

# **CAREERS 360**

**PRACTICE** **Series**

## **UCEED 2025**

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**Past Years Official Paper  
Solution Creation  
(2019-2024)**

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# ABOUT THIS BOOK

Dear UCEED Aspirants,

I'm thrilled to announce the creation of a comprehensive ebook specifically for your needs. This ebook is specially made to aid you in your preparation for the UCEED (Undergraduate Common Entrance Examination for Design) by providing detailed solutions to past year papers. This ebook aims to serve as your trusted companion, offering not only solutions but also valuable insights and strategies derived from analyzing previous years' papers.

Preparing for UCEED requires more than just theoretical knowledge; it demands a strategic approach and familiarity with the exam pattern. Through this ebook, you'll gain a deeper understanding of the exam structure, question types, and effective problem-solving techniques. Each solution provided is carefully explained, ensuring clarity and enhancing your grasp of the underlying concepts.

Furthermore, we have endeavored to make this ebook accessible and user-friendly, allowing you to navigate through the content seamlessly. Whether you're reviewing key concepts, practicing problems, or simulating exam conditions, this ebook is designed to cater to your diverse needs.

I'm confident that with the aid of this ebook, you'll be better equipped to tackle the challenges posed by the UCEED examination and realize your aspirations of securing admission to premier design institutions.

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**Wishing you the very best in your preparation journey!**

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# UCEED EXAM PATTERN TREND IN LAST FEW YEARS

Year	Part A(NAT)	Part A(MSQ)	Part A(MCQ)	Part B (Sketching)
2024	14	15	28	2
2023	18	18	32	1
2022	18	18	32	1
2021	18	18	32	1
2020	18	18	32	1
2019	20	20	45	0

# UCEED PREPARATION TIPS

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UCEED is a computer-based online examination consisting primarily of two parts

**Part A (120 mins & 200 Marks)**

**Part B (60 mins & 100 marks)**

**PART-A** (investigates the imaginative and visualization-based skills **through perceived information** in a person through given questions. Anyone who aspires to be a designer should understand the intention of design, which is more problem-solving with a sense of aesthetics, function, etc.)

## **Understanding The UCEED Part- A**

The evaluation process focuses broadly on 04 significant themes with the following.

- Patterns and Visual Relationships
- Mapping, Spatial & Mechanical Reasoning
- Understanding of Scale and Proportions
- Visual Information and Drawing Conclusions

## **Understanding the UCEED PART-B**

This part investigates imaginative visualization-based skills **through Reflection** on given questions/situations.

### **So, what is reflection-based evaluation?**

It answers the major questions asked below.

- How do you see the visual information in your narration?
- How do you think out of the box in a limited time?
- How do you imagine the subject and its surroundings?
- How do you relate between two different subjects?

# UCEED PAST YEAR PAPER ANALYSIS

## UCEED Exam Analysis 2024

As per students who appeared for UCEED 2024 exam, the overall difficulty level of the paper was moderate.

- UCEED 2024 paper was easy as compared to previous year paper.
- MCQ section was easy.
- Some questions were asked directly from previous year question paper.

Based on UCEED exam pattern 2024, there will be a total of 68 questions carrying a total of 240 marks, and Part A is further divided into three Sections 1, 2, and 3. All sections are compulsory. Questions from Part A will appear on the computer. Part B is also compulsory and consisted of a drawing question carrying 60 marks.

## UCEED Exam Analysis 2023

Feedback from UCEED 2023 participants suggests that Part B posed more challenges than Part A. However, the overall consensus was that this year's design entrance exam was less difficult than previous years. Despite a few challenging questions in the Aptitude section, the overall difficulty was rated as easy to moderate.

Many students found the NAT section in Part A to be slightly more difficult than other sections. The Aptitude section had lengthy questions that were somewhat challenging, making time management crucial. This summary provides a brief review of the UCEED 2023 exam based on student feedback.

## UCEED Exam Analysis 2022

The Numerical answer type (NAT) questions in the UCEED entrance exam 2022 were moderate but lengthy. The MCQs and MSQs had the easy LOD. Many candidates are saying they had very little time to complete UCEED part A. There was no General Knowledge question in the paper. 2 to 3 questions in NAT were based on physics concepts like speed and distance. There were some alphabet-based questions.

The drawing question (UCEED Part B) was easy and many aspirants were able to complete part B in the allotted time. The drawing question asked in the UCEED entrance exam 2022 was as follows:

“There was a mouse in the school canteen and a boy who was scared to look at it climbed into a chair. A brave woman chases that rat. On the table, there were 2 bags and 2 bottles. One of the tiffin boxes was falling down from the table. There were some broken plates. The canteen owner was shocked to see all this. Draw this scene in the view of the canteen owner.”

## UCEED Exam Analysis 2020

According to the UCEED exam analysis 2020, the question was in a new pattern, the candidates did not face any problem as such while answering the questions. It was mandatory for the candidates to answer one question which was 60 marks within 30 minutes. There were a total of three sections in part A of the questions paper and candidates found the numerical answer type questions difficult as compared to multiple select questions that the candidates had to answer.

## UCEED Exam Analysis 2019

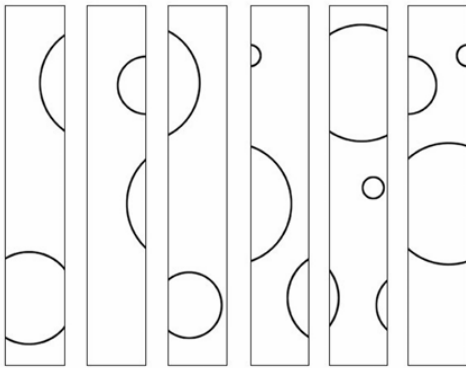
The number of candidates who appeared in UCEED 2019 has noticeably risen. According to the exam analysis, the paper was quite lengthy and students face challenges in time management. The question asked in the UCEED 2019 was different from last year's question paper but had the same level of difficulty.

UCEED 2019 was of 3 hours with 85 questions carrying a total of 300 marks. The question booklet consists of Numerical Answer Type, Multiple Select Questions, and Multiple Choice Questions, and all sections were compulsory. Students who went through previous years' mock papers found the exam relatively easy to moderate and were able to finish their exam within the stipulated time. The question paper was quite similar to those of the previous years.

# UCEED 2024

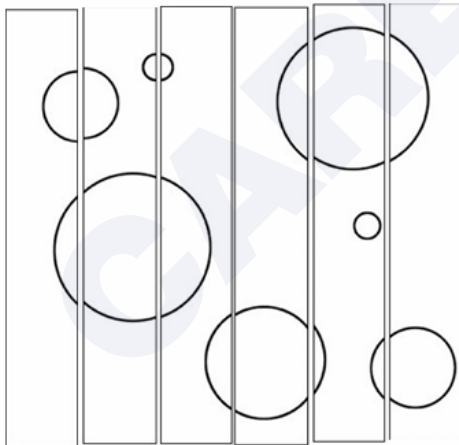
## PART A Section 1: Numerical Answer Type (NAT)

**Q.01** What is the maximum number of complete circles that will be seen, if the strips given below are re-arranged without rotating?



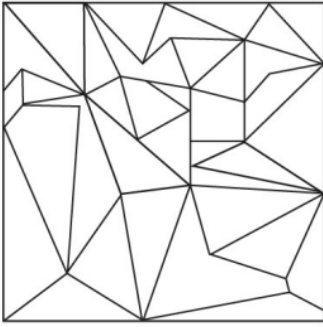
**Solution:**

If we rearrange, then we get the figure (shown below)

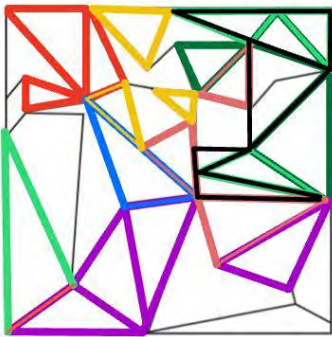


Hence, we get 7 circles.

**Q.02** What is the total number of triangles in the figure given below?

**Solution:**

We can see in the figure given that we have a total 24 triangles.



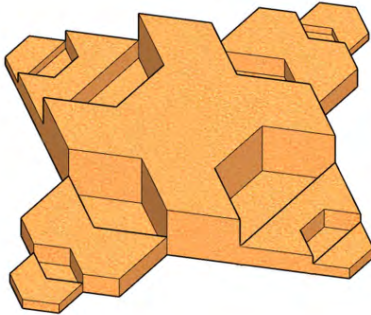
**Q.03** Given below are ten pieces of a puzzle. When arranged correctly, they form a four-digit number. What is the number formed after the correct arrangement?

**Solution:**

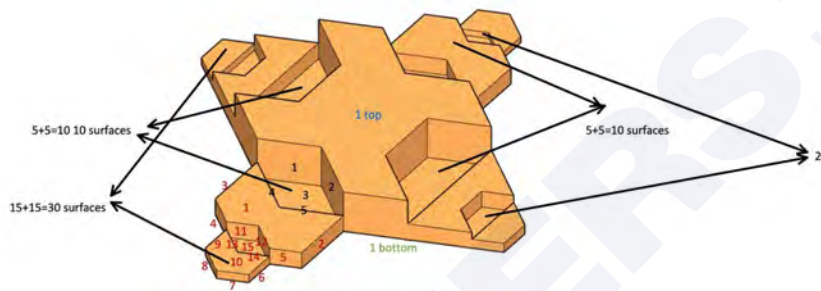
If we rearrange the puzzle they will form a four-digit number, we get 8563 as shown below.



**Q.04** A perspective view of a solid is shown below. The solid is symmetrical, and hidden surfaces such as the base are flat. What is the total number of surfaces in the solid?



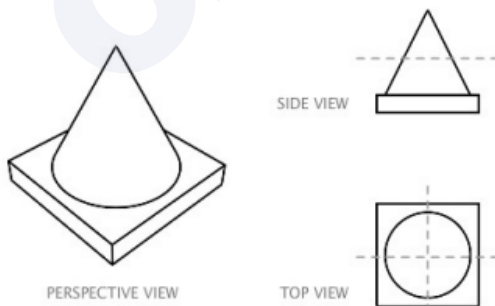
**Solution:**



$$\begin{aligned} \text{Total} &= 10+10+20+30+2 \\ &= 72 \end{aligned}$$

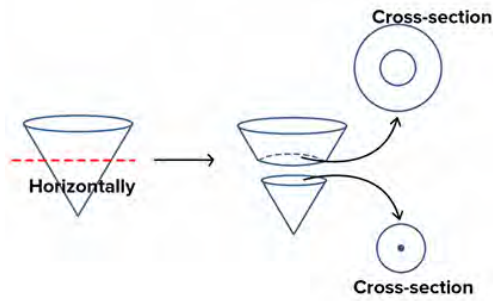
Hence, this figure has 72 surfaces.

**Q.05** A perspective view of a solid object is shown on the left. The object is cut simultaneously along THREE perpendicular planes, as shown on the right. How many surfaces will the resulting pieces have in total (i.e. sum of the surfaces of all pieces)?

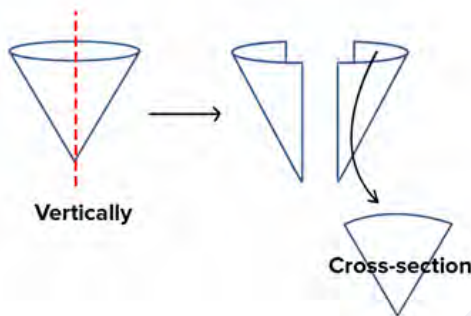


**Solution:**

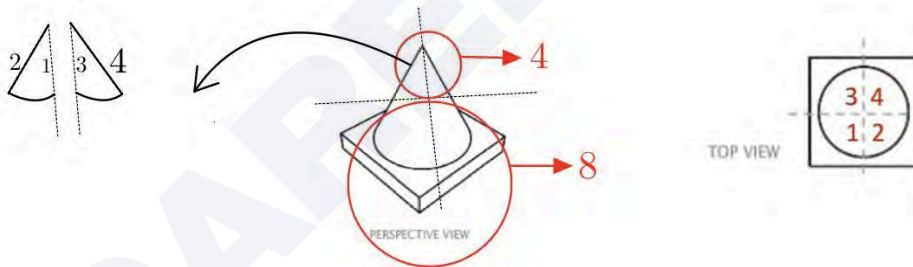
When cone cut along Horizontal axis we get another cone as shown below.



When the cone is cut along the vertical axis. We get (as shown below)



Now ATQ,

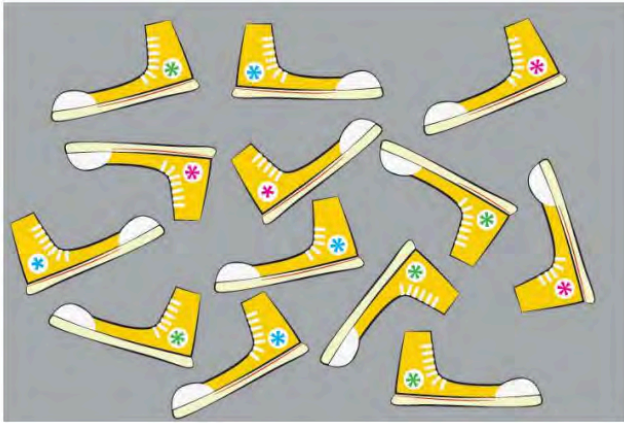


4 surfaces on top (as shown above) and 8 at the bottom. So, like this, we have 4 more parts.

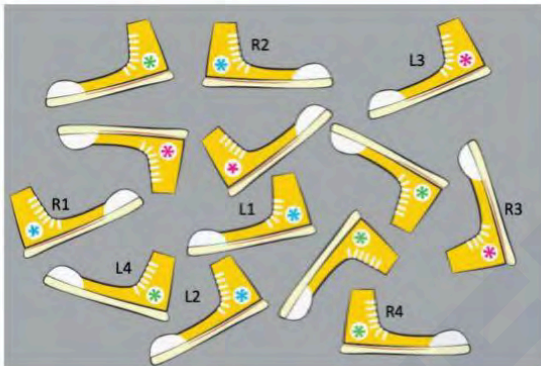
$$\therefore 4 \times 4 + 8 \times 4 = 16 + 32 = 48$$

So, the total surfaces are 48 surfaces.

**Q.06 How many matching pairs of shoes (both left and right shoes) are present in the image below?**



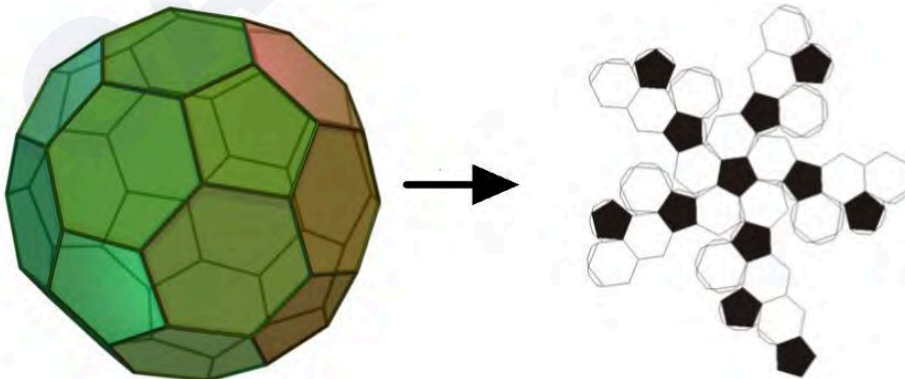
**Solution:**



Therefore, in total we have 4 pairs.

**Q.07 A typical football is made by stitching together 12 pentagons and 20 hexagons. How many vertices (junctions) are there in such a football?**

**Solution:**



ATQ,  
A football consists of 12 pentagons and 20 hexagons.

We can see every hexagon is connected by a pentagon and the pentagon has 5 vertices.

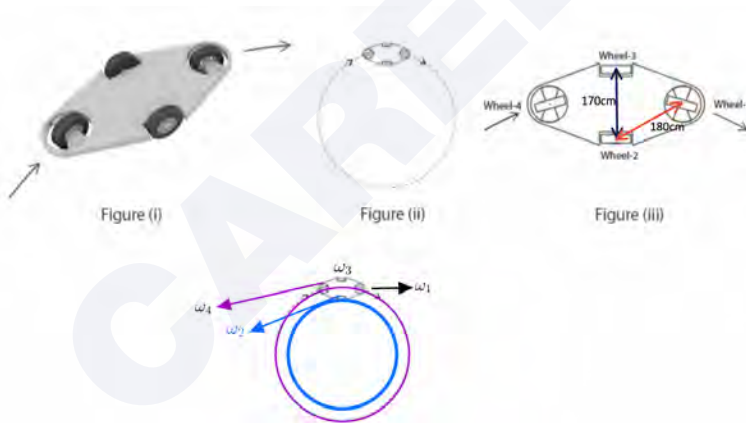
Therefore, 12 pentagons =  $12 \times 5 = 60$

So, the total 60 vertices.

**Q.08** A vehicle with a wheel arrangement is shown in Figure (i). This vehicle is travelling along a circular path as shown in Figure (ii). The wheels do not change their orientation while moving along the circular path. Figure (iii) shows the location of the centres of the wheels. The distance between the centres of Wheel-3 and Wheel-2 is 170 cm, and the distance between the centers of Wheel-1 and Wheel-2 is 180 cm. The radius of the circular path followed by Wheel-2 is 525 cm. What is the radius of the path followed by Wheel-1 in cm?

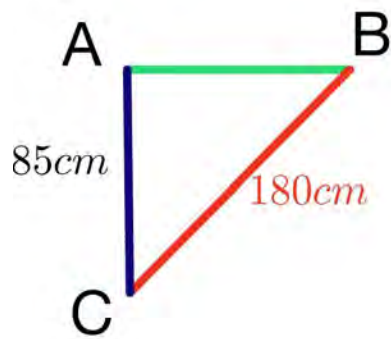
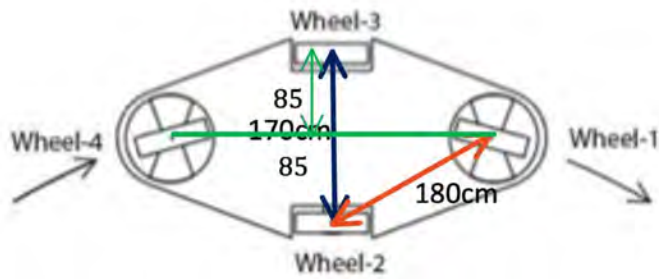


**Solution:**



So the blue colour path is traced by wheel 2 i, e. 525 cm.

Now, we have to find the path created by the wheel 4 (purple colour path)



So to get AB, only Pythagoras theorem,

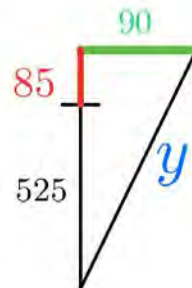
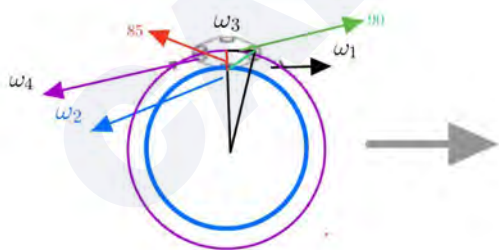
$$BC^2 = AB^2 + AC^2$$

$$180^2 = AB^2 + 85^2$$

$$AB^2 = 180^2 - 85^2$$

$$AB^2 = 8100$$

$$AB = 90 \text{ cm}$$



$$\Rightarrow y^2 = (85 + 525)^2 + 90^2$$

$$= (610)^2 + 8100$$

$$= 372100 + 8100$$

$$y^2 = 380200$$

$$y \approx 617$$

**Q.09** Shown below is an image of a circle and six equilateral triangles. The circumference of the circle is 18.85 cm. What is the area of ONE equilateral triangle in cm<sup>2</sup>? Assume  $\sqrt{3} = 1.732$  and  $\pi = 3.14$ .



**Solution:**

We know the circumference of the circle = ATQ,

$$2\pi r = 18.85$$

$$2 \times 3.14 \times r = 18.85$$

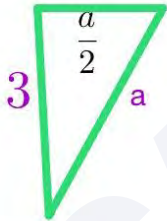
$$r = \frac{18.85}{2 \times 3.14}$$

$$r = 3.2 \text{ cm}$$

$$r \approx 3.2 \text{ cm}$$



Now,



Apply Pythagoras theorem.

$$\left(\frac{a}{2}\right)^2 + 3^2 = a^2$$

$$\frac{a^2}{4} + 9 = a^2$$

$$\frac{a^2 + 36}{4} = a^2$$

$$a^2 + 36 = 4a^2$$

$$3a^2 = 36$$

$$a^2 = 12$$

$$\text{Area of equilateral triangle} = \frac{\sqrt{3}a^2}{4}$$

$$= \frac{\sqrt{3}}{4} \times 12 = 3\sqrt{3} = 5.15 \text{ cm}^2$$

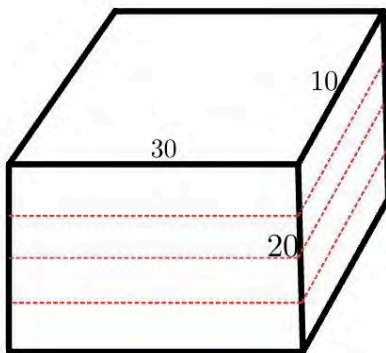
**Q.10** A wooden block of dimension 10cm x 20cm x 30cm is cut into equal-sized planks. The cut planks are stacked one above the other to achieve a total height of 100cm exactly. If the minimum number of planks are cut to achieve this height, then what is the volume of each plank in  $\text{cm}^3$ ?

**Solution:**

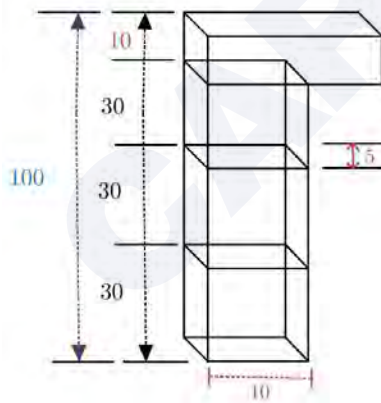
Given,

Wooden block dimension = 10cm x 20cm x 30cm

Total height = 100 cm



So cut it alongside having 20 cm dimension (as shown above with a red dotted line) to get a minimum no. of planks of equal size, now put them (cutouts) one on another. So we will image something like shown below.

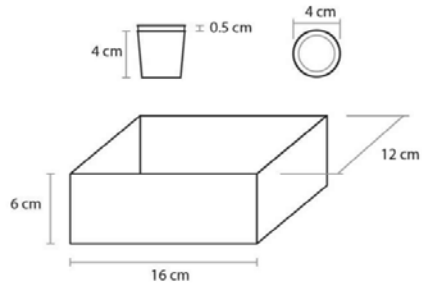


Now the volume of each plank =  $L \times B \times H$

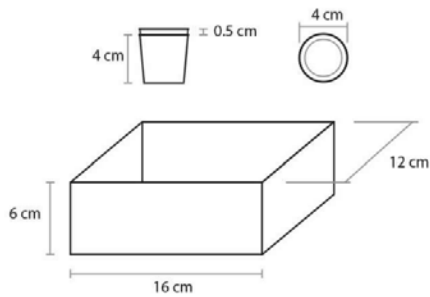
$$= 10 \times 5 \times 30$$

$$= 1500 \text{ cm}^3$$

**Q.11** Shown below are two stacked paper cups and a box with their dimensions. If stacking is allowed, then what is the maximum number of cups that can be stored in the box without deforming the cups?



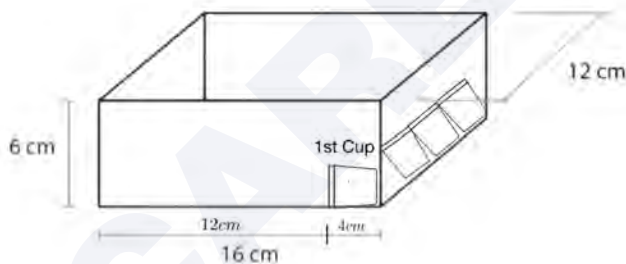
**Solution:**



There are 3 possibilities to placing cup of 4 cm

- i) along 4cm
- ii) along 6cm
- iii) along 16 cm

Put along 16 cm (as shown below)



We can see 1 cup has been placed now the left space=12 cm (16 cm-4cm)

Now 0.5 cm space is required for stacking

$$\frac{12}{0.5} = 24 \text{ cup}$$

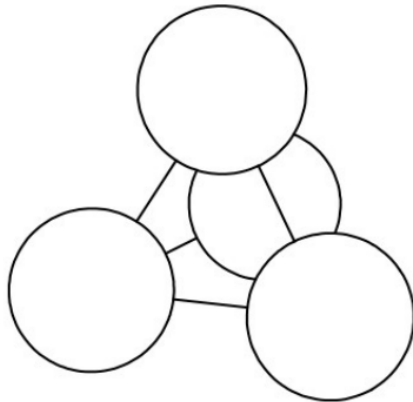
Total=24+1=25 cup in 1 row

We have 3 rows

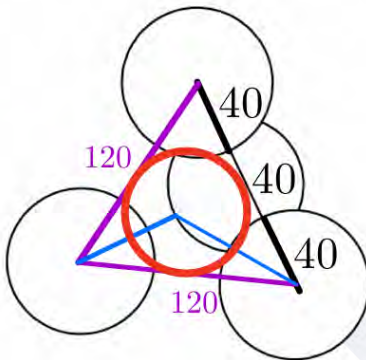
Total no of cups=  $25 \times 3 = 75 \text{ cups}$

**Q.12** Shown below is a configuration of FOUR solid spheres each of radius 40cm that are placed on four corners of a regular tetrahedron with side 120cm. The centers of the spheres coincide with the corners of the tetrahedron. What is the

radius (in cm) of the largest sphere that can be accommodated within the tetrahedron?



**Solution:**



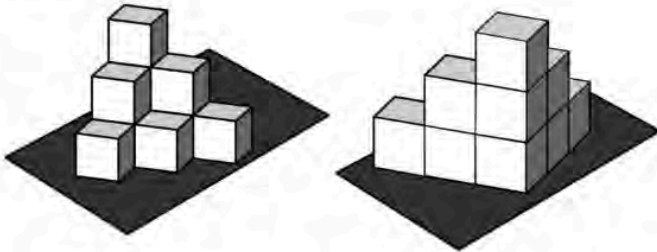
So, the radius of the largest sphere could be somewhere around 33 cm (as shown above). It is slightly smaller than given solid spheres  
Hence, 32.5-34.5 cm is the answer.

**Q.13** Section P shows three views of a regular dice. TEN of such regular dice are stacked on an opaque table, as shown in Section Q (two views of the same arrangement). What is the maximum sum that can be achieved by adding the numbers on the visible surfaces from all angles?

Section P

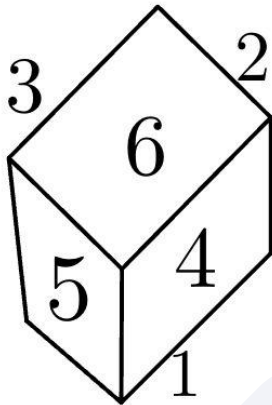


Section Q



**Solution:**

Normal Dice (as shown below)



Opposite 4 is 3

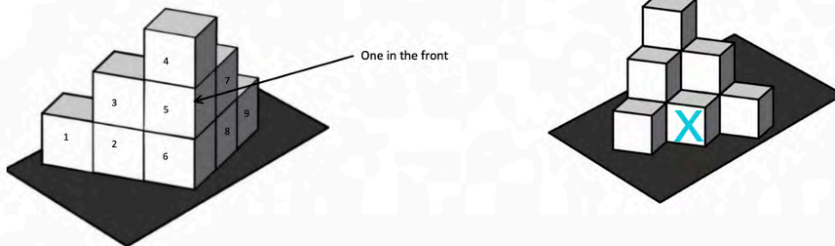
Opposite to 6 is 1

Opposite 5 is 2

We know that on an opaque surface we can't see from the bottom

If we want the maximum sum then we need to keep the lowest number i.e, 1 at the bottom

Total number of Dice=10



Case 1:

Dice in Row 1

All the numbers will be shown except 1

$$\text{Sum} = 6+5+4+3+2$$

$$= 20$$

Case 2: Dice in row 2 and dice 1 and 9 (as shown above)

Row 2 has 2 dice

In this, we will hide the lowest digits, i.e, 1,2

$$\text{Sum } 6+5+4+3=18$$

So total 5 dice in this case

$$\text{Sum} = 18 \times 4 = 72$$

Case 3:

In middle dice, i, e. In cube X

$$\text{Sum} = 6+5+4 = 15$$

Case 4:

The remaining cube shows R faces (i.e, 5, and 1)

$$\text{Sum} = (6 + 5) \times 2$$

$$= 11 \times 2 = 22$$

Case 5:

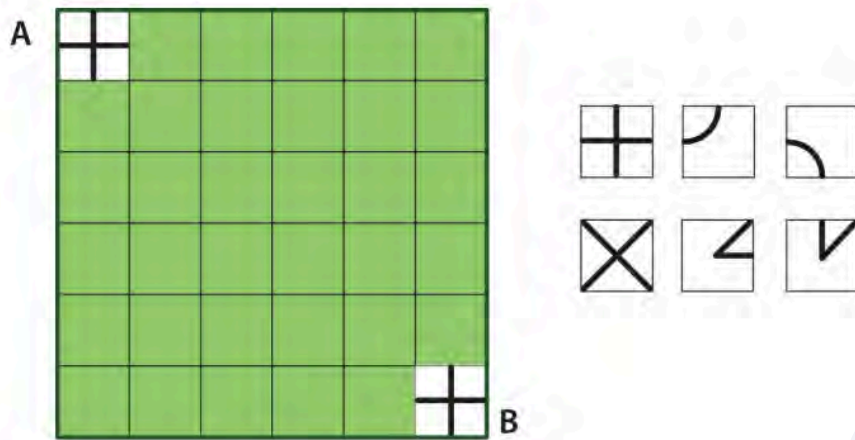
Dice number 8,2 (as shown above)

$$\text{Sum} = 2 \times 6 = 12$$

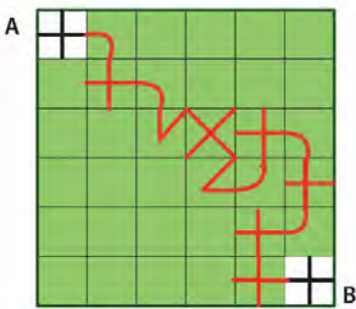
$$\text{Total sum} = 20+72+15+22+12=141$$

**Q.14** What are the minimum number of tile pieces (shown on the right) that are required to create a path from tile A to tile B, such that ALL the following conditions are met:

- All tiles are to be used at least once.
- Tiles cannot overlap.
- The path of a tile must be connected to another path of a tile.
- The same type of tile cannot be used one-after-the other in a sequence.
- Rotation of the tiles is not allowed.
- Exclude tile A and tile B from the count.



**Solution:**



So, with all terms and conditions, 13 tiles are required to create a path from tile A to tile B.

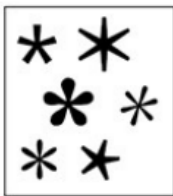
Hence, the answer is 13.

## Section 2: Multiple Select Questions (MSQ)

Q.15 Which option(s) contain(s) stars that are NOT found in the image below?



Option A:



A

Option B:



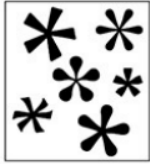
B

Option C:



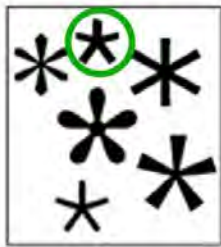
C

Option D:



D

Solution:



C



A

These types (as highlighted in the above image) of stars can not be found in the given image. Hence, options A and C are the answers.

**Q.16** Alphabets A to Z are arranged starting at 6'o o'clock, and three alphabets with their respective positions are shown in the image given below. Which of the following combinations is/are correct?



- A. GOA= 3'o clock+ 3'o clock+ 6'o clock
- B. SKY= 9'o clock+ 9'o clock+ 6'o clock
- C. FLY= 3'o clock+ 6'o clock+ 9'o clock
- D. BYE= 9'o clock+ 6'o clock+ 3'o clock

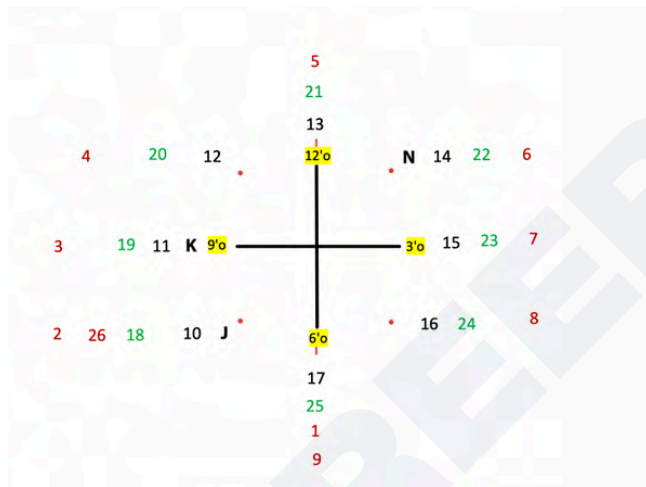
Solution:

A	B	C	D	E	F	G	H	I	J
1	2	3	4	5	6	7	8	9	10

K	L	M	N	O	P	Q	R	S	T
11	12	13	14	15	16	17	18	19	20

U	V	W	X	Y	Z
21	22	23	24	25	26

We know the numbering of alphabets as shown above. Now according to the numbering recreate the given figure we get a pattern (shown below)

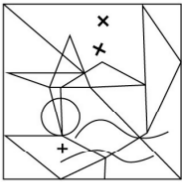


Now observe the image and check options one by one.

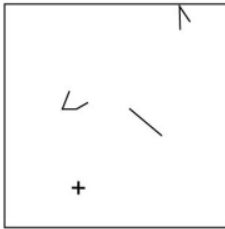
GOA=7,15,1=3'o clock, 3'o clock , 6'o clock  
 SKY= 19,11,25=9'o clock, 9'o'clock, 6'o clock

In the words fly and Bye, we can see F and B's position is similar to J, and it is 7:30 'o'clock which doesn't match the options. So options A and B are correct.

**Q.17 Which option(s) contain(s) the exact fragments of the image shown on the left?**

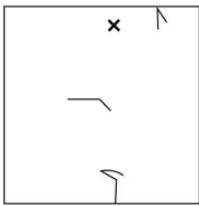


**Option A:**



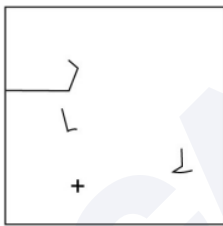
A

**Option B:**



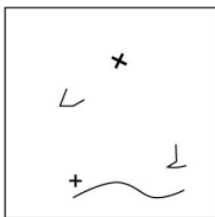
B

**Option C:**



C

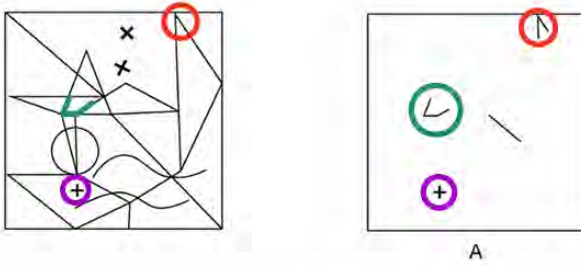
**Option D:**



D

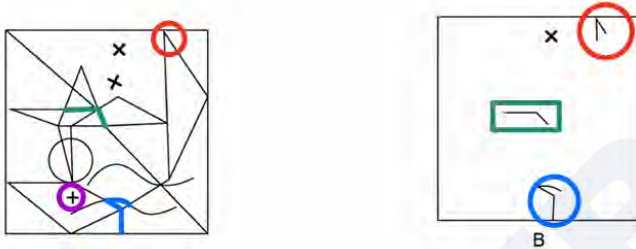
**Solution:**

Option A:



We can see the green highlighted part is different.  
Hence, this option is wrong.

Option B:



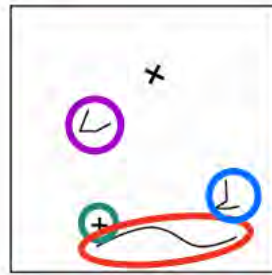
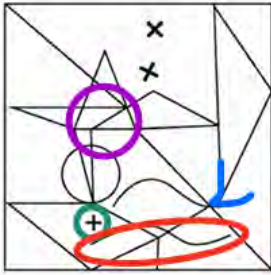
Option B has the exact fragment of the image.

Option C:



We can see that the green and Red parts do not match with fragment image. So this option is wrong.

Option D:



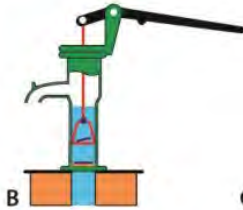
D

Option D has the exact fragment of the image.  
So options B and D are correct.

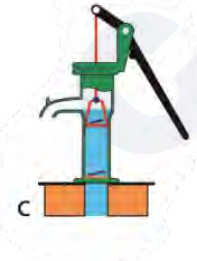
**Q.18** Shown below are the vertical cross-sections of handpumps. Which of the following options depict(s) the correct working principle?

**Option A:**

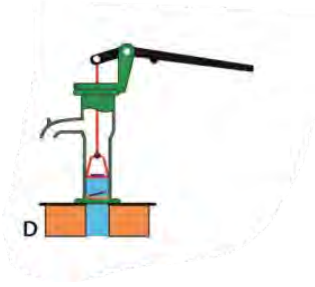
**Option B:**



**Option C:**



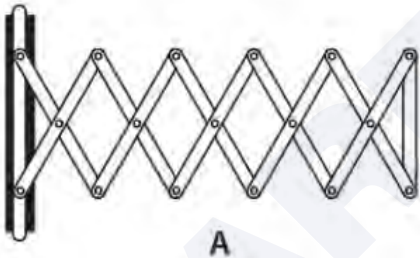
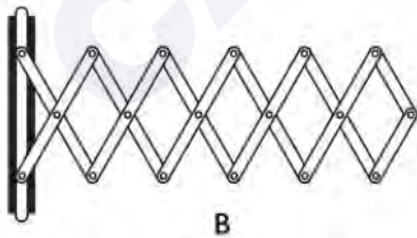
**Option D:**

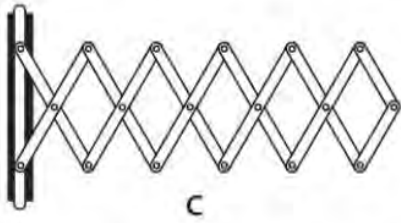
**Solution:**

Pulling the pump lever upwards causes the piston to move downwards and the foot valve to close; the piston non-return valve is open as the piston moves downwards. The result of this movement is that water from the underside of the piston non-return valve is moved to the topside of the piston non-return valve.

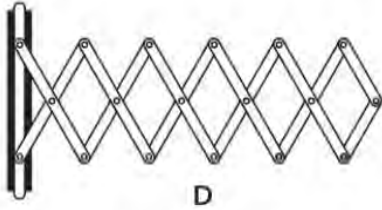
In options C and D, we can see that the piston is not underwater so they will not follow the correct working principle, So options C and D are wrong.

Therefore, options A and B are correct.

**Q.19 Which of the options will collapse completely?****Option A:****Option B:****Option C:**

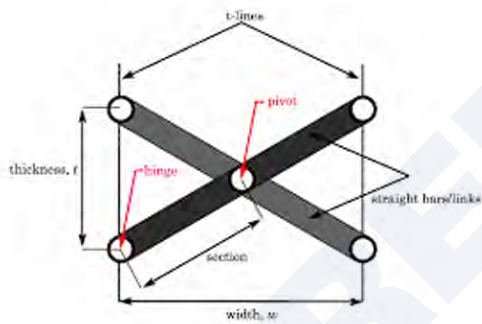


Option D:



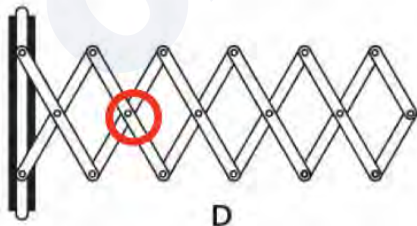
**Solution:**

In the scissor jaw hinge, the straight bars positions are shown below.



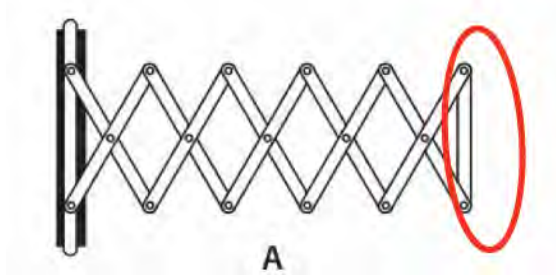
Now we have to eliminate options

Option D:



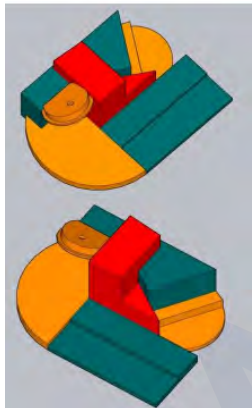
Because of the position of straight bars, option D can not collapse. Hence, option D is wrong.

Option A:

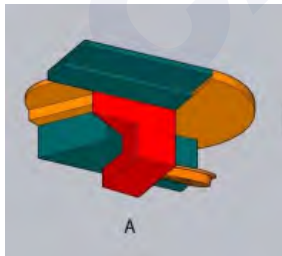


This straight end makes an obstacle. So this will not collapse.  
Hence, option A is wrong.  
Therefore, options B and D are correct.

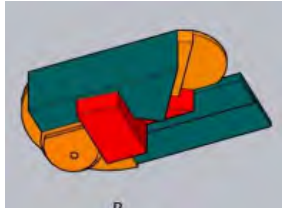
**Q.20** Two views of a solid object are shown on the left. Which of the following options is/are the view(s) of the same object?



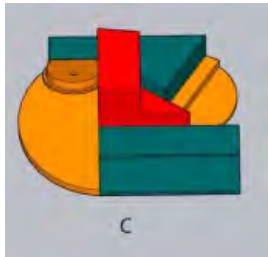
**Option A:**



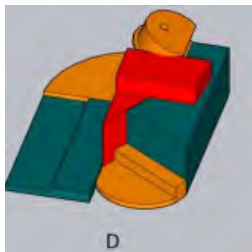
**Option B:**



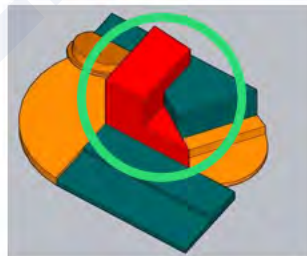
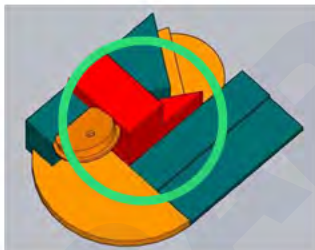
Option C:



Option D:



Solution:



If we observe option D we can observe that the red parts view in the image is not similar to the original image. Therefore, options A, B, and C are correct.

**Q.21 Which of the options is/are correct according to pigment colour theory?**

Option A:



**Option B:**

B

**Option C:**

C

**Option D:**

D

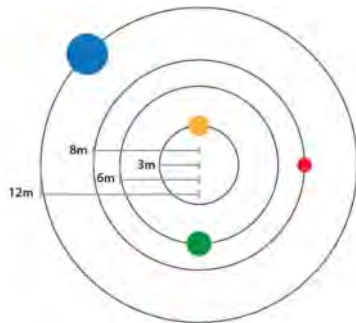
**Solution:**

An artist's traditional colour wheel has 12 colours: 3 primary, 3 secondary, and 6 tertiary. Some materials let certain colours pass through them and absorb other colours. These materials are called dyes or pigments. The primary colours of pigment are red, blue, and yellow. Mixing these primary colours of pigment gives us the three secondary colours: red + blue = violet, red + yellow = orange, and yellow + blue = green. Then, the primary colours mixed with the secondary give us the tertiary. They are red-violet, red-orange, yellow-orange, yellow-green, blue-green, and blue-violet.



We can now observe the pattern and see that options B and C are wrong because of the yellow colour difference in B and the purple colour in C. Therefore, options A and D are correct.

**Q.22** Four spheres start revolving clockwise in concentric circles from their initial positions as shown below. Yellow travels at 2m/sec, green at 4m/sec, red at 2m/sec, and blue at 4m/sec. Which of the following statement(s) is/are TRUE?



- A. Yellow and green never cross (overtake) each other
- B. Red and blue take the same time to complete one revolution
- C. Yellow takes less time than green to complete one revolution
- D. Blue and red will cross each other twice after the first 3 complete revolutions of blue

**Solution:**

Time	1 s	2 s	3s	4s	5s	6s	7s	8s	9s	10 s	11s	12s	13 s	14 s	15 s	16 s	17s	18s
Yellow	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36
Green	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72
Red	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36
Blue	4	8	12	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72

Option A: It is correct, as we can see from the above table that yellow and green never cross/overtake each other.

Option B: Red and yellow take some time to complete one revolution instead of red and blue.

Option C: Yellow takes more time to complete one revolution as the speed of yellow is 2m/s whereas green is 4m/sec.

Option D: This option is wrong because they never cross each other.  
Hence, option A is correct.

**Q.23** Shown below is a cross-section of two different trees of the same species and age but found in different locations. Based on the image, which of the statement(s) is/are TRUE.



- A. Growth of the tree X is more consistent than tree Y
- B. Growth of the tree X is healthier than tree Y
- C. Climatic conditions could be the reason for the uneven ring structures in tree Y
- D. Growth of the tree Y is healthier than tree X

**Solution:**



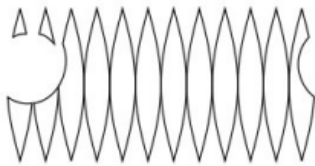
**Growth rings:** As trees age, they grow in height and width. You can tell the age of a tree by counting these rings. The annual growth of a tree can be measured by the distance

between the growth rings. As the growth rate slows down in the winter months, the new layer of wood cells is smaller and packed more closely.

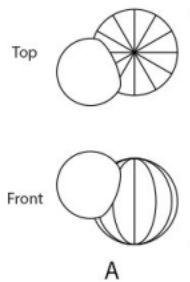
Now if you look at the options then we can say options A B and C are correct but D is wrong because D says growth of the tree X is healthier than tree Y which contradicts option A.

Therefore, options A, B, and C are correct.

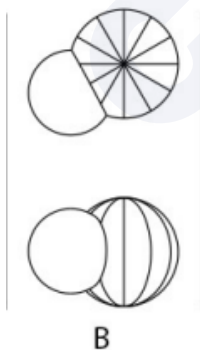
**Q.24** Given on the left is the unwrapped surface of a hollow sphere that was intersected by a smaller solid sphere. Which of the options would result in this unwrapped surface?



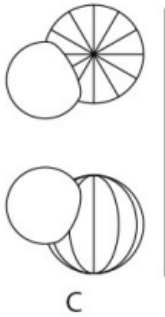
**Option A:**



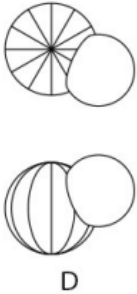
**Option B:**



**Option C:**



**Option D:**



**Solution:**

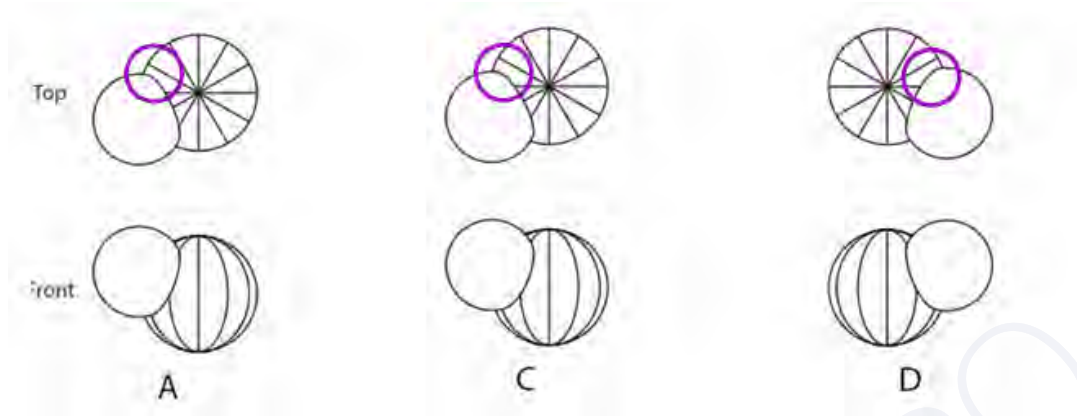
A hollow sphere is a sphere that has been thinned out, has space and a cavity inside, and is not solid.

Now use the elimination method.

Option B:



A straight line (as highlighted) makes this option wrong because the top view is straight, but the front view does not.



The position in option C (as highlighted) is wrong, as the distance is greater in C. Therefore, A and D are the correct answer.

**Q.25** Six concentric white rings, each of equal thickness but having different diameters, are positioned on different planes in space. A one-point perspective view of the rings is shown below. Based on this view, which of the option(s) is/are TRUE?



- A. Rings 6 and 3 are closer to the viewer compared to ring 5
- B. Rings 2 and 4 are at an equal distance from the viewer
- C. Ring 1 is the nearest to the viewer
- D. Ring 5 is the farthest from the viewer

**Solution:**

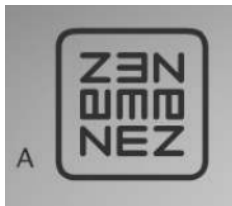
Concentric circles are defined as two more circles with common centres.  
ATQ,

The white rings are of equal thickness but have different parameters. So we can say options A, B, and C are correct as the viewer will be outside the circle, so the nearest point is ring 1 but the farthest will be 6 not, 5. Therefore, option D is wrong.

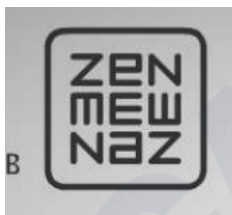
**Q.26 Which of the options can be created by the stamp shown on the left?**



**Option A:**



**Option B:**



**Option C:**

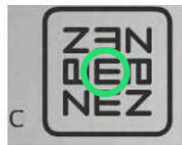


**Option D:**



**Solution:**

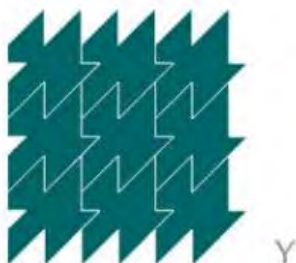
Option C:



If we compare both images given above, we can say this is not possible to create because of the position of centre E.

Therefore, options A, B, and D are correct.

**Q.27** Tile X was used to create a pattern that is seamless (without gaps) when arranged as shown in Y. Which tile(s) from the options will create a seamless pattern?



**Option A:**



A

**Option B:**



B

**Option C:**



C

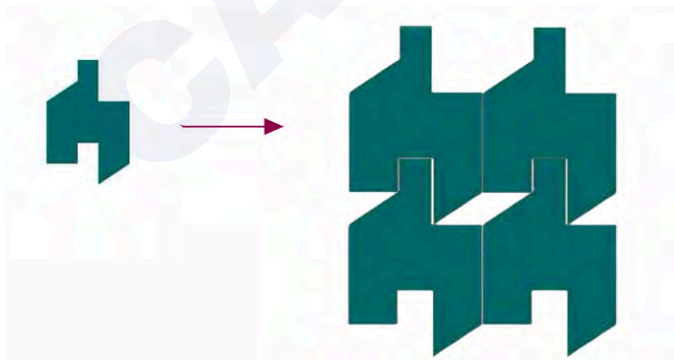
**Option D:**



D

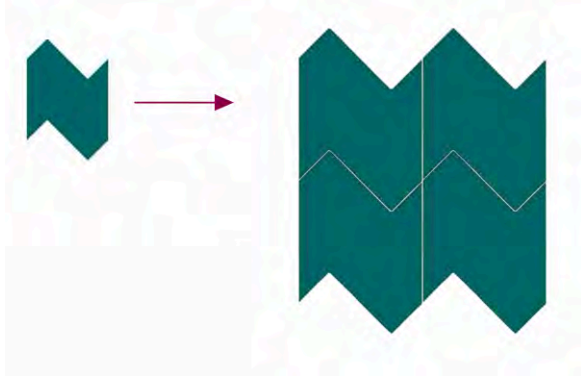
**Solution:**

Option A:



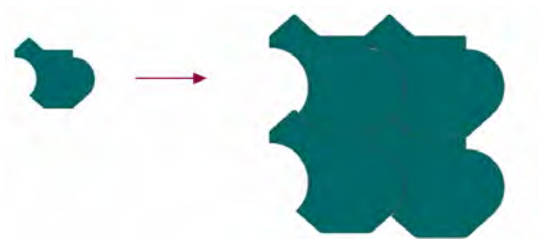
So we can see that option A does not make a seamless pattern.

Option B:



Option B makes a seamless pattern.

Option C:



Option C makes the seamless pattern

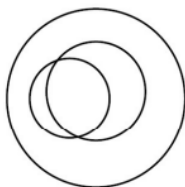
Option D:



Option D is wrong

Hence, options A and C make seamless patterns.

**Q.28** Which of the following relationship(s) is/are represented by the Venn diagram?



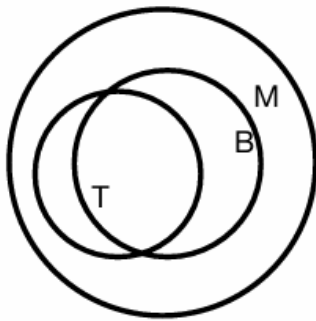
**A. Beverages, Tea, Milk**

- B. Men, Designers, Teachers**  
**C. Mammals, Cats, Animals**  
**D. Singers, Performers, Actors**

**Solution:**

Option A:

Beverages are a drink. Milk and Tea both are beverages.



Hence, option A is correct.

Option B:

Designers and teachers can be men or women. Therefore, they do not make a relationship with respect to the given Venn diagram. Therefore, option B is wrong.

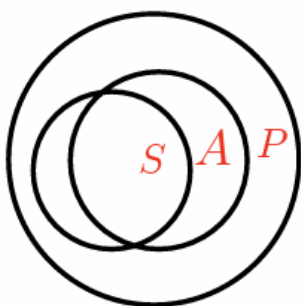
Option C:

Mammals include human and other animal that are warm-blooded vertebrates (vertebrate have backbone) with hair. They feed their young with milk and have a more well-developed brain. So all animals are not mammals and vice versa.

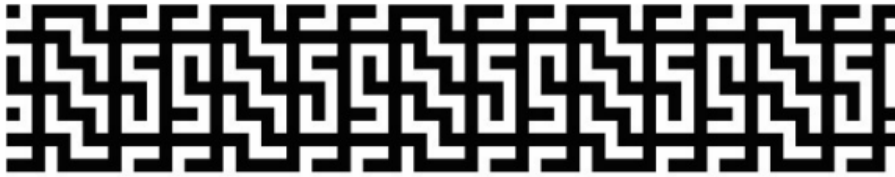
Therefore, they do not make relationship with respect to the given Venn diagram. Therefore, option C is wrong.

Option D:

Performers mean who performs, and we know that singers and actors are performers as well. Some singers are actors and vice versa. Therefore, option D is correct.



Q.29 Shown below is a portion of a continuous strip. Which of the option(s) is/are part of this strip?



Option A:



Option B:



Option C:



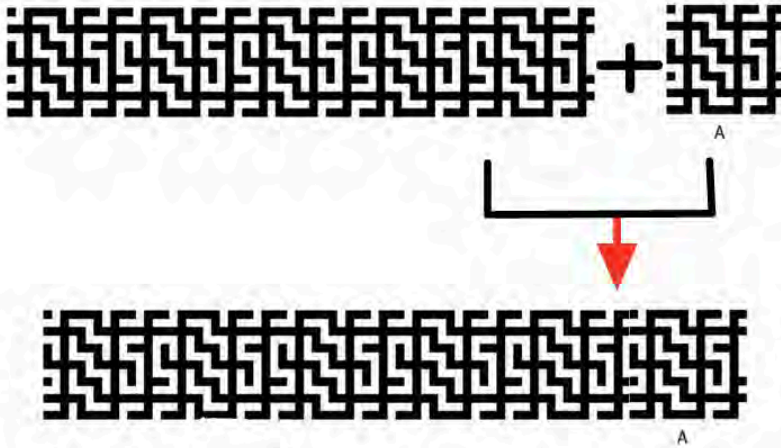
Option D:



**Solution:**

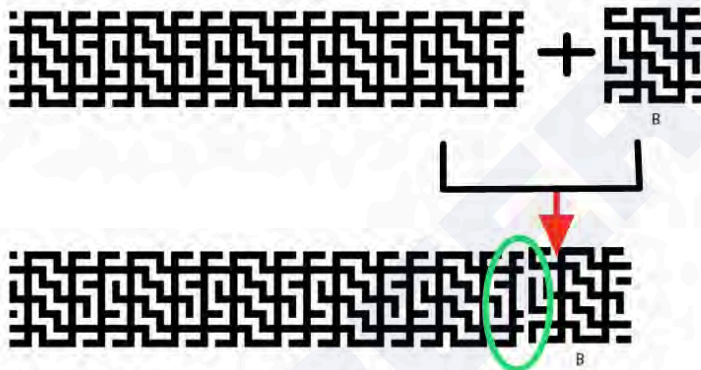
In these types of questions, we need to check each option one by one.

Option A:



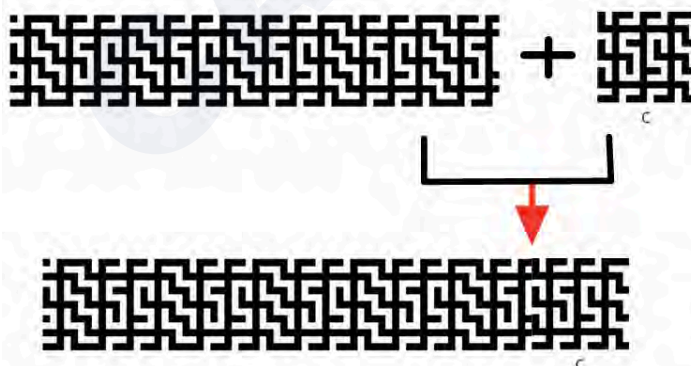
Option A is correct

Option B:



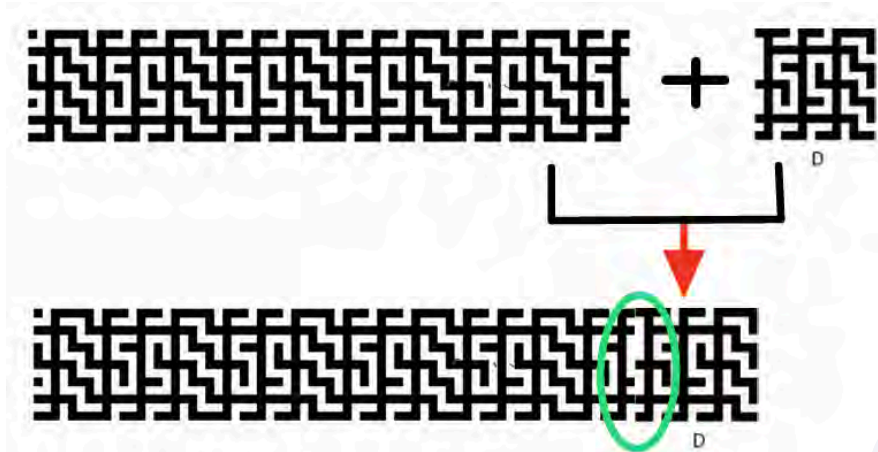
We can see lack of symmetry . So option B is wrong.

Option C:



Hence option C is correct

Option D:



Hence, option D is wrong because of the lack of symmetry.

### Section 3: Multiple Choice Questions (MCQ)

**Q.30** If the image on the left is flipped horizontally (about Y-axis), and then rotated 180 degrees, what will be the resulting image?



**Option A:**



**Option B:**



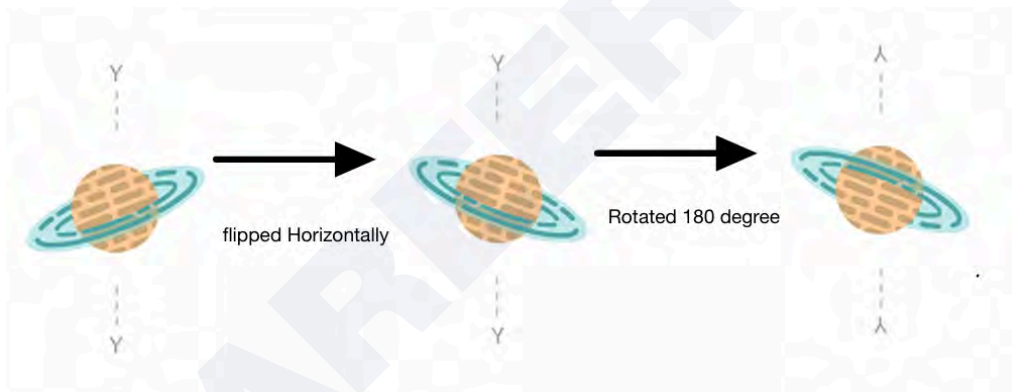
**Option C:**



**Option D:**



**Solution:**



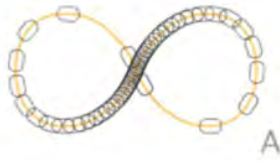
The given image is flipped horizontally about the y-axis (as shown above) and then rotated 180 degree.

Hence, option C is correct.

**Q.31 Which option represents the key frames of the animation shown below?**



**Option A:**



**Option B:**



**Option C:**

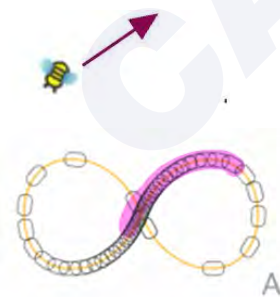


**Option D:**



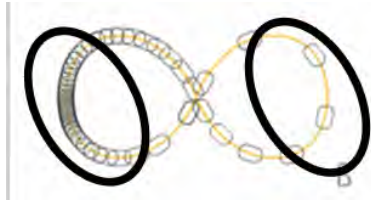
**Solution:**

The bees wangle back and forth, so the key frames of the animation should be symmetrical, i.e, slow to fast to very fast.

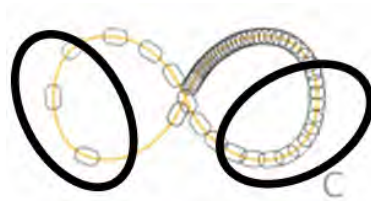


The bee is starting from left and goes right so, in the beginning. The speed is slow but here is it fast (as highlighted) which is not possible.

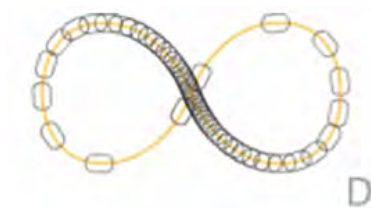
Hence, option A is wrong.



We can see it is not symmetrical. Hence, option B is wrong.



We can see it is not symmetrical. Hence, option C is wrong.



This has symmetry. Hence, option D is correct.

**Q.32 Which option will replace the question mark?**



**Option A:**



**Option B:**



**Option C:**



C

Option D:

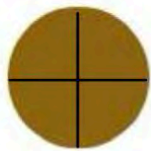


D

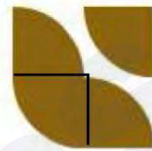
Solution:



1



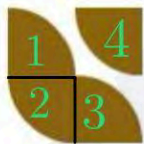
2



3

If we observe the 2nd figure, i.e., The circle is made up by combining all part of 1st figure.

Now when we combine all parts of figure 3rd we will get (as shown below)

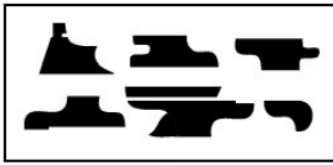


Hence, option B is correct.

**Q.33** Which collection when arranged correctly will result in the silhouette of the pen shown below?



Option A:



A

Option B:



B

Option C:



C

Option D:



D

Solution:

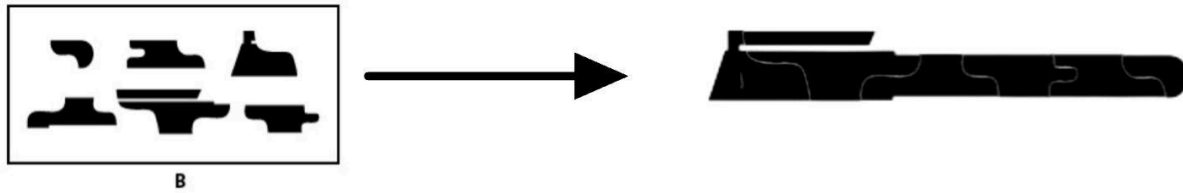


A

When the parts are rearranged, we get an image as shown below.

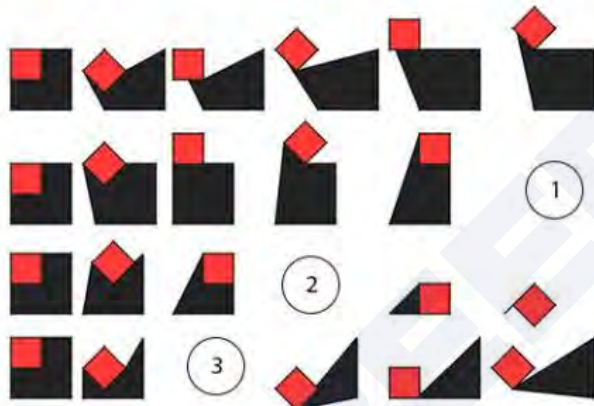


This does not resemble the original pen figure. Hence, option A is wrong.



This figure of pen resembles the original pen figure. Therefore, option B is correct.

**Q.34** Which option from the right will replace the circles labelled 1, 2 and 3 in the image on the left?



**Option A:**



**Option B:**



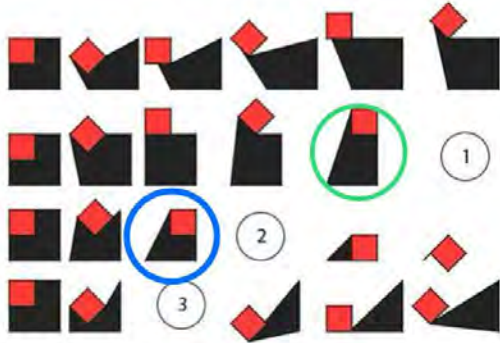
**Option C:**



**Option D:**



**Solution:**



We can observe the pattern as standing as a tilted square (red colour)

So in circle labelled 1 we will have tilted because previous is standing (green highlighted)

Therefore, option A and B is eliminated.

Now,

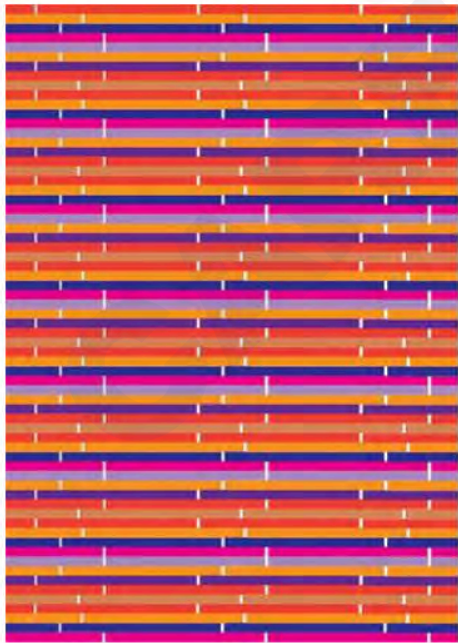
So In circle labelled 2 we will have tilted because previous is standing (blue highlighted)

.

Therefore, option D is eliminated.

Hence, option C is correct.

**Q.35 Which option is the basic building block for the pattern made on the left?**



**Option A:**



Option B:



Option C:



Option D:



Solution:



Pink and purple are not connected anywhere in the original pattern. Hence, option A is wrong.



Orange and red are not connected anywhere in the original pattern. Hence, option B is wrong.

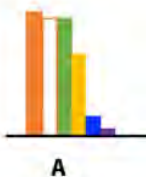


The Red colour is not present in the given pattern. Hence. Option D is wrong. Therefore, option C is correct.

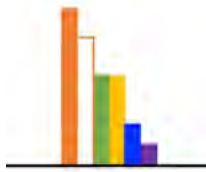
**Q.36. Which option represents the data in the pie-chart?**



**Option A:**

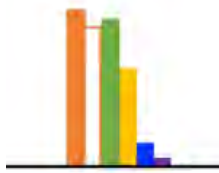


**Option B:**



B

Option C:



C

Option D:



D

Solution:



Observe the given pie chart carefully and analyse the part covered by each colour.



A

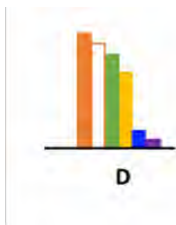
Yellow and green colour has very minor differences. So option A is wrong.



Blue part is less than half of yellow part. Therefore, option B is incorrect.



The white part is more in the pie chart, but in this it is less. Hence, this option is wrong.



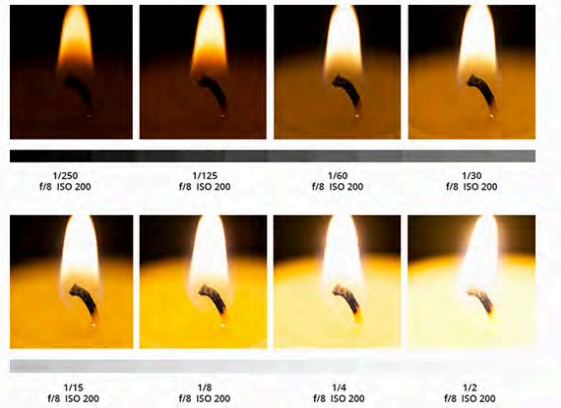
Option D shows similar partition between colours as shown in the original pie chart.

**Q.37 Shutter speed is one of the parameters by which exposure of the image can be controlled. How does shutter speed control exposure?**

- A. By increasing the size of the opening through which light enters the camera.**
- B. By increasing sensitivity of the image sensor.**
- C. By increasing the time for light to enter the camera.**
- D. By increasing the number of pixels in the image.**

**Solution:**

Shutter speed is exactly what it sounds like: It's the speed at which the shutter of the camera closes. A fast shutter speed creates a shorter exposure — the amount of light the camera takes in — and a slow shutter speed gives the photographer a longer exposure

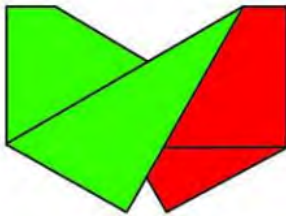


Hence, we can say that shutter.

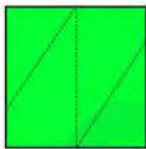
Shutter speed controls the amount of light that enters the camera and the duration that the sensor is exposed to light .

Hence, option C is correct.

**Q.38** Given below is a folded sheet of paper with green colour on one side and red colour on the other side. Dotted lines represent the fold lines. Which option shows the correct fold lines when this sheet is unfolded?

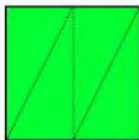


**Option A:**



A

**Option B:**



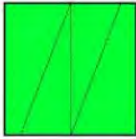
B

**Option C:**



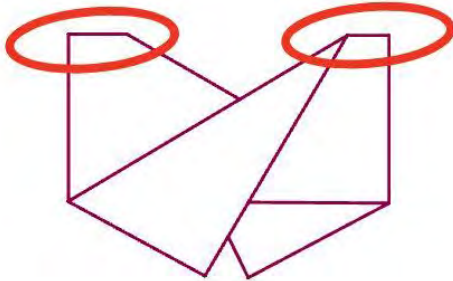
C

Option D:

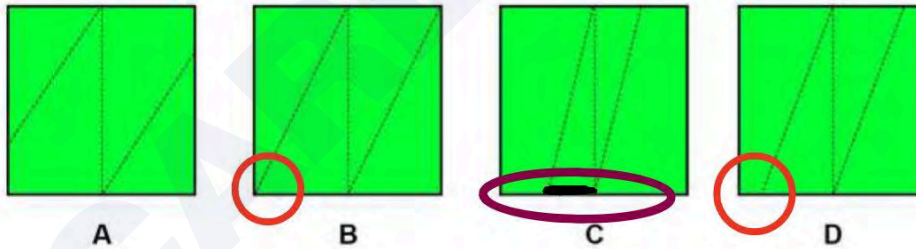


D

Solution:



This part is not so small. So option D and B is eliminated. Now part C is also eliminated because of small middle part division (as shown below)



Hence, option A is correct.

Q.39 An animated character speaking a sentence in English is given below. Which sentence is the character saying?

- A. I love UCEED!
- B. Today is my day!
- C. Oh! Hurry up!
- D. God, help me!



**Solution:**



Option A:

When we say "I" our lips will not get attacked. So option A is wrong [You can try this by speaking and observing lip movement]

Option C:

When we say "Oh!" our lips get a round structure but in the image, it is showing closed lips. Therefore, option C is wrong.

Option D:

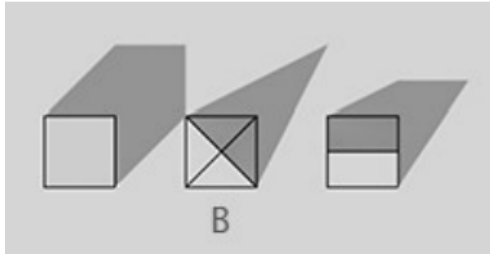
When we say "G" our lips get apart but lips touch each other. Hence, option D is wrong. Hence, option B is correct.

**Q.40** A cube, a triangular prism and a square pyramid of equal height are resting on a surface along a straight line, arranged in a random order. If the source of light is fixed and the light rays are parallel, which of the options shows the shadows correctly in top view?

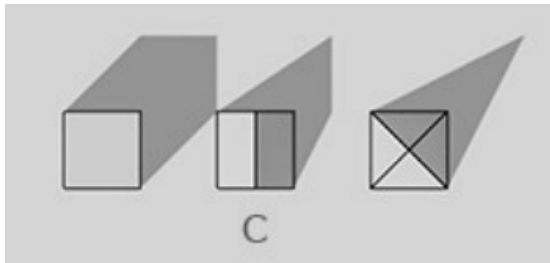
Option A:



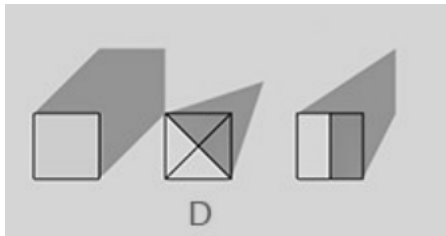
Option B:



**Option C:**

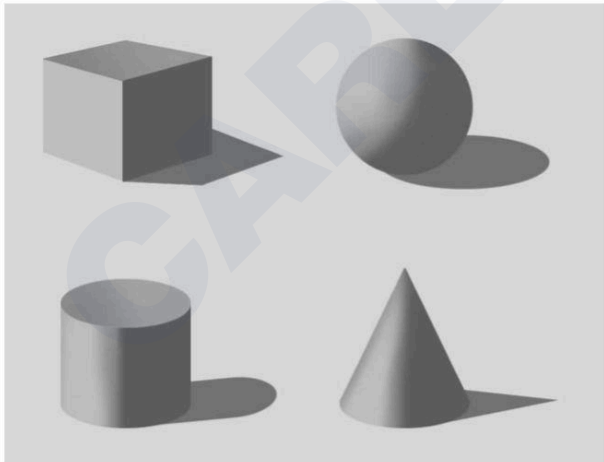


**Option D:**

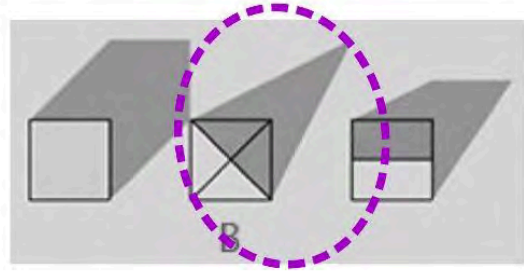
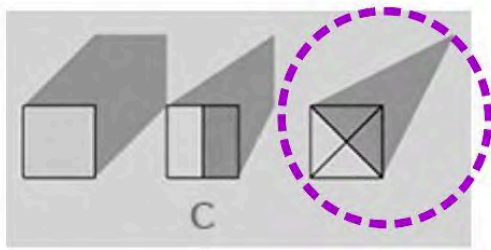


**Solution:**

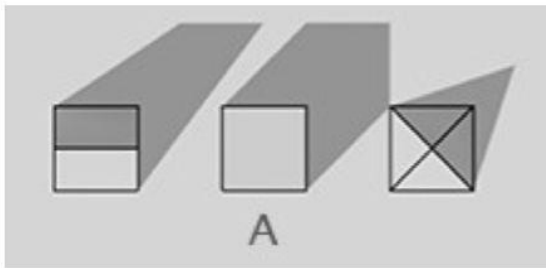
Below images shows the shadow of different objects.



Now check each option one by one.



The shadow of a square pyramid cannot be bigger than its height. So option C and B is eliminated.



Now if we observe the option A carefully we can see the cube has big shadow which shows that light source is at a distance, but the square pyramid denies the fact of light source at a distance.

Therefore, option A is wrong.  
Hence, option D is correct.

**Q.41** A ball with a thin elastic rod moves from left to right as shown below. Which option represents the movement of the rod?



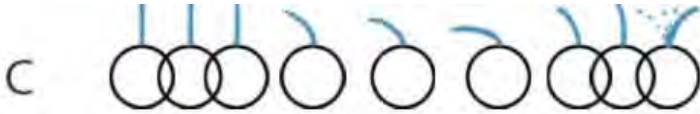
**Option A:**



**Option B:**



**Option C:**



Option D:

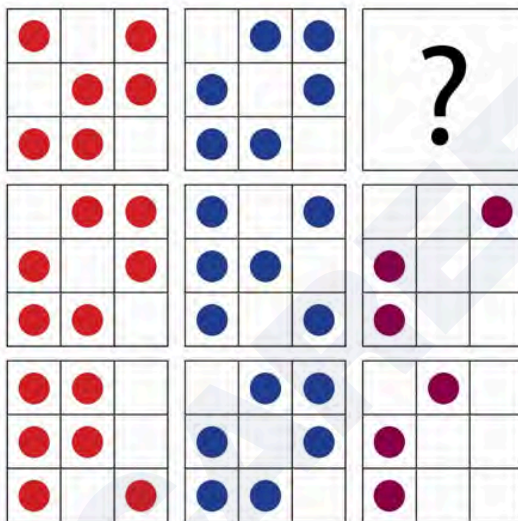


**Solution:**

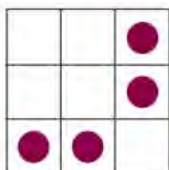
A ball with a thin elastic rod moves from left to right, then the movement of this elastic rod will be toward left (Not straight or right). Therefore, option B and C is eliminated.

When we start the movement in no circumstances the elastic rod will be straight. So, option D is eliminated. Because if we see the mid-ball, the elastic rod is straight. Hence, option A is correct.

**Q.42 Which option will replace the question mark?**

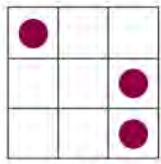


Option A:



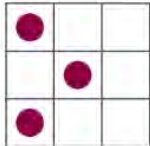
A

Option B:



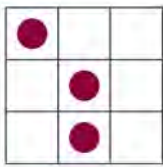
B

Option C:



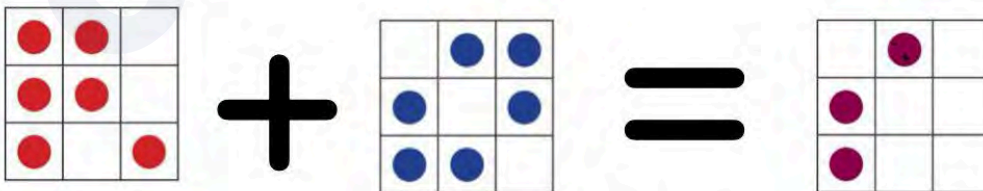
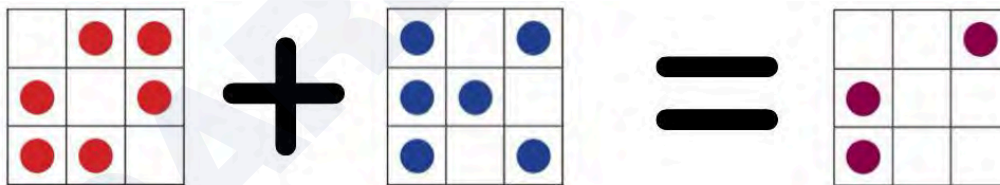
C

Option D:

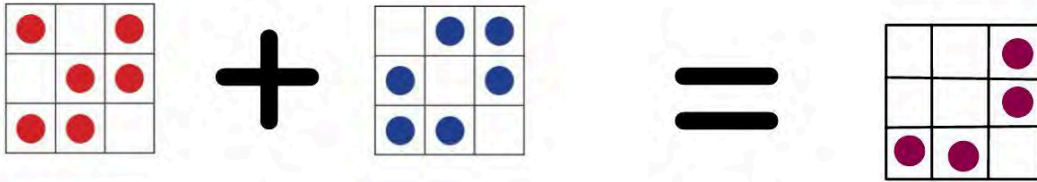


D

Solution:

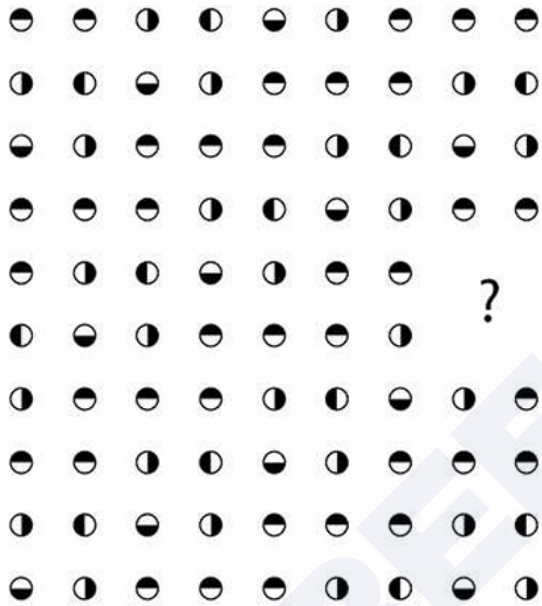


If we observe them carefully then we can notice the new figure (purple) have only the collide dots of red and blue squares So,



Hence, option A is correct.

**Q.43** Which option will replace the question mark?



**Option A:**



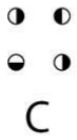
A

**Option B:**

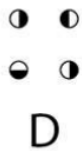


B

Option C:

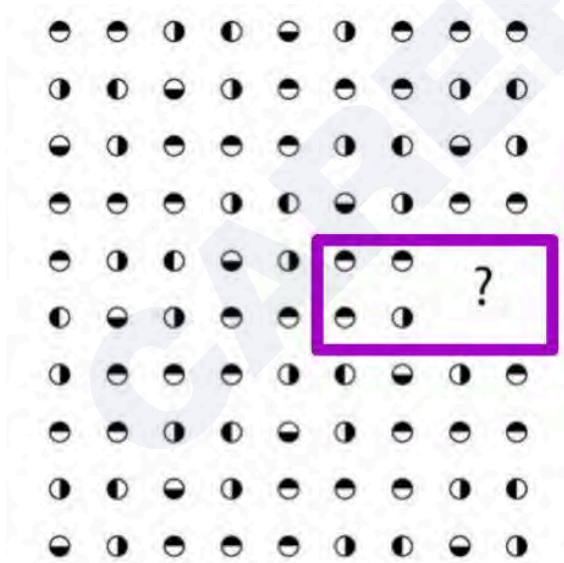


Option D:



Solution:

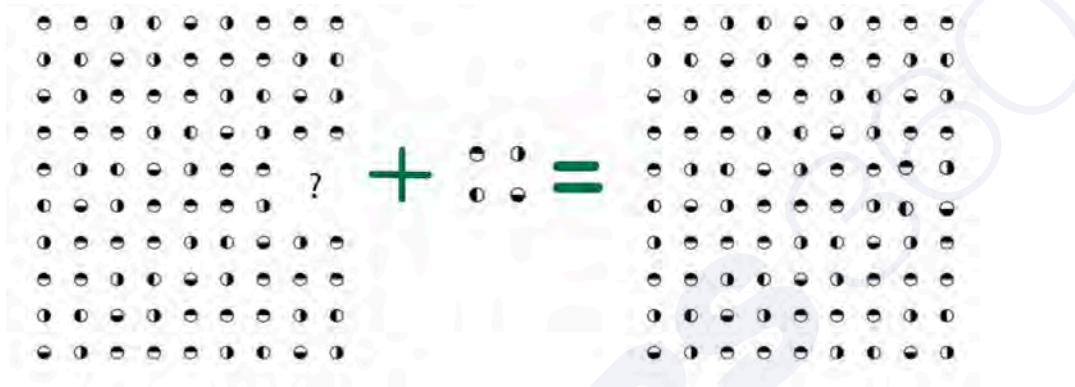
Now observe the pattern carefully we can see the sequence as shown below.



Now we observe the pattern in highlighted part, then the sequence will be

1112  
1234

Therefore, option A is correct.



Q.44 Which option will replace the question mark?



Option A:



Option B:



B

Option C:



C

Option D:

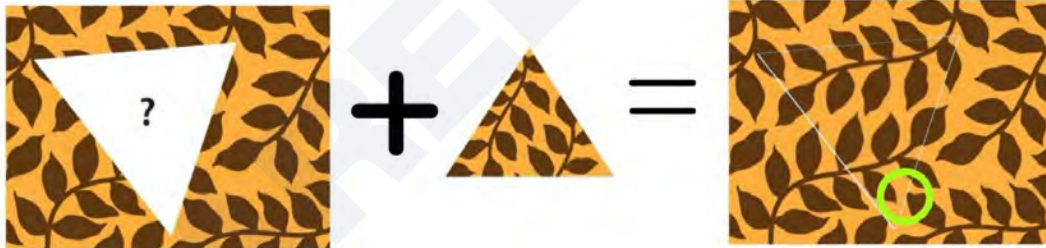


D

**Solution:**

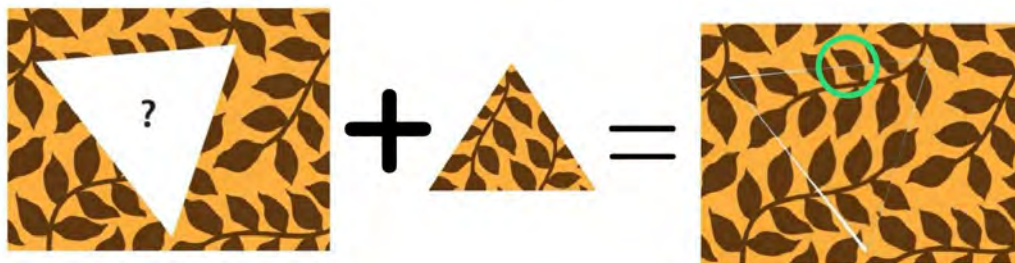
In such question check each option one by one.

Option A:



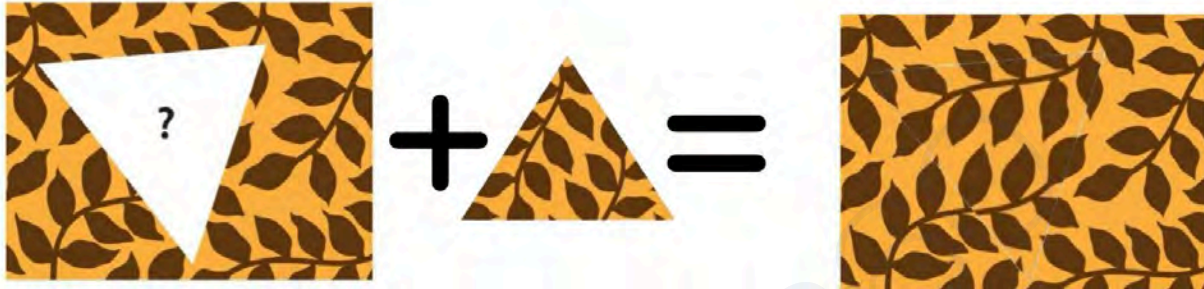
In this, the lighted part shows that the leaf's tip is incomplete.  
Hence, option A is wrong.

Option B:



In this lighted part shows that leaf's is not maintaining proper curve.  
Hence, option B is wrong.

Option C:



Hence, the question mark will be replaced by option C.

**Q.45** A printed code word (in capital letters) has been shredded into strips and the strips are jumbled. Identify the code word.



- A. AEFITFHLEA
- B. AEFHIFTLEA
- C. AFEHITFELA
- D. AFEIHFTELA

**Solution:**



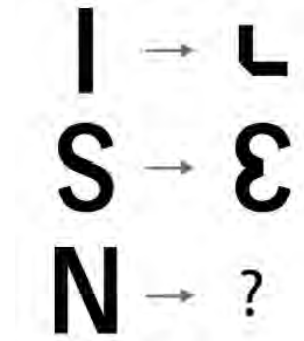
After rearranging the figure, we get the above image.

Now we can see that it is AEFHIFTLEA

I.e. Option B.

Hence option B is correct.

**Q.46** Which option will replace the question mark?



Option A:



Option B:



Option C:



Option D:



**Solution:**



If we observe this carefully we can see that image is cut from symmetry, then the cut parts vertical image will be attached to the part from which half part was cut, and we get the desired figure.

Now,



Hence, option B is correct.

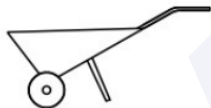
**Q.47 Construction materials are to be moved using the trolleys in the options. Assume friction is negligible. Which trolley requires the least amount of effort?**

**Option A:**



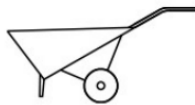
A

**Option B:**



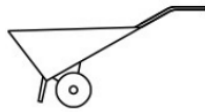
B

**Option C:**



C

**Option D:**

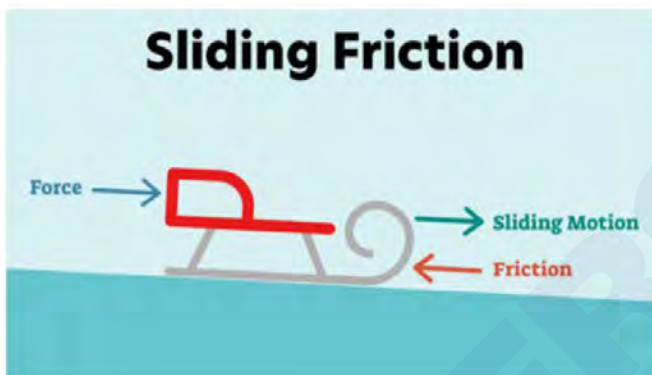


D

**Solution:**

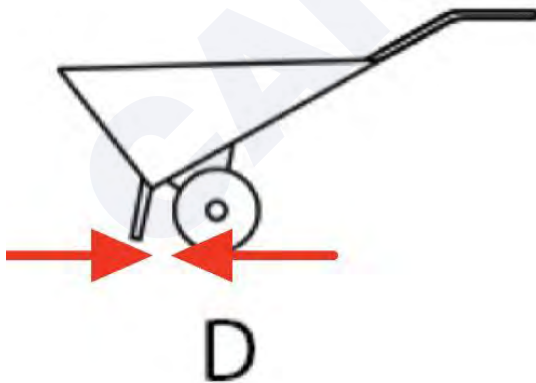
Friction is defined as the resistance offered by the surfaces that are in contact when they move past each other. Friction provides traction that is needed to walk without slipping.

For e.g.



Now according to the question friction is negligible so when friction is negligible, it is typically a situation in which two opposing forces are not acting strongly against each other, resulting in minimal resistance.

Now we can see in option D only two opposing forces acting against each other is weak (as shown below).

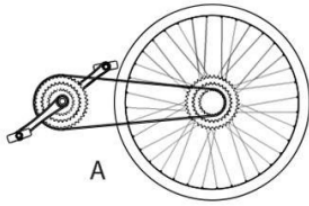


D

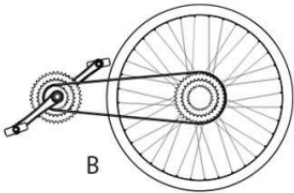
Hence, option D is correct.

**Q.48** A cyclist was peddling a geared cycle on an upward inclined road and decided to stop on the incline. Which option can be used to stop the bicycle on the incline only using force on foot pedals?

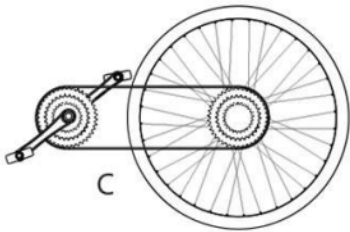
Option A:



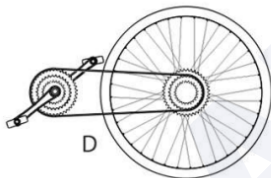
Option B:



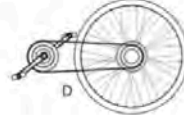
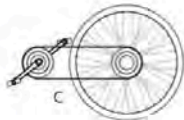
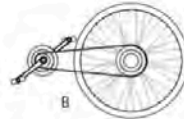
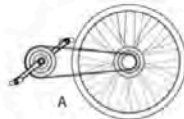
Option C:



Option D:



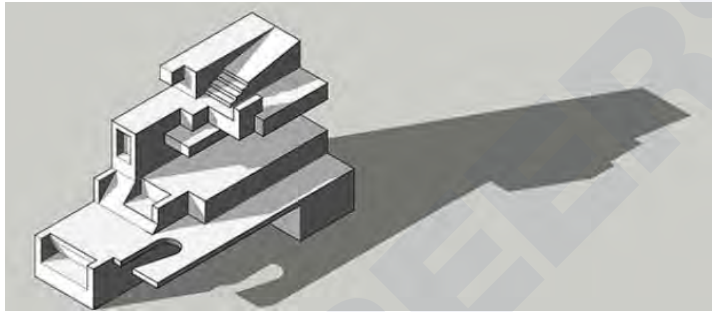
Solution:



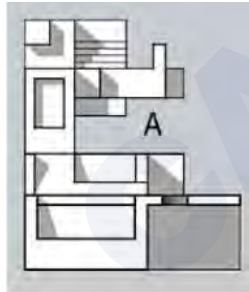
A typical bicycle has anything from three to thirty different gears—wheels with teeth, linked by the chain, which make the machine faster (going along the straight) or easier to pedal (going uphill). Bigger wheels also help you go faster on the straight, but they're a big drawback when it comes to hills. That's one of the reasons why mountain bikes and BMX bikes have smaller wheels than racing bicycles. It's not just the gears on a bicycle that help to magnify your peddling power when you go uphill: the pedals are fastened to the main gear wheel by a pair of cranks: two short levers that also magnify the force you can exert with your legs. When you press the brake levers, a pair of rubber shoes (sometimes called blocks) clamps onto the metal inner rim of the front and back wheels. As the brake shoes rub tightly against the wheels, they turn your kinetic energy (the energy you have because you're going along) into heat—which has the effect of slowing you down.

Now if we see the position of gears we can easily eliminate option A, C and D  
Hence, option B is correct.

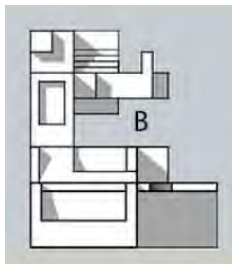
**Q.49 Which option represents the solid shown below?**

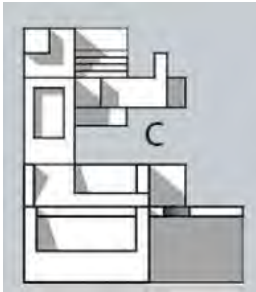
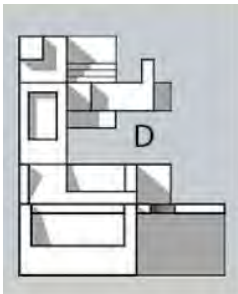
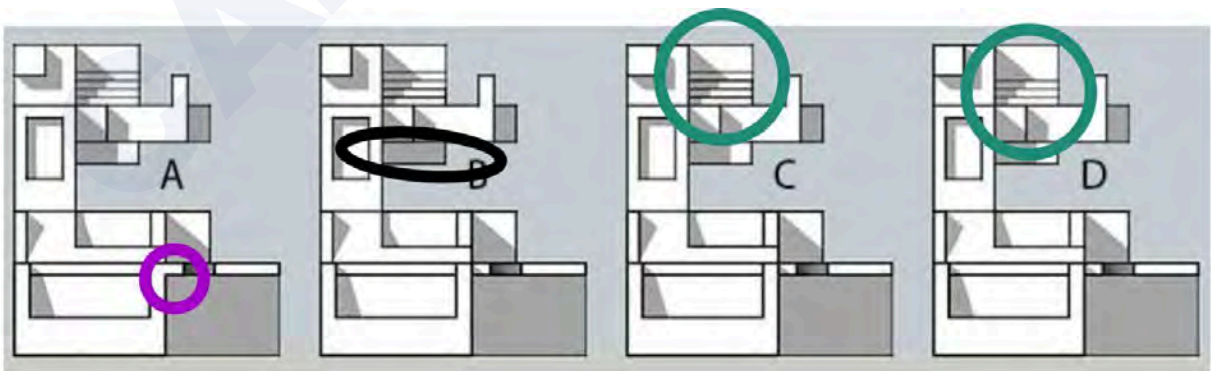
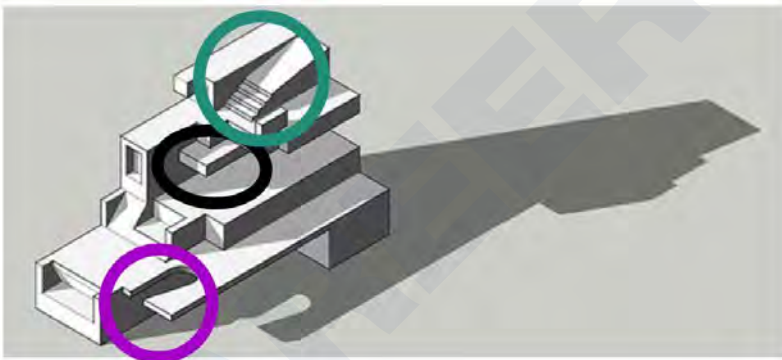


**Option A:**



**Option B:**

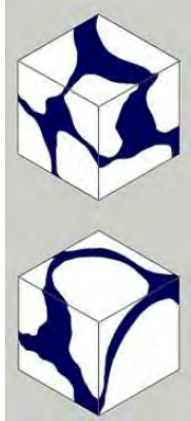


**Option C:****Option D:****Solution:**

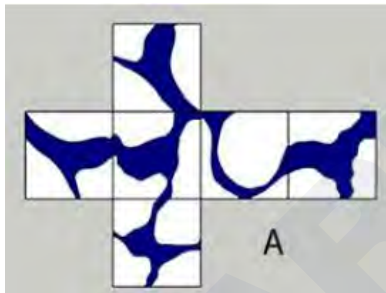
- Shadow in real structure is not covering the whole part below stairs. So, in option B highlighted part shows the shadow covering the structure. So option B is eliminated.

- Purple highlighted part has no gap in the image, but option A do have gap. Hence, option A is eliminated.
- Green highlighted we can see in original image the shadow is starting from stair turn at an angle from 2nd stair but option D it is starting from stair 1st. Hence, option D is wrong.

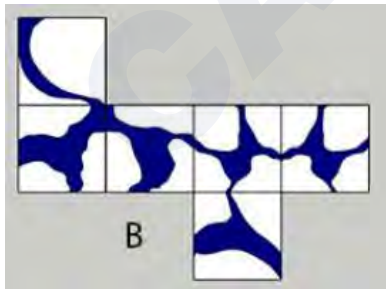
**Q.50 Two views of a cube are shown on the left. Which option represents the unwrapped cube on the left?**



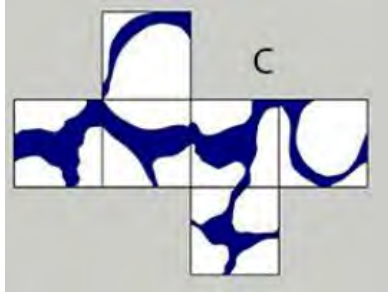
**Option A:**



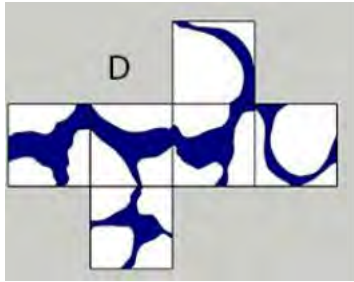
**Option B:**



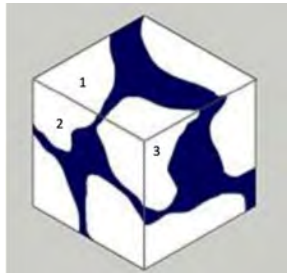
**Option C:**



Option D:



Solution:



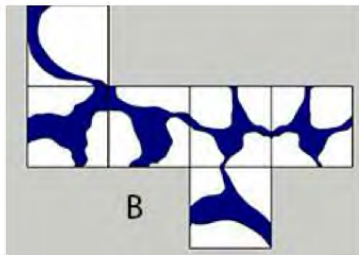
Here

6 is adjacent to 1

2 is adjacent to 5

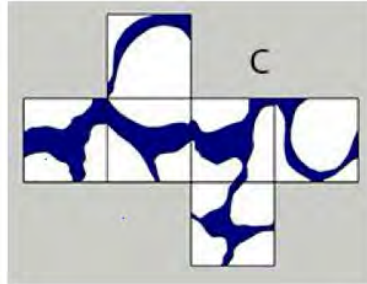
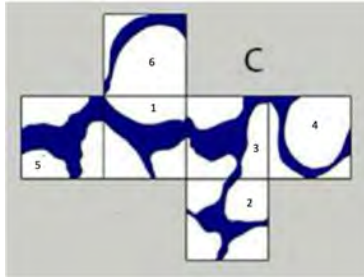
3 is adjacent to 4

Option B:



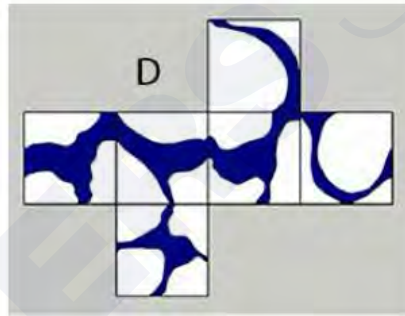
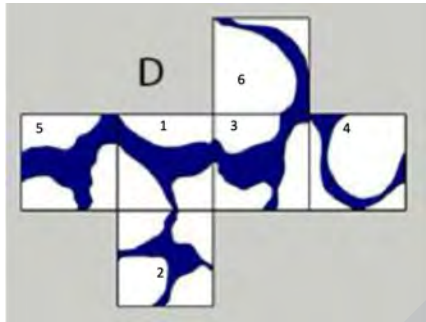
Face 4 is not present in option A. Hence, option A is wrong.

Option C:



If we see the open dice then 6 is adjacent to 2 but in real it should be adjacent to 1. Hence, the option is wrong.

Option D:



If we see the open dice then 5 is adjacent to 3 but in real it should be adjacent to 2. Hence, the option is wrong. Hence, option A is correct.

**Q.51** During a long-distance sea voyage, without the Captain realizing, steering of the ship started malfunctioning in the following manner. When the Captain was trying to turn the ship 60 degrees to the left, the ship was turning 30 degrees to the right. When the Captain was trying to turn the ship 90 degrees to the left, the ship was turning 90 degrees to the right. When the Captain was trying to turn the ship 45 degrees to the right, the ship was turning 30 degrees to the left. When the Captain was trying to turn the ship 90 degrees to the right, the ship was turning 45 degrees to the left.

Before the malfunction, the ship was going in a North-East direction. After the malfunction started, without realizing the problem, the Captain tried to turn 90 degrees to the left, then 90 degrees to the right, then 45 degrees to the right and finally 60 degrees to the left. Find the current direction of the ship.

- A. NORTH EAST
- B. EAST

- C. WEST**  
**D. NORTH WEST**

**Solution:**

Let's analyse each turn the Captain intended and the actual turn due to the malfunction:

Intended turn: 90 degrees left (North-East to North-West)

Actual turn: 90 degrees right (North-East to South-East)

Intended turn: 90 degrees right (South-East to South-West) BUT malfunction makes it opposite

Actual turn: 90 degrees left (South-East to North-East) - Cancels out the previous turn.

Intended turn: 45 degrees right (North-East to East) BUT malfunction makes it opposite

Actual turn: 30 degrees left (North-East to more North-North-East)

Now, let's track the overall direction change:

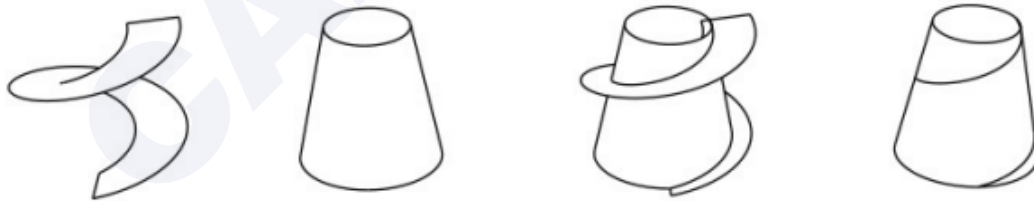
Started North-East

Turned 90 degrees right (South-East) - cancels out with later turn

Turned slightly more North-North-East

Therefore, the current direction of the ship is still very close to North-East. When we see the options we have option B i.e, East which is near North-East direction. Hence, option B is correct.

**Q.52 A hollow paper cone is cut by a spiral blade. The blade, the cone, the position of the cone and blade, and the line along which it gets cut are shown below. The surface of the cone is then unwrapped on a flat surface. Which option shows the unwrapped surface?**



**Option A:**



**Option B:**



**Option C:**

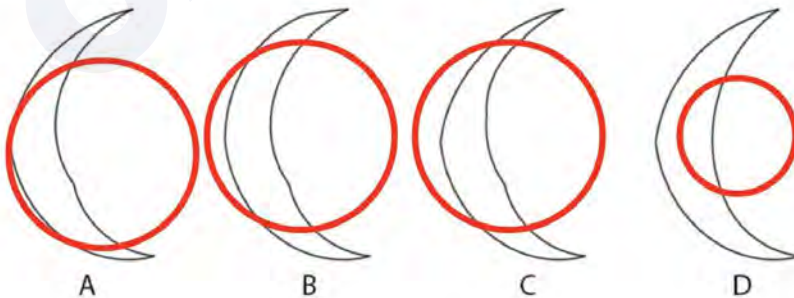


**Option D:**

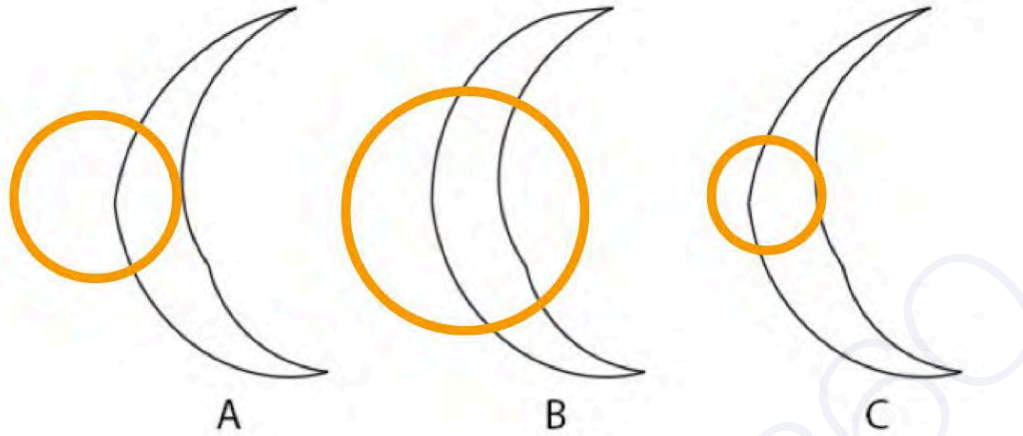


**Solution:**

In this question we can use elimination method in the options



Option D is eliminated as you can see that Option D has curve (proper) which can not be seen in option A,B and C.



Option B is eliminated, as we can see the curve is continuous in option B, but not in options C and A.



Option C if minutely observed doesn't have a continuous curve, which is wrong. Therefore, option A is correct.

**Q.53** Two rotating discs are placed on top of each other that are pivoted at the centre. The disc in front has two cut-outs, and the disc in the back has a line pattern. Both discs can rotate in any direction. Shown below are the four positions at which different parts of the line pattern are visible. Which option represents the line pattern on the back disc?



**Option A:**



A

**Option B:**



B

**Option C:**



C

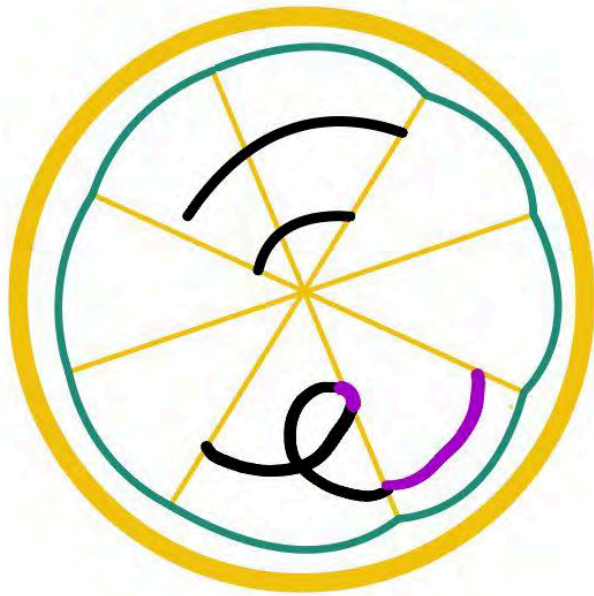
**Option D:**



D

**Solution:**

To get the correct answer, redraw this diagram and combine in 1 circle.



Now if we observe options. Option C is eliminated because the spiral shape is absent (as shown below)



We can see the ending of the line in the image, but this can't be seen in options B and A.

Hence, option D is correct.

**Q.54 Which option has the same visual grammar as the letters on the left?**

# de sign

Option A:



A

Option B:



B

Option C:



C

Option D:



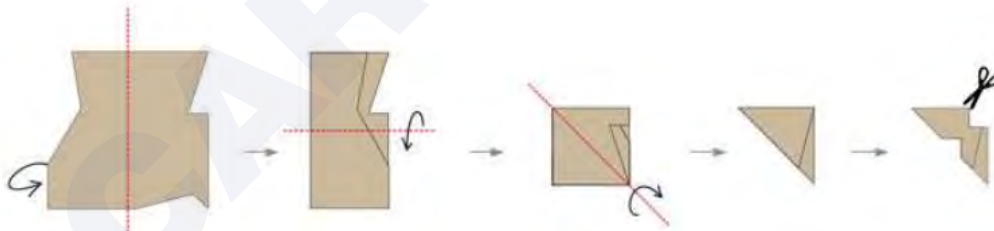
D

Solution:



We can see similar visual grammar in option B.  
Hence, option B is correct.

**Q.55** An irregular piece of paper is folded and cut as shown below. Which option shows the correct cuts when the paper is unfolded?



**Option A:**



**Option B:**



B

Option C:



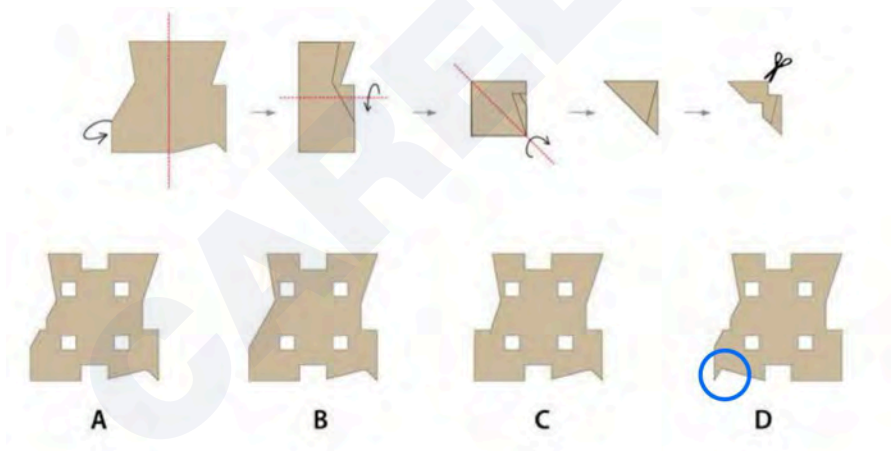
C

Option D:



D

Solution:

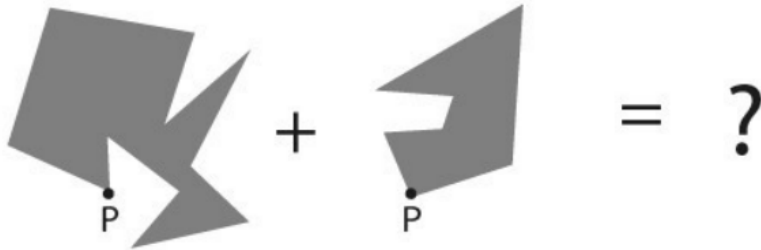
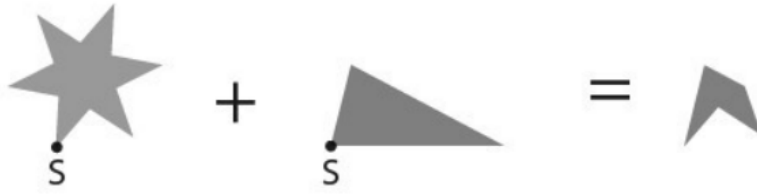


Option D is eliminated because the highlighted cut should be on the right, as in the other option.

Now again if we check options A, B and C we can observe that on the left side, the triangular cut should be seen which is not present in options B and C.

Hence, option A is correct.

**Q.56 Which option will replace the question mark?**



Option A:



Option B:



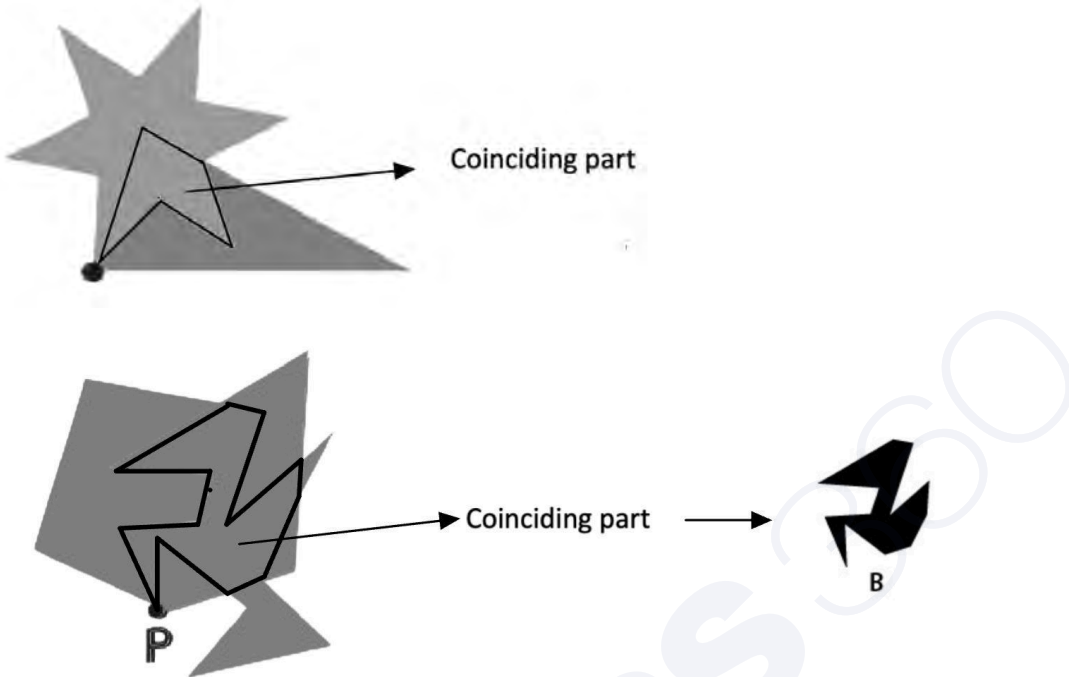
Option C:



Option D:



Solution:



So option B is correct.

**Q.57** Shown below is the crawling sequence of a worm in eleven frames. Which option represents the missing frames?



**Option A:**



**Option B:**



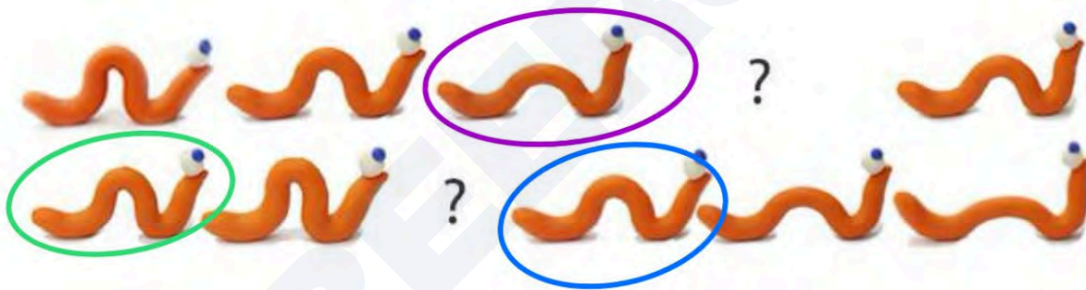
Option C:



Option D:



Solution:



Purple colour highlighted worm is the same as given in option C.

So, option C is eliminated.

The blue colour highlighted worm is the same as given in option A.

So, option A is eliminated.

The green colour highlighted worm is the same as given in option D.

Option D is eliminated.

## PART-B

### Q. 1 Drawing

On a Sunday morning, 5-year-old Geet, her grandmother and father are cleaning their old garage. It is a big garage with large open windows near the ceiling. It has an old bicycle, a football and other objects. The father is cleaning the cobwebs. The grandmother while cleaning, finds her old guitar which she used to play during her college days. She gets excited and starts playing it as Geet starts dancing around. The garage also has a lot of old memories of Geet's sporty grandmother and her studious father. Geet's school friend stands at the door of the garage watching this whole scene. Draw this scenario from the friend's point of view.

#### Note:

- Use only pencil
- Do not use colours
- Evaluation Criteria:
- Perspective
- Proportion
- Composition
- Observation
- Imagination
- Quality of sketch
- Attention to detail

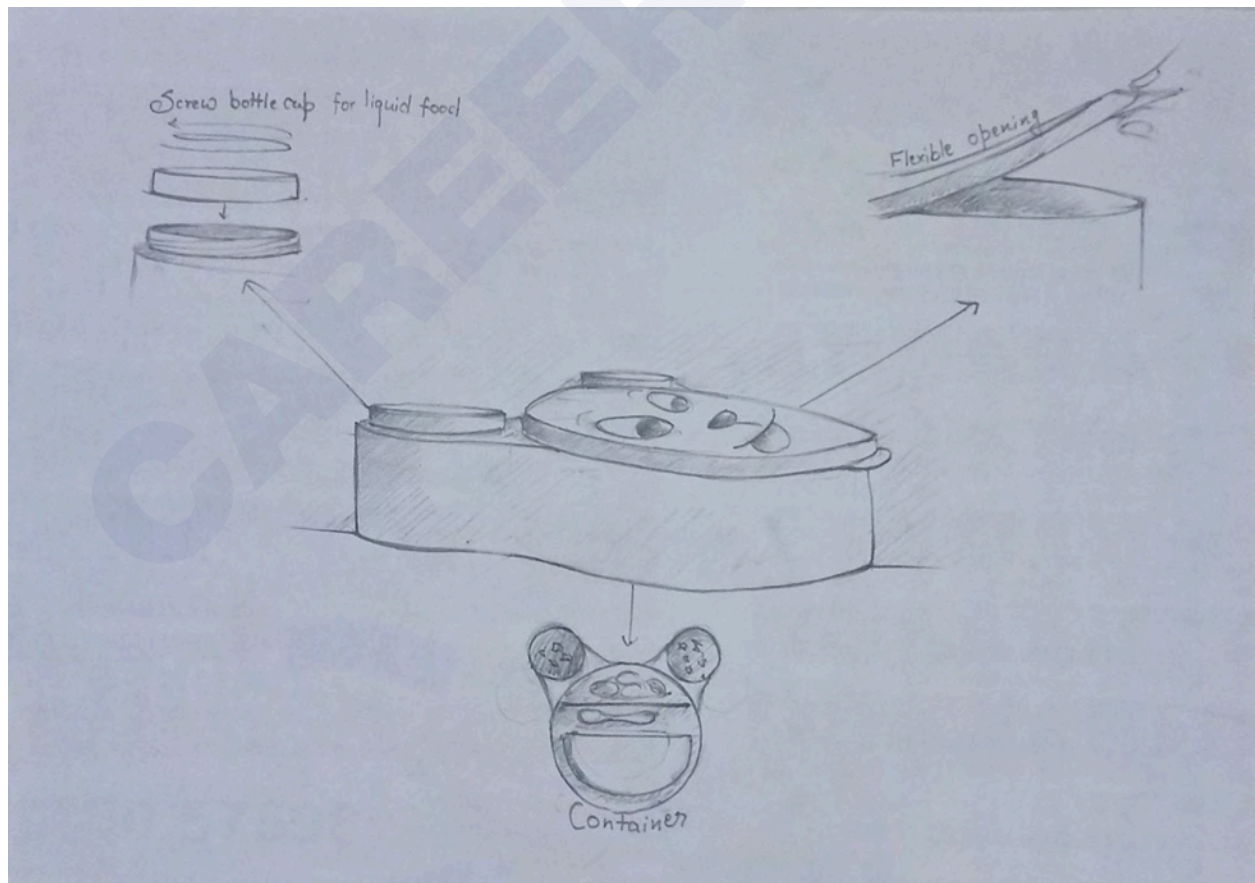


## Q. 2 Design Aptitude

A six-year old girl is going to school for the first time. She needs to carry a lunch box in her school bag. Her lunch can contain typical Indian food items (both dry as well as liquid food items, such as Roti, Rice, Dosa, Dal, Sambar, etc.). Design a lunch box for her, considering her needs. Sketch your design, and visually explain the features of your design along with clear labels. Note: Use only pencil. Do not use colours. Explain your design only through visuals and short labels. Do not write separate explanations.

### Evaluation Criteria:

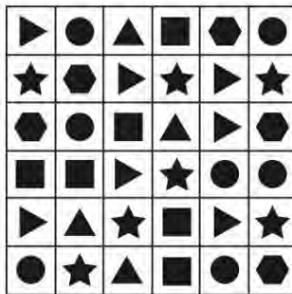
- Appropriateness of three-dimensional form and visual graphics
- Provisions for fulfilling functional requirements
- Considerations for product usability by the user
- Attention to detail and explanation of features through visuals only
- Clarity of the sketch and quality of presentation, and uniqueness of design.



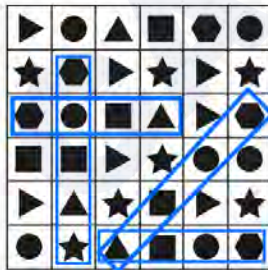
# UCEED 2023

## PART A Section 1: Numerical Answer Type (NAT) questions

Q.01 How many times does the shape sequence (shown on the top) appear in the grid below? The sequence may appear top-to-bottom, bottom-to-top, left-to-right, right-to-left or at an angle.

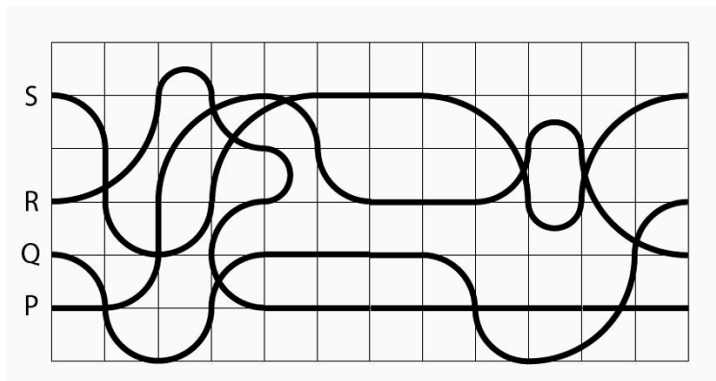


Solution:

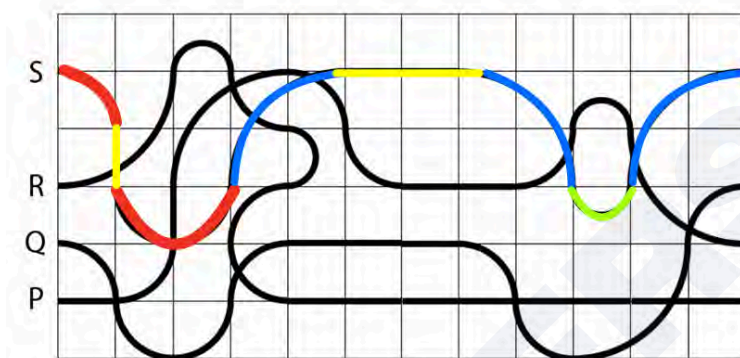


We can see in the image given below that we have 4 sequences.  
Hence, the answer is 4.

Q.02 The bold lines correspond to four different paths P, Q, R and S. What is the length of the longest path? The length of each side of the square grids is 7 units. Use for  $\pi$ .



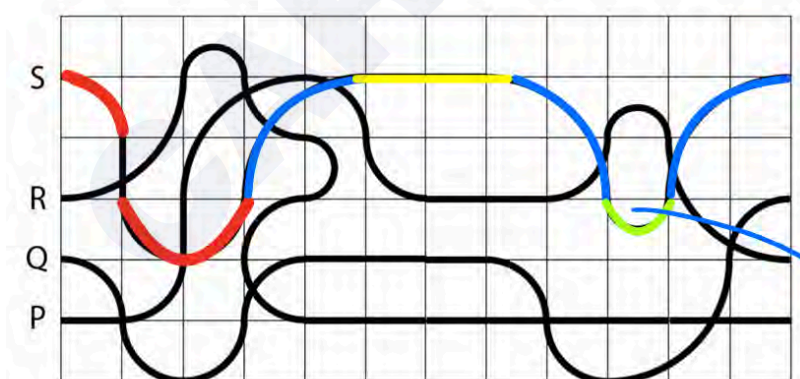
**Solution:**



Given: side of grid=7 unit

If we carefully observe the figure, we can see the given fig.

Path 1



Red curves make  $\frac{3}{4}$ th up a circle with a radius of 7 units.

Blue curves are also  $\frac{3}{4}$ th of a circle with a radius of 14 units.

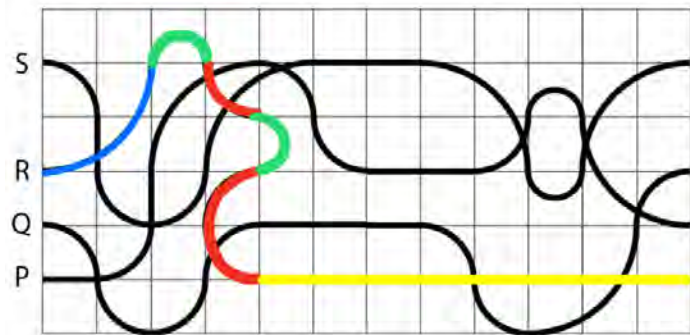
A green curve makes a semicircle with a radius  $\frac{7}{2}$

We know, the length of the path= circumference.

$$\begin{aligned} \text{The length of the path} &= \frac{3}{2} \times 2\pi \times 7 + \frac{3}{4} \times 2\pi \times 14 + \frac{1}{2} \times 2\pi \times \frac{7}{2} \\ &= 33 + 66 + 21 + 11 \end{aligned}$$

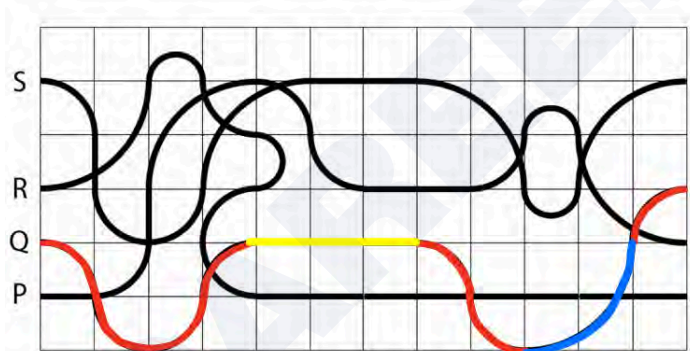
The length of path = 131

Path 2



$$\begin{aligned} \text{The length of the path} &= \frac{1}{4} \times 2\pi \times 14 + \frac{3}{4} \times 2\pi \times 7 + 56 + 2\pi \times 3.5 \\ &= 22 + 33 + 56 + 22 \\ &= 133 \end{aligned}$$

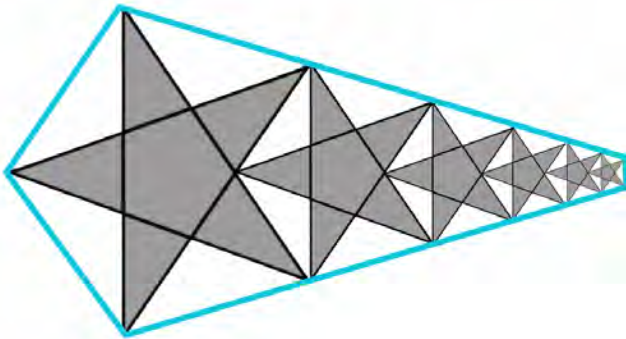
Path 3:



$$\begin{aligned} \text{The length of the path} &= \frac{1}{4} \times 2\pi \times 14 + \frac{3}{4} \times 2\pi \times 7 + 21 \\ &= 22 + 33 + 44 + 21 \\ &= 120 \end{aligned}$$

Path 4:





We can have 6 maximum no. of stars.

**Q.04 A dice throw can result in the numbers 2,3,5 or 6. Every 4th throw will result in 3. What is the minimum number of times the dice have to be thrown for the pawn to move from zero to reach exactly 100?**

100	99	98	97	96	95	94	93	92	91	
81	82	83	84	85	86	87	88	89	90	
80	79	78	77	76	75	74	73	72	71	
61	62	63	64	65	66	67	68	69	70	
60	59	58	57	56	55	54	53	52	51	
41	42	43	44	45	46	47	48	49	50	
40	39	38	37	36	35	34	33	32	31	
21	22	23	24	25	26	27	28	29	30	
20	19	18	17	16	15	14	13	12	11	
0	1	2	3	4	5	6	7	8	9	10

Solution:

Step 1: As dice can throw the numbers 2,3,5 or 6 as 1 is not there, form 99 will not reach 100. So that means this ladder (as shown below is of no use)

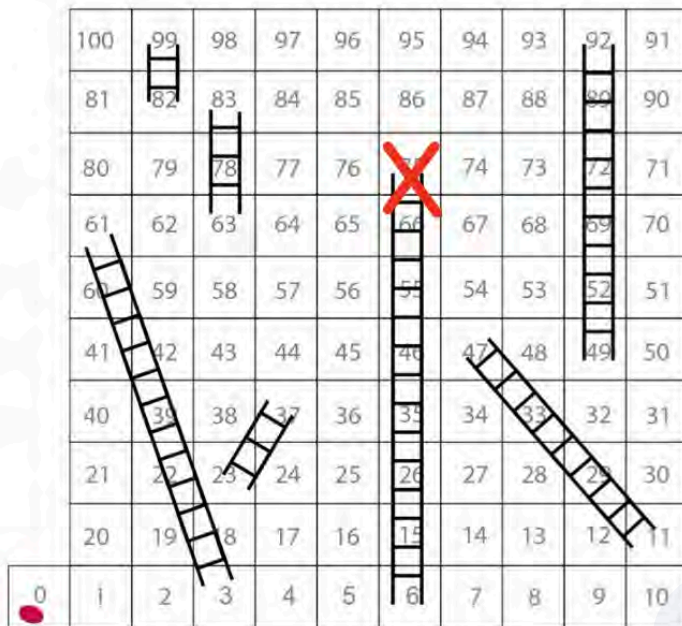
100	<del>99</del>	98	97	96	95	94	93	92	91	
81	<del>82</del>	83	84	85	86	87	88	<del>89</del>	90	
80	79	<del>78</del>	77	76	75	74	73	<del>72</del>	71	
61	62	63	64	65	<del>66</del>	67	68	<del>69</del>	70	
<del>60</del>	59	58	57	56	<del>55</del>	54	53	<del>52</del>	51	
41	<del>42</del>	43	44	45	<del>46</del>	47	48	<del>49</del>	50	
40	<del>39</del>	38	<del>37</del>	36	<del>35</del>	34	<del>33</del>	32	31	
21	<del>22</del>	<del>23</del>	24	25	<del>26</del>	27	28	<del>29</del>	30	
20	19	18	17	16	<del>15</del>	14	13	<del>12</del>	11	
0	1	2	3	4	5	6	7	8	9	10

Step 2:

100	<del>99</del>	98	97	96	95	94	93	92	91	
81	<del>82</del>	83	84	85	86	87	88	<del>89</del>	90	
80	79	<del>78</del>	77	76	75	74	73	<del>72</del>	71	
61	62	63	64	65	<del>66</del>	67	68	<del>69</del>	70	
<del>60</del>	59	58	57	56	<del>55</del>	54	53	<del>52</del>	51	
41	<del>42</del>	43	44	45	<del>46</del>	47	48	<del>49</del>	50	
40	<del>39</del>	38	<del>37</del>	36	<del>35</del>	34	<del>33</del>	32	31	
21	<del>22</del>	<del>23</del>	<del>24</del>	25	<del>26</del>	27	28	<del>29</del>	30	
20	19	18	17	16	<del>15</del>	14	13	<del>12</del>	11	
0	1	2	3	4	5	6	7	8	9	10

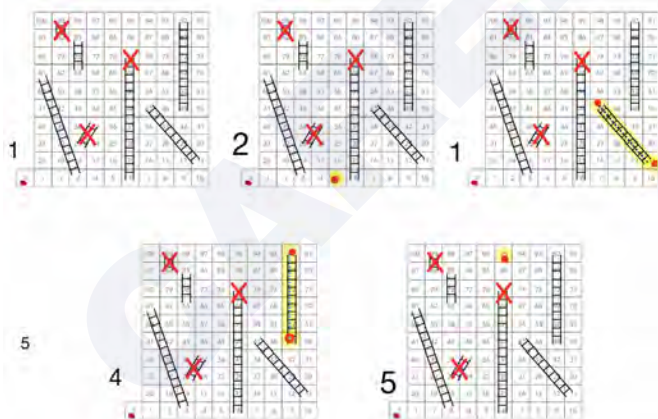
Coming to 23 we have to move whole, as there is no shortcut, so again it will be too many numbers of times dice have to be thrown so again it will not be of any use.

Step 3:



So this again is of no use, because from 77 to reach 100 too many number of times the dice has to be thrown.

These three will not be of much use so we can get the answer in one way, so here I am showing one way [given below]

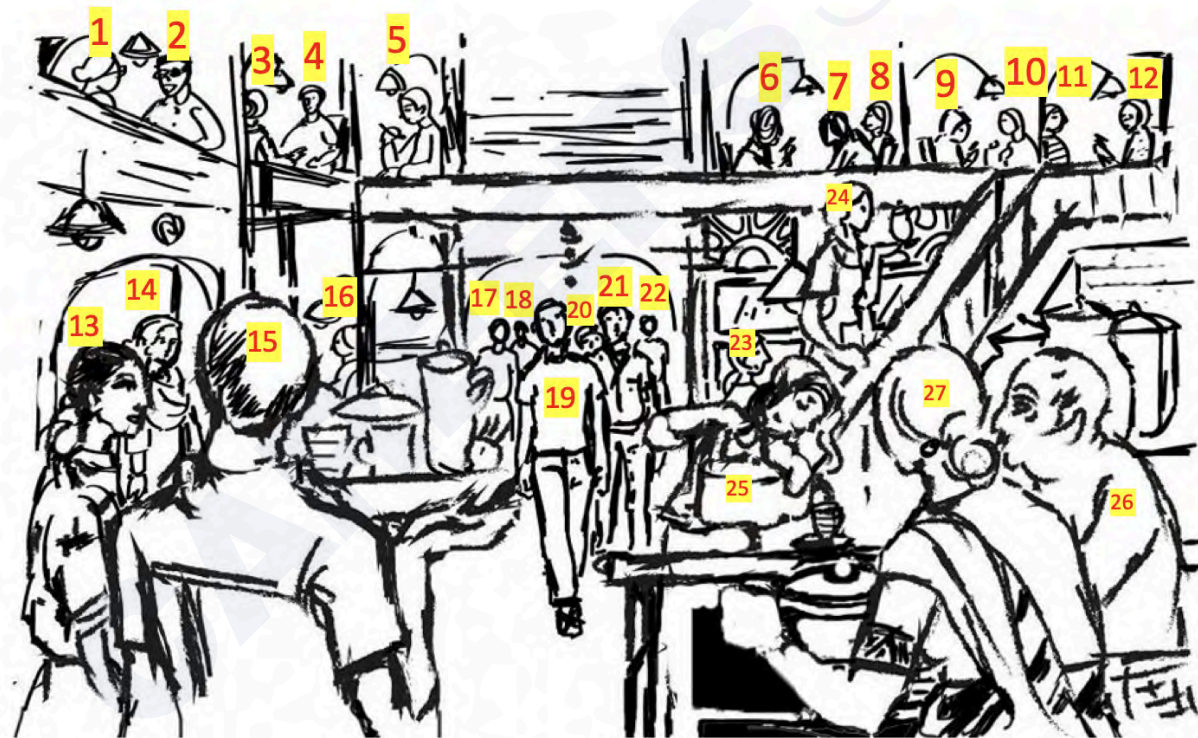


In the next step with 5 on the dice, it will read 100 so we know that a minimum of 5 times the dice has to be thrown for the pawn to move from 0 to 100.

**Q.05 Count the number of human figures in the picture.**



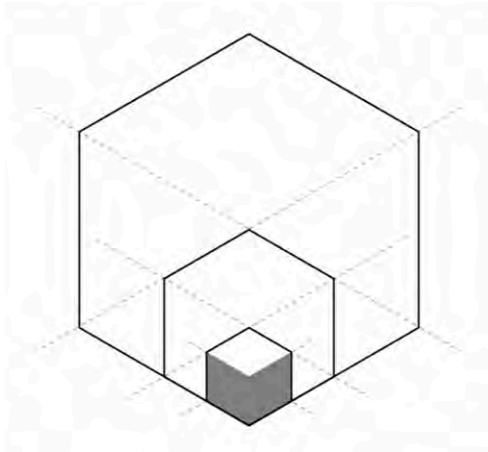
**Solution:**



To get the correct count of the number of human figures in the picture, start from one side and then move on to the other.

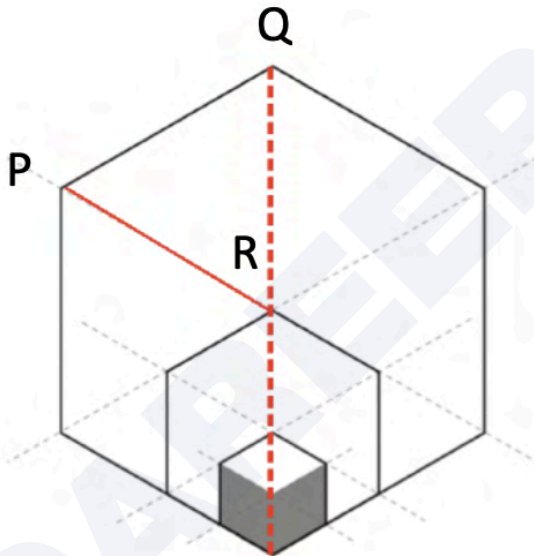
In total, we have 27 humans.

**Q.06** In the figure given below, the area of the largest regular hexagon is 720 units. What is the area of the shaded portion?



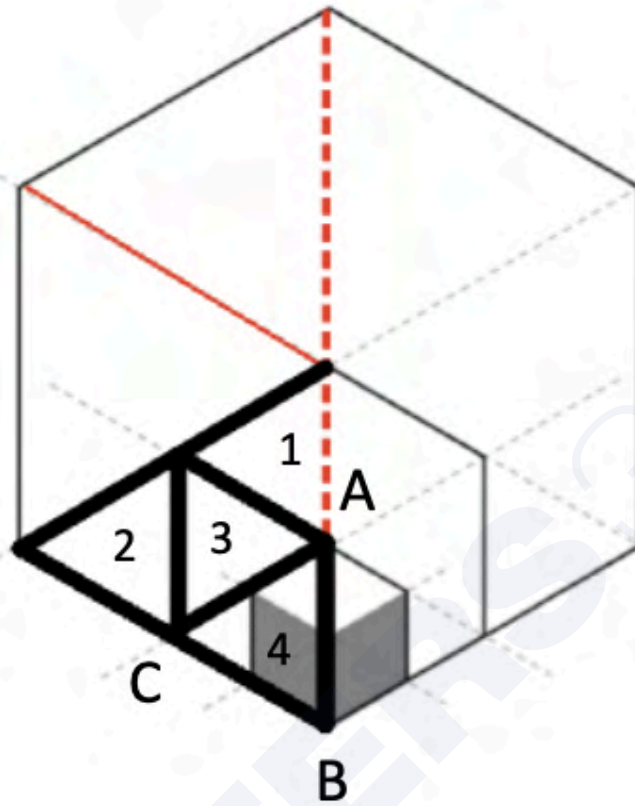
**Solution:** The area of the largest regular hexagon is 720 *units*.

We just need to find a relation between the shaded portion and the largest regular polygon.



So this triangle PQR is  $\frac{1}{6}th$  part of the largest hexagon.

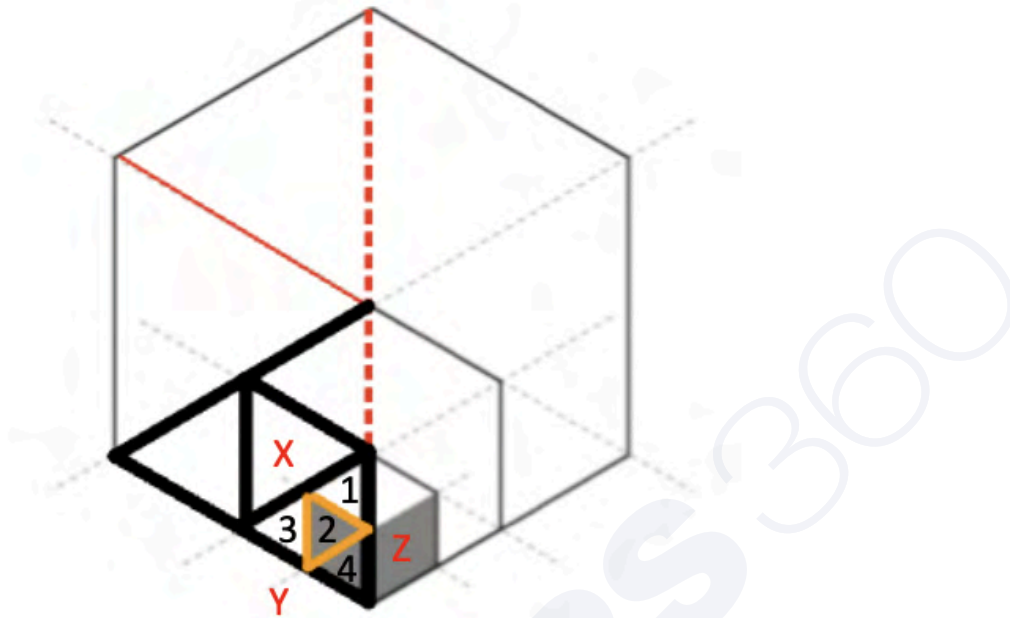
$$\therefore \text{Area of } \Delta PQR = \frac{1}{6} \times 720 = 120 \text{ units}$$



Then we again divide the triangle into smaller units, we can say that there are 4 such triangles.

$$\therefore \text{Area of } \triangle ABC = \frac{1}{4} \text{Area of } \triangle PQR$$

$$\begin{aligned} \text{Area of } \triangle ABC &= \frac{1}{4} \times 120 \\ &= 30 \text{ unit} \end{aligned}$$



Then we again divide the triangle ABC into smaller units, we can say that there are 4 such triangles.

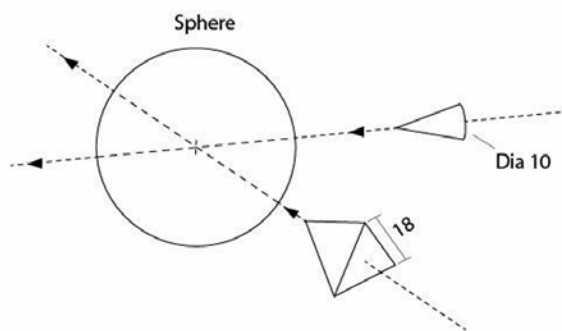
$$\therefore \text{Area of } \Delta XYZ = \frac{1}{4} \text{Area of } \Delta ABC$$

$$\begin{aligned} \text{Area of } \Delta XYZ &= \frac{1}{4} \times 30 \\ &= 7.5 \text{ unit} \end{aligned}$$

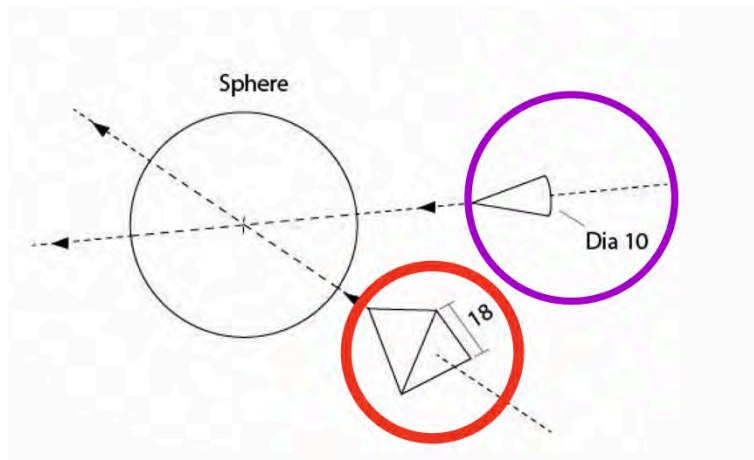
So in the shaded area, we have 4 such triangles

So shaded area =  $4 \times 7.5 = 30 \text{ units}$ .

**Q.07** A tetrahedron of side 18 units and a cone having a base diameter of 10 units are cutting through a sphere as shown. Count the total number of surfaces in the resultant sphere.



**Solution:**



The tetrahedron will make a triangular hole and because of this triangular hole the number of surfaces will be 3 and the outer one will be 4.  
 Now, the cone will make a circular hole, i.e, 2 surfaces and because it has a diameter less than the side of a tetrahedron (i.e, 18) so it will pass through it (from inside)  
 So a total of 6 no. of surfaces should be there.

**Q.08** Tim cycled from his house to his friend John's house and then on to his (Tim's) school without stopping. The average speed for his entire journey was 26 km/hr. The distance from John's house to Tim's school is 0.3 times the distance from Tim's house to John's house. Tim's speed from John's house to Tim's school was twice that of Tim's speed from Tim's house to John's house. What was Tim's average speed from John's house to Tim's school in km/hr?

**Solution:**



Time taken from Tim to John's house:

$$Time = \frac{Distance}{speed} = \frac{x}{y} hr$$

Time taken from John to Tim's school:

$$\text{Time} = \frac{\text{Distance}}{\text{speed}} = \frac{3x}{2y} \text{ hr}$$

$$\begin{aligned} \text{Distance between Tim's house and school} &= x + 0.3x \\ &= 1.3x \text{ km} \end{aligned}$$

$$\begin{aligned} \text{Total time} &: \frac{x}{y} + \frac{3x}{2y} = \frac{x}{y} \left[ 1 + \frac{0.3}{2} \right] \\ &= \frac{x}{y} [1 + 0.15] \end{aligned}$$

$$= 1.15 \frac{x}{y} \text{ km}$$

The average speed between Tim's house and school = 26 km/hr

$$\frac{1.3x}{1.15 \frac{x}{y}} = 26$$

$$1.3y = 26 \times 1.15$$

$$y = \frac{26}{1.3} \times 1.15 = 23 \text{ km/hr}$$

$$\begin{aligned} \text{Tim's average speed from John's house to Tim's school } 2y &= 2 \times 23 \\ &= 46 \text{ km/hr} \end{aligned}$$

**Q.09 Identify the total number of differences in the images shown below.**



**Solution:**



So there are a total of 9 differences here (as shown above)

**Q.10 Count the number of cats in the given image.**



**Solution:**

To make it easy, count the cat's head or tale.



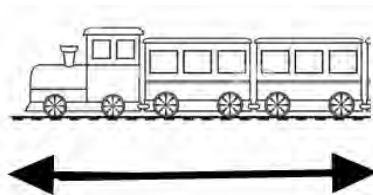
Total No of cats =11

**Q.11** Two trains of unequal length have speeds of 60 and 50 km/hr. When they travel in opposite directions in straight-line tracks, they take 9 seconds to completely cross each other. When they travel in the same direction, a person on the faster train sees the slower train for 18 seconds. For how much time (in seconds) would a person in the slower train see the faster train when the trains travel in the same direction?

**Solution:**



Length =  $x$  m  
Speed = 60km/hr



Length =  $y$  m  
Speed = 50km/hr

Formula area:  $Speed = \frac{distance/length}{Time}$

Relative speed in opposite direction:  $60 + 50 = 110 \text{ km/hr}$

$$\Rightarrow 110 \times \frac{5}{18} \text{ m/s}$$

Time = 9 sec.

Distance =  $x + y = speed \times time$

$$= 110 \times \frac{5}{18} \times 9 = 275 \text{ m}$$

- When they travel in the same direction, a person on the faster train sees the slower train for 18 seconds.

Relative speed in the same direction:  $60 - 50 = 10 \text{ km/hr} = 10 \times \frac{5}{18} \text{ m/sec.}$

The time taken by the slower train to cross is 18 seconds.

Length of slower train =  $y \text{ m} = \text{Relative speed} \times \text{time} = \frac{50}{18} \times 18 = 50 \text{ m}$

The total length of both trains = 27 m

Length of faster train =  $275 - 50 = 225 \text{ m}$

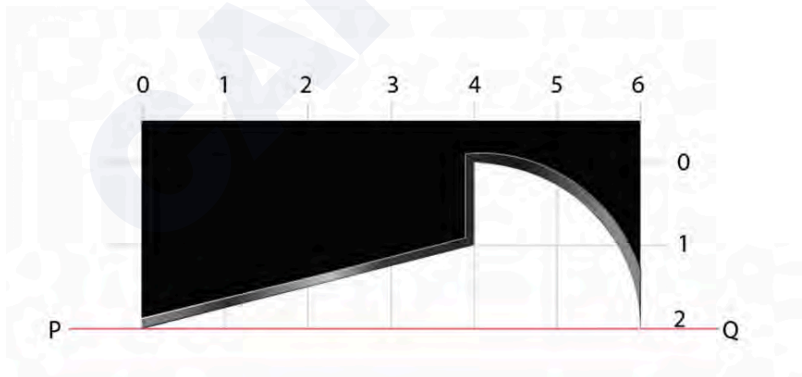
- For the person on the slower train

Relative speed in the same direction:  $60 - 50 = 10 \text{ km/hr} = 10 \times \frac{5}{18} \text{ m/sec}$

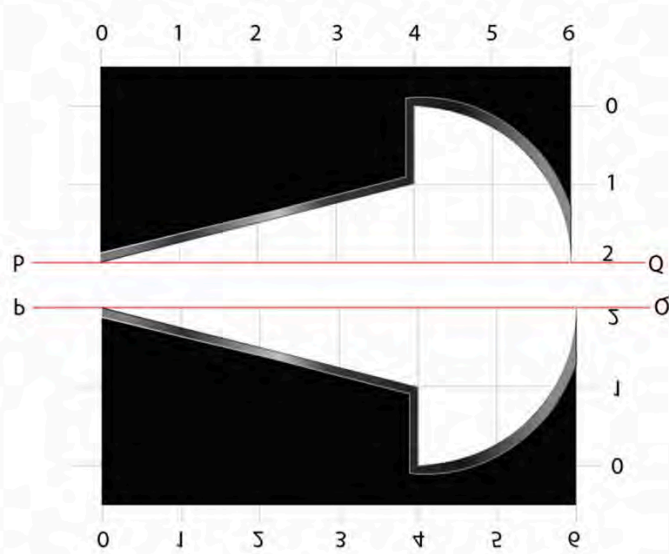
Length of faster train = 225 m

Time taken by faster train to cross =  $\frac{225}{\frac{50}{18}} \text{ sec} = 225 \times \frac{18}{50} = 81 \text{ sec.}$

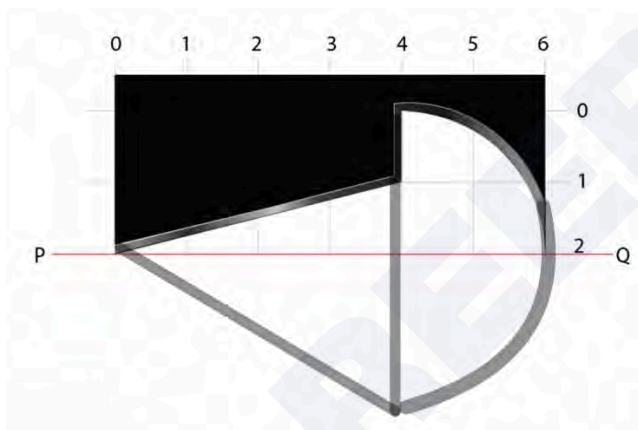
**Q.12** The image shows the profile of the blade which is designed to turn a wooden block, rotating about the axis PQ. Calculate the volume of the turned wooden block between P and Q. Consider the value of  $\pi$  to be  $\frac{22}{7}$ .



**Solution:**



According to the question, when we rotate about the PQ axis, we get a combination of the and a hemisphere.



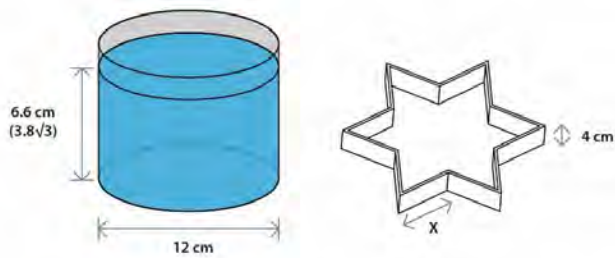
$$\text{Volume of cone} = \frac{1}{3} \pi r_1^2 h_1$$

$$= \frac{1}{3} \pi \times 1 \times 4 = \frac{4}{3} \pi$$

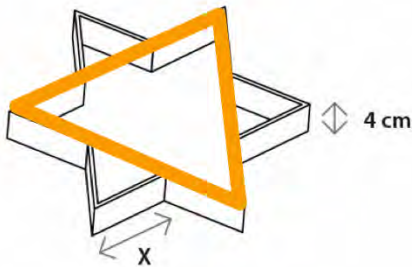
$$\text{Volume of hemisphere} = \frac{2}{3} \pi r_2^3 = \frac{2}{3} \pi \times 2^3 = \frac{16}{3} \pi$$

$$\text{Total volume} = \frac{4\pi}{3} + \frac{16\pi}{3} = \frac{20\pi}{3} = 20.95$$

**Q.13** A blue colour liquid is used completely to make a star-shaped jelly using the mould shown on the right. What is the value of 'X' in cm? Ignore the wall thickness of the mould and consider the value of  $\pi$  to be  $\frac{22}{7}$ .

**Solution:**

$$\begin{aligned}\text{Volume of blue liquid} &= \pi r^2 h \\ &= \pi \times 6 \times 6 \times 3.8\sqrt{3} \text{ cm}^3\end{aligned}$$



$$\text{Total area of star-shape} = 3\sqrt{3}r^2 \text{ cm}^2$$

Height of mould = 4 cm

$$\begin{aligned}\text{The total volume of mould} &= 3\sqrt{3}x^2 \times 4 \\ &= 12\sqrt{3}x^2 \text{ cm}^3\end{aligned}$$

We know the volumes of both figures are the same

∴ The volume of blue liquid = the volume of mould

$$\pi \times 6 \times 6 \times 3.8\sqrt{3} \text{ cm}^3 = 12\sqrt{3}x^2 \text{ cm}^3$$

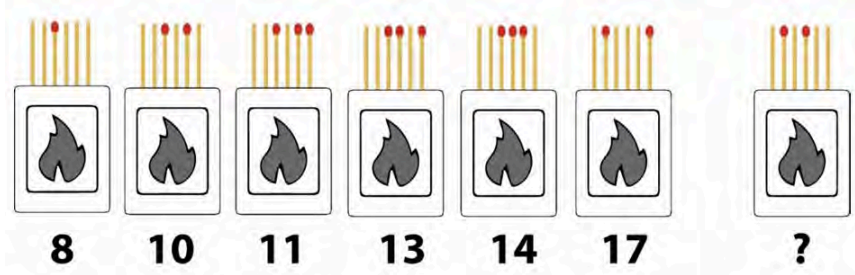
$$x^2 = \frac{22}{7} \times 3 \times 3.8$$

$$x^2 = 35.8285$$

$$x = \sqrt{35.8285}$$

$$x = 5.98 \text{ cm}$$

**Q.14**

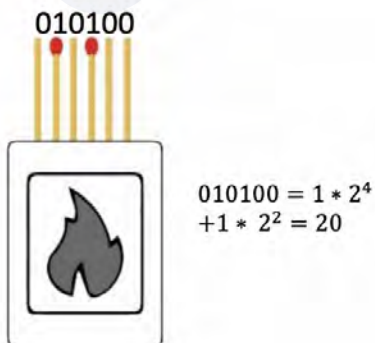


**Solution:** We can see we have no. of lines in each pattern, i.e, 6. But there are two tires of match sticks, i.e., one with a head and one without a head.

Let's use a binary number and consider

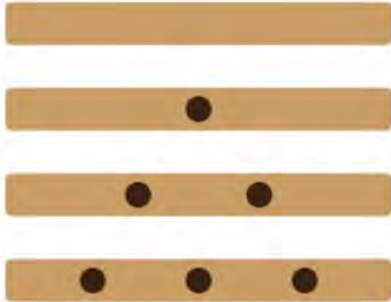


001000	001010	001011	001101	001110	010001
<b>8</b>	<b>10</b>	<b>11</b>	<b>13</b>	<b>14</b>	<b>17</b>
$001000 = 1 * 2^3$ $+ 0 * 2^2 + 0 * 2^1$ $+ 0 * 2^0 = 8$	$001010 = 1 * 2^3$ $+ 0 * 2^2 + 1 * 2^1$ $+ 0 * 2^0 = 10$	$001011 = 1 * 2^3$ $+ 0 * 2^2 + 1 * 2^1$ $+ 1 * 2^0 = 11$	$001101 = 1 * 2^3$ $+ 1 * 2^2 + 0 * 2^1$ $+ 1 * 2^0 = 13$	$001110 = 1 * 2^3$ $+ 1 * 2^2 + 1 * 2^1$ $+ 1 * 2^0 = 14$	$010001 = 1 * 2^4$ $+ 1 * 2^0 = 17$



Hence, the answer is 2.

**Q.15** Shown below are four sides of a rectangular dice. If 3 such dice are thrown together, what is the probability of getting a total sum of 4? Consider the value of the blank side to be zero.



**Solution:**

3 dice are thrown together and whenever we throw a dice, we get either 0,1,2, or 3.

Now to get a sum of four, these are the possible combinations

The total sum of 4 is possible by the following combinations:

0,2,2 or 0,1,3 or 1,1,2

Now 0,2,2 can be in 3 ways i.e,

(2,0,2) (0,2,2) (2,2,0)

Now 0,1,3 can be 6 ways i.e,

(0,1,3) (0,3,1) (1,3,0) (1,0,3) (3,1,0) (3,0,1)

(1,1,2) can be in 2 ways i.e,

(1,1,2) (1,2,1) (2,1,1)

So, the probability of getting any number (0 or 1 or 2 or 3) =  $\frac{1}{4}$

So,

$$\text{Probability of getting } (0,2,2) = \frac{1}{4} \times \frac{1}{4} \times \frac{1}{4} \times 3 = \frac{3}{64}$$

$$\text{Probability of getting } (0,1,3) = \frac{1}{4} \times \frac{1}{4} \times \frac{1}{4} \times 6 = \frac{6}{64}$$

$$\text{Probability of getting } (1,1,2) = \frac{1}{4} \times \frac{1}{4} \times \frac{1}{4} \times 3 = \frac{3}{64}$$

$$\begin{aligned} \text{The probability of getting a total sum of 4} &= \frac{3}{64} + \frac{6}{64} + \frac{3}{64} = \frac{12}{64} \\ &= \frac{3}{16} = 0.1875 \end{aligned}$$

So, the answer is 0.17-0.19.

**Q.16** How many distinct types of characters appear in the figure given below?

6 6 5 4 3 2 1  
 3 2 1 2 3 4 5  
 2 1 2 3 4 5 6  
 5 4 3 2 1 2 3  
 4 3 2 1 2 3 4  
 2 1 2 3 4 5 6  
 3 2 1 2 3 4 5

Solution:

6	6	5	4	3	2	1
<del>3</del>	<del>2</del>	<del>1</del>	<del>2</del>	3	4	<del>5</del>
2	1	2	3	4	<del>5</del>	<del>6</del>
5	4	3	2	<del>1</del>	<del>2</del>	<del>3</del>
<del>4</del>	<del>3</del>	2	<del>1</del>	2	<del>3</del>	<del>4</del>
3	<del>2</del>	<del>1</del>	<del>2</del>	<del>3</del>	<del>4</del>	<del>5</del>
2	<del>1</del>	<del>2</del>	<del>3</del>	4	<del>5</del>	<del>6</del>

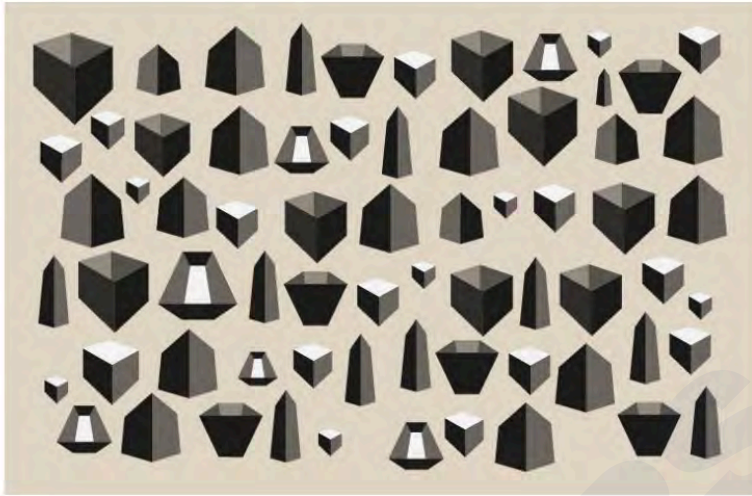
7  
2  
5  
4  
2  
2

6	6	5	4	3	2	1
<del>3</del>	<del>2</del>	<del>1</del>	<del>2</del>	3	4	<del>5</del>
2	1	2	3	4	<del>5</del>	<del>6</del>
5	4	3	2	<del>1</del>	<del>2</del>	<del>3</del>
<del>4</del>	<del>3</del>	2	<del>1</del>	2	<del>3</del>	<del>4</del>
3	<del>2</del>	<del>1</del>	<del>2</del>	<del>3</del>	<del>4</del>	<del>5</del>
2	<del>1</del>	<del>2</del>	<del>3</del>	4	<del>5</del>	<del>6</del>

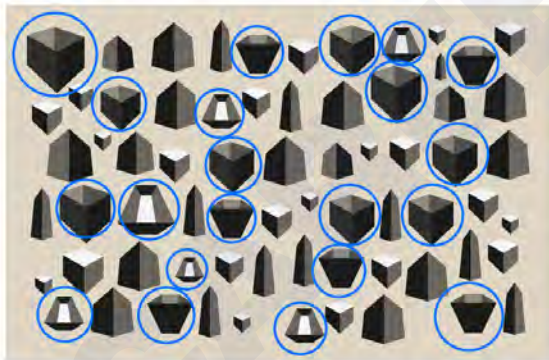
7  
2  
5  
4  
2  
1  
2

So there are 23 distinct types of characters.

**Q.17** Objects made out of cardboard are shown in the image below. Count the number of objects shown as open containers in this image.

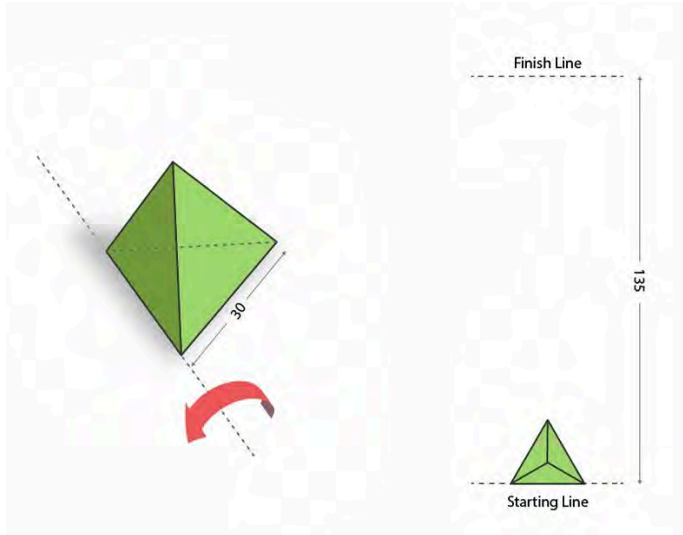


**Solution:**

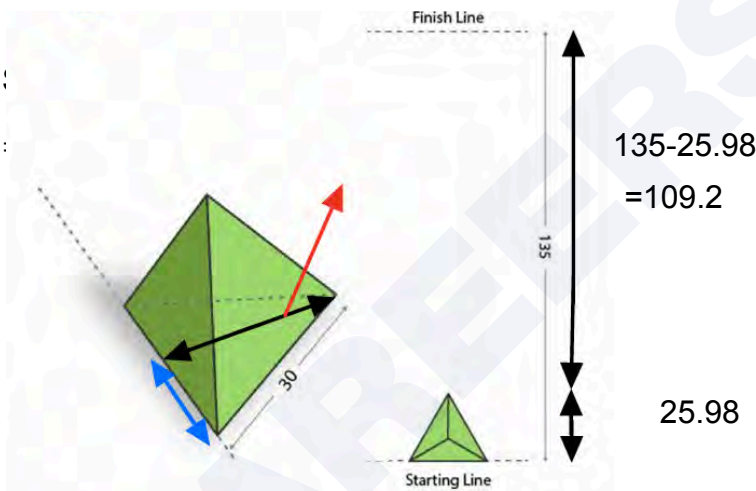


So total of 21 objects are open containers in this image.

**Q.18** A triangular pyramid with equal sides can be flipped on its edges without slipping or sliding as shown on the left. What is the minimum number of flips needed for the pyramid to reach the finishing line if the starting position is as shown on the right?



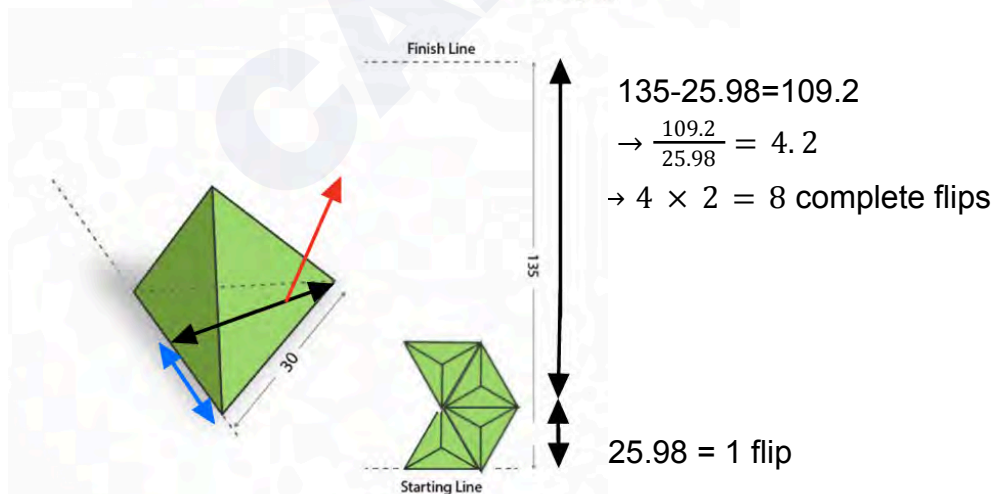
**Solution:** Foremost, find the distance it will cover in one flip. So first find the height of this equilateral triangle [As shown below]



$$\Rightarrow \sqrt{30^2 - 15^2}$$

$$\Rightarrow \sqrt{675}$$

$$\Rightarrow 25.98$$

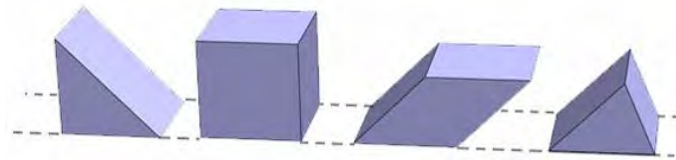


We can see that for every alternate flip, it's gaining height  
In the 9th flip, it will reach the top

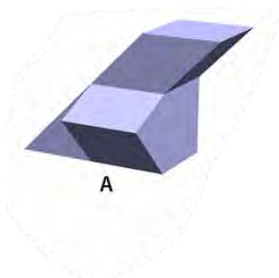
$\therefore 9 + 1 = 10$  flips  
 Answer = 10 flips.

## Section 2: Multiple Select Questions (MSQ)

**Q.19:** Shown in the top row are 4 pieces of building blocks. Which of the option(s) is/are made using all four pieces?



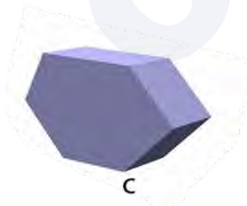
**Option A:**



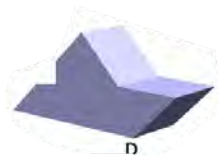
**Option B:**



**Option C:**

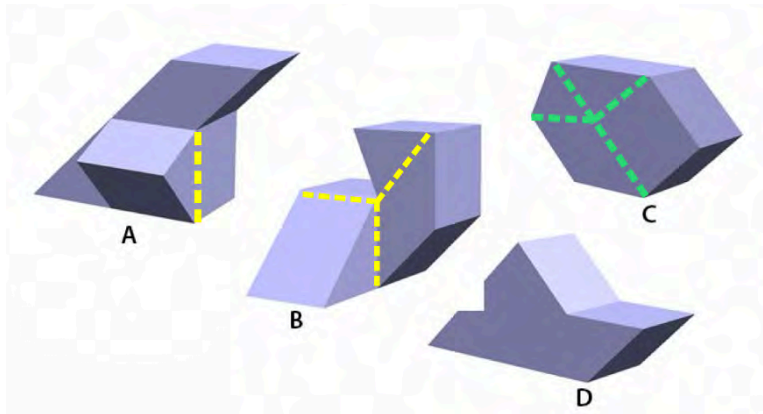


**Option D:**



**Solution:**

If we join four pieces of building blocks, we can



We can see that all pieces can be seen in option A.  
Hence, the answer is A.


**Q.20** A printer wishes to print four colours, Crimson, Pink, Brown, and Indigo, using CMYK [Cyan, Magenta, Yellow, and Key (black)] inks. The printer uses the CMYK combinations shown below (in % of each ink) to produce the colours on the right. Which combination(s) will result in the correct colour (s)?

**Option A:**

C = 05%	}	
M = 90%		
Y = 70%		
K = 05%		


**A**

**Option B:**

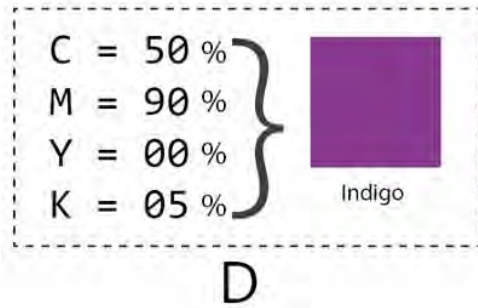
C = 05%	}	
M = 15%		
Y = 70%		
K = 00%		

**B**

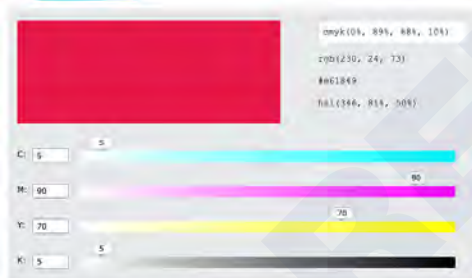
**Option C:**

C = 50%	}	
M = 50%		
Y = 100%		
K = 05%		

**C**

**Option D:**

**Solution:** To get the exact combination, we have to check each option one by one

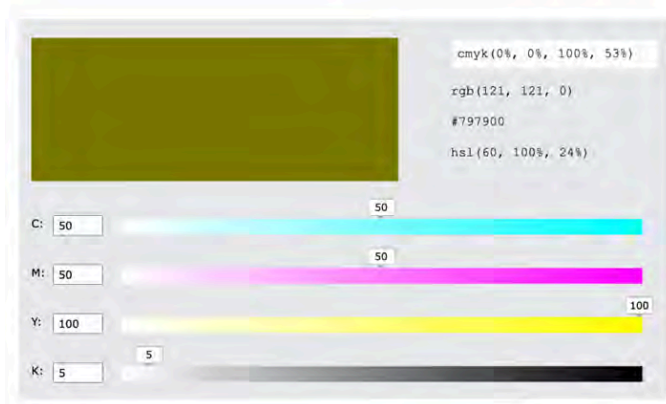
**Option A:**

Hence, option A is correct.

**Option B:**

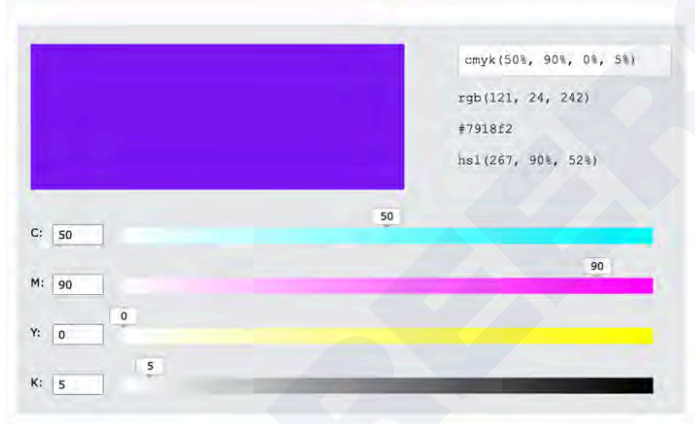
Hence, option B is incorrect.

Option C:



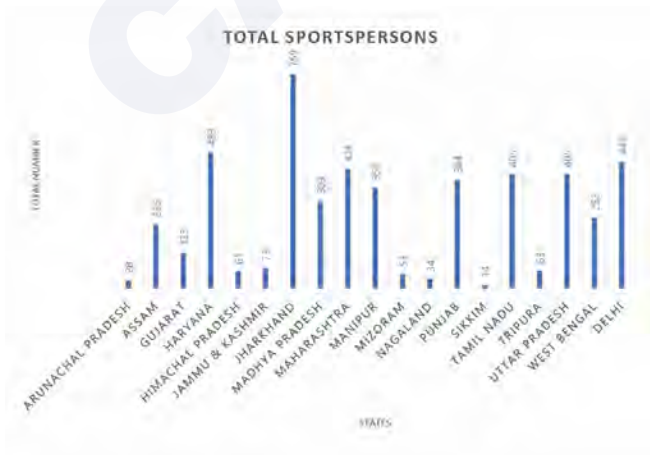
Hence, option C is incorrect.

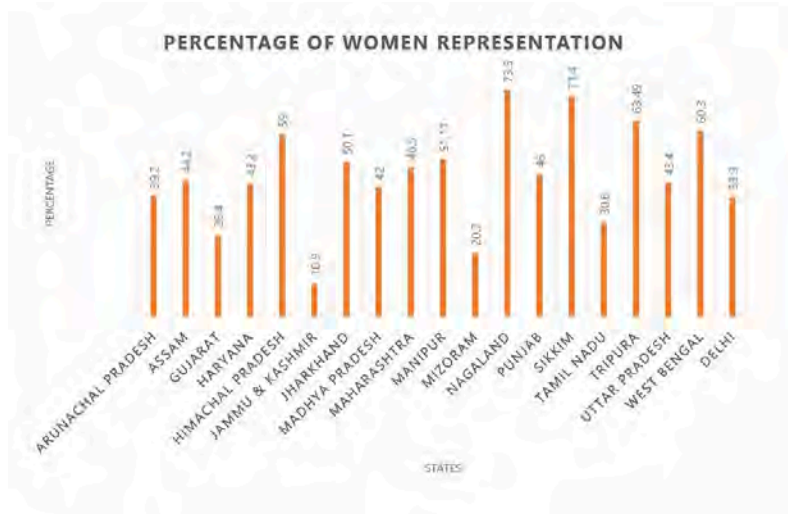
Option D:



Hence, option D is correct.

**Q.21**





Which of the statement(s) is/are true?

- A. Jharkhand has the highest number of sportspersons, but its percentage of women representation is not the highest.**
- B. Of all the Northeastern states, Nagaland produces the highest number of sportspersons.**
- C. Jammu & Kashmir has a low number of sports persons but a high number of women's representation.**
- D. Even though Tamil Nadu and Uttar Pradesh have the same number of sportspersons, Uttar Pradesh fares higher in women's representation as compared to Tamil Nadu.**

**Solution:**

Statement A -

Jharkhand-Total sportsperson=759

Percentage of women sportsperson=50.1

We can say by observing the graph that the statement is true.

Statement B-

North-eastern states are Manipur, Mizoram, Assam, Arunachal Pradesh, Meghalaya, Nagaland, and Tripura. By observing the graph, we can say that the statement is false.

Statement C-

Jammu Kashmir has a total T3 Sportsperson which is low but the percentage of women representation is not the highest. Therefore, the statement is false.

Statement D-

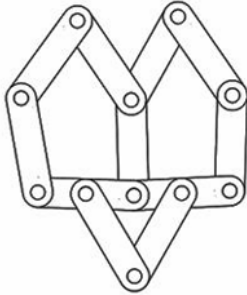
Uttar Pradesh, total sports person=405

Percentage of women representation =43.4%

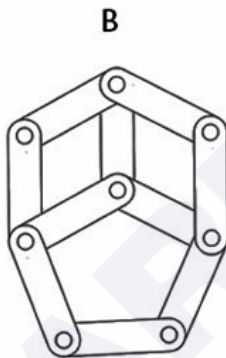
Tamil Nadu, total sports person =405  
 Percentage of women representation=30.6%  
 Therefore, we can say the statement is true.

**Q.22** The figure below shows four mechanisms made using links and hinges. If circles represent hinges, which of the option(s) will allow relative motions between the

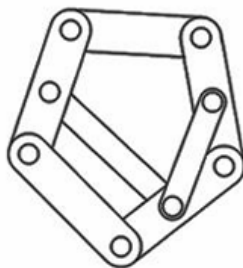
**Option A:**



**Option B:**

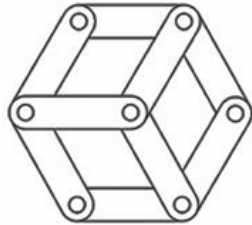


**Option C:**



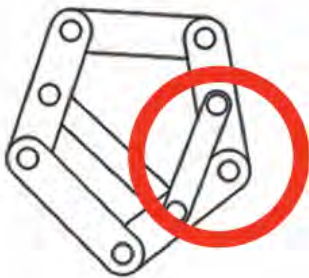
Option D:

D



Solution:

C



If we observe option C we can see the highlighted part won't allow the hinges to move and create hindrance. Therefore, this is incorrect. In the rest of all options, i.e., A, B, and D will have movement.

**Q.23** Shown on the left is a sheet of stickers. Identify the option(s) in which monkeys of the same species are sitting together.



Option A:



Option B:



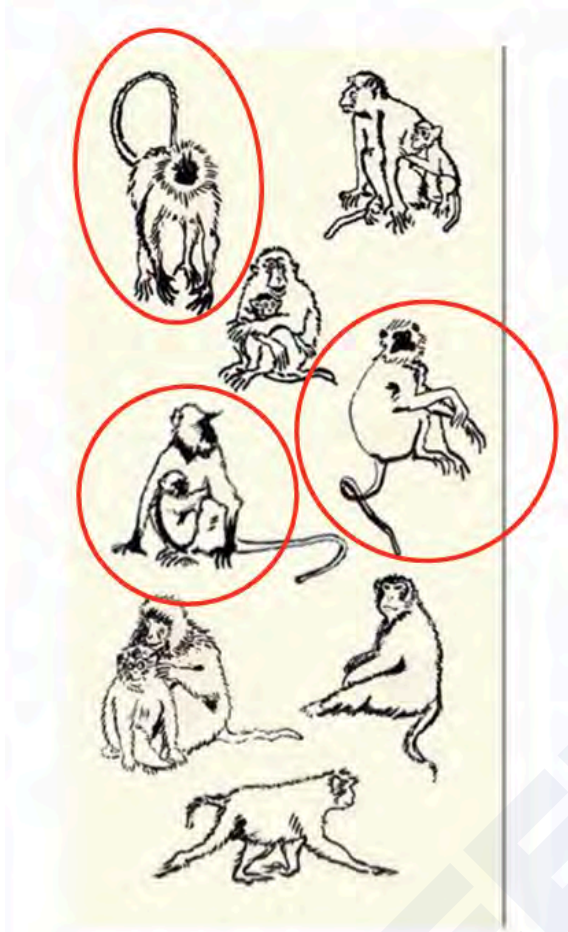
Option C:



Option D:



Solution:



We can see above that these 3 monkeys have dark faces. So, we can identify them through their tails and now check each option one by one.

Option A:



We can see the same tails which means this is correct.

Option B :



We can see they do not have the same types of tails.

Option C:



We can see the same tails which means this is correct.

Option D:

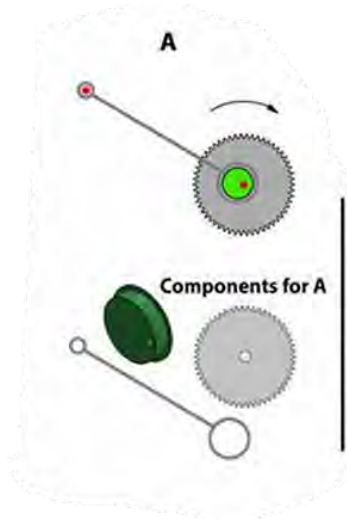


We can see they do not have the same types of tails.

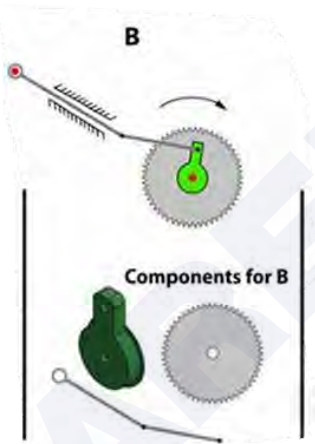
**Q.24** Different views of the cross-section of a fish toy are shown here. The points P and Q are connected in such a way that the fishtail waves. The gray colour gear and the green colour part are joined together. The rod is free to move depending on how it is connected to the green part. Which of the option(s) will work to wave the tail?



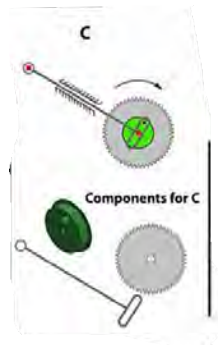
Option A:



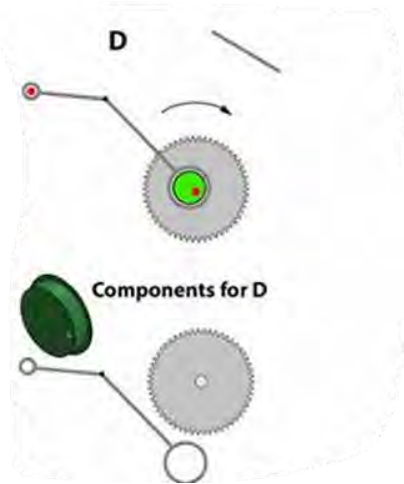
Option B:



Option C:



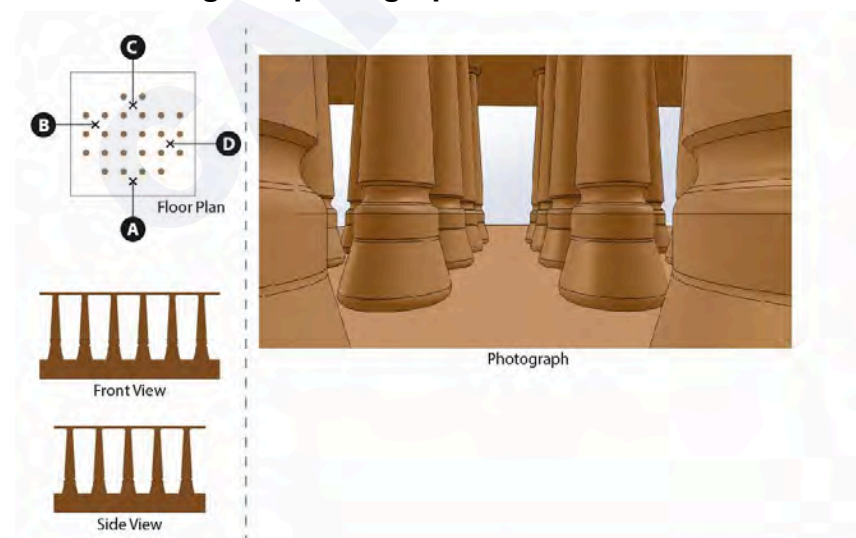
Option D:

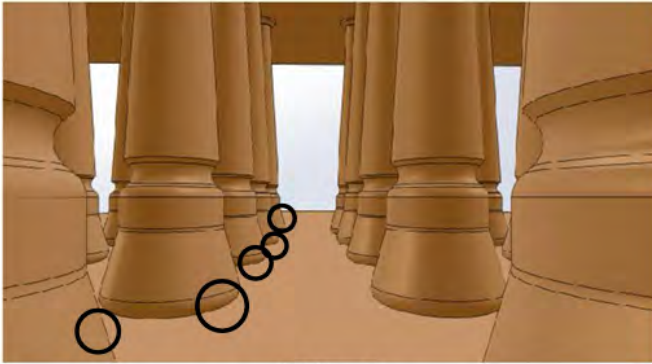


**Solution:**

The grey colour gear and green colour parts are joined together. The rod is free to move depending upon how it is connected to the green part, then A, B, and C will work to wave the tail as in option D connection is not making it move. Hence, options A, B, and C are correct.

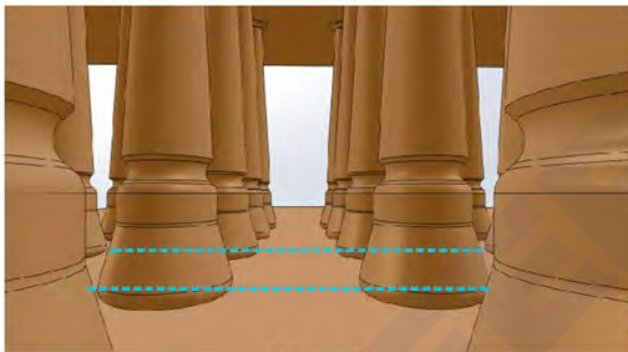
**Q.25** A tourist is shooting photographs of an ancient building from four locations A, B, C, and D marked by x. The tourist is using only one camera without changing its magnification. Identify the location(s) in the floor plan which will result in the given photograph.



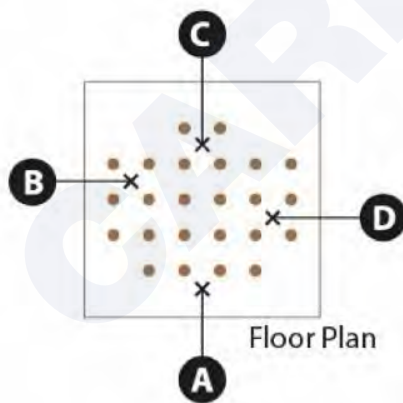
**Solution:**

Photograph

We can see from the photograph that we have 5 columns.



Photograph



On the left and right from the third row make columns are seen so if we see from position A, 5 columns can be seen and from the third row, left and right columns are there so that means A is correct.

If seeing from position B, straight ahead we can see 5 columns but from the third, we have columns on the left side on the fourth row, there are no columns but in the picture, we can see columns. Therefore, this is incorrect.

If seeing from position C, we can see only 4 columns, but there are 5 columns, so C will not be correct.

If seeing from position D, there are 5 columns ahead which can be seen. Therefore, D is also correct.


Therefore, the correct answers are A and D.

**Q.26** The options show four ways of attempting to write the word “universe” in a mix of lower-case and upper-case letters. Which of the option(s) is/are correctly read as “universe”?

Option A:

A 

Option B:

B 

Option c:

C 

Option D:

D 

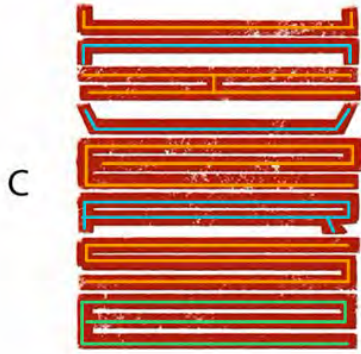
Solution:

A 

Hence, this is incorrect.

B 

Hence, this option is correct.



Hence, this option is correct.



Hence, this option is correct.

Q.27 Which of the option(s) is/are from the same font family (i.e. weight and/or width variations) as the words given below?

# मुद्राक्षर अभिकल्प

Option A :

# फेड

A

Option B:

वात

B

Option C:

धागा

C

Option D:

अकल

D

Solution:

मुद्राक्षर अभिकल्प

We can see in red that it is a slant and in the green highlighted part we have a gap. Now observe each option one by one.

Option A:



A

This has a slant. Hence, the option is correct.

Option B:



B

This has a gap. Hence, this is also correct.

Option C:



C

This is straight. Hence, this is wrong.

Option D:



D

This has a gap. Hence, this is also correct.

Therefore, the A, B, and D options are correct.

**Q.28** Which of the pieces could be used four times individually to form a square?  
The pieces can be rotated and flipped but should not be overlapped.

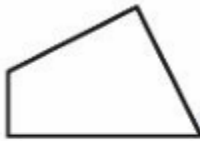


**Option A:**



**A**

**Option B:**



**B**

**Option c:**



**C**

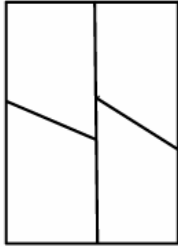
**Option D:**



**D**

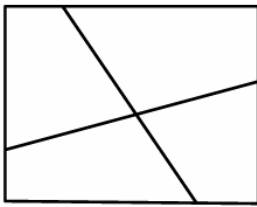
**Solution:**

Option A:



By combining the rotated and flipped form of the given figure, we can form a square as shown above.

Option B:



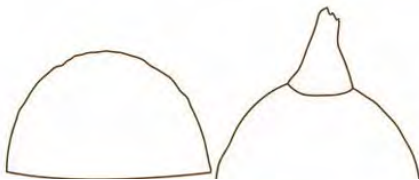
By combining the rotated and flipped form of the given figure, we can form a square as shown above.

Option C: Not possible to make a square by combining the pieces.

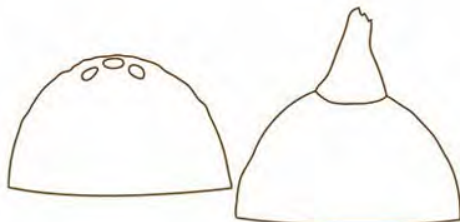
Option D: Because of the curve in the piece, we can not form a square by combining the pieces.

**Q.29** Shown below is a coconut broken into two pieces. Identify the correct representation(s) of the coconut.

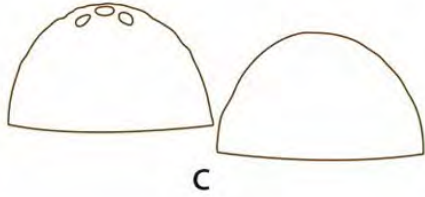
**Option A :**



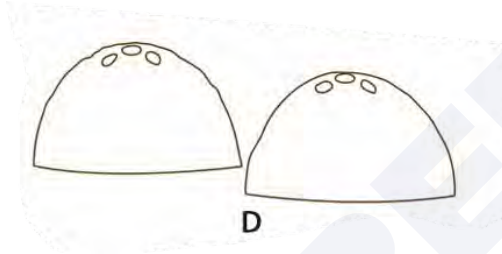
**Option B:**



Option C:



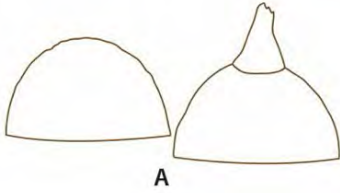
Option D:



Solution:

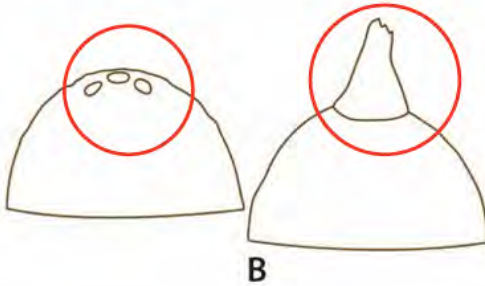


Option A :



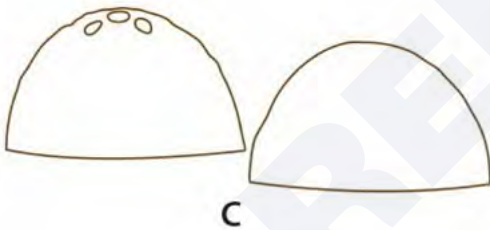
This option is correct

Option B:



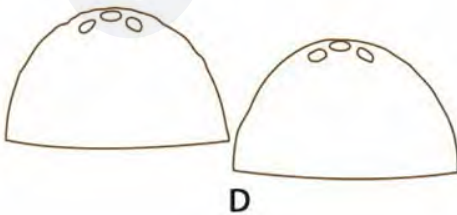
These both are on the same side of a coconut. Hence, this is incorrect.

Option C:



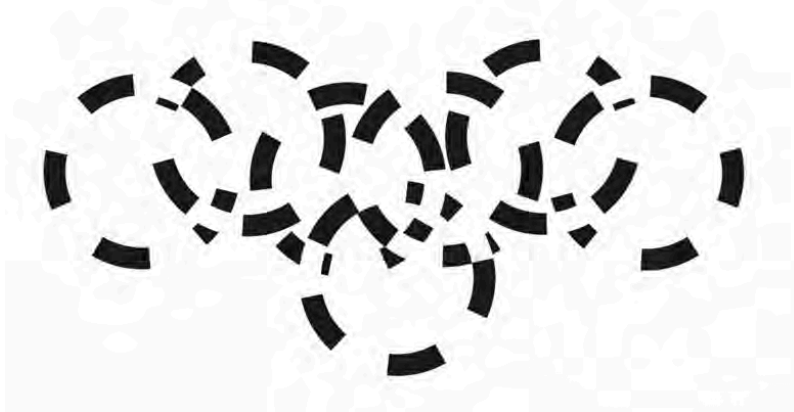
This option is correct.

Option D:



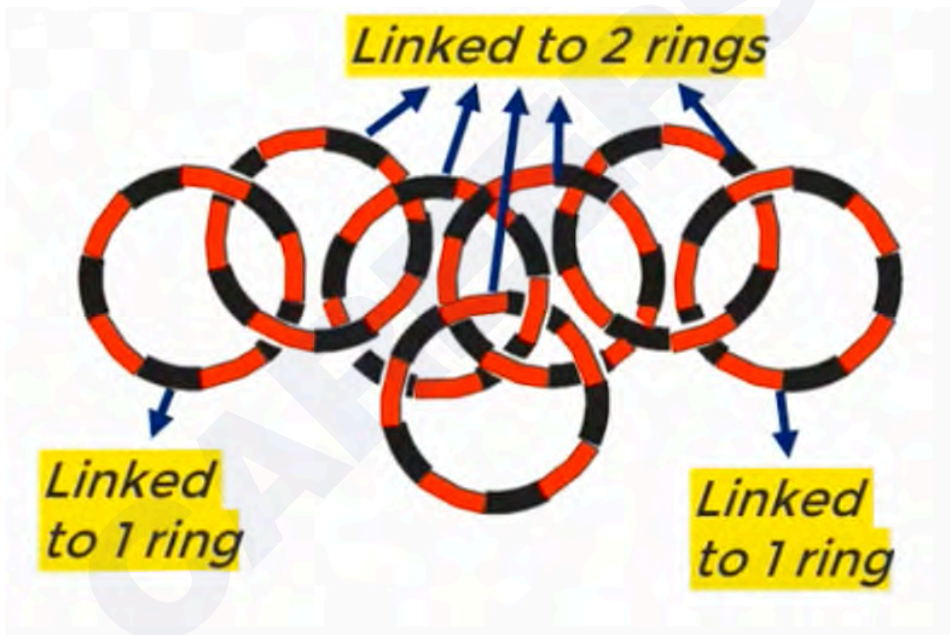
The 3 eyes are only one side of a coconut. Hence, this is incorrect.

**Q.30** Shown below is an image of solid rings of black and white patterns. A ring going inside another is called a link. Which of the statement(s) is/are TRUE?



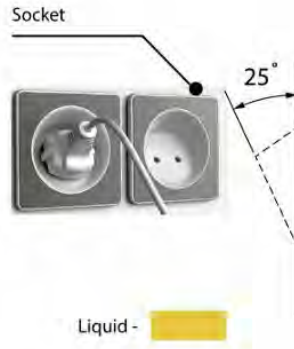
- A. All rings are linked to form one continuous chain.
- B. One ring does not have any link.
- C. One ring has three links.
- D. Two rings have only one link.

Solution:

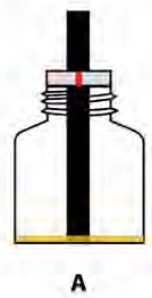


Hence, we can see that statements A and D are correct.

**Q.31** The options show different configurations of refill bottles of mosquito repellent, for an atypical socket shown on the left. After fitting, the red mark on the refill bottle must align with the red mark on the machine. Which of the option(s) will allow all the liquid to be consumed?



**Option A:**



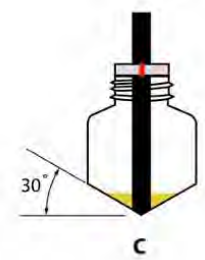
**A**

**Option B:**



**B**

**Option C:**



**C**

**Option D:**

**Solution:**

Option A: When the refill bottle is tilted at 25 degrees, the black wick can't reach all the liquid.

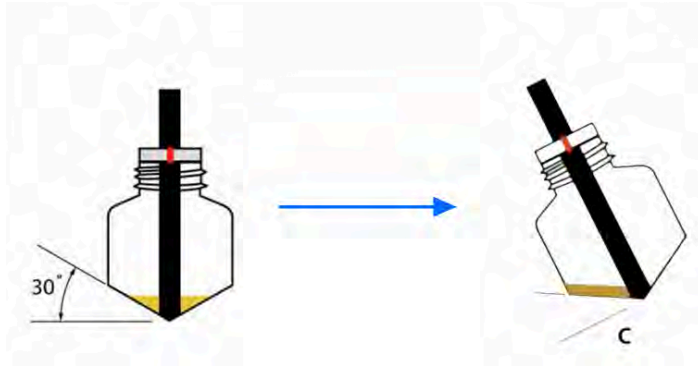


Option B:



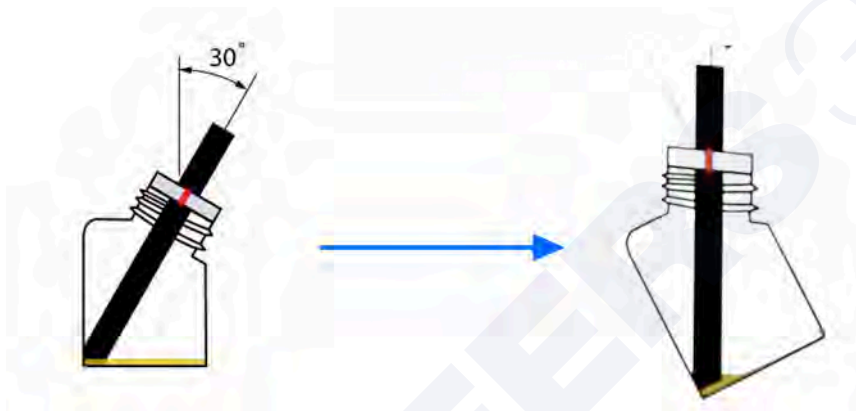
The black wick can reach all the liquid. Hence, it is correct.

Option C:



Hence, this option is correct because the black wick can reach all the liquid.

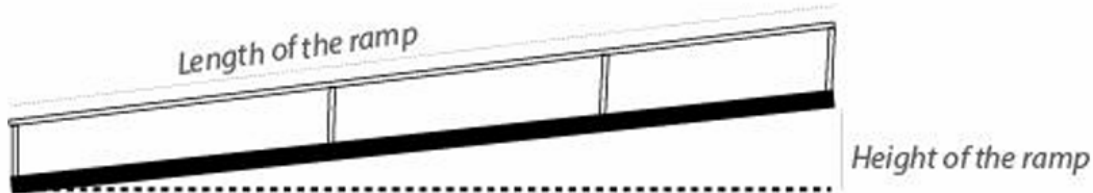
Option D:



The black wick can reach all the liquid. Hence, this option is correct.

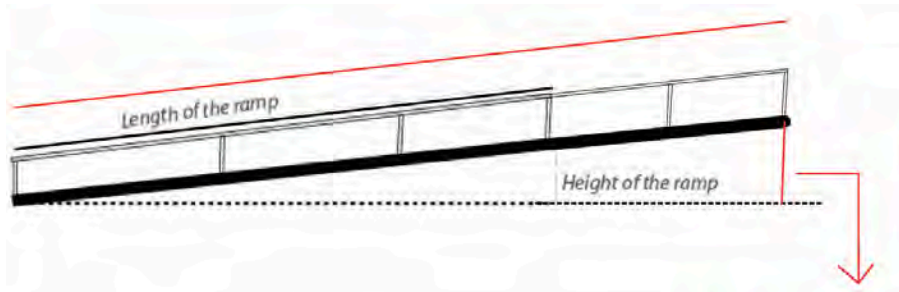
**Q.32** With reference to the image below, which of the statement(s) is/are false?

- A.** Ramps are a good solution for standard wheelchair users to access any building with entry above ground level.
- B.** Height along with the length of the ramp will determine if standard wheelchair users can use it without assistance.
- C.** People on standard wheelchairs will need assistance to go up and down shorter-length ramps, irrespective of their height.
- D.** A shorter length of ramp is convenient for standard wheelchair users without assistance if the height of the ramp is high.



**Solution:**

New length of ramp

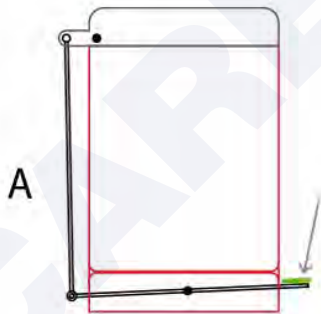


New Height of Ramp

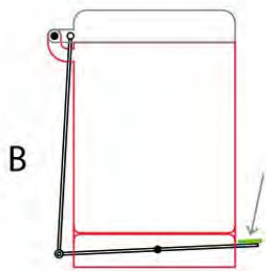
We can see that statements A and B are correct statements, but according to the question, we need a false statement. Therefore, statements C and D are the answer to this question.

**Q.33 In which of the option(s) dust-bin lids will open?**

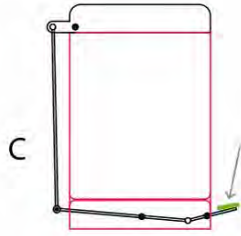
**Option A:**



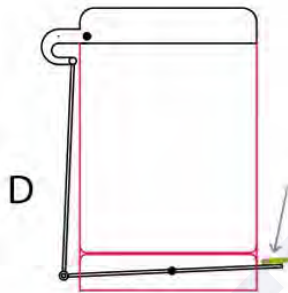
**Option B:**



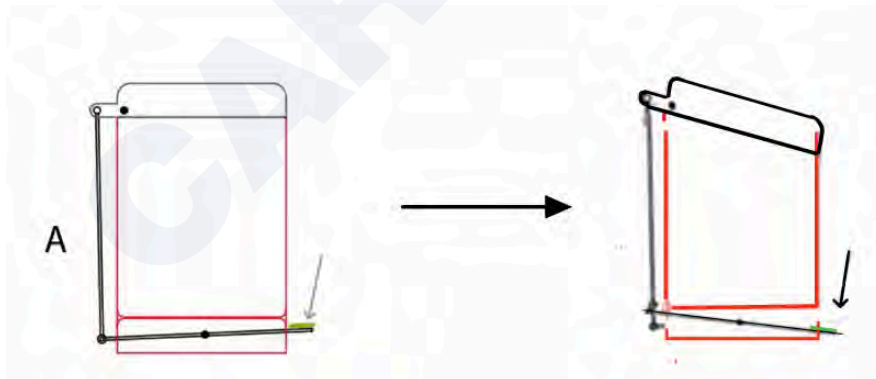
Option C:



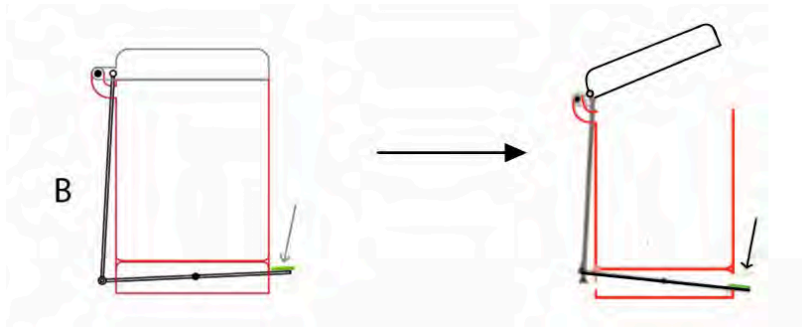
Option D:



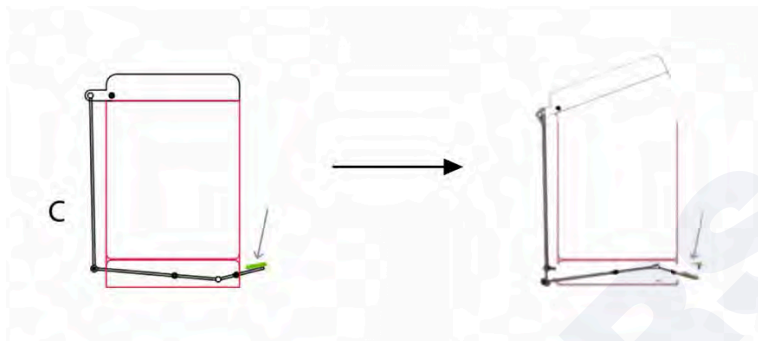
Solution:



Dustbin lid will not open. Hence, this option is incorrect.



Dustbin lid will get open. Hence, this option is correct.



Dustbin lid will get open. Hence, this option is correct.



Dustbin lid will not open. Therefore, this option is incorrect.

Hence, options B and C are correct.

**Q.34** On 16th July 2022, Parvathy bought 4 new pairs of socks A, B, C, and D to train herself for the Marathon race on Gandhi Jayanti. She started her training the next day wearing the new socks. She trained every day, including the day of the marathon, wearing the socks (one pair every day) in the following sequence: C, A, B, and D. Unfortunately, she could not train from 3rd to 22nd September 2022 as she was unwell. She resumed her training on the 23rd wearing pair 'A' socks and

continued with the same sequence till the event day. Identify the pair of socks that Parvathy wore the maximum during her entire training period.

**Solution:** She trained from 17th July to 2nd September and from 23rd September -2nd October.

So, days between 17th July - 2nd September.

July=15 days (including 17th and 31st)

August =31 days

September=2 days

Total days= 15+31+2=48 days

$$48 \div 4 = 12$$

So, she could wear each pair 12 no. of times between 17th July and 2nd.

And, days between 23rd sep-2nd October

September =8 days (including 23rd)

October=2 days

Total =8+2 =10 days

She resumed with sock A and continued with the same sequence.

So, she wore socks as follows in 10 days

AB DC AB DC AB

$$A - 12 + 3 = 15 \text{ times}$$

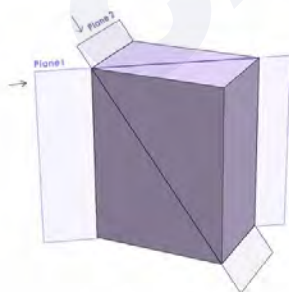
$$B - 12 + 3 = 15 \text{ times}$$

$$C - 12 + 2 = 14 \text{ times}$$

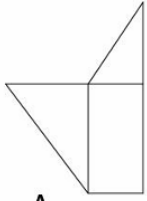
$$D - 12 + 2 = 14 \text{ times}$$

So, we can say that Parvathy wore maximum times A and B.

**Q.35** The rectilinear hollow box shown on the left is cut along plane 1 and plane 2. Which of the option(s) shows (s) the correct unfolded pieces?

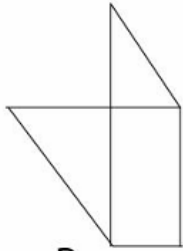


**Option A:**



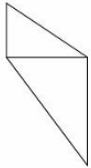
A

**Option B**



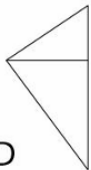
B

**Option C:**



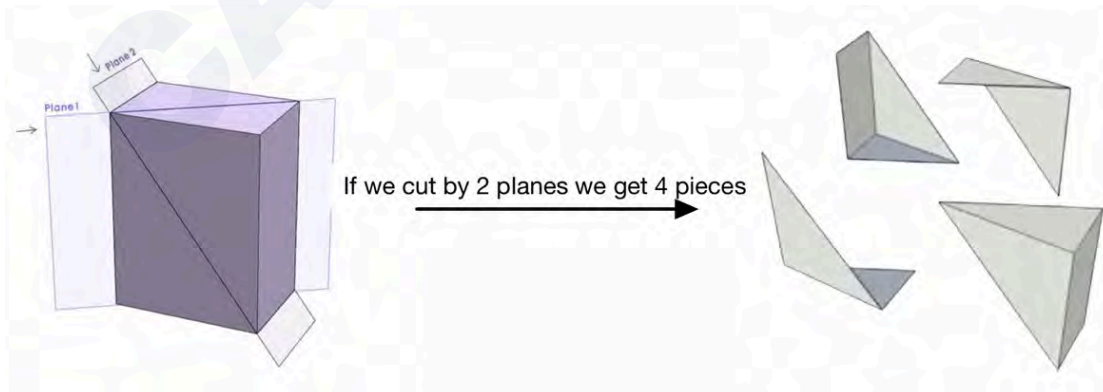
C

**Option D:**



D

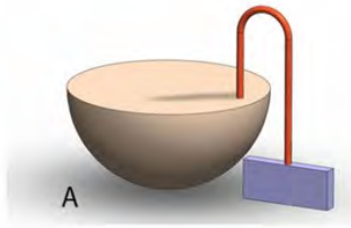
**Solution:**



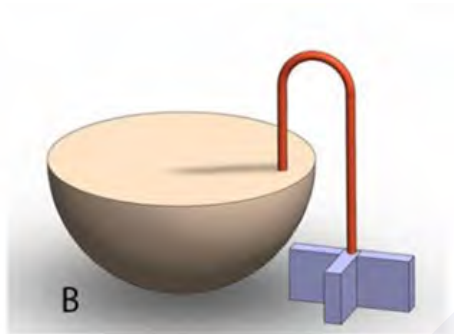
We can see the 2 right angles at the corner in all the pieces. Now go through each option. We can see options B and D are correct.

Q.36 Shown below are tables of a new design. Which table(s) will not tilt, if given a small perturbation in any direction?

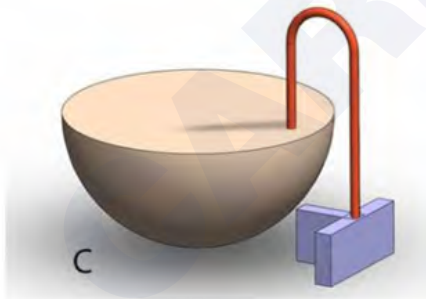
Option A:



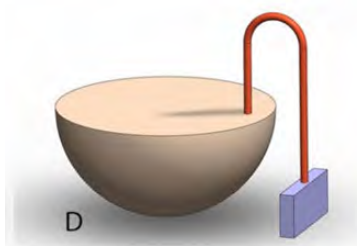
Option B:



Option C:



Option D:



**Solution:**

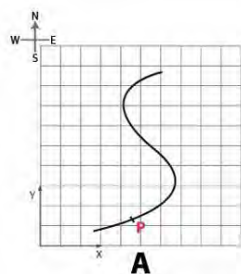
Perturbation means deviation from a particular position.

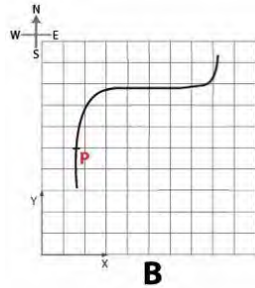
Now if we check the options we can observe that options C and d when given a small perturbation in any direction, will not tilt.

Hence, options C and D are correct.

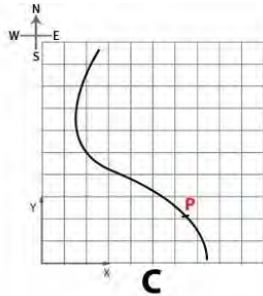
**Section 3: Multiple Choice Questions (MCQ)**

**Q.37** Imagine that you are travelling in a passenger train, with 22 coaches, depicted by curved black lines in the options. You are sitting on a window seat in the 19th coach (seat position marked as P). At a given instant of time when the train is heading northwards, select the option that will allow you to see the engine at the front clearly through the window of your seat.

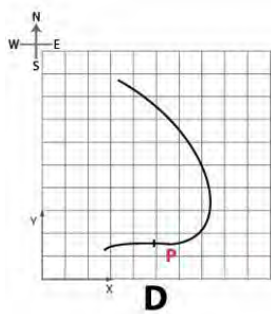
**Option A:****Option B:**



**Option C:**



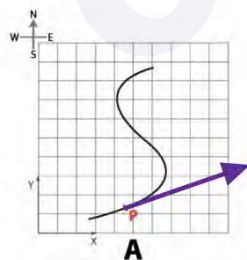
**Option D:**



**Solution:**

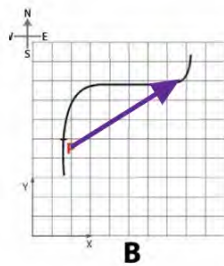
In this question, we have to see the engine from the window seat of the 19th coach in the train of 22 coach.

Option A:



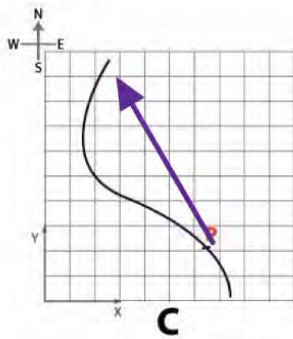
When you are sitting at position P i.e., Window then you will see the view of the east side (as shown in the image above.) but as the train is moving in a North direction that means the engine will be in the North. So we can't see the engine. Hence, this option is wrong.

Option B:



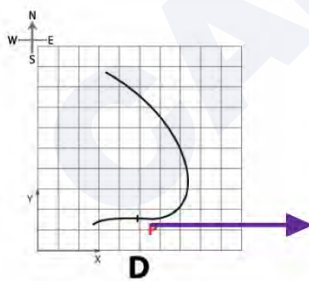
The part of the train will block the view, so here as well we can't see the engine.

Option C:



You are on the Right side and clearly from this window, you can see the engine. Hence, this is correct.

Option D:



Even though the engine is on the direct side, you are sitting on the right side, so from the right side you only side east (as shown above). So you will not be able to see the engine. Hence, option C is correct.

**Q.38 Which of the molds shown on the right can be used to make the cake shown on the left?**

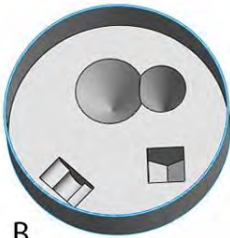


Option A:



A

Option B:



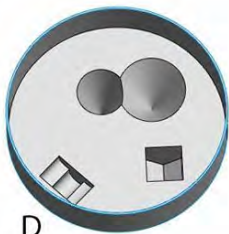
B

Option C:



C

Option D:



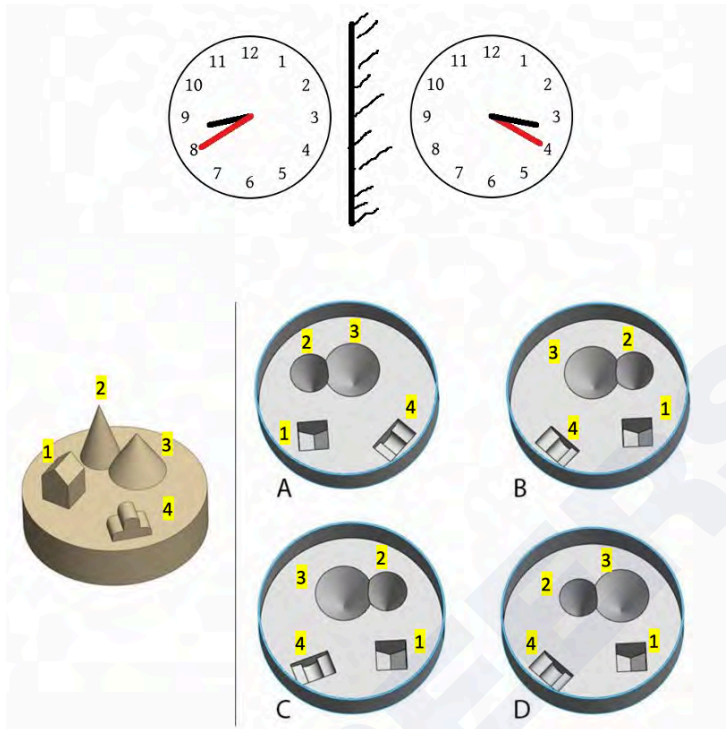
D

**Solution:** This question is related to mirror image. So let's understand mirror image.

In the mirror image,

- The right side of the object becomes the left side.
- The left side of the object becomes the right side.
- The top and bottom sides of the object remain unchanged.

**Example:**

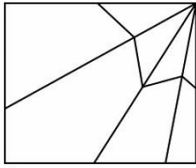


So we can see that the mirror image of the object given is B  
Hence, the correct answer is B.

**Q.39** Which of the options shown on the right, when folded at the lines, will resemble the paper shown on the left?

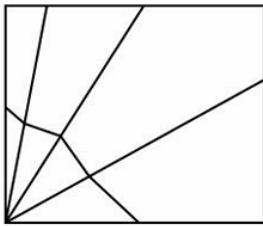


**Option A:**



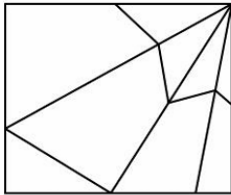
A

**Option B:**



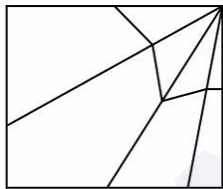
B

**Option C:**



C

**Option D:**



D

**Solution:**

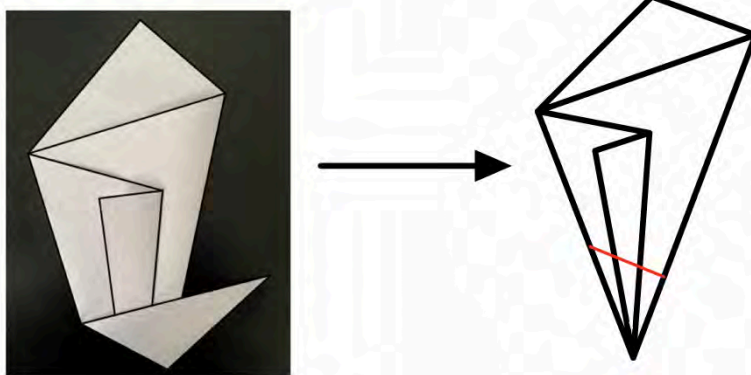
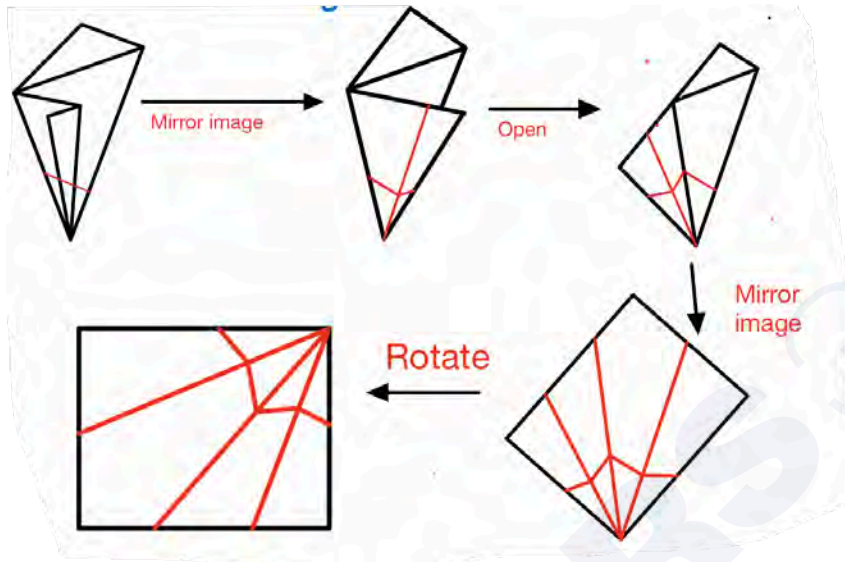


Figure 1

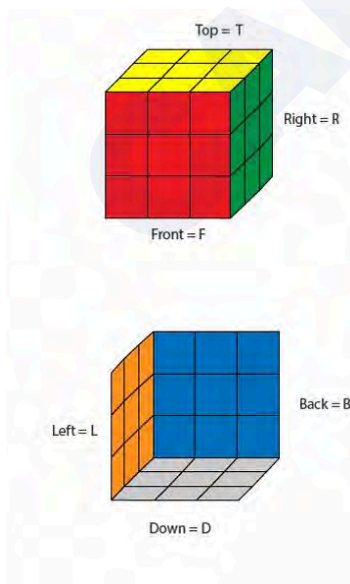
Figure 2

When we open the figure 2 we will get the mirror image.

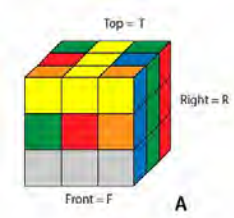


So if we match it with options, we can clearly say that A is the correct answer.

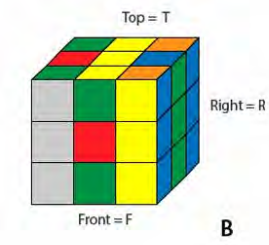
**Q.40** The faces of a solved Rubik's Cube are shown in the figure. A 90-degree clockwise turn of a face T is denoted as 'T+' and a 90-degree anticlockwise rotation is denoted as 'T-'. What is the result of the operation T+, D+, R-, L-? All operations are done by looking directly at the face.



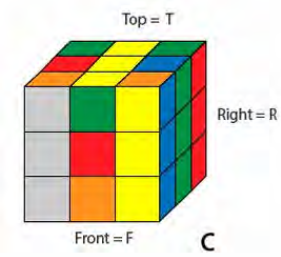
**Option A:**



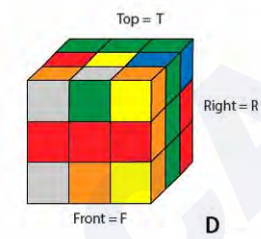
**Option B:**



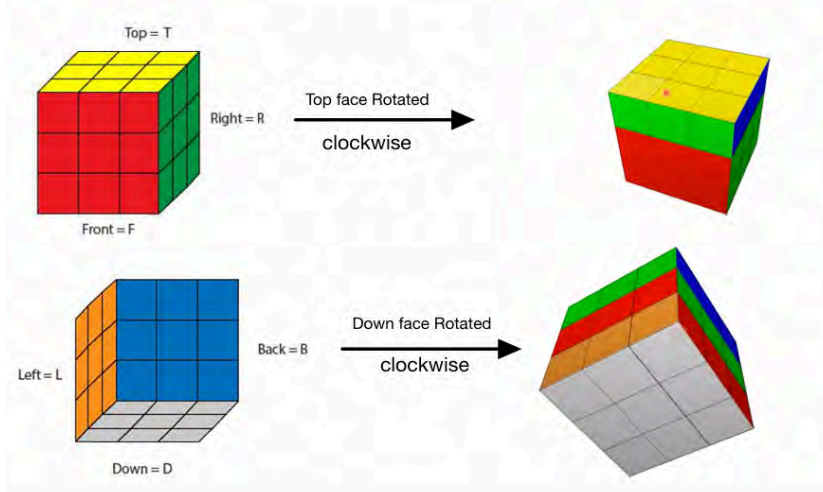
**Option C:**



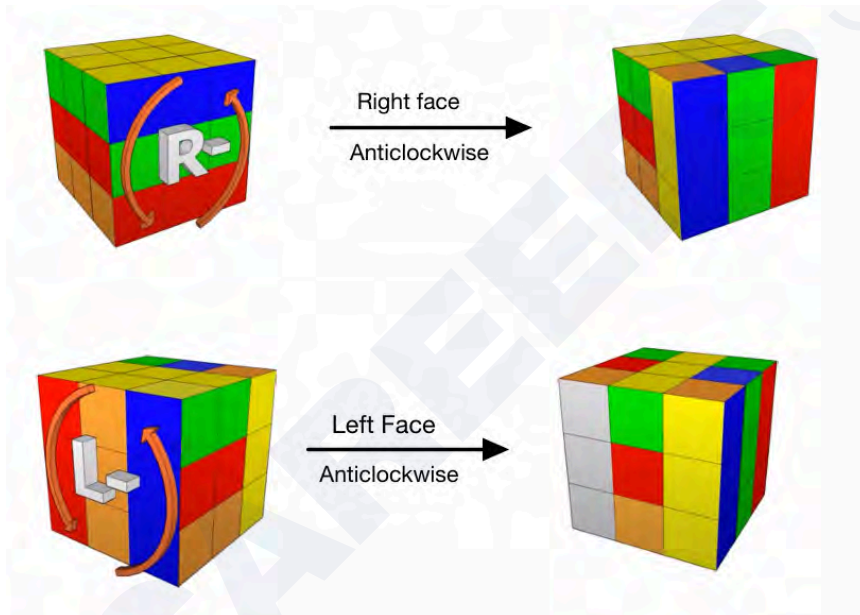
**Option D:**



**Solution:**



According to the next instruction R- i.e., Right face anti-clockwise.

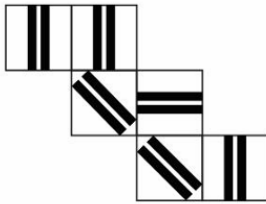


We can see that C is the correct answer.

**Q.41** Shown on the left are all the 6 faces of a cube. Which option can be folded into this cube?

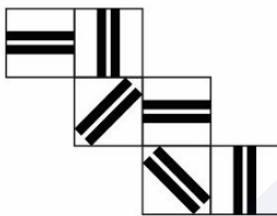


Option A:



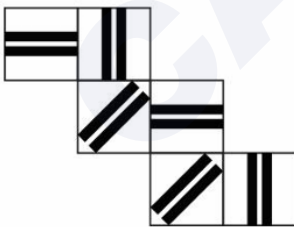
A

Option B:



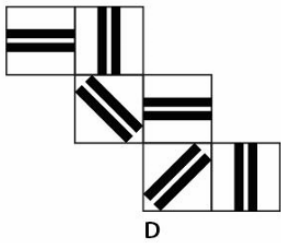
B

Option C:



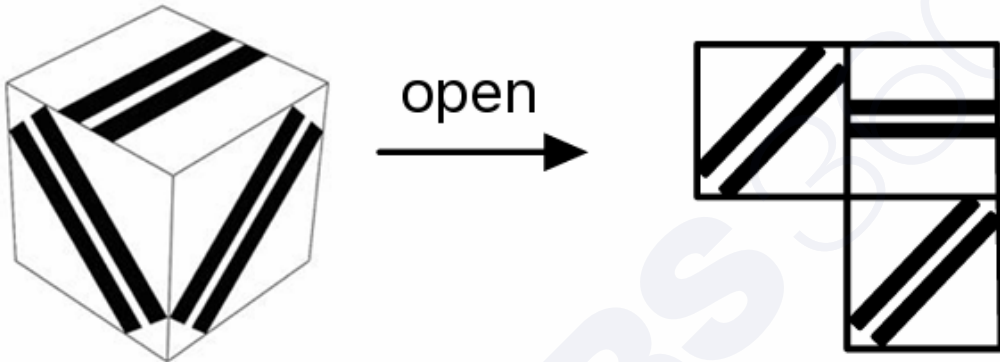
C

Option D:



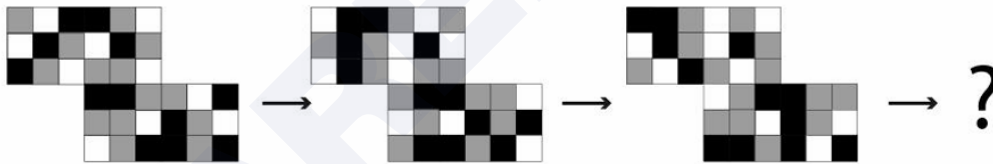
D

**Solution:**

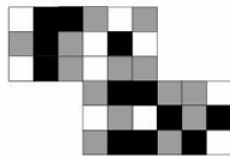
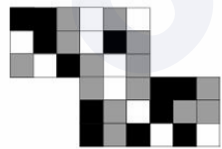


Now if we try to find a particular combination (figure 2) we can find it in option C  
Hence, option C is correct.

**Q42:**

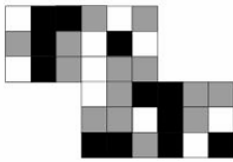


**Option A:**



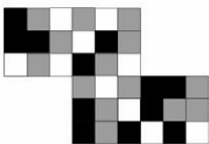
B

Option C:



C

Option D:

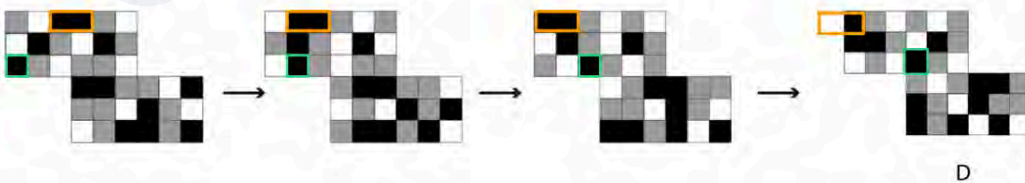


D

Solution:



If we observe the above image we can see that the shaded area (orange) is moving on the left side in Row 1 but in the 2nd row, No movement has been observed in Row 3rd, the shaded area (green) is moving on to the right side. Now by option, we can see that option D is correct (shown below)



**Q.43** The white part in the shoe sole shown left represents the embossed / raised area. Find out the right footprint of the shoe from the given options.



Option A:



A

Option B:



B

Option C:



C

Option D:



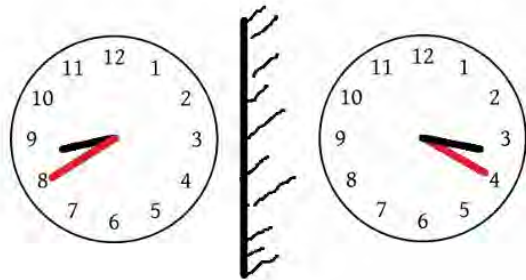
D

**Solution:**

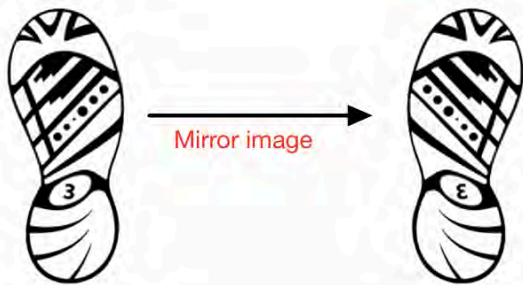
We need to find out the mirror image of the footprint.

In the mirror image,

- The right side of the object becomes the left side.
- The left side of the object becomes the right side.
- The top and bottom sides of the object remain unchanged.

**Example:**

So the mirror image of the footprint is



Now check the options one by one.

Option A:



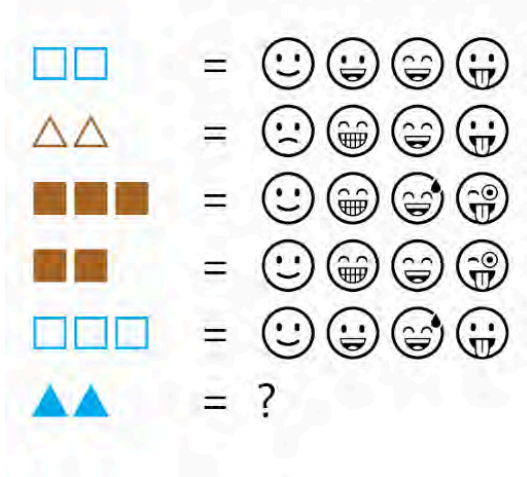
Both images don't resemble. Hence, option A is incorrect.

Option B:



Both images resemble each other. Hence, option B is correct.

**Q44:**



Option A:



Option B:



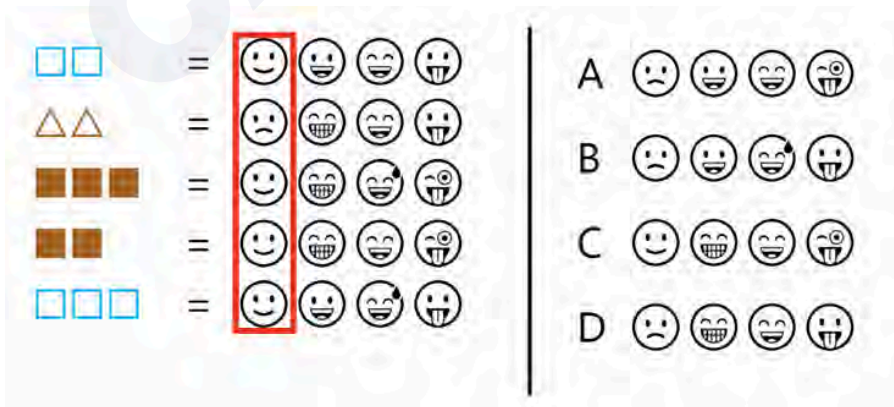
Option C:



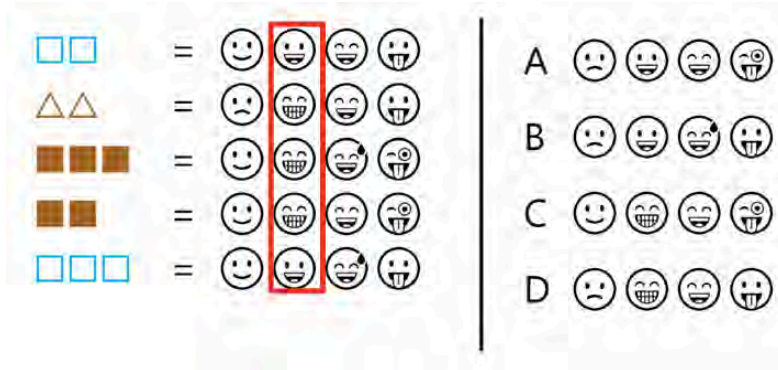
Option D:



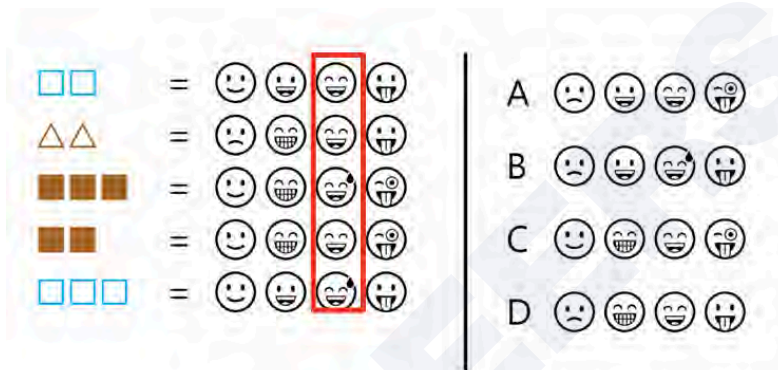
Solution:



If we observe it, we can see an emoji and observe the triangle shape's emoji is sad. Therefore, option C is eliminated.



If we look for row 2 we can see that brown color emojis are different from blue colour. Therefore, option D is eliminated.

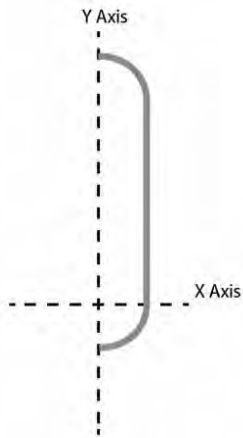


If we look for row 3 then the third and fifth column has smiles with tears and the common between the third and fifth columns that we observe both have quantity i.e., No of squares same. Hence, option B is eliminated.

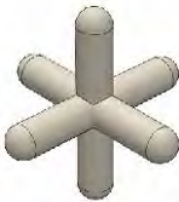
Therefore, option A is correct.

**Q.45** The following operations are done on the curve shown in the figure.

1. The curve is revolved 360 degrees around the Y axis.
  2. The resulting form is then cloned twice around the X-axis at 120 degrees to each other.
  3. The resulting form is then cloned once about the Y axis at 90 degrees.
- What is the resulting 3D form?

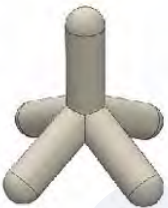


**Option A:**



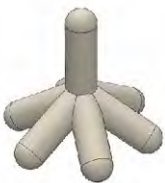
A

**Option B:**



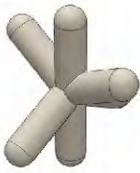
B

**Option C:**



C

**Option D:**

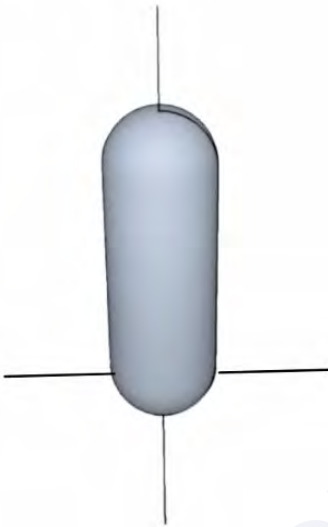


D

**Solution:**

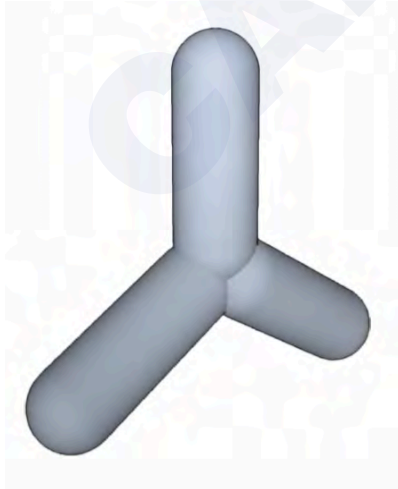
Statement 1:

The curve is revolved 360 degrees around the y-axis



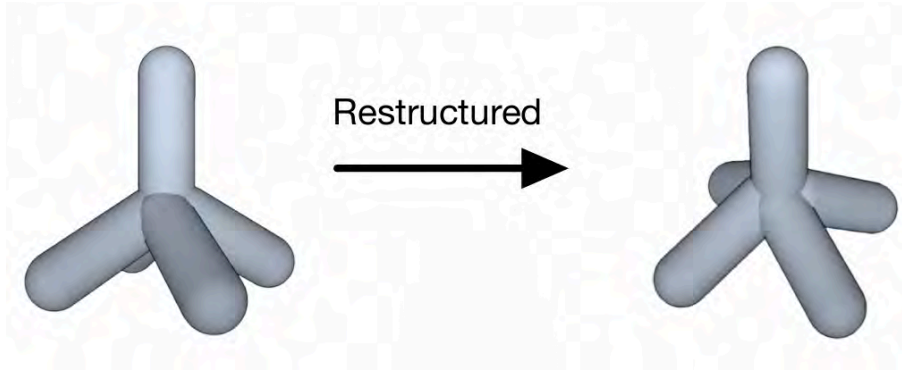
Statement 2:

The resulting form is then cloned twice around the x-axis at 120 degrees to each other.



Statement 3:

The resulting form is then cloned once about the y-axis at 90 degrees.



Hence, option B is correct.

**Q.46 Which combination shows a lunar eclipse?**

**Option A:**



**Option B:**



**Option C:**

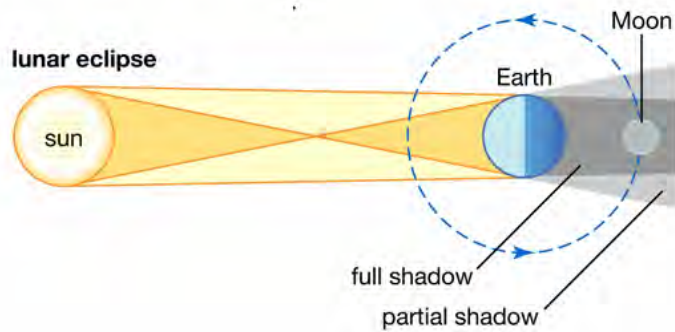


**Option D:**



**Solution:**

A Lunar eclipse occurs when the Sun casts Earth's shadow onto the Moon. For this to happen, the Earth must be physically between the Sun and Moon, with all three bodies lying on the same plane of orbit. A lunar eclipse can only occur during a Full Moon and when the Moon passes through all or a portion of Earth's shadow



Hence, option B is correct.

**Q.47** A boat is moving on the river and following the path as shown by the dashed line. Both the boatmen are facing front and rafting with equal force in the directions shown by the arrows in the options. Which of the options will help the boat to take a right turn?



**Option A:**



A

**Option B:**



**Option C:**



**Option D:**



**Solution:**

The principle used in boat movement is known as buoyancy or Archimedes' Principle. Archimedes' Principle states that the force exerted on an object in a fluid is equal to the weight of the fluid displaced (moved out of the way) by the object. This force is called buoyant force. The buoyant force pushes upwards against the object.

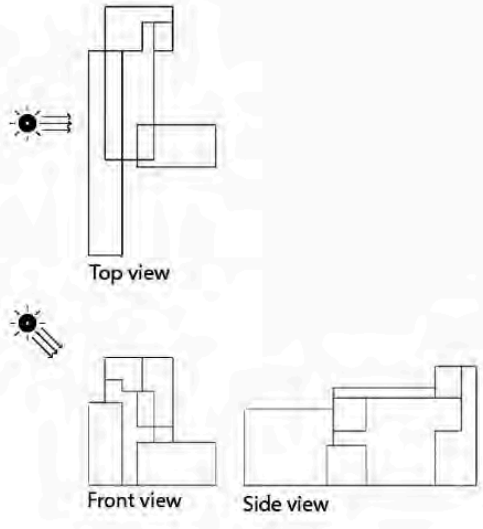
Now we know that both the boatmen are facing front and rotating with equal force, and we should understand the navigation rules that if you want to turn right you have to paddle on the left side of the raft.

In options A and C, both the boatmen are paddling in opposite directions, which makes these options wrong.

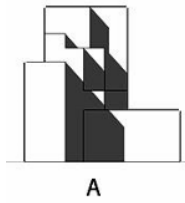
In option B, we can see paddling in the left direction, which is wrong again (as explained above)

Hence, option D is correct.

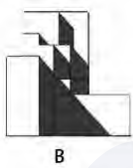
**Q.48 Select the correct sunshade pattern on the illustrated structure. Assume the Sun at 45 degrees on the left as shown.**



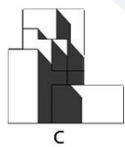
Option A:



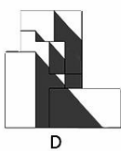
Option B:



Option C:

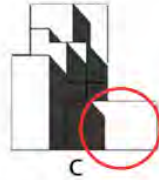
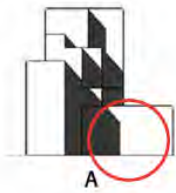


Option D:



**Solution:**

When the sun is on the left side, the shadow will be on the right side.



We can see that in options A and C, the shadow ends abruptly, therefore these options are eliminated.

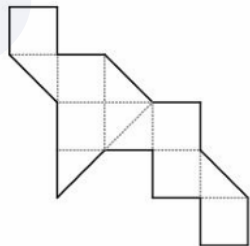


Here in option B as well, the shadow is incomplete. So option B is also eliminated. Hence, option D is correct.

**Q.49 Which option, when folded, will result in the solid shown?**

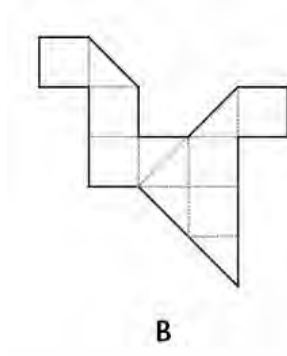


**Option A:**



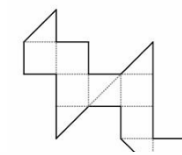
A

Option B:

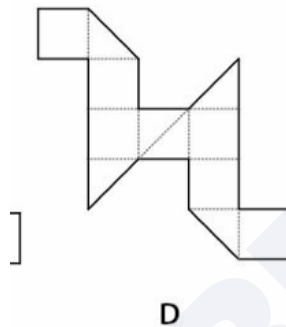


B

Option C:

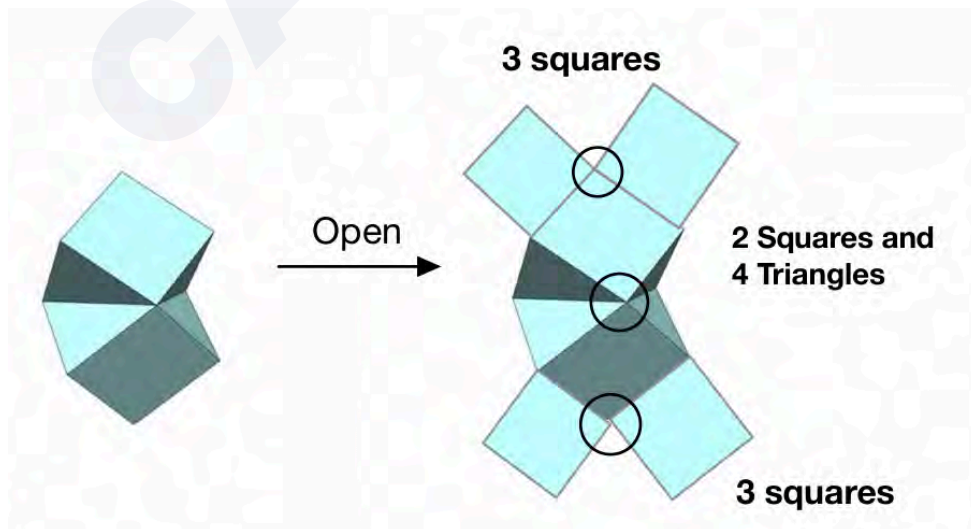


Option D:



D

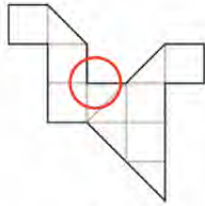
Solution:



Option A:

We are unable to find 3 squares anywhere, so option A is wrong.

Option B:



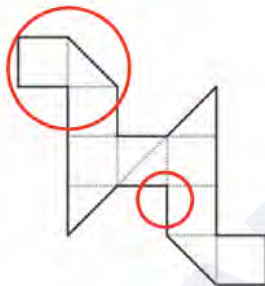
B

We are unable to find 3 squares, but 2 squares and 4 triangles can't be found. Hence, option B is wrong.

Option C:

We can find 3 squares, but 2 squares and 4 triangles can't be found. Hence, option C is wrong.

Option D:



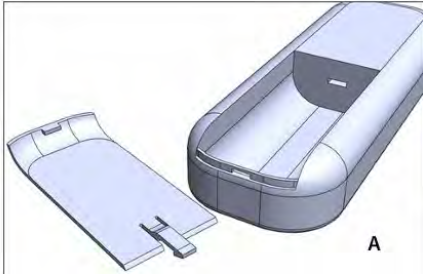
D

Hence, option D is correct

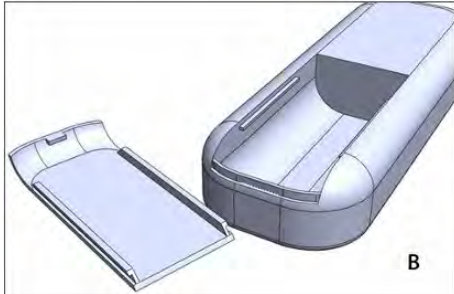
We have 3 squares as well as 2 squares and 4 triangles.

**Q.50 The options show designs for a remote control and its battery cover. Which design will be feasible?**

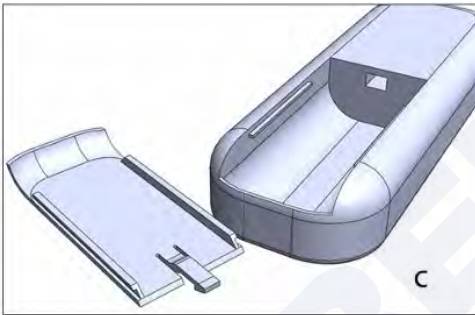
**Option A:**



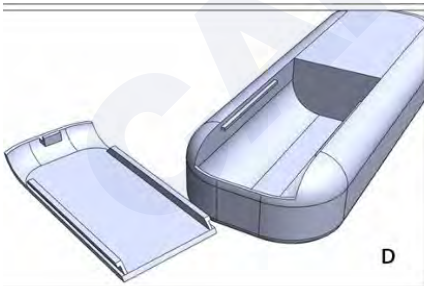
Option B:



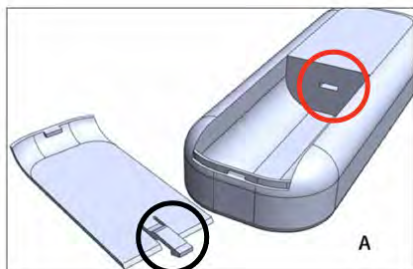
Option C:



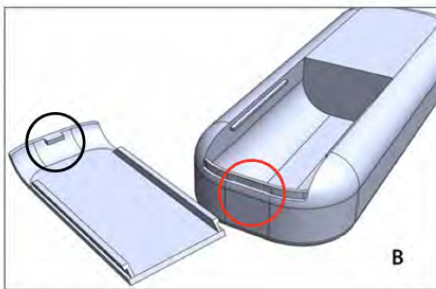
Option D:



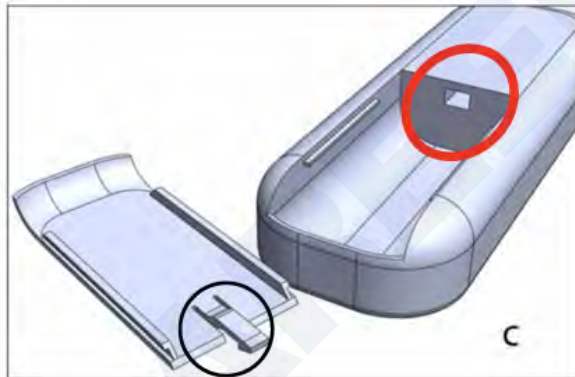
Solution:



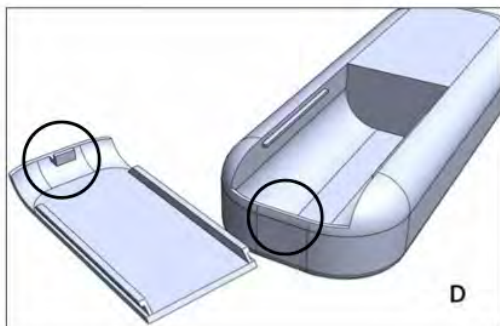
If we see this catch (black) which has to be locked (Red) this hole should be a little higher and broader but in the real image, it is not there. Hence, this is wrong.



If we see there is no slot made for this (Black) latch, so again this is incorrect.



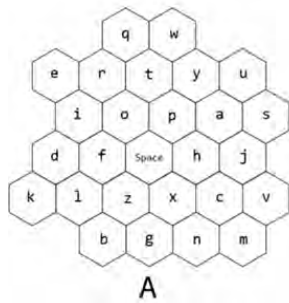
Here the latch and hole are correctly placed. Hence, this option is correct.



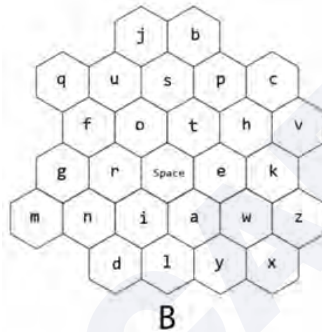
If we see there is no slot made for this (block) latch, so again this is incorrect.

**Q.51** Four keyboard layouts were designed to enter text on touch-screen mobile phones. Which of these layouts has the shortest finger travel distance for entering text in the English language? Assume, the mobile is held vertically in the left hand, and a right-handed user presses the keys using only the index finger of the right hand.

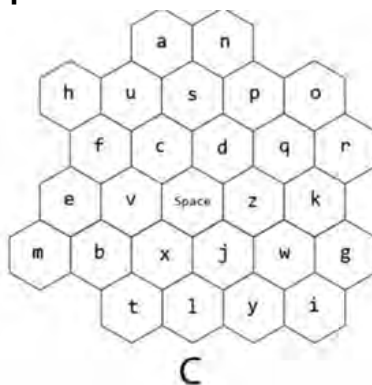
**Option A:**



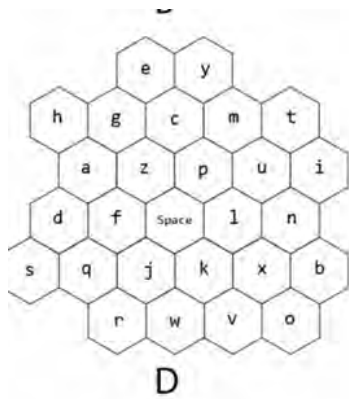
**Option B:**



**Option C:**



**Option D:**



**Solution:**

We know in English while forming words the most common alphabets are vowels, so first check where are the vowels placed in each option:



A



B



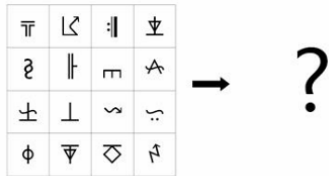
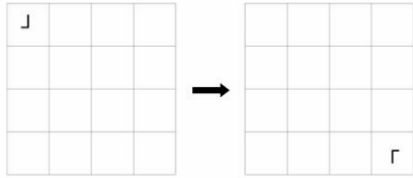
C



D

So, we can see the shortest figure distance traveled will be option B. Hence, option B is correct. As all the vowels are near the space.

**Q52.**



**Option A:**



**Option B:**



**Option C:**

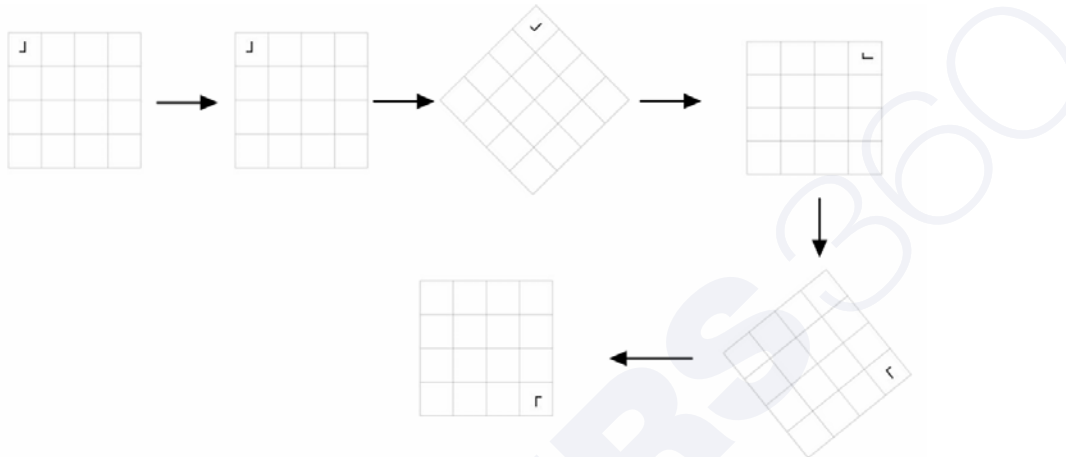


**Option D:**

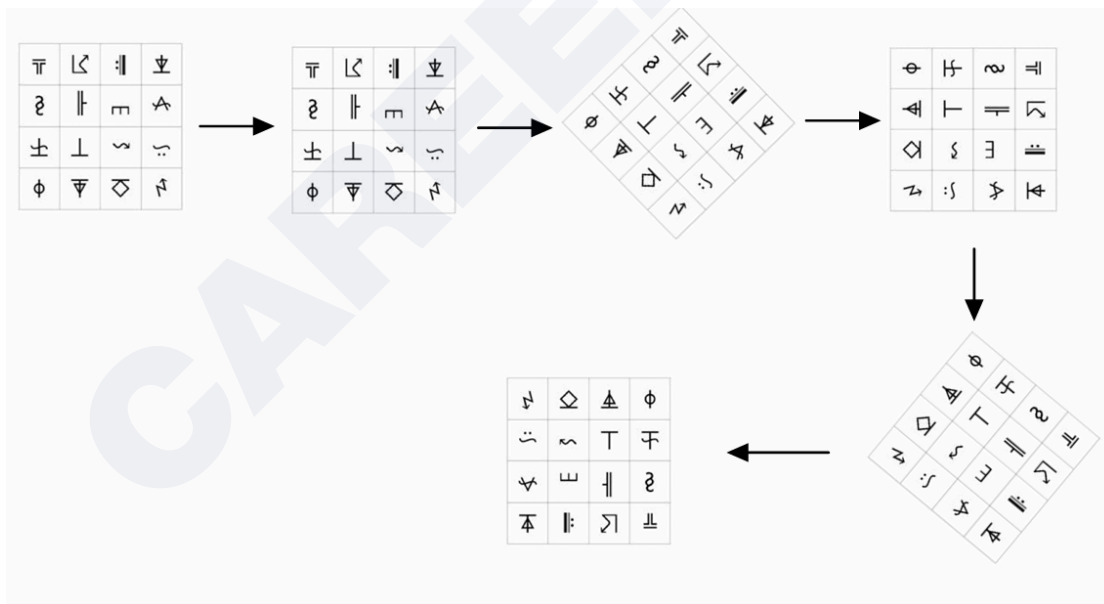
⚡	◇	△	φ
∩	~	⊥	⊞
☆	⊥	∥	∞
△	∥	∩	⊥

D

**Solution:**

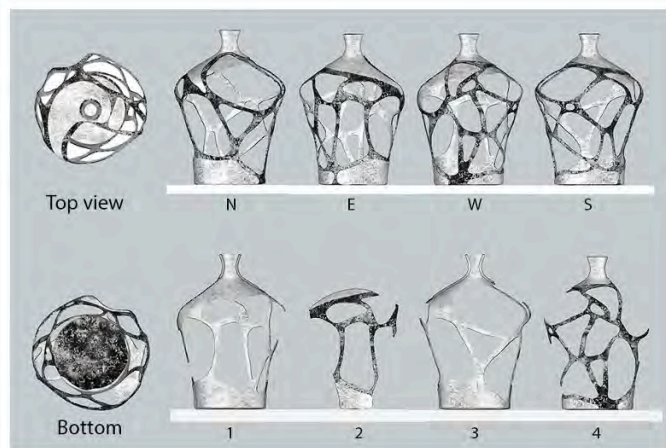


So this is a sequence, now do this process in the given image.



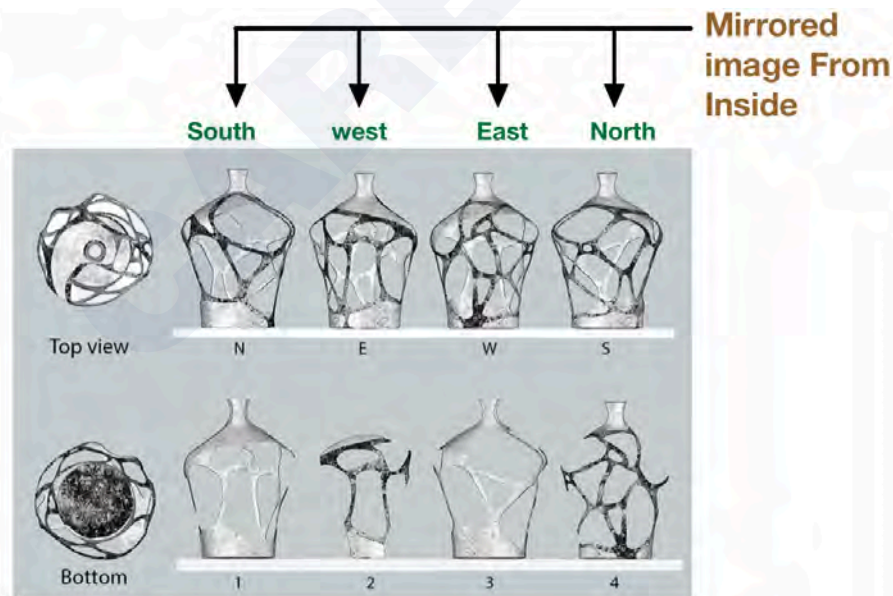
Hence, option B is correct.

**Q.53 Refer to all the sides of a vase shown below.**



- A 1. Inside eastward, 2. Outside westward mirrored, 3. Inside Westward, 4. Outside westward mirrored
- B 1. Inside Westward, 2. Outside eastward mirrored, 3. Inside southward mirrored, 4. Outside westward mirrored
- C 1. Inside westward mirrored, 2. Outside eastward mirrored, 3. Inside southward, 4. Outside northward
- D 1. Inside southward, 2. Outside eastward mirrored, 3. Inside Westward, 4. Outside northward

Solution:



Option A:

If we see a pattern in 1 (bottom view), that is, this is a mirror image of the top view east side (from outside) and the west side (from inside). Hence, option A is wrong.

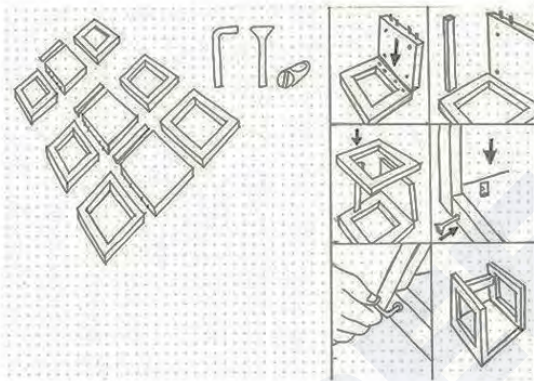
Option B:

If we see the pattern in 1 (bottom view), we find this is a mirror image of the top view east side (from the outside) and the west side (from the inside). Now pattern 2 has again the same pattern that outside eastward mirrored.

Now pattern 3. The triangle in the middle is the same as the top view north (from outside) and south (from inside) Pattern 4, the triangle (on the left side) is the mirror image (top view south) from outside.

Hence, option B is correct.

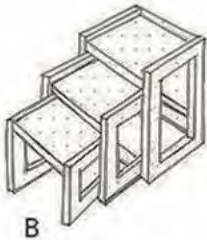
**Q.54 Which of the options can be made by following the instructions given in the image below?**



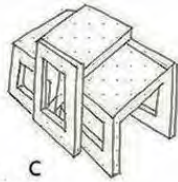
**Option A:**



**Option B:**



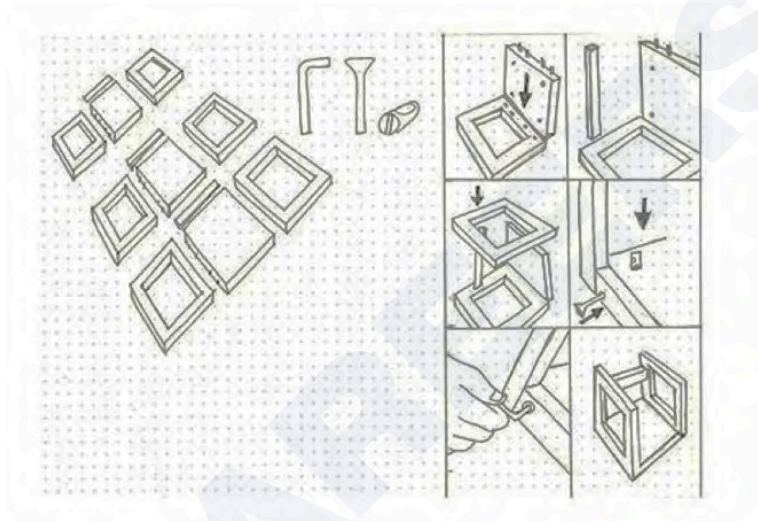
**Option C:**







Option D:

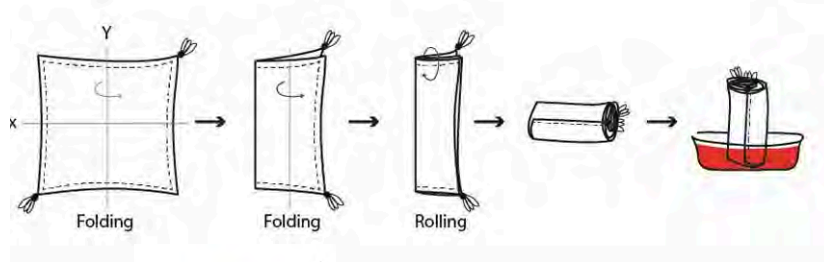


Solution:



If observed we find three  and six  and  when they are fixed according to instructions we will get  Hence, option B is correct.

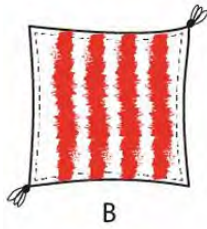
**Q.55** Aru bought a new cushion cover from the market. Though the material is cotton, she was not happy with the plain cushion cover and planned to dye it a colour. She followed the process as shown in the diagram, starting with folding the cover along the Y axis. After the first dye, she made the cushion cover dry and again did the same process, but this time started folding along the X-axis. Find out the pattern she created after the second dye.



Option A



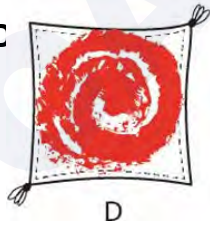
Option B:



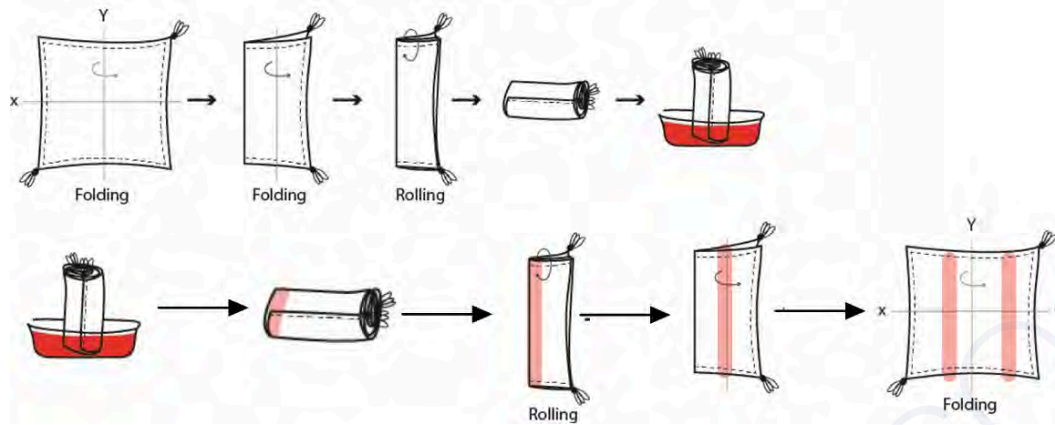
Option C:



Option D



Solution:



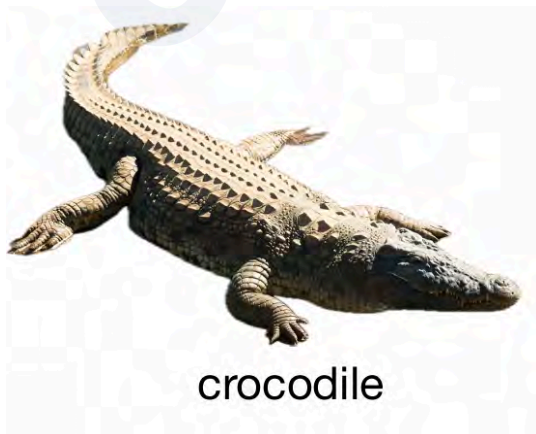
So when came process is done while folding along the X-axis, we will get option C.  
Hence option C is correct.

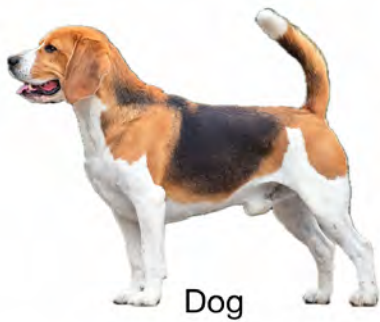
**Q.56** Select the correct option which lists the animals appearing in the GIF.



- A. Lizard, Dog, Swan
- B. Goat, Cat, Crocodile
- C. Dog, Swan, Seal
- D. Dog, Goat, lizard

**Solution:**





Dog



Swan

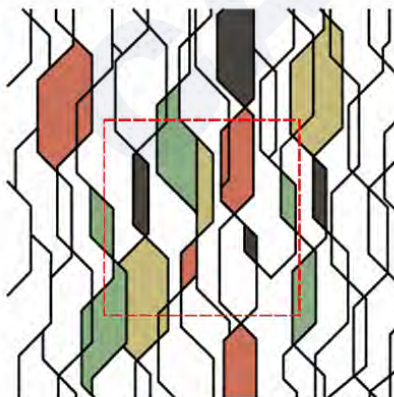


Seal



If we observe the given figure, we can see that this image has nothing that resembles crocodiles and lizards. Therefore, options A, B, and D are eliminated. Hence, option C is the correct answer.

**Q.57 Find the exact pattern highlighted in the red square.**



**Option A:**



A

**Option B:**



B

**Option C:**



C

**Option D:**



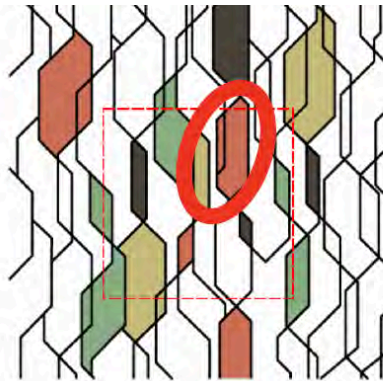
D

**Solution:**

Option A:

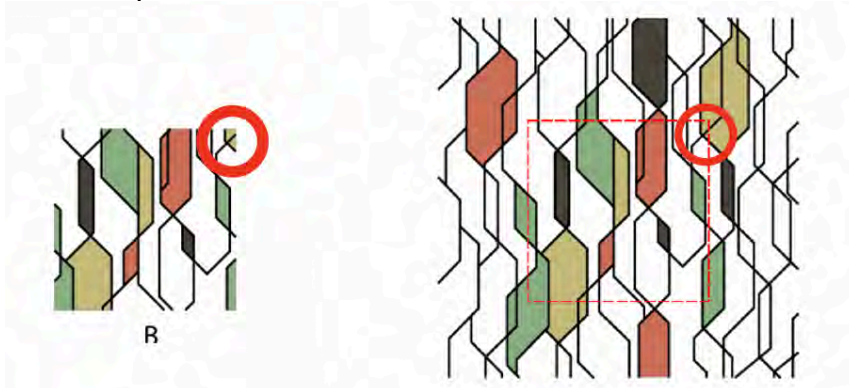


A



We can observe that the black line in the red part is not present in option A. Hence this is incorrect.

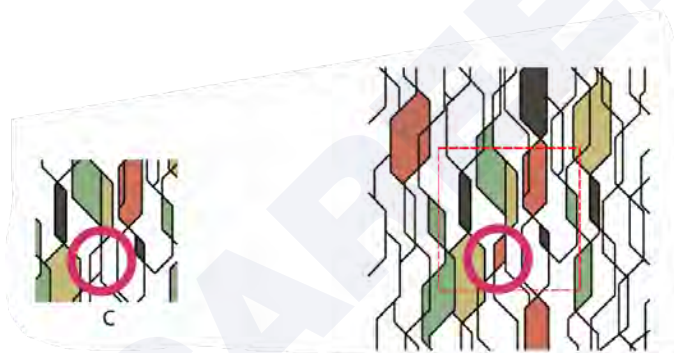
Option B:



The highlighted part doesn't resemble it.  
So this option is not correct.

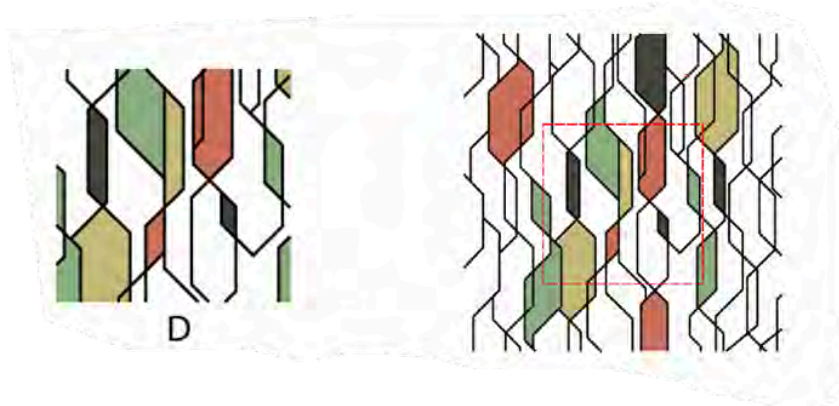
**Note: It has a very minute difference, so students need to observe it minutely.**

Option C:



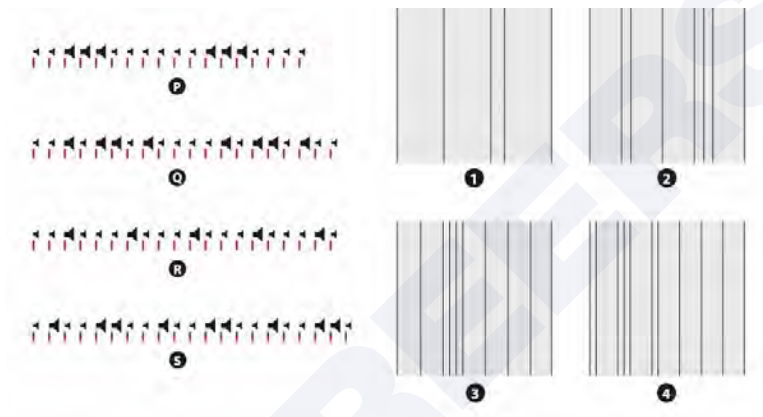
We can see we have colour in the original figure, this is not present in option C.  
Therefore, this option is incorrect.

Option D:



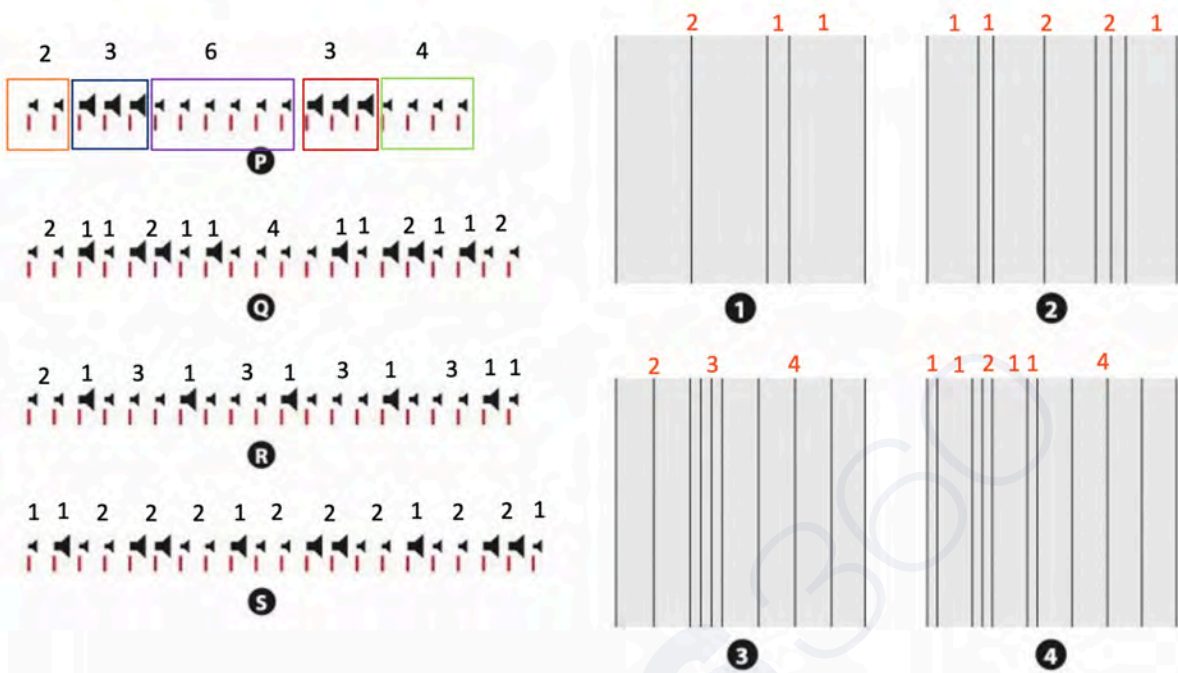
Option D is the correct answer.

**Q.58** A layout director of a newspaper was listening to music loops P, Q, R, and S. Subsequently, the director created layouts 1, 2, 3, and 4 for the Music section of the newspaper. Indicate the correct pair of music loops and the layout.



- A. P-4, Q-3, R-2, S-1
- B. P-2, Q-1, R-4, S-3
- C. P-3, Q-4, R-1, S-2
- D. P-1, Q-2, R-3, S-4

**Solution:** Considering we have no idea of musical notes, we can just observe the pattern here.



If we see a pattern in S i.e, 1 1 2 2 ..... This pattern matches with the pattern of image 2, now we can eliminate options A, B, and D. Hence, option C is correct.

**Q.59** Shown below is a transparent roller stamp. Identify the print made from the roller.



Option A



Option B:



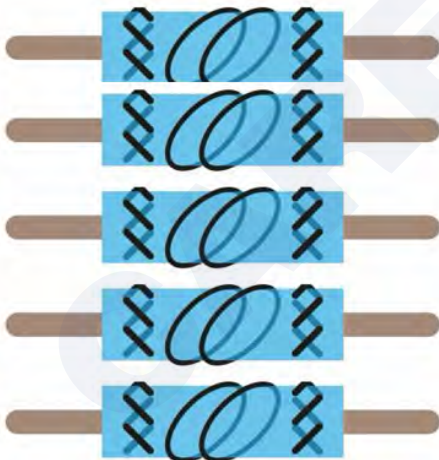
Option C:



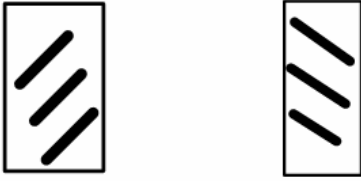
Option D:



Solution:



The transparent part will be stamped on the paper, so the side pattern will be like shown in the image given below.



So we can observe this pattern in option D. Hence, option D is correct.

**Q.60 Find the odd one.**

**Option A:**



A

**Option B:**



B

**Option C:**



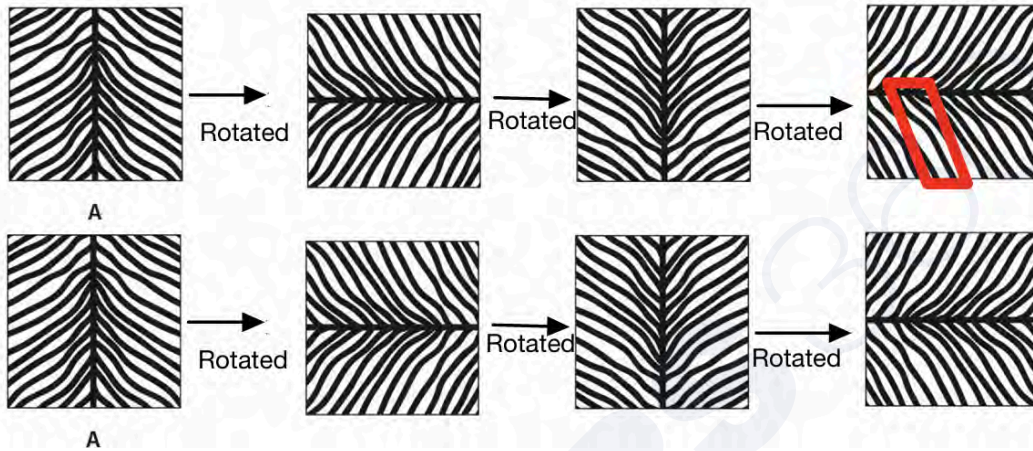
C

**Option D:**



D

**Solution:**



When we rotate option A clockwise we get option B, when option B is rotated clockwise we get option C and when option C is rotated clockwise we get an image that has a difference when compared to option D i.e., The zigzag pattern as shown above. Hence, option D is the odd one out.

**Q.61 Shown below are visual lines that were decoded into names.**



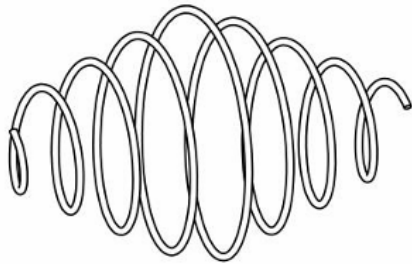
- A. RAGAVENDERAN**
- B. RADHAKRISHNAN**
- C. RAMANABHUSHAN**
- D. THIRUVALLUVAN**

**Solution:** Since we count the no of lines then, we can see that in Figure One we have 14 lines with the name GAUTAMA(7 words) which means the no of lines is double the number of letters in the word GAUTAMA.



This image shows 26 lines, which means the answer should be 13 letters. Hence, option B RADHAKRISHNAN with 13 letters is the correct option.

**Q.62 Identify the side view of the spring.**



**Option A:**



A

**Option B:**



B

**Option C:**

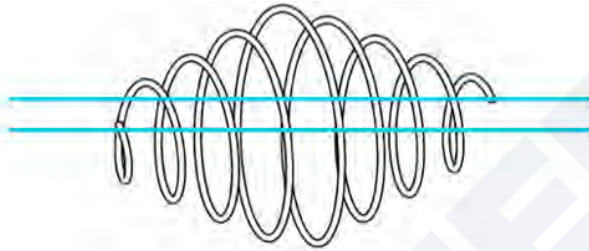


C

Option D:



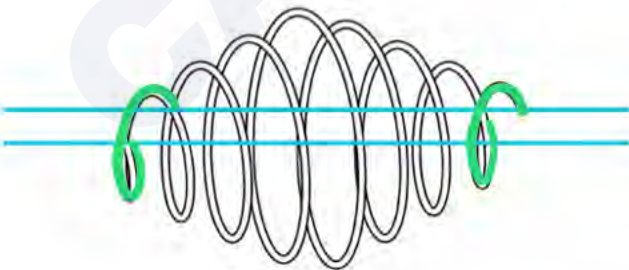
**Solution:** We have to imagine the side view of the spring so it will form a smaller circle to a bigger circle and again bigger circle to a smaller circle there should be a point where the line could come inside to make a smaller circle also somewhere there should be 4 lines, 4 curves or 2 circles which is there in A and B but not in C and D. Hence, D is eliminated.



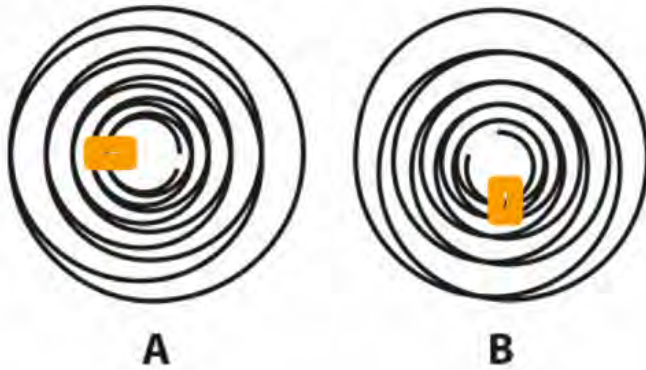
If we draw a line, we see there is a gap here which is similar.



This is in both the option A and B.

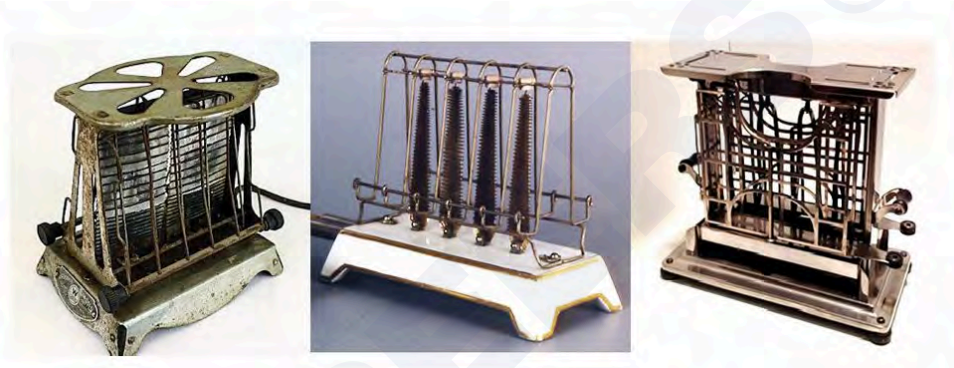


We see both are almost of the same size and perimeter.



If we see that in option B the bigger part (shaded) is smaller. Hence, option A is correct.

**Q.63 What is the function of these objects?**



- A. Measuring earthquakes
- B. Weaving cotton
- C. Toasting bread
- D. Burning wood

**Solution:**



Antique 1920s Westinghouse turnover toaster.



D-12 Toaster, invented in 1909 by Frank Shailor by General Electric.



Universal Toaster with swinging cages.  
Hence, option C i.e., toasting bread is correct.

**Q.64 Cathy has less money than David. Cathy and David together have as much money as Alice and Bob together. Alice and David together have less money than Bob and Cathy together. What is the correct richest-poorest pairing?**

**A: Bob-Cathy**

**B: Bob-Alice**

**C: David-Cathy**

**D: Cathy-Alice**

**Solution:**

Cathy < David.....1)

Cathy +David=Alice+Bob.....2)

Alice+David<Bob+Cathy .....3)

From equation 2

David=Alice+Bob-Cathy

Now put the value of David in Equation 3

We get,

Alice+Alice +Bob -Cathy <Bob +Cathy

$2\text{Alice} < 2\text{Cathy}$   
 $\text{Alice} < \text{Cathy} \dots 4)$   
 From Equation 2  
 $\text{Alice} = \text{Cathy} + \text{David} - \text{Bob}$   
 Substitute in equation 3  
 $\text{Cathy} + \text{David} - \text{Bob} + \text{David} < \text{Bob} + \text{Cathy}$   
 $2\text{David} < 2\text{Bob}$   
 $\text{David} < \text{Bob} \dots 5)$   
 From equation 4, 1, 5  
 $\text{Alice} < \text{Cathy} < \text{David} < \text{Bob}$   
 Alice is the poorest and Bob is the richest  
 Therefore, option B is correct.

**Q65.**

**SUGAR = ?**


**Option A:**

A 

**Option B:**

B 

**Option C:**

C 

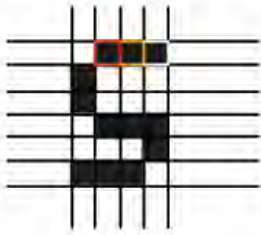
**Option D:**

D 

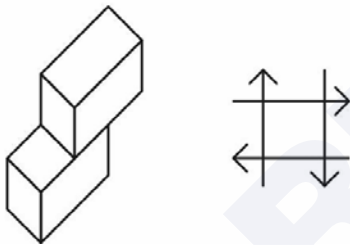
**Solution:**



The word is obtained from a grid as shown above. So we can see 3 squares on the upper side of S which are not in options A, B, and D. Hence, option C is correct.



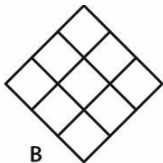
**Q.66** Shown below is a 3D block. Four such blocks are interlocked in a square form. What will be the top view of the blocks after interlocking?



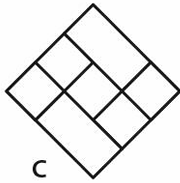
**Option A:**



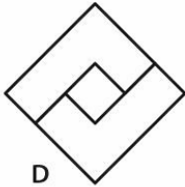
**Option B:**



**Option C:**



**Option D:**



**Solution:**

When four blocks are interlocked in a square form we will get a symmetrical shape, which is not in options C and D, therefore options C and D are eliminated.



We are unable to see this big square (as shown in the image given above).  
Hence, option A is correct.

**Q.67 Which betel nut cutter will require less force to be applied to cut a betel nut?  
Consider the hinge points to be at the same line.**

**Option A:**



A

Option B:



B

Option C:

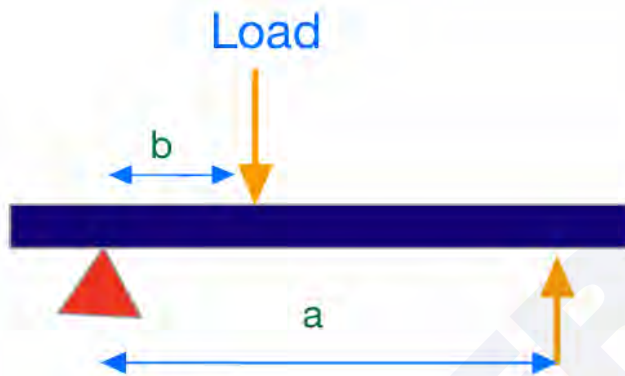


C

Option D:



D

**Solution:**

A Class 2 lever has the load between the effort and the fulcrum. In this type of lever, the movement of the load is in the same direction as that of the effort. Note that the length of the effort arm goes all the way to the fulcrum and is always greater than the length of the load arm in class 2

$$\text{Force} \times a = \text{Load} \times b$$



$$\text{Force} = \text{load} \times \frac{b}{a}$$

We can  $\text{force} \propto b$  and  $\text{force} \propto \frac{1}{a}$

i.e, The higher the force, the larger the distance  $b$ , or the higher the force, the smaller the distance  $a$

The force will be lesser when it is applied far from the hinge and the load is near to the hinge. This case is in option C. Therefore, the correct answer is C.

**Q68.**

 = GOAT = LIZARD = TIGER = ?

- A. RAM
- B. MOTH
- C. BAT
- D. SNAKE

**Solution:**

Let's write the name (original ) of the given species

Frog=Goat

Snail=Lizard

Cat=Tiger

Spider=\_\_\_\_\_

Now we can see the letter of the species is equal to the first letter of the coded name, i.e, the Frog's last letter is G and Goat's first letter is G.

So for spider, the last letter is R, so a coded word should start with R.

Hence, option A is correct.

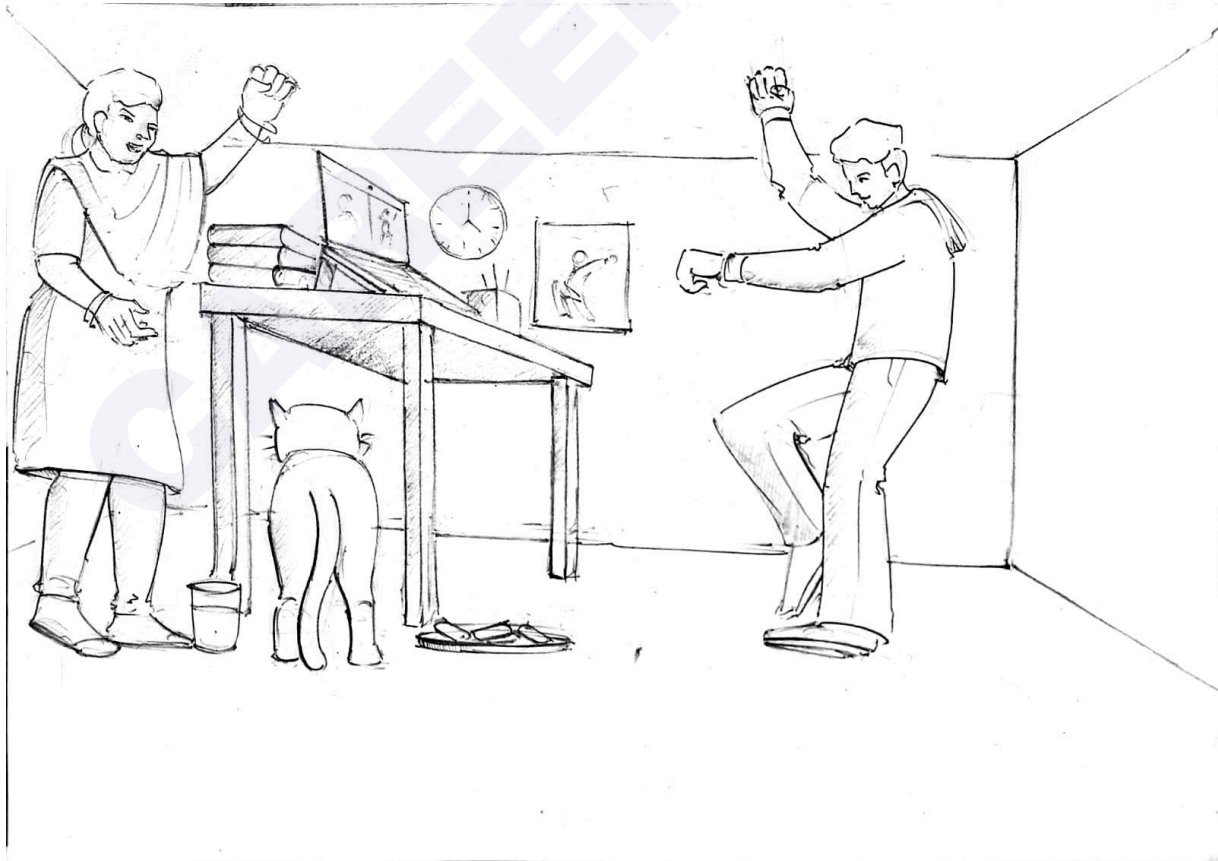
## PART-B

### Sketching

Nandu is giving a dance exam in online mode in front of a laptop kept on a table. His mother is prompting from behind. While the exam is going on, his pet cat Poco is running around tumbling over a glass of water, a plate of biscuits and a few books. No one can stop Poco and the exam must go on. Visualize and draw the whole situation as if you are sitting on the floor witnessing the scene.

#### Note:

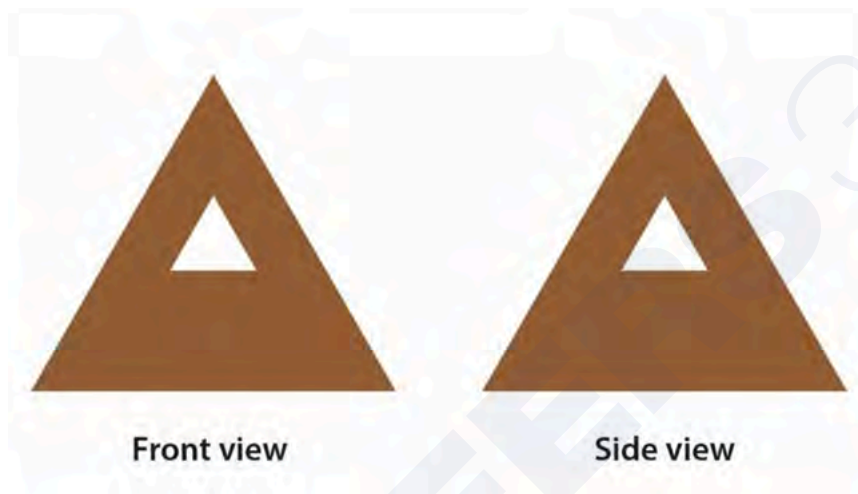
- Make pencil sketches only
- Do not use colours
- Evaluation Criteria:
  - Observation
  - Imagination
  - Selection & composition of objects
  - Quality of lines
  - Presentation
  - Attention to details



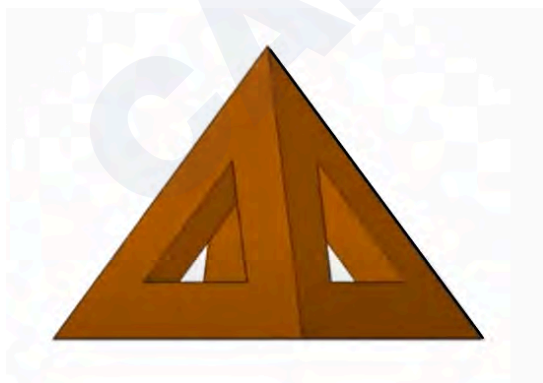
# UCEED 2022

## PART-A : Section 1: Numerical Answer Type (NAT) questions

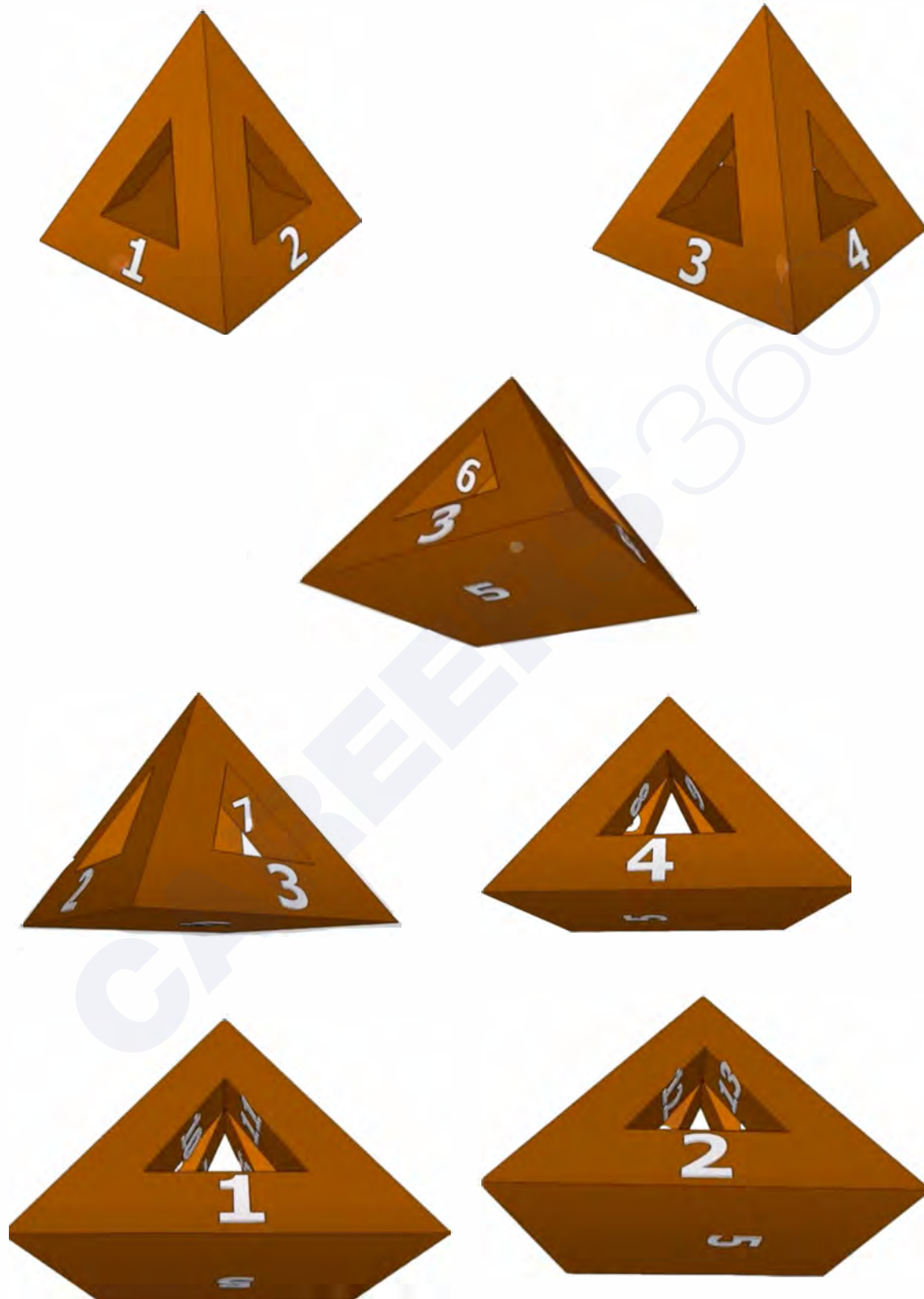
Q.01 A solid square pyramid has triangular cut-outs that pass through and through, as shown in the figure. How many surfaces are there in the resultant solid?

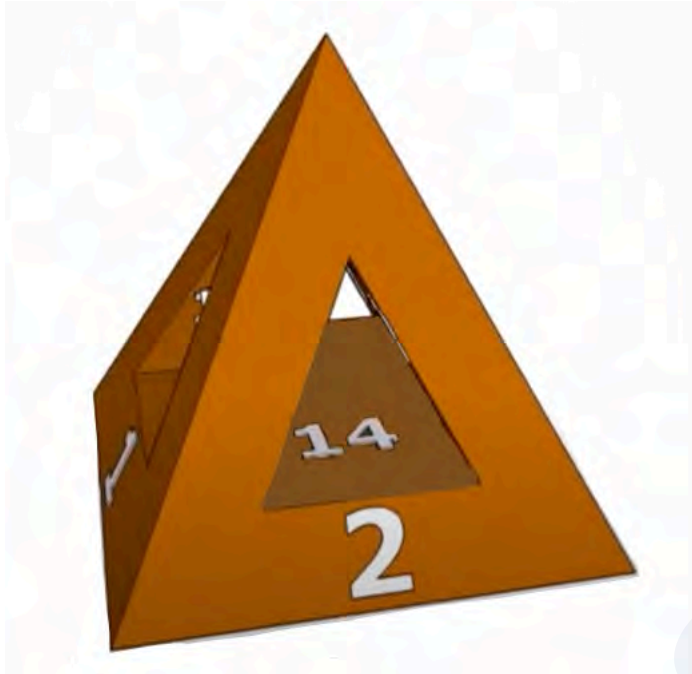


**Solution:** We need to find the No of surfaces in the resultant solid, to do this we need 3-D to make it understand better.



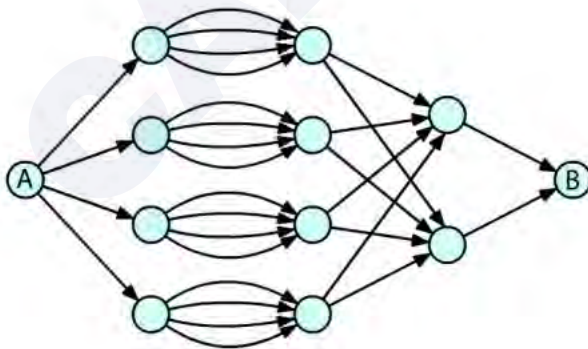
This is a square pyramid with a triangle cut out, So the No. of surfaces are



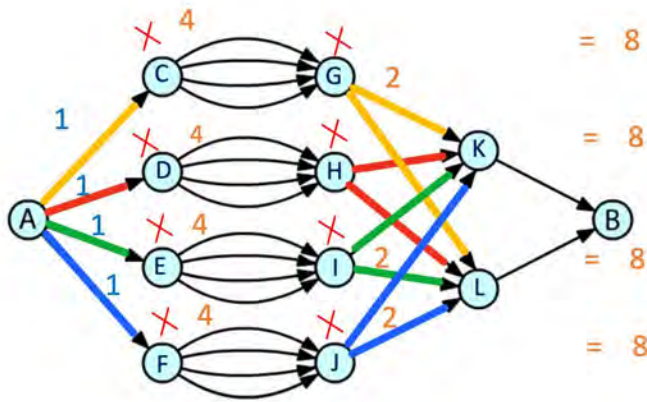


So total No. of surfaces =14

**Q2. The figure shows different paths for going from A to B. The directions of the paths are indicated by arrows. No node can be visited twice. What is the total number of different paths to go from A to B?**



**Solution:**



So from the above figure, we can see from A to C we have one path, from C to G we have 4 paths, from G to K we have 2 paths and from K to B we have 1 path, therefore total

$$A \rightarrow C \rightarrow G \rightarrow K \rightarrow B$$

We have  $1 \times 4 \times 2 \times 1 = 8$  pathways

Similarly,  $A \rightarrow D \rightarrow H \rightarrow K \rightarrow B$  We have 8 pathways.

$A \rightarrow E \rightarrow I \rightarrow L \rightarrow B$  We have 8 pathways.

$A \rightarrow F \rightarrow J \rightarrow L \rightarrow B$  We have 8 pathways

Hence, In total  $8 + 8 + 8 + 8 = 32$

Therefore, the total number of paths to go from A to B are 32.

Q3.

$$FF1 + 1 \rightarrow F = ART$$

$$1F \setminus 1 + 1 \setminus \setminus 1 = TEXT$$

$$F \setminus L \setminus \setminus \setminus + \setminus \setminus \setminus \setminus \setminus = ?$$

**Solution:** Let Say

$$\overset{1}{FF1} + \overset{2}{1\text{H}F} = \text{ART}$$

We can see 1 + mirror image of 2 give us the Result ART

$$FF1 + \text{mirrored } 1\text{H}F = \text{ART}$$

$$F + \text{mirrored } F = A$$

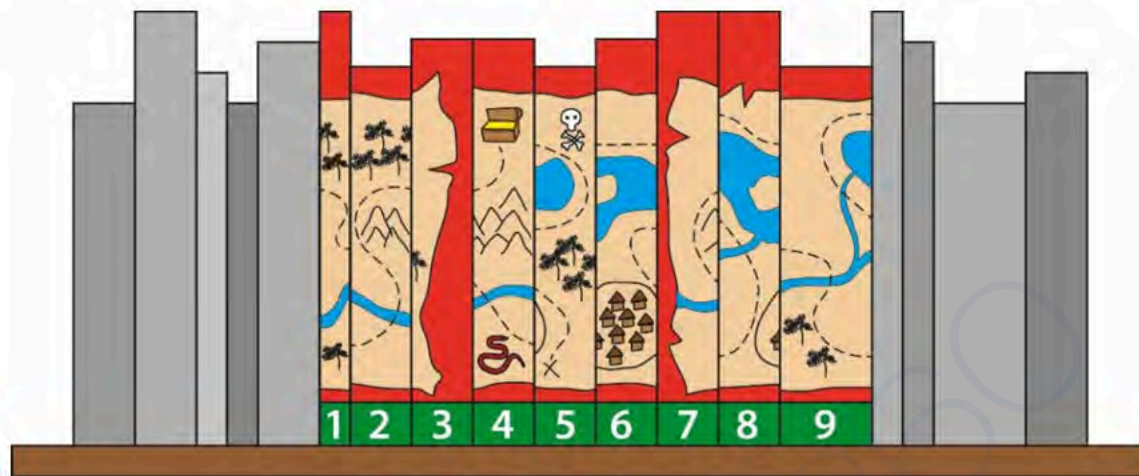
$$F + \text{mirrored } H = R$$

$$1 + \text{mirrored } 1 = T$$

Similarly, we can say

$$FJLT^c + \text{mirrored } J^cT^cL^cF = \text{836975}$$

**Q.04** Shown below is a bookshelf that has a kid's adventure novel in a book series of 9 volumes. The spines (binding side) of these books contain parts of a treasure map. What is the sequence of the books that form the completed treasure map? Enter the answer as a single nine-digit integer.

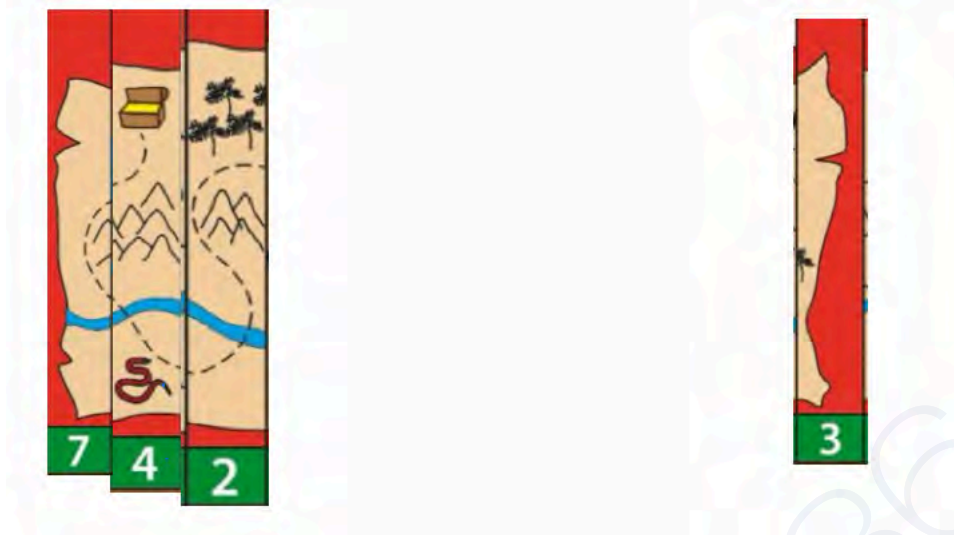


**Solution:** We have a treasure map, so we need to find the correct sequence of the book that forms the complete treasure Map.

We can see from the given image that 7 is the left-side part of the book and 3 is the right-hand side part of the book, so place them to connect the rest.



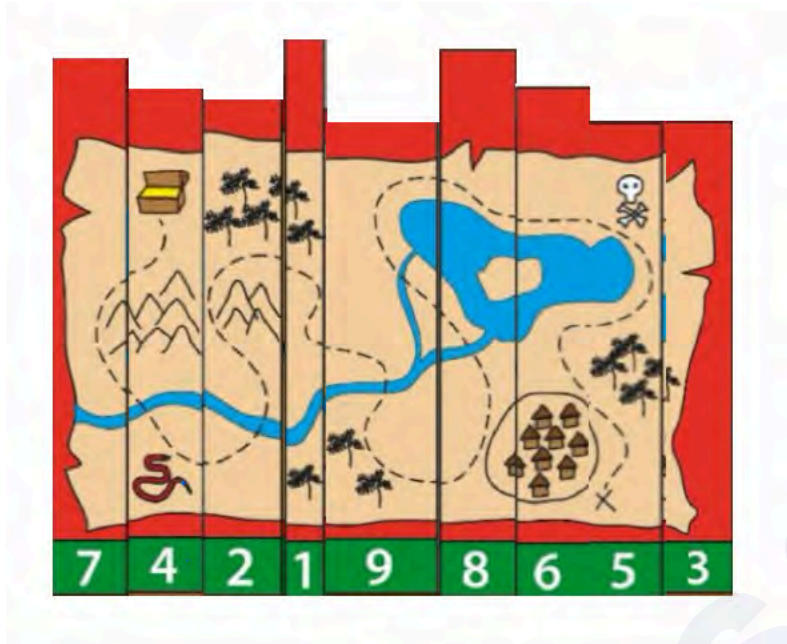
After 7 we can place 4 by looking at the dot, River, and incomplete form of mountain, So after 4 we can only have 2 rivers at the same distance. So place 2 after 4



After 2 we can see in option River is connecting the link and plant are incomplete in 2 and only 1 has incomplete mountains



After 1 we can connect to 9 seeing the flow of the river and dotted links. After 9 we can connect 8 by looking at the river connection. After 8 we can connect 6 by seeing the River and Hut Boulevard and succeed by 5



**Q.05** Perform the following steps:

**Step 1:** Start with  $x=1, y=2$

**Step 2:** Replace  $x$  by  $x$  multiplied by  $y$

**Step 3:** Replace  $y$  by  $y+1$

**Step 4:** If  $y=5$ , then go to Step 6, otherwise go to Step 5

**Step 5:** Go to Step 2

**Step 6:** Stop

**What is the value of  $x$ ?**

**Solution:** Step 1 :  $x = 1, y = 2$

Step2:  $x = 1 \times 2 = 2$

Step3:  $y = y + 1 = 2 + 1 = 3$

Step4:  $y \neq 5$

Step 5: Go to step 2

Step 2:  $x = 6 \times 4 = 24$

Step3:  $y = y + 1 = 4 + 1 = 5$

Step 5:  $y = 5$

Step 6: stop

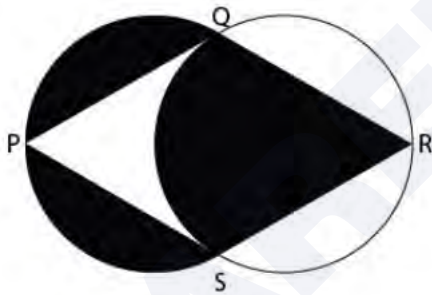
$$x = 24$$

**Q.06** The animation depicts the morphing of faces and abstract forms. A face consists of two eyes, two ears, a nose, and a mouth. How many unique faces appear in this morphing animation?

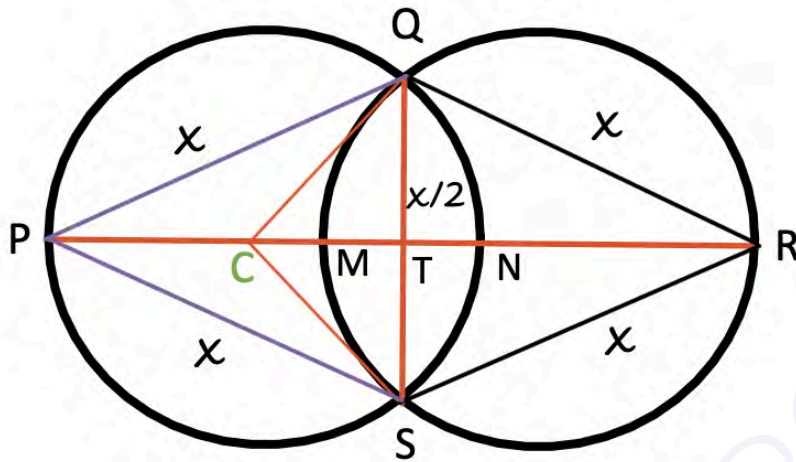


( The following question contains an animated GIF image)

**Q7.** If  $SQ=QR=RS=SP=PQ$  and  $PR= 21$  units, what is the area of the black portion?  
(Assume  $\pi = \frac{22}{7}$ )



**Solution:**



Here,  $CT = \frac{r}{2}$  where  $r =$  radius.

Now consider triangle PQT.

$$PT = \frac{PR}{2} = \frac{21}{2} = 10.5.$$

$$\angle QPT = 30^\circ, \text{ Hence } QT = \frac{x}{2} \text{ and } PT = \frac{\sqrt{3}}{2}x = 10.5$$

$$\Rightarrow x = \sqrt{147}$$

In  $\Delta CQT$

$$CQ^2 = QT^2 + CT^2$$

$$r^2 = \left(\frac{x}{2}\right)^2 + \left(\frac{r}{2}\right)^2$$

$$r^2 = \frac{x^2}{4} + \frac{r^2}{4}$$

$$r^2 - \frac{r^2}{4} = \frac{147}{4}$$

$$\frac{3r^2}{4} = \frac{147}{4}$$

$$r^2 = \frac{147}{3} = 49$$

$$r = 7\text{cm}$$

We know the area of the sector =  $\frac{\theta}{360} \pi r^2$

Area of segment = Area of the sector – an area of a triangle.

$$\begin{aligned}\text{Area of sector CQMS} &= \frac{120^\circ}{360} \pi r^2 = \frac{120^\circ}{360} \times \frac{22}{7} \times 7 \times 7 \\ &= \frac{1}{3} \times 22 \times 7 = \frac{154}{3}\end{aligned}$$

$$\begin{aligned}\text{Area of triangle CQS} &= \frac{1}{2} \times QS \times CT = \frac{1}{2} \times \sqrt{147} \times \frac{7}{2} \\ &= \frac{\sqrt{147}}{4} \times 7\end{aligned}$$

$$\text{Area of segment QMSQ} = \frac{154}{3} - \frac{\sqrt{147}}{4} \times 7 = 30.1157$$

Area of RQMSR (Softly cone) = area of PQS + Area segment

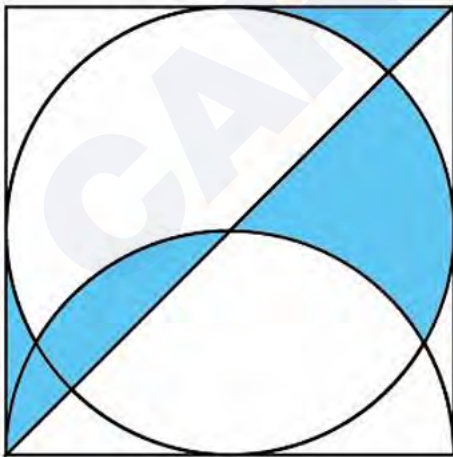
$$\begin{aligned}\text{Area of RQMSR} &= \frac{\sqrt{3}}{4} \text{side}^2 (\text{we can see PQS is a equilateral triangle}) + 30.1157 \\ &= \frac{\sqrt{3}}{4} \times 147 + 30.1157 = 93.76 \text{cm}^2\end{aligned}$$

Hence, required area = Area of RQMSR + 2 × segment area.

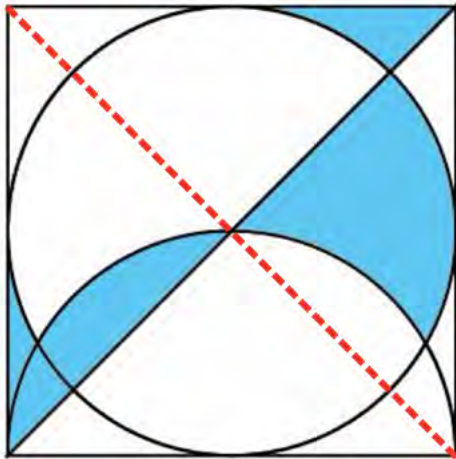
$$= 93.76 + (30.115) \times 2$$

$$= 153.99 \text{cm}^2$$

**Q.08** A circle and a semicircle are inscribed in a square as shown below. What fraction of the area of the square is the blue-shaded area?

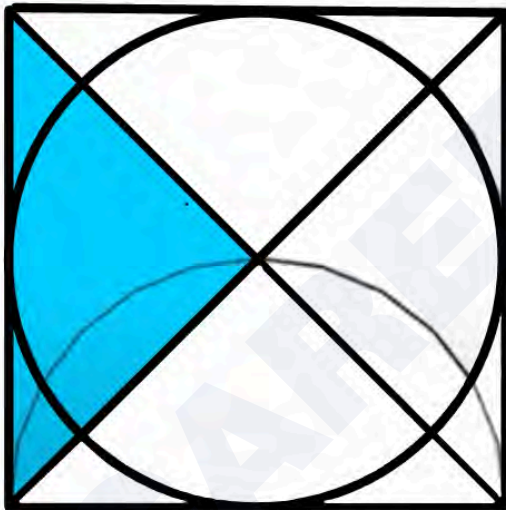


**Solution:** We have to adjust the areas to make it easy to find the area of the shaded region.



**Figure 1**

By making a diagonal (Red line) in Figure 1 the right and left parts are identical, so if we shift the right part to the left we get (figure 2)

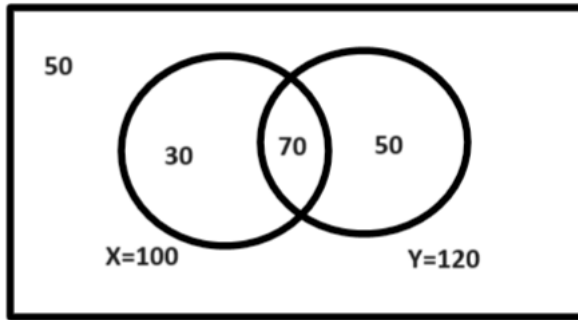


The Blue shaded area is  $\frac{1}{4}$  of the figure

Hence  $\frac{1}{4} = 0.25$

**Q9. A total of 200 people were surveyed for newspaper readership. It was found that 100 people read the publication  $x$ , 120 people read the publication  $y$  and 50 people do not read either  $x$  or  $y$ . What is the total number of people who read either publication  $x$  or publication  $y$  but not both?**

**Solution**



People who read  $x$  + people who read  $y$  – (Total surveyed) = people who read  $x$  and  $y$

$$100 + 120 - 200 = \text{people who read } x \text{ and } y$$

$$220 - 200 = \text{people who read } x \text{ and } y$$

$$20 = \text{people who read } x \text{ and } y$$

Now people who don't read either  $x$  or  $y$  but not both =  $200 - 20$

$$= 180$$

Total people who read newspaper = Total surveyed – people who do not read any newspaper

$$= 200 - 50$$

$$= 150$$

People who read both  $x$  and  $y$  = people who read  $x$  + people who read  $y$  – people who read newspaper

$$= 100 + 120 - 150$$

$$= 220 - 150$$

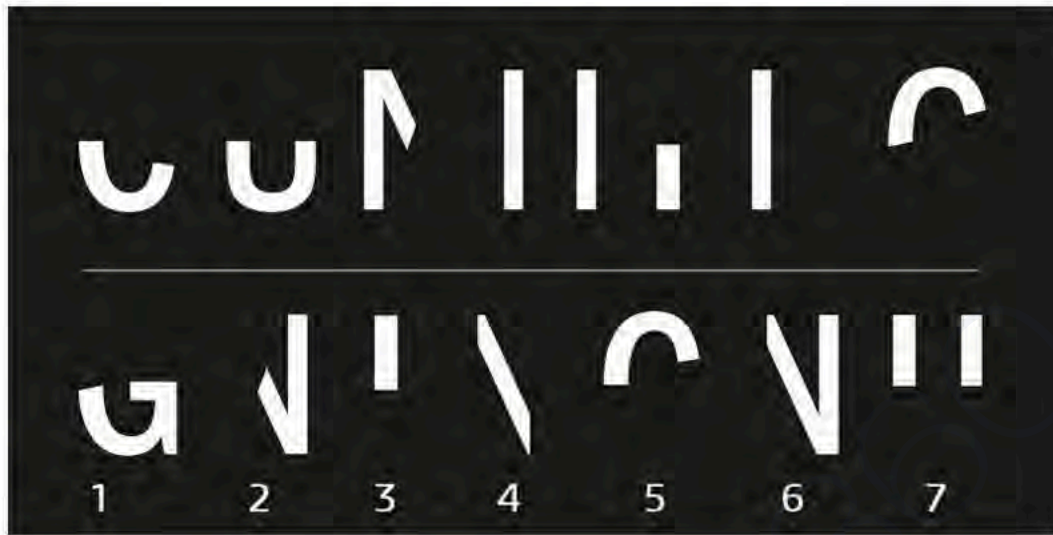
$$= 70$$

People who read either publication  $x$  or  $y$  but not both = People read newspaper - People who read both  $x$  and  $y$

$$\text{People who read either publication } x \text{ or } y \text{ but not both} = 150 - 70$$

$$= 80$$

**Q.10** Row 1 shows a word with 7 partial letters. Row 2 contains the parts that complete the word in Row 1. The parts in Row 2 are arranged randomly. What should be the correct sequence in Row 2?



**Solution:** We have Row 1 and Row 2, which contain the parts that complete the word in Row 1.

**Step 1:** First letter of Row 1, if connects with 5<sup>th</sup> of row it will form C



**Step 2:** Second letter of Row 1, if joined with 7<sup>th</sup> letter of row 2 it will form 7



**Step3:** The third letter of row 1, if joined with 2 letters of row 2 will form N



**Step4:** The fourth letter of row 1, if joined with 4 letters of row 2 will form N



**Step 5:** The fifth letter of row 1, if joined with 3 letters of row 2 will form I



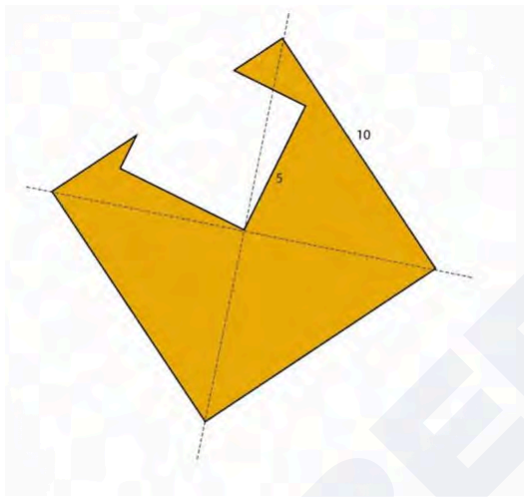
**Step 6:** The sixth letter of row 1, if joined with 6<sup>th</sup> letter of row 2 will form



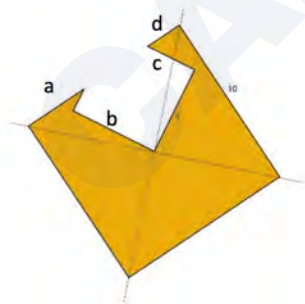
**Step7:** The seventh letter of row 1, if joined with 1<sup>st</sup> letter of row 2 will form G



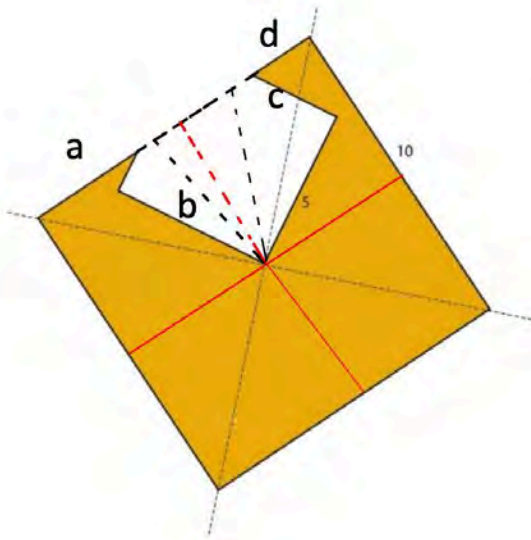
**Q.11** A square of side 10 units, shaded in yellow, is cut using a square of side 5 units as shown in the figure. What is the perimeter of the resulting shape, shaded in yellow?



**Solution:**



$$\begin{aligned} \text{Perimeter} &= 10 + 10 + 10 + a + b + 5 + 5 + c + d \\ &= 40 + a + b + c + d \end{aligned}$$



$$a + b + c + d = \text{side of square} = 10$$

So, perimeter =  $40 + 10$

= 50 units

**Q.12** X is three times as old as Y was three years ago. After 17 years, Y will be as old as X is today. What is the sum of the ages of X and Y today?

**Solution:**



Given that:

$$x = 3(y - 3) = y + 17$$

$$\Rightarrow 3y - 9 = y + 17$$

$$3y - y = 17 + 9$$

$$2y = 26$$

$$y = 13$$



= 13 Years

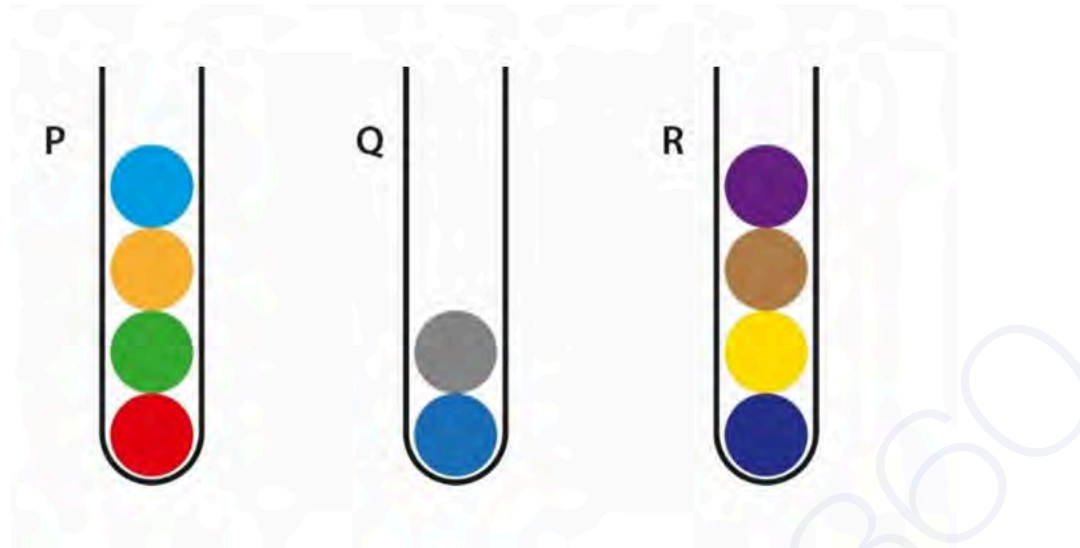


=17+13

=30 years

$$x + y = 13 + 30 = 30 \text{ years}$$

**Q.13** Shown below are three tubes P, Q, and R with coloured marbles. Each tube can hold a maximum of 5 marbles. Only one marble can be transferred in a move. What is the minimum number of moves required to transfer the red marble from tube 'P' to the bottom of tube 'R'?



**Solution:** According to the question, only one marble can be transferred in a move, to transfer the red marble from tube P to the bottom of tube R

**Move 1:** Shift the blue marble from P to R

**Move 2:** Shift the yellow marble from P to Q

**Move 3:** Shift Green marble from P to Q

**Move 4:** Shift red marble from P to Q. So far we have 4 moves and tube P got empty and Q and R are full

**Move 5:** Now empty R by shifting the marble from Q to P so we move the blue marble from R to P

**Move 6:** Shift purple marble from R to P

**Move 7:** Shift brown marble from R to P

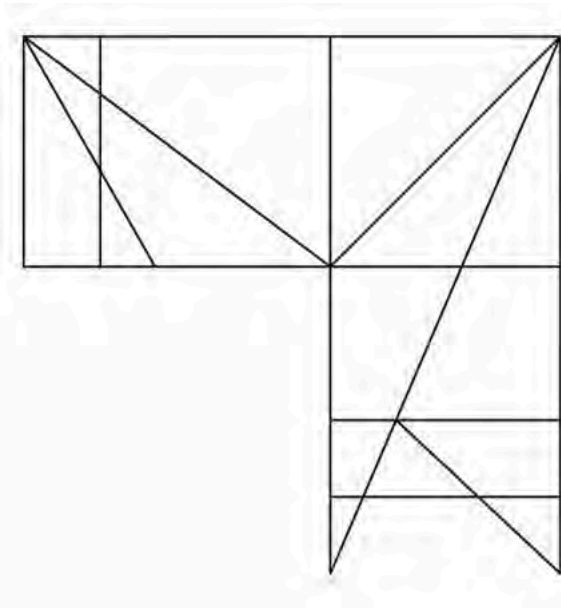
**Move 8:** Shift light yellow marble from R to P

**Move 9:** Shift navy blue marble from R to P. So far we have 9 moves and R is empty.

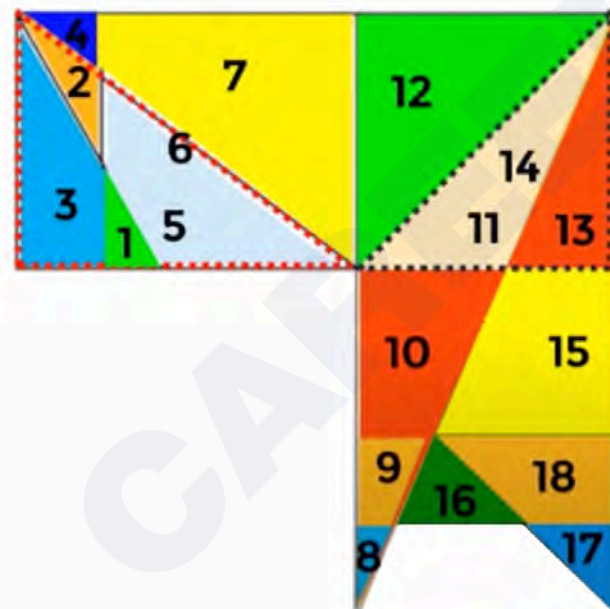
**Move 10:** Shift the red marble from Q to R

So a total of 10 steps were needed to transfer red marble from P to R.

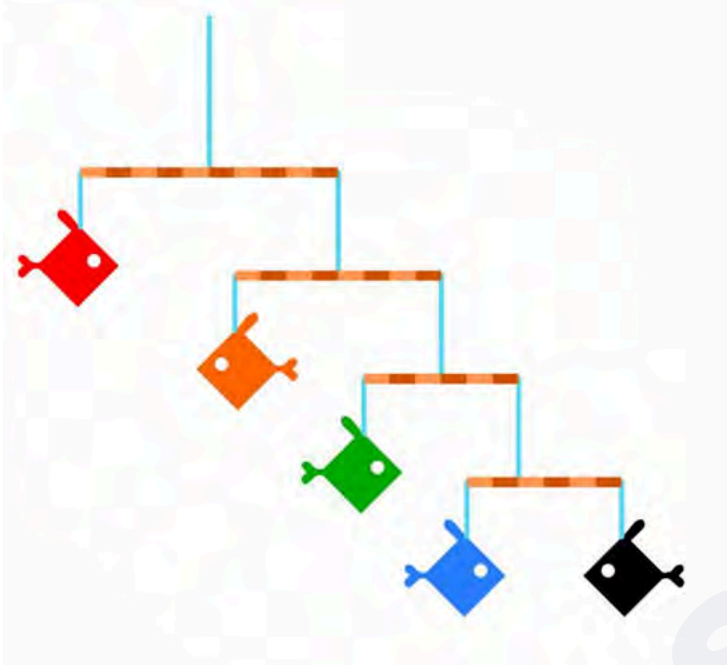
**Q.14 How many right-angled triangles are there in the image?**



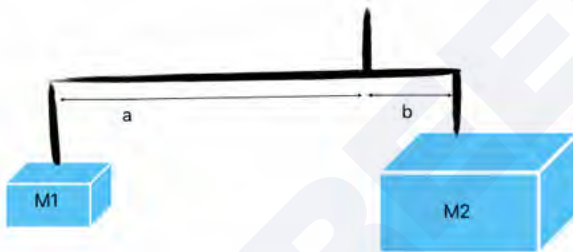
**Solution:** We have to find the No. of triangle according to the question. You Can see in the image given below, we have 18 right-angled triangles.



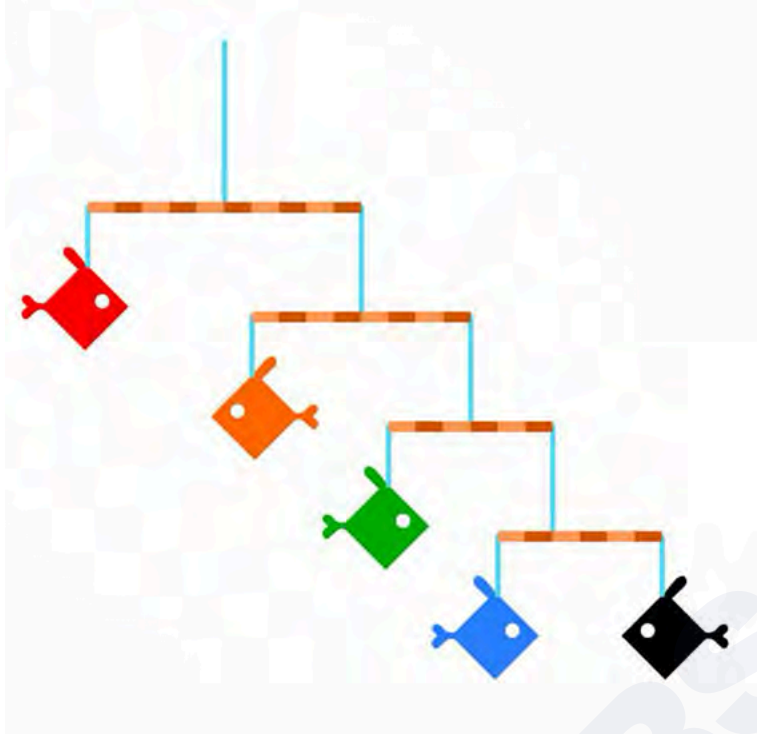
**Q.15** The image shows a hanging sculpture created by tying fish-shaped cutouts of different weights by blue strings on brown sticks, as shown. The sticks and strings have negligible weight. The sculpture remains balanced after it is suspended from a ceiling. If the weight of the black fish is 5 grams, what is the weight (in grams) of the red fish?



**Solution:** This formula should be used to solve the above equation



$$M1 * a = M2 * b$$



We know the weight of Black fish is 5 gm, and we can see the length with which black and blue fish are tied has a length in 1: 2 [you can also count the Black given in the string attached], if the length is in 1: 2 , so the weight will be in 2: 1 , Therefore

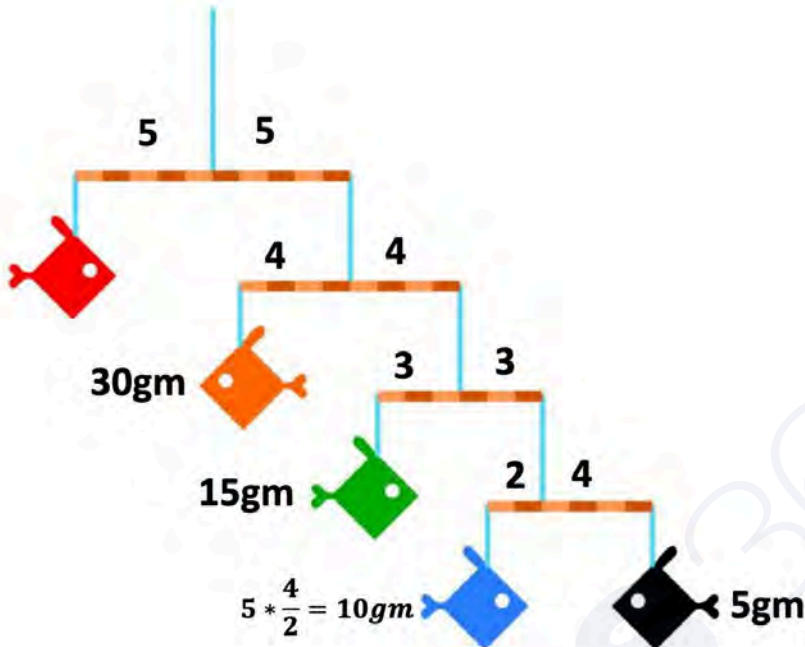
$$M_1(\text{Blue}): M_2(\text{Black}) = 2: 1$$

$$\Rightarrow \frac{M_1}{M_2} = \frac{2}{1}$$

$$M_1 = \frac{2}{1} \times M_2$$

$$= \frac{2}{1} \times 5 = 10\text{gm}$$

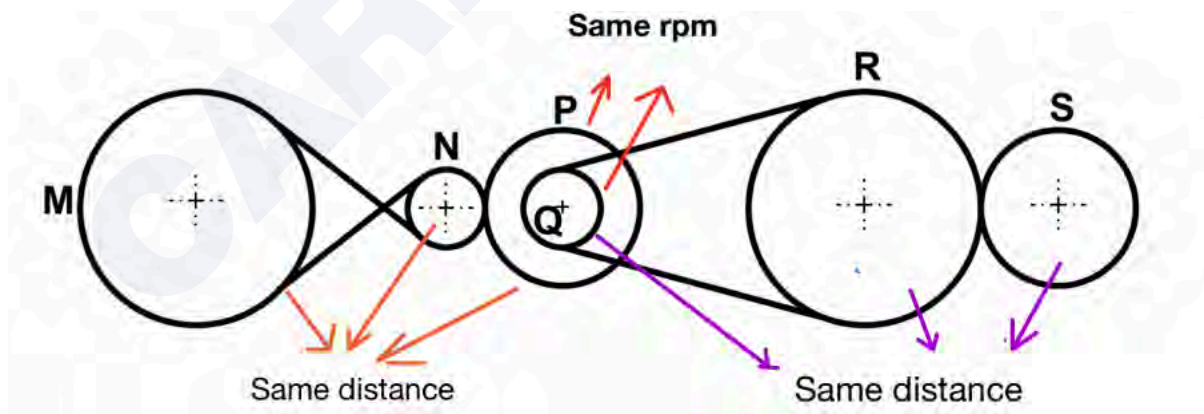
Hence, the Weight of blue fish is 10gm Similarly, we can find the weight of green fish.



Hence, the weight of red fish is 60 gm.

**Q.16** A system of gears and belts is shown below. The diameters of the gears M, N, P, Q, R and S are 3, 1, 2, 1, 3, and 2 meters respectively. If the gear M is rotating at 100 rpm, what is the rpm of gear S?

**Solution:**



Gears Connected will cover the same distance, and the gears mounted on the same shafted have the same rpm.

$$Distance = Circumference \times rpm$$

$$rpm = \frac{Distance}{circumference}$$

Distance moved by  $M = \text{Circumference} \times \text{rpm}$

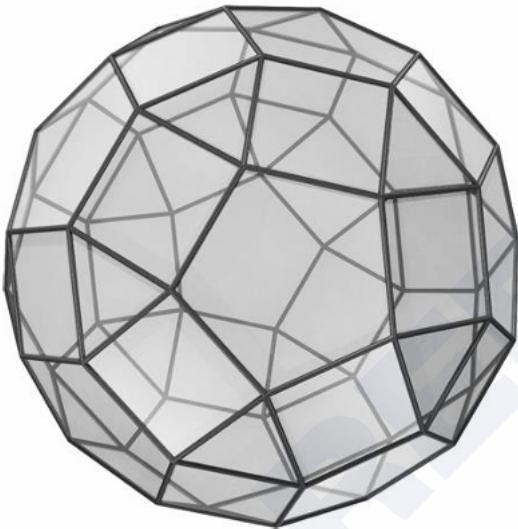
$$= 3\pi \times 100 = 300\pi = \text{Distance moved by } P$$

$$\text{rpm by } P = \frac{\text{Distance}}{\text{circumference}} = \frac{300\pi}{2\pi} = 150 = \text{rpm of } Q$$

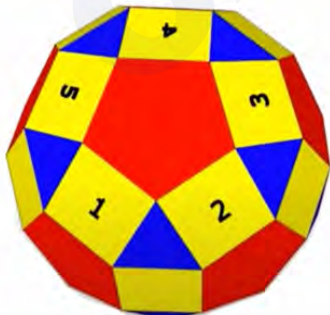
Distance moved by  $Q = 150 \times 1\pi = \text{Distance moved by } S$

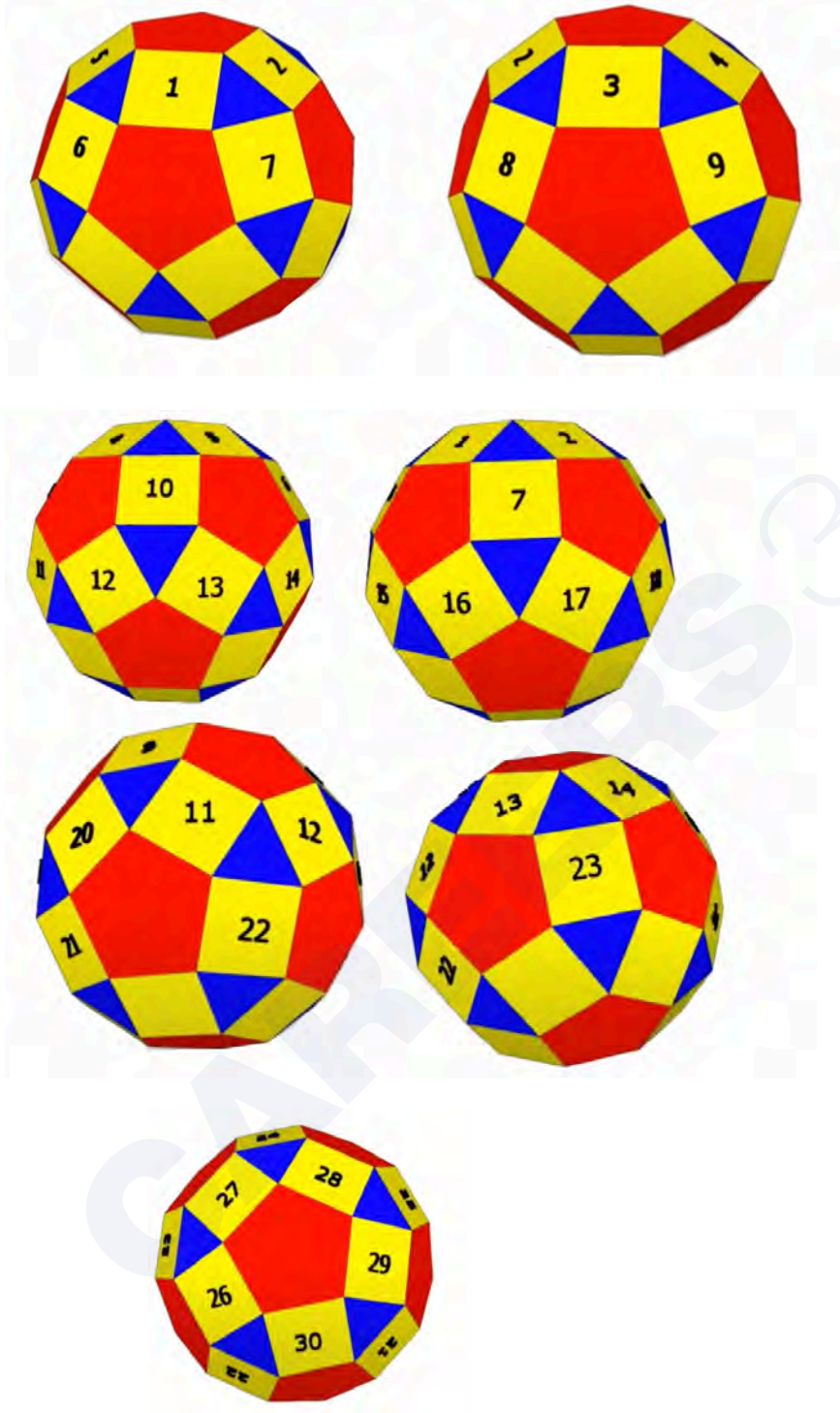
$$\text{rpm by } S = \frac{\text{Distance}}{\text{circumference}} = \frac{150\pi}{2\pi} = 75$$

**Q.17** The given 3D object is made by combining three shapes - pentagons, squares and triangles. What is the total number of squares?



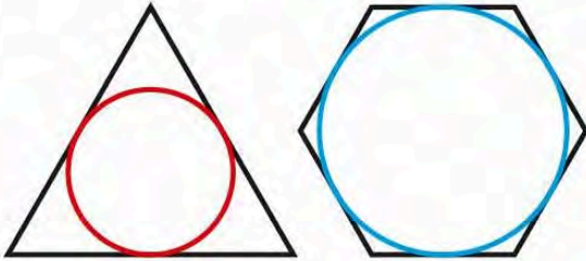
**Solution:** By rotating the 3D object, we can count the total number of squares.





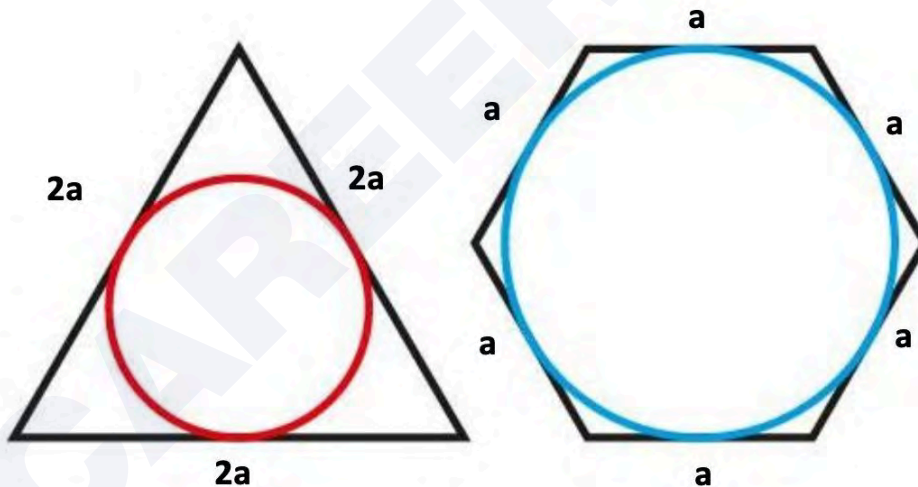
So, total number of square = 30

**Q.18** The perimeter of the equilateral triangle and the regular hexagon shown in the figure are equal. The circumference of the red circle inscribed in the triangle is 10 cm. What is the circumference of the blue circle inscribed in the hexagon?

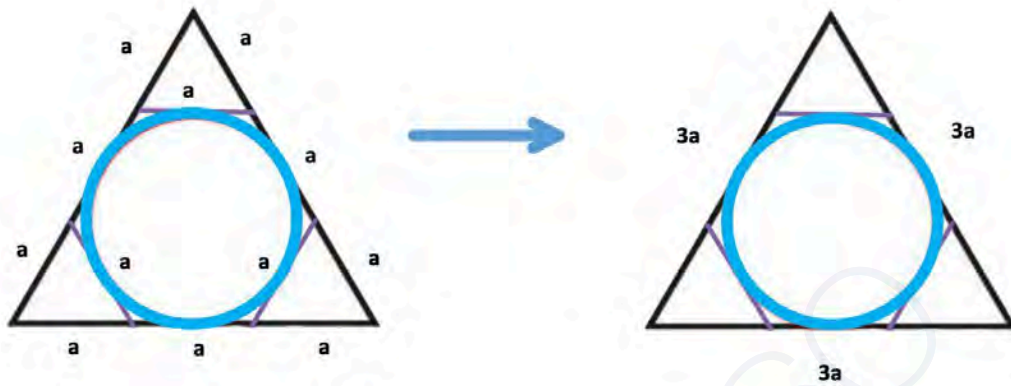


**Solution:** Triangle and hexagon have the same perimeter. The circumference of the red circle = 10 cm

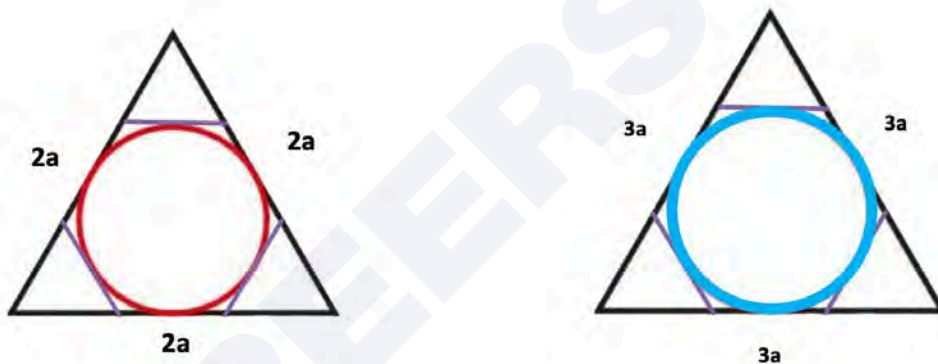
Let the perimeter =  $6a$  cm



Now extend the sides of Hexagon



As we know, a triangle with all sides the same is known as an equilateral triangle.



So the relation between above triangles are:

$$\frac{\text{circumference of blue circle}}{\text{circumference of red circle}} = \frac{3}{2}$$

$$\therefore \text{circumference of blue circle} = \frac{3}{2} \times \text{Circumference of red circle}$$

$$= \frac{3}{2} \times 10 = 15$$

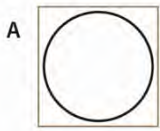
Circumference of blue circle = 15

## Section 2: Multiple Select Questions (MSQ)

Q19 Show on the left is a pattern printed by repeated use of a single printing block. Which of the printing blocks shown on the right can be used to print the pattern?



Option A:



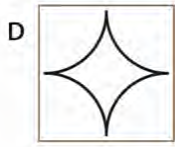
Option B:



Option C:



Option D:



**Solution:**

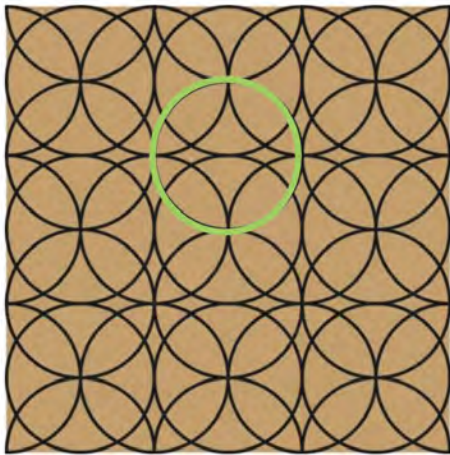


Fig a

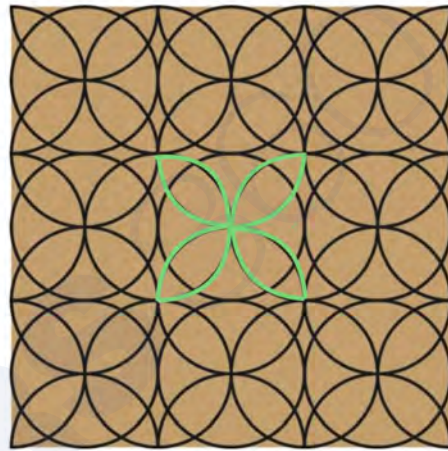
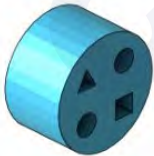


Fig b

We can see from fig a and fig b that option a and d are printed in the given printed pattern.

**Q20. Shown on the left is a socket with four holes in it. Which of the plugs will fit perfectly in this socket?**



**Option A:**



A

**Option B:**

B

**Option C:**

C

**Option D:**

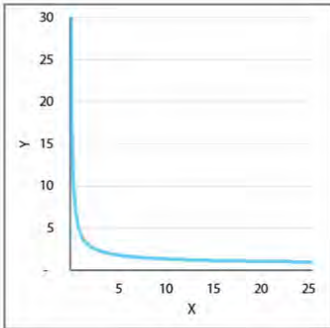
D

**Solution:**

As per the given socket upper right whole is a circle and left upper is a triangular whole so amongst the given options C and D will be fitted into the given socket.

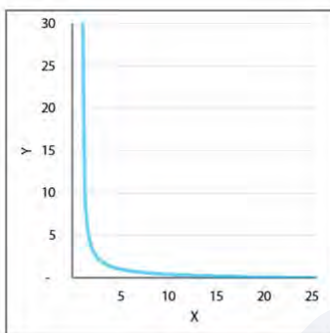
**Q.21** Which of the options show parts of the graph representing the equation  $x^y = 25$ ?

**Option A:**



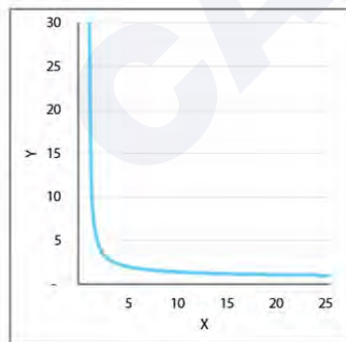
A

**Option B:**



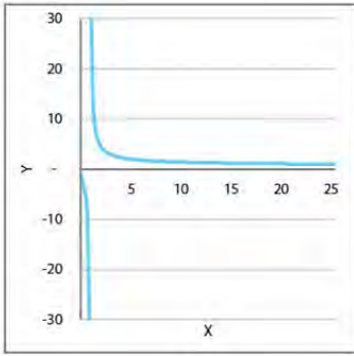
B

**Option C:**



C

**Option D:**



D

**Solution:** Let's find the out few values of  $x$  and  $y$  for which equation  $x^y = 25$  is true.

$$x = 5, y = 2$$

$$x = 25, y = 1$$

$$x^y = 5^2 = 25$$

$$x^y = 25^1 = 25$$

$$x = 625, y = \frac{1}{2}$$

$$625^{\frac{1}{2}} = \sqrt{625} = 25$$

$$x = \frac{1}{25}, y = 1$$

$$\frac{1}{25}^{-1} = \frac{1}{\frac{1}{25}} = 25$$

So the values are correct, so now try to find out which graph is correct

x	y
1/25	-1
1/5	-2
5	2
25	1
625	1

We can see with  $x$  increasing,  $y$  is decreasing

- In option A,  $x$  is decreasing and  $y$  tends to be zero, so this option is not correct.
- In option B, if we reduce  $x$ ,  $y$  will keep on increasing but if we increase  $x$  here it is shown that  $y$  tends to be zero while we are seeing it doesn't tend to be zero but if decreases it becomes in the fraction it less than one but is not zero, so this is incorrect.

- In option c , if we reduce x, y will keep on increasing and if you increase x, y will reduce, but it will not become zero but will be in fraction.

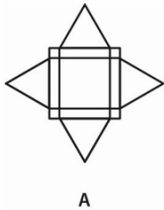
Hence, option is C is correct.

Similarly, option D also satisfy the equation

Therefore, option c and D are correct.

**Q.22 Which of the given figures can be drawn without lifting the pen? The lines can cross each other but cannot overlap on top of one another.**

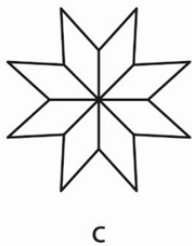
**Option A:**



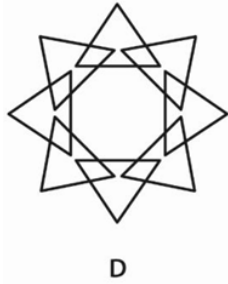
**Option B:**



**Option C:**



**Option D:**

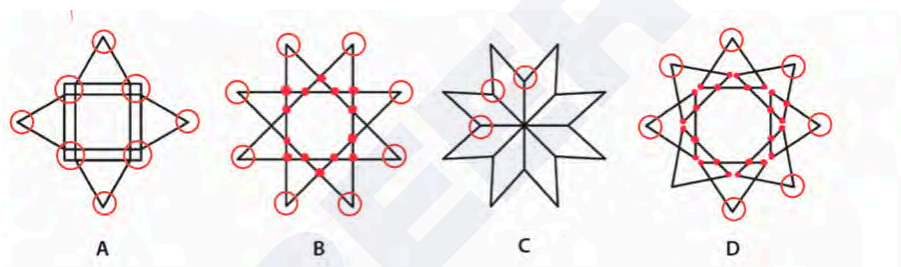


**Solution:** Smartest way to check if figures can be drawn without lifting a pen. Pen is to see the intersections.

It is possible if at all the intersections, there are even no. of lines or there are exactly 2 intersections where an odd number of lines join.

Condition:- If at 1 or more than 2 intersections odd no of lines join, it is not at all possible to draw that figure without lifting.

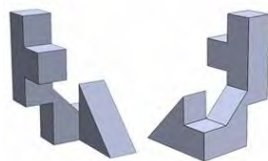
So we will check all intersection in all the given options.



Here option choose 3 intersection points which is not possible

So, the correct answers are A, B and D.

**Q.23** Shown below are 2 views of the same solid. Through which of the cutouts shown in the options, will the solid pass?



**Option A:**



A

Option B:



B

Option C:



C

Option D:



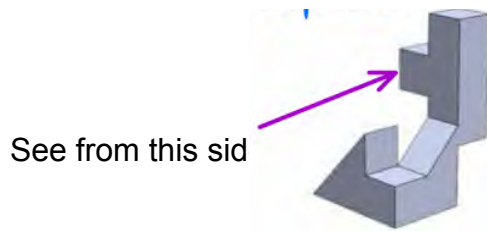
D

**Solution:**

We know any solid figure is in 3 directions, i.e,  $x$ ,  $y$  and  $z$

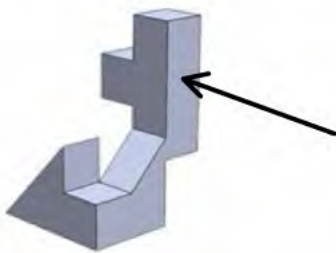


**Step 1 :** So from  $x - axis$  , irrespective of thickness, the figure can be passed.



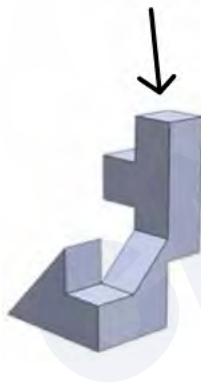
This figure can pass through option A, but it will not pass from option B.

**Step 2:** Now from  $y - axis$ , we can see this (figure given below)



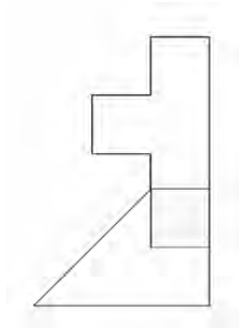
Can pass through option C [irrespective of thickness]

**Step 3:** So, from  $z - axis$  we can see this [figure given below]



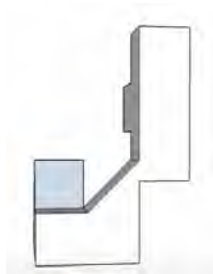
Can pass through option D, [irrespective of thickness]

So, for the reference, you can also visualize it through a model.



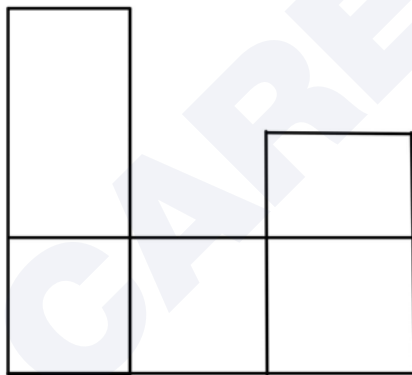
**Step 1** (From  $x - axis$ )

If we rotate this, we can see.



**Step 2** (From  $y - axis$ )

If viewed from top, it will look like,



**Step 3:** (From  $z - axis$ )

Hence, option A, C and D are correct.

**Q.24** Shown below are different forms for a step-stool. Which of the forms will remain stable when a person is standing on the top step?

**Option A:**



**Option B:**



**Option C:**

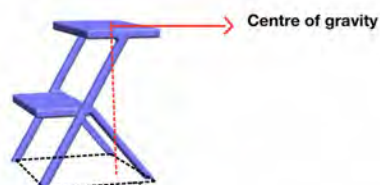


**Option D:**



**Solution:**

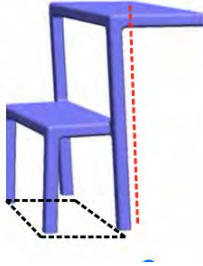
We know in physics that an object or person is said to be stable when the line of gravity can imaginary vertical lines from the centre of gravity (to the ground) is within the base of support.



- **Option A:**

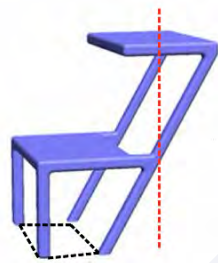
We can see the centre of gravity line comes under the base support, so the person standing will remain stable.

- **Option B :**



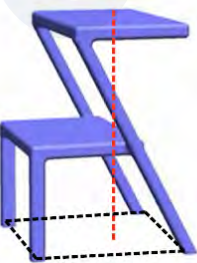
The centre of gravity line falls outside the support of the base, so the form will not remain stable.

- **Option C:**



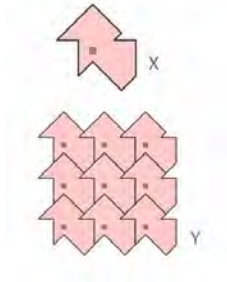
The centre of gravity line falls outside the support of the base, so the form will not remain stable.

- **Option D:**

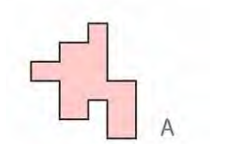


We can see the centre of gravity line comes under the base support, so the person standing will remain stable.

**Q.25** Tile X was used to create a pattern which is seamless (without gaps), when arranged as shown in Y. Which of the tiles from the options will create a seamless pattern?



**Option A:**



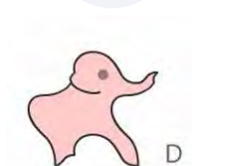
**Option B:**



**Option C:**

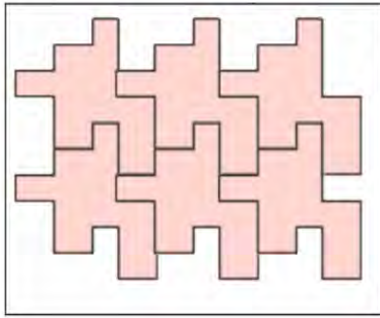


**Option D**



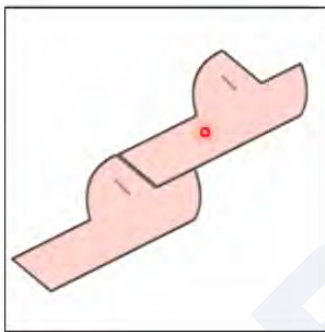
**Solution:** We have to check the gap, which has been created by the figure, So in tile X we can see  $90^\circ$  angle on the left and bottom side of the figure so that we can make a seamless pattern.

- **Option A:**



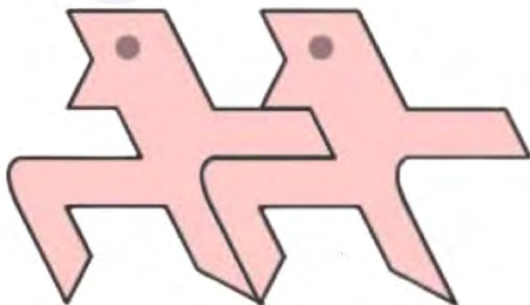
We can see the figure is making a seamless pattern like X.

- **Option B:**



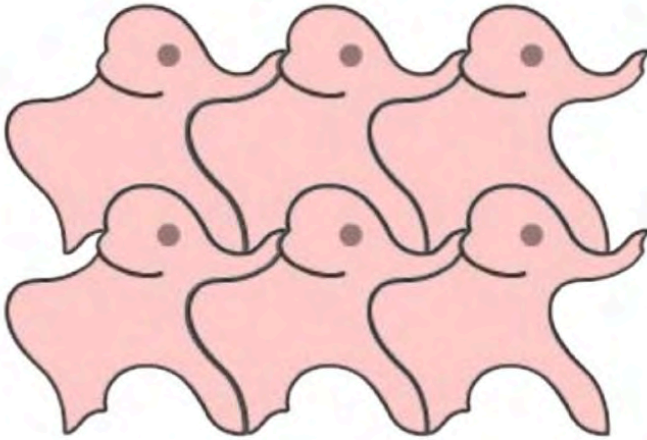
We can see the figure is not making a seamless pattern like X.

- **Option C:**



We can see the figure is not making a seamless pattern like X.

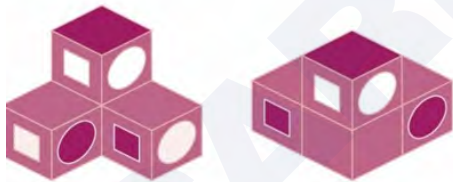
- **Option D:**



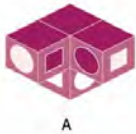
We can see the figure is making a seamless pattern like X.

Hence, option A and D are correct.

**Q.26** A painted solid is shown from two different directions. Which of the options can be the same solid seen from another direction?



**Option A:**



**Option B:**



B

**Option C:**



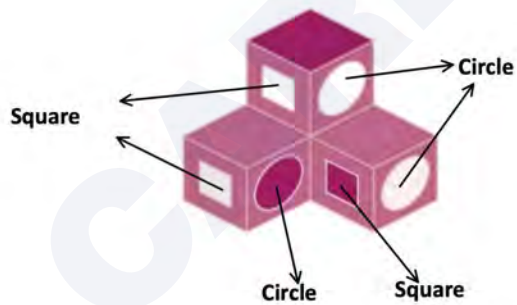
C

**Option D:**



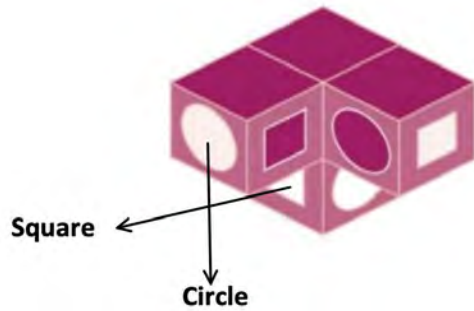
D

**Solution:**



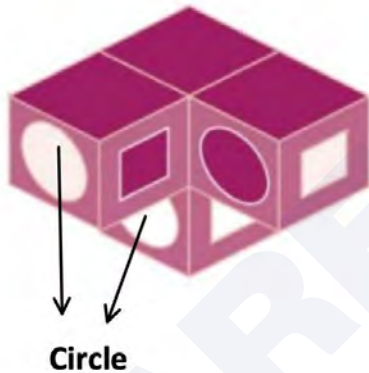
We can see we have 2 white squares on the same side, and two white circles on the other side, whenever there is a white square there is a coloured circle, and where there is a coloured square.

- **Option A:**



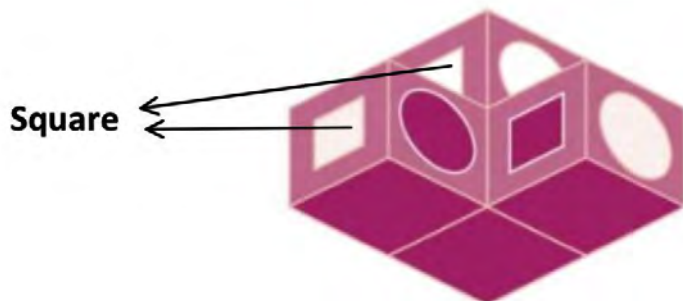
There is a circle and a square, but we have seen that both circles are on the same side, so this will not be correct.

- **Option B:**



We can see 2 circles on the same side and square. Square on the other side and where there is a circle there is a red coloured square and there is a white square with coloured circle. So this is correct.

- **Option C:**



We have 2 white square on the same side and 2 circle on the other side combined with coloured circles and squares respectively. Hence, it is correct.

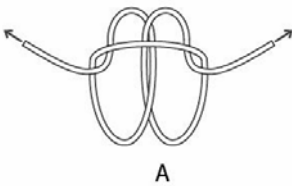
- **Option D:**



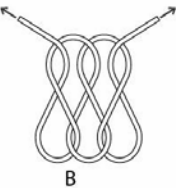
This shape is the same as given in the question. Hence, this is correct.

**Q.27 Which of the options will form a knot when both the ends are pulled outward?**

**Option A:**



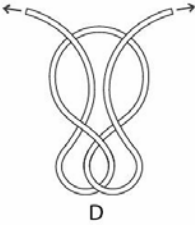
**Option B:**



**Option C:**

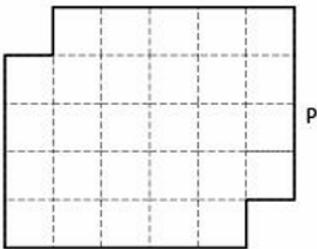


**Option D:**

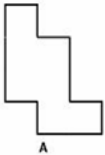


**Solution:** We all know whenever we are tying a knot if there are two ends, one of the ends should come from below then only it will be a knot. If you look at the options carefully you can observe option B and D are correct as option A and C will not form a knot. Hence, B and D are correct.

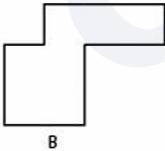
**Q.28** Figure P can be created by tiling 4 identical pieces. The pieces should not overlap while tiling. Which of the pieces shown in the options can be used to create figure P, assuming that you can rotate and flip them?



**Option A:**



**Option B:**



**Option C:**

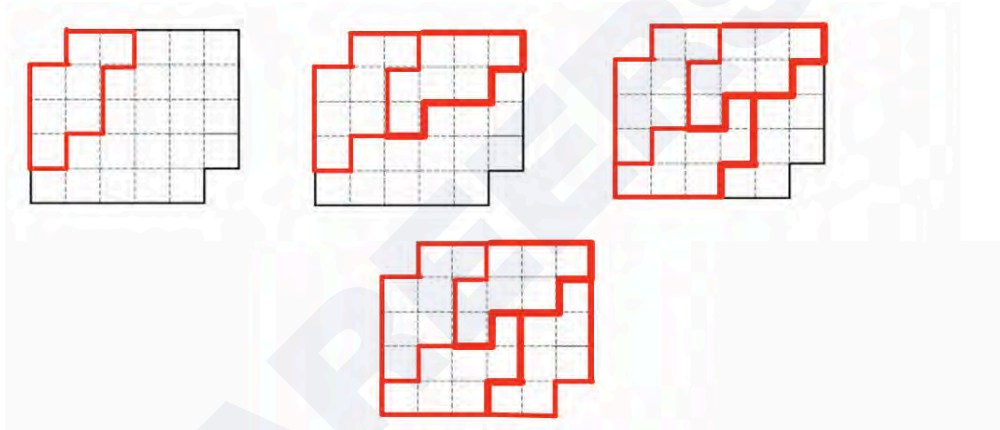


**Option D:**



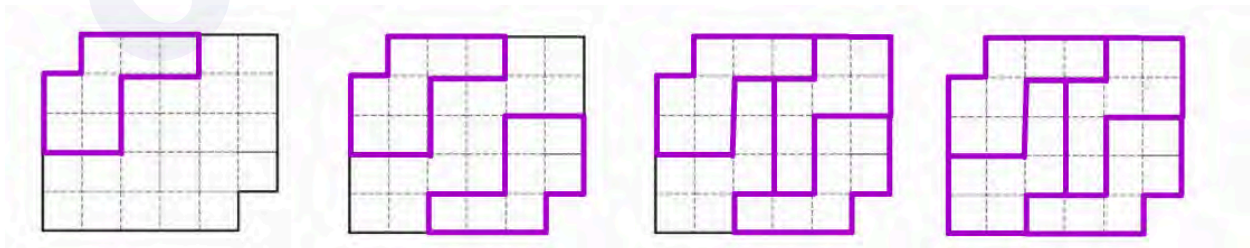
**Solution:** According to the question, pieces should not overlap while tiling, but we can rotate and flip them. Now carefully check each option one by one.

• **Option A:**



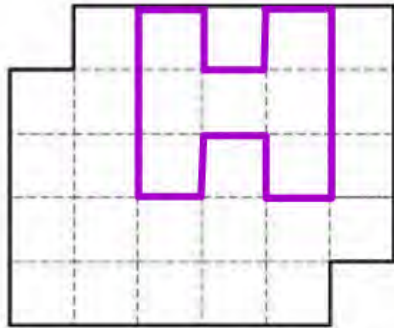
We can see four identical pieces can be created by flipping and rotating the tile.

• **Option B:**



We can see four identical pieces can be created by flipping and rotating the tile.

• **Option C:**



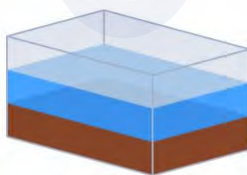
We can see we can only make 1 piece. Hence, this option is not correct.

- **Option D:**



We can see we can only make 2 pieces. So, this option is not correct. Hence, A, B is the correct answer.

**Q.29** Shown below is an isometric view of a cuboidal glass container of size 2 X 2 X 3 units. It contains a solid wooden block and some water. When tilted, which of the options will be the side view(s) of the glass container?



Glass Container

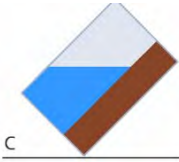
**Option A:**



**Option B:**



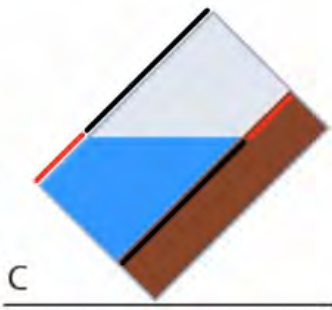
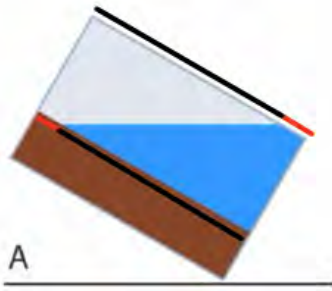
**Option C:**



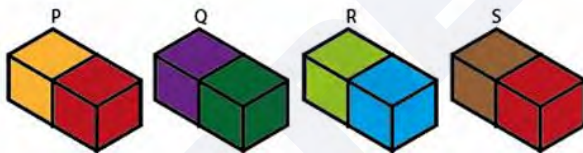
**Option D:**



**Solution:** We can see, water and empty space are equal, so the space will remain same and if we carefully observe all the options we can option a and c are correct because water and empty space has same space.



Q.30 Four solid pieces P, Q, R and S are arranged to form a cube. Which of the cubes shown in the options is/are NOT possible?



Option A:



Option B:



Option C:



Option D:

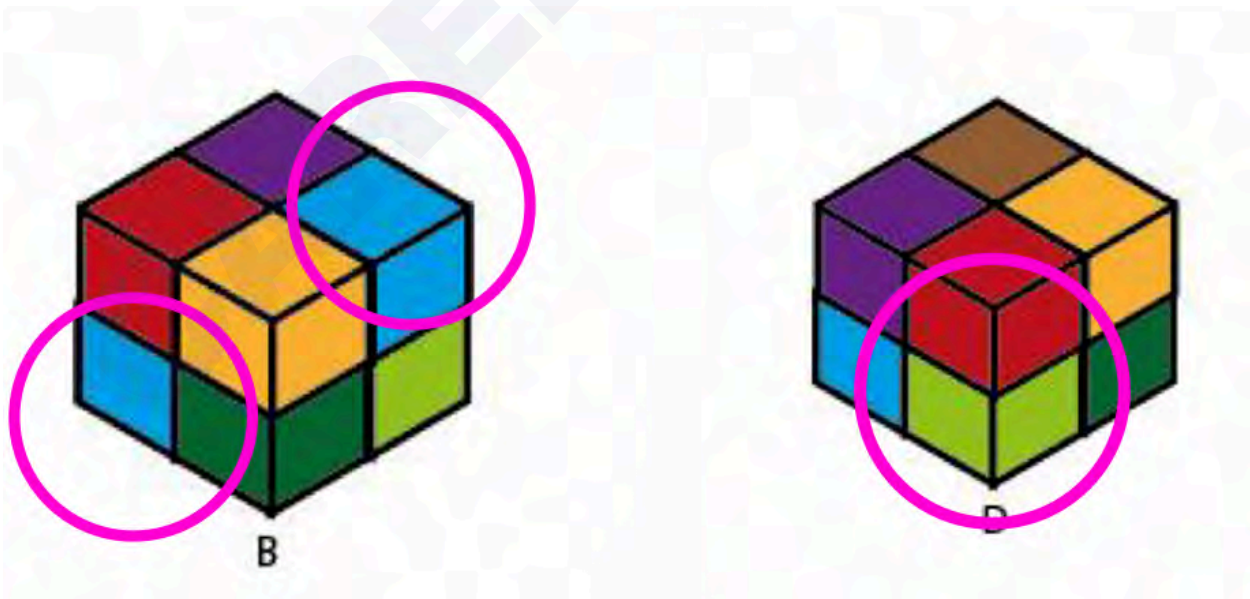


**Solution:** We have to carefully read the question because we have to find the cube which is not possible to form.

Now carefully observe,

- **Option B:** Two blue-black can be seen, which is not possible. Hence, option B is correct answer

Similarly, in **option D** blue and green are in the same solid. So, this is also not possible. Hence, option D is also the correct answer.



Correct answer Here is B and D.

**Q.31** A contractor has a set of ceramic tiles, of which one tile is shown on the left. Which of the options show(s) the pattern(s) created using this tile?



Ceramic Tile

**Option A:**



A

**Option B:**



B

**Option C:**



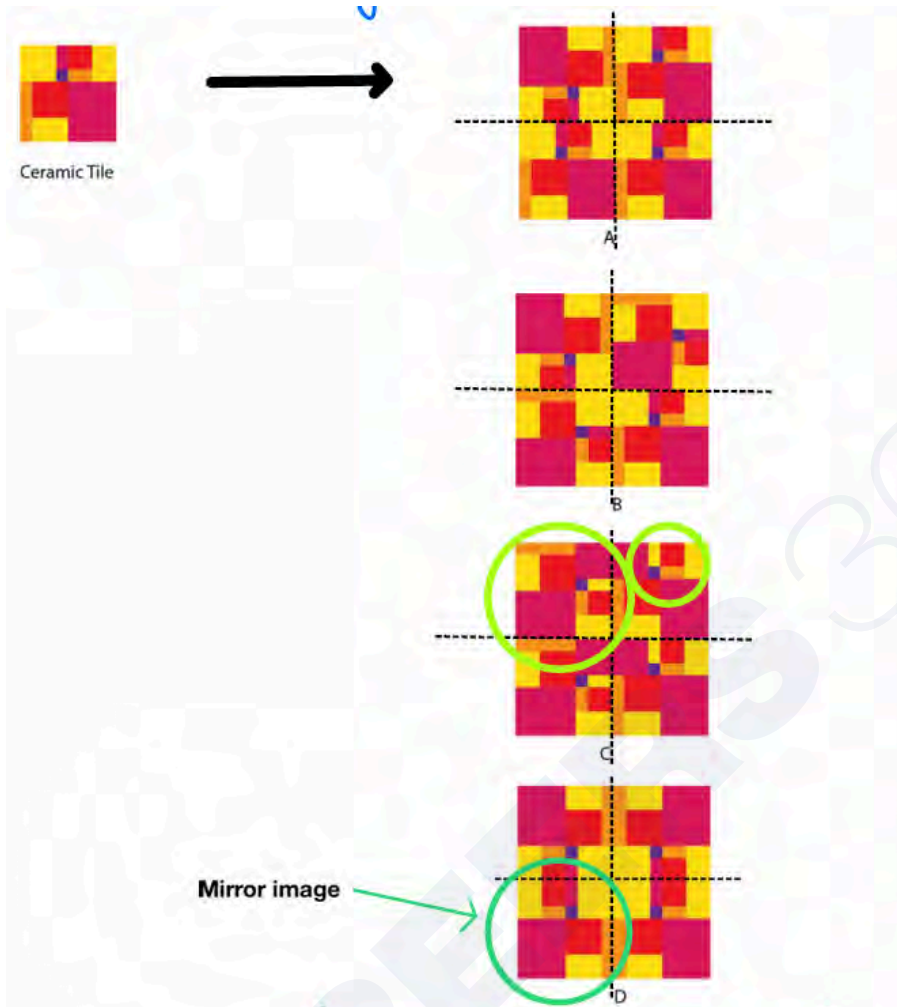
C

**Option D:**



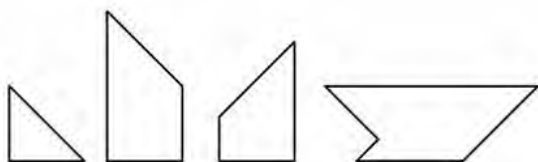
D

**Solution:** We have to find the correct option which can be created using a given ceramic tile. We need to remember tiles can be rotated but can't be flipped, so keeping that in mind, we should observe each option one by one.



We can see options C and D are not possible because in option C there are two pink shades given which is not possible and in option D the highlighted part is a mirror image of the above which is not possible without a flip, so C and D are correct answers.

**Q.32** Which of the options can be made using all four pieces shown in the top row? Flipping the pieces is allowed.



**Option A:**



A

**Option B:**

B

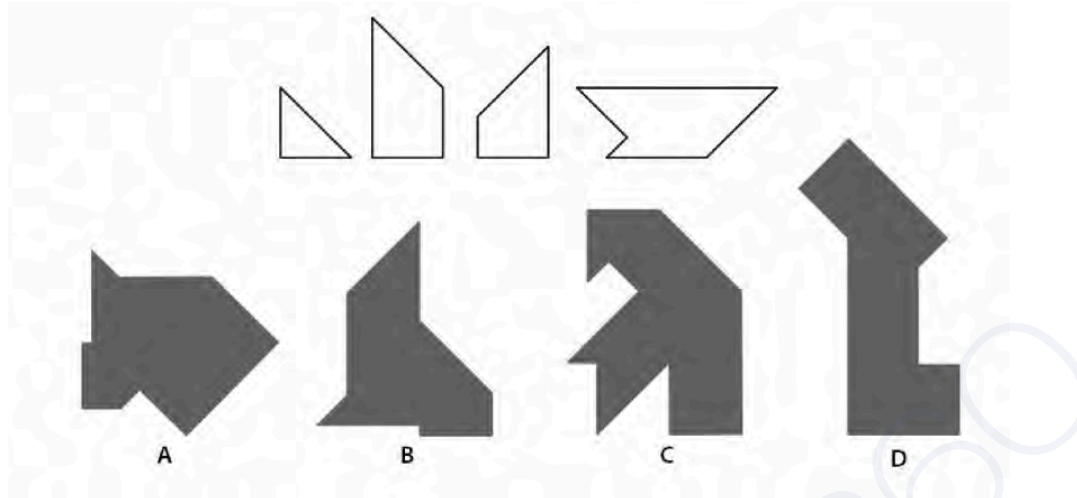
**Option C:**

C

**Option D:**

D

**Solution:**



We have to make the figure using given pieces and flipping is allowed, so usually we have to visualize each option one by one keeping the shape of the given pieces in mind.

- **Option A:**



We can see option A can be formed by just flipping the pieces.

- **Option B:**



We can see only 2 pieces are used, so this is not correct.

- **Option C:**



C

We can see option C can be formed by just flipping the pieces.

- **Option D:**

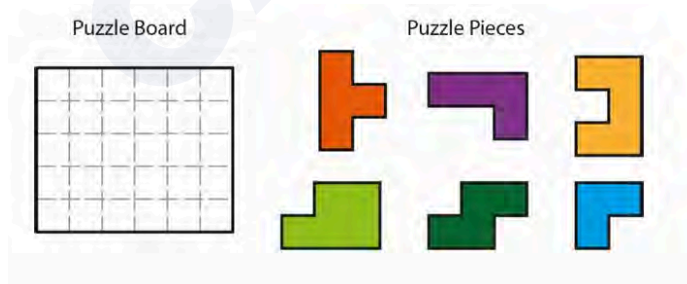


D

This option is also correct.

Hence, A, C, and D are correct answers.

**Q.33** A puzzle board can be covered completely using puzzle pieces, six of which are shown below. Which of the pieces in the options can be used along with these six pieces to cover the board completely? Flipping and rotating of the pieces is allowed. Overlapping of the pieces is NOT allowed.



**Option A:**



A

Option B:



B

Option C:



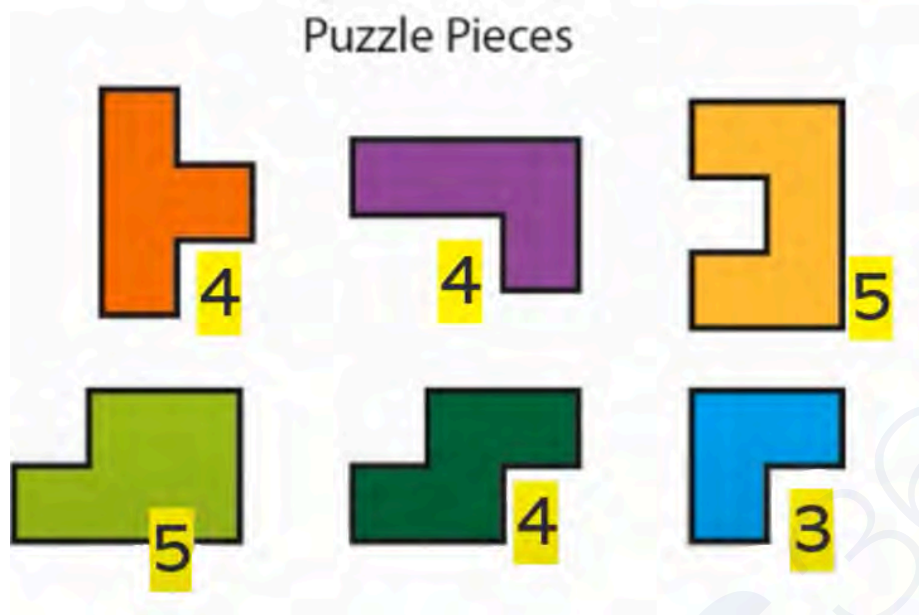
C

Option D:

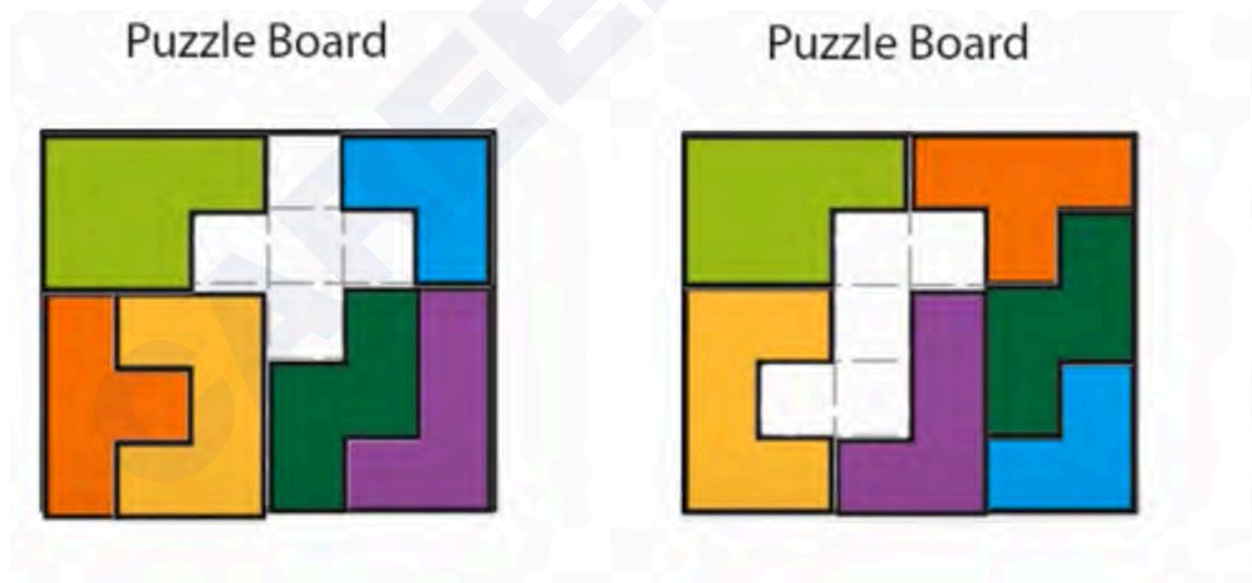


D

**Solution:** We have to cover the given puzzle board completely using the puzzle pieces but according to the question only rotating and flipping of the pieces is allowed but overlapping of the pieces is not allowed we can see there are 30 squares are there in puzzle pieces.



We can sum all of them, and we get a total of 25 squares in this, so to cover the puzzle board we need 5 more squares. So in option A we have 5 squares, In option B we have 4 squares, In option C again 4 squares and In option D we have 5 squares. Therefore, options A and D are correct. You can see it in the image given.



**Q34. Which of the chairs will rock TO AND FRO?**

**Option A:**



**Option B:**



**Option C:**

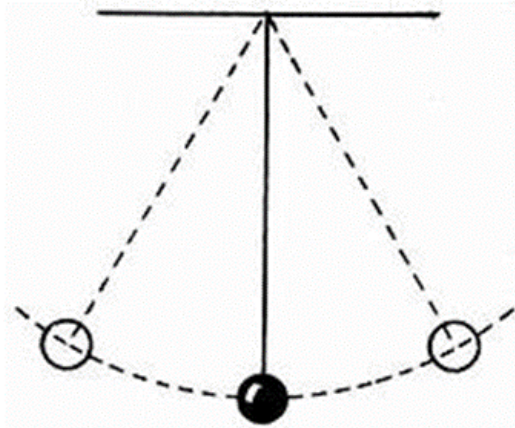


**Option D:**



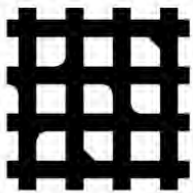
**Solution: TO AND FRO**

If an object moves to and fro, it means the object is moving repeatedly from one place to another and back again or from side to side, such a motion is also called oscillatory motion. E.g., Pendulum.



So among the given options, we can see that there is a hurdle in option C and a non-uniform base in option B, So To and Fro motion is not possible in options B and C. Hence, options A and D are correct.

**Q.35 Which of the options is/are simple rotation(s) of the image P?**



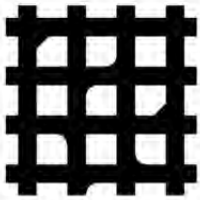
P

**Option A:**



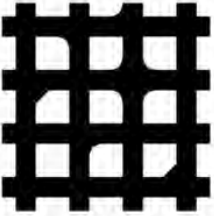
A

**Option B:**



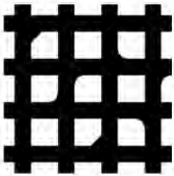
B

Option C:



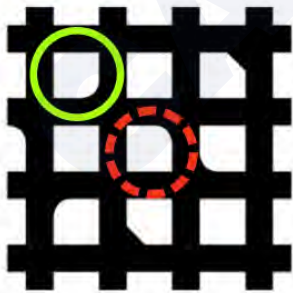
C

Option D:



D

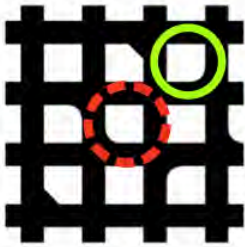
**Solution:** To find the simple rotation of image P we need to first focus on the center part of the image and compare the options.



P

- **Option A :**

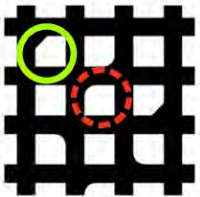
The curve on the right upper has come on the left bottom, which means  $180^\circ$  rotation has been done, So option A is correct.



A

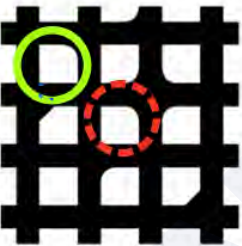
- **Option B:**

This is just  $90^\circ$  rotated, hence this is correct.



B

- **Option C :**



C

In this, P is not rotated, so this is not correct.

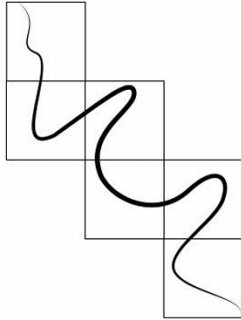
- **Option D:**



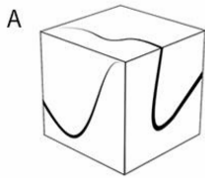
D

This is  $90^\circ$  rotated if we focus in the center, but the remaining blocks do not match the rotating, Hence this is wrong.

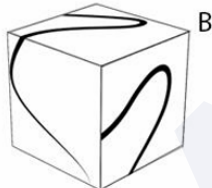
**Q.36** Shown on the left is the development of a cube. Which of the options can be created when the shown development is folded?



**Option A:**



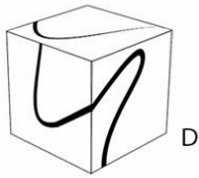
**Option B:**



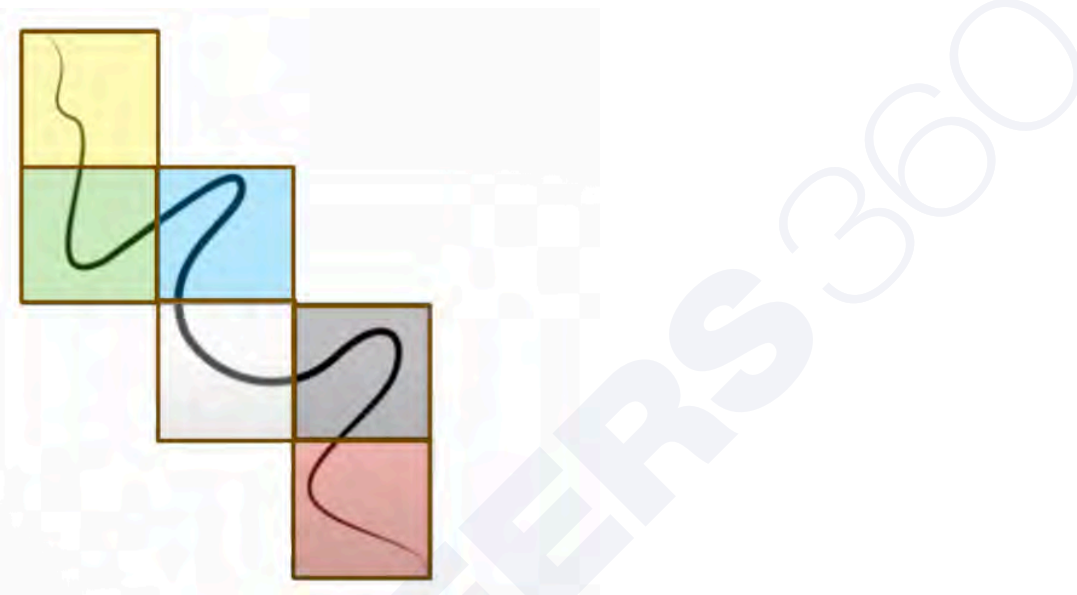
**Option C:**



**Option D:**

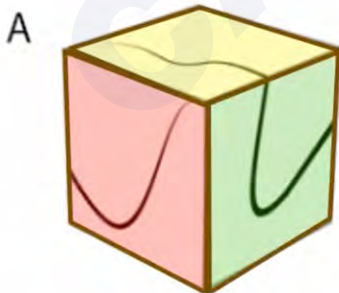


**Solution:** To make it easy, colour-coded them.



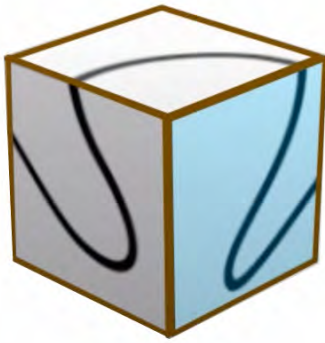
If we fold the above figure we can find that yellow is adjacent to white, green is adjacent to gray, and blue is adjacent to pink, so according to the rules only one colour among adjacent can come in a folded cube. Now check each option one by one.

- **Option A:**

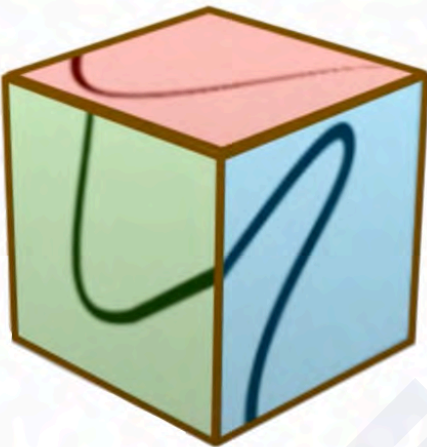


We know yellow, green, and pink are not adjacent, so this is correct Option B:

- **Option B** is incorrect.
- **Option C:** Is correct, as no two adjacent are coming together.



- **Option D:** It is incorrect, as green and gray are adjacent, so they can't come together.



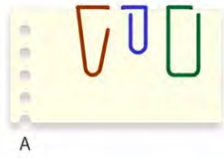
Hence, options A and C are correct.

### Section 3: Multiple Choice Questions (MCQ)

**Q37:** Three paper clips are attached to a paper as shown on the left. Which of the options shows the back side of the paper?



**Option A:**



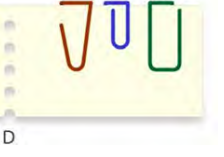
**Option B:**



**Option C:**



**Option D:**



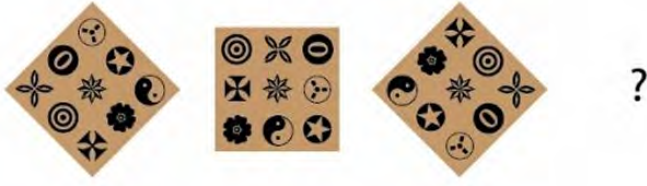
**Solution:** The answer should be the vertical mirror image of the given figure.

Hence, option C is correct

As in the mirror image,

- The right side of the object becomes the left side.
- The left side of the object becomes the right side
- The top and bottom remain unchanged.

**Q.38**



Option A:



A

Option B:



B

Option C:



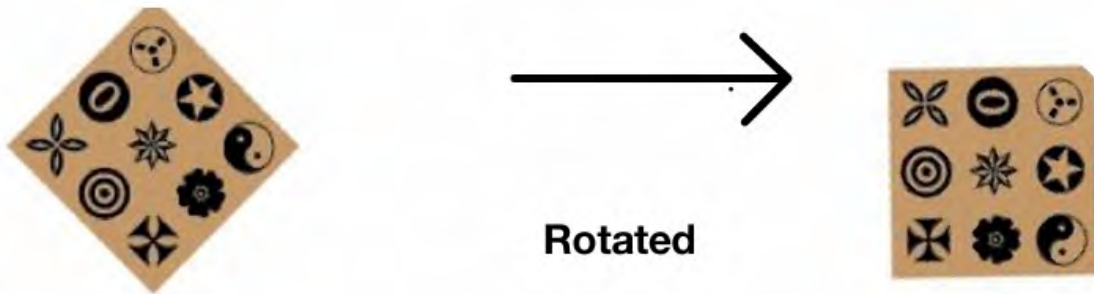
C

Option D:



D

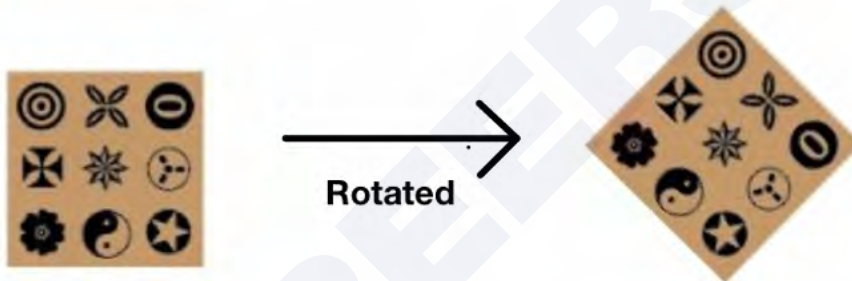
Solution:



Then the whole thing is moved one step forward and it became,



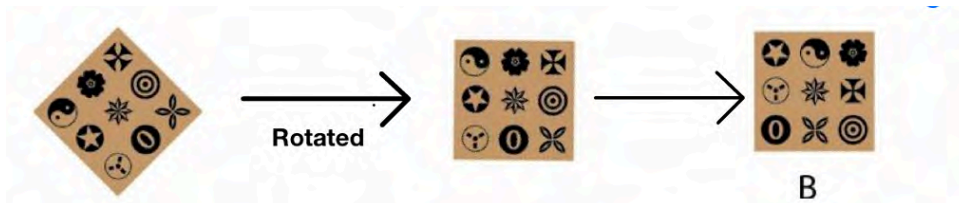
Then this will be rotated as shown below



Then the whole thing is moved one step forward and it became,



Now, the next step will be the rotation and one step forward so we will get.



Option A cannot be the correct answer because the left corner zero is not possible in this way after rotation. Hence, option B is correct.

**Q.39 An animation of revolving circles is shown on the left. If it is flipped horizontally and then flipped vertically, what will be the resulting animation?**

Not possible to do as animated images are not available.

**Q.40 You can set preferences in a mobile app by making a series of selections. You want to be notified of promotions and transactions but do not want to receive newsletters. You want to allow access to your location and mic but do not want to allow access to your contacts. What is the correct sequence of actions?**

- Do not notify me on Promotions
- Send me Newsletter
- Notify my Transactions
- Do not allow access to my Contacts
- Allow access to my Location
- Allow access to my Mic

- A. Check, skip, check, check, skip, check
- B. Skip, Skip, check, skip, check, check
- C. Check, skip, skip, skip, check, check
- D. Skip, skip, check, check, check, check

**Solution:**

This is a very easy question but don't get confused.

**Step 1:** Do not notify me of promotions but according to the question, notifications are needed, so skip this.

Hence, options A and C are eliminated.

**Step 2:** Send me a newsletter.

But according to the question, a newsletter is not needed, so skip this.

**Step 3:** Notify my transaction

Transaction notifications are required, so check.

**Step 4:** Do not allow access to my contacts.

According to questions, you don't give access to contacts, so check this. Hence, option B is also eliminated.

So, option D is correct.

**Q.41** A story depicts Sabina encountering a spider. The continuing scene has to represent the spider's point of view of Sabina. What is the most appropriate option?



**Option A:**



A

**Option B:**



B

**Option C:**



C

**Option D:**



D

**Solution:** We have to show what the image the spider will be seeing from its point of view.

Option A: It is just an upside-down image of Sabina, So this is wrong.

Option B: This perspective is as if the spider is just on the head of Sabina, the image will look like this, so this is wrong.

Option C: If you see the spider perspective, option C is the correct answer

Option D: The image of Sabina is not symmetrical (as shown below) so this is wrong.



D

**Q.42** Which option is the correct mirror image of the figure given on the left?



**Option A:**



A

Option B:



B

Option C:



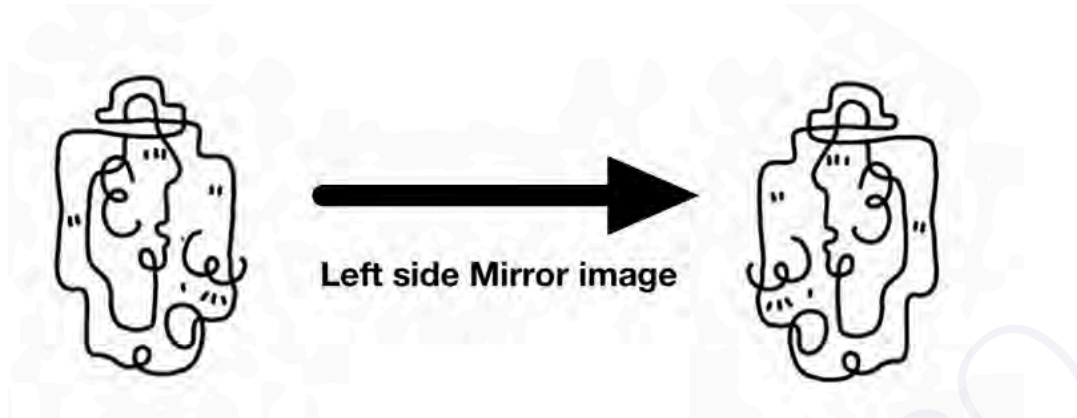
C

Option D:



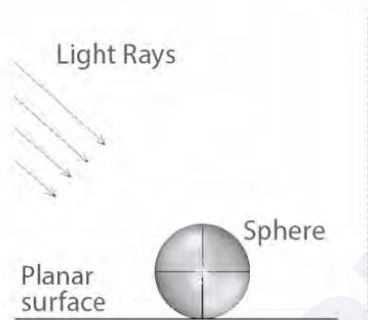
D

**Solution:** The Mirror image of an object is a reflected duplication of an object that appears almost identical but is reversed in the direction perpendicular to the mirror surface.

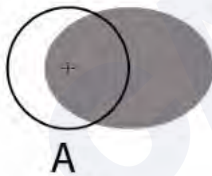


Hence, option C is correct.

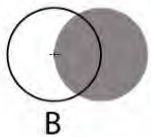
**Q.43** A solid sphere is kept on a planar surface. Parallel rays of light are falling on it, as shown in the image. Which option correctly represents the shadow cast by the sphere on the planar surface?



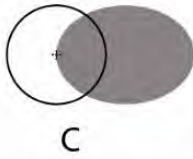
**Option A:**



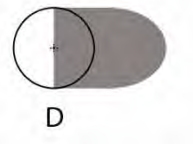
**Option B:**



**Option C:**

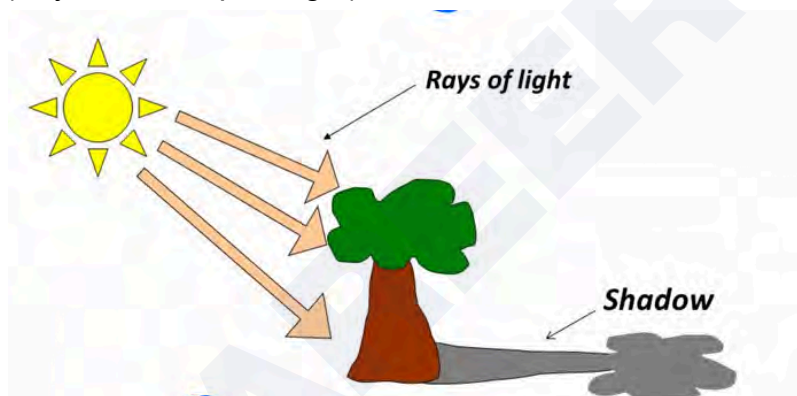


**Option D:**

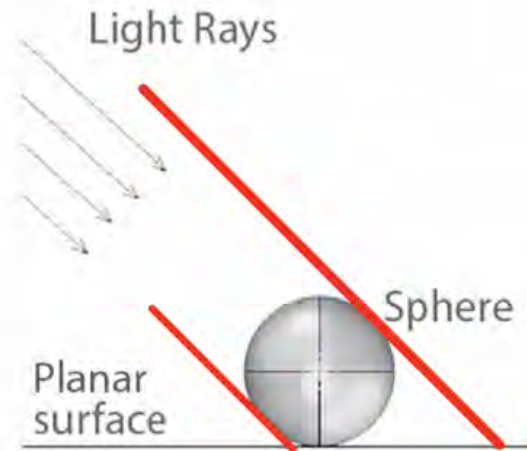


**Solution:** We can see that lights are coming from the left top, so the image's shadow can't be a straight line, hence option D is eliminated. Now if light rays come over the sphere, they can't form the replica of the sphere as a shadow, so image option B is also eliminated.

Now look at the image given below.  
(Physics concept of light)



Now if you see in option C the shadow is starting from the centre so it is not possible. The shadow will start forming from the left side (as shown below) so option A is correct.



**Q.44** Four students were given a task to design a stencil for the word 'pedagogy' for spray-painting. Shown in the options are the designs of each student that are to be cut into stencils for painting. Identify the design that will NOT work as a stencil to paint the given word.

**Option A:**

A

**Option B:**

B

**Option C:**

C

**Option D:**

D

**Solution:** Observe each option minutely, you will observe that in stencils the main part is attached so if you see options C and look at the letters 'e' and 'a' you can see that the red circle part can fall off as it is not attached, Hence option C is correct.



**Q.45** A group of friends is on a trek. The sunlight is directly above them. No other light source is present. Identify the most appropriate lighting for this scene.

**Option A:**



A

**Option B:**



B

**Option C:**



C

Option D:



D

**Solution:** Now we can observe that light is from the top only so the shadow should be on the base only so only option A is correct as in option B. No shadow is coming but in option D if a light is from the right then only the left side shadow can appear. Hence, option C is correct.

**Q.46 Identify the odd one.**

Option A:



Option B:



Option C:

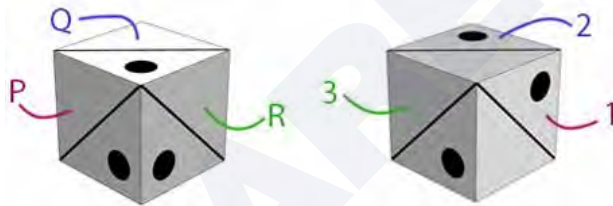


Option D:

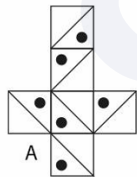


**Solution:** If you observe it you can see option A is nothing but 5 and its mirror image, B is nothing but 3 with its mirror image, C is 2 with its mirror image and D is S with its mirror image. Hence, option D is an odd one.

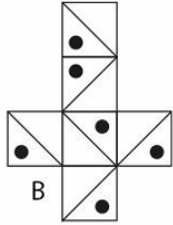
**Q.47** Shown below are the 2 views of a cube. If face P is opposite to 1, Q is opposite to 2 and R is opposite to 3, which option can be folded to make the cube?



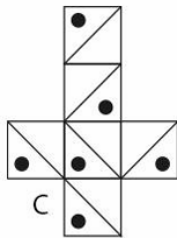
Option A:



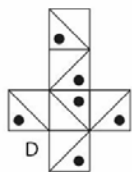
Option B:



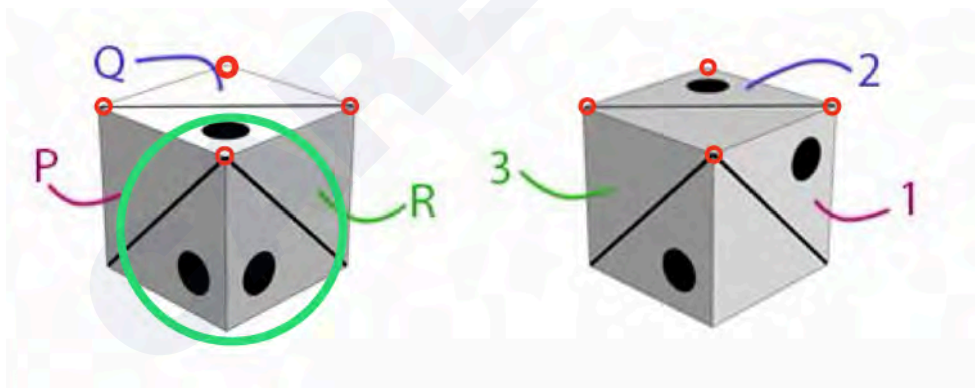
Option C:



Option D:

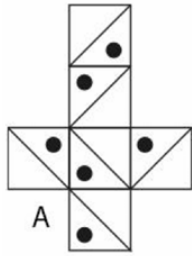


Solution:



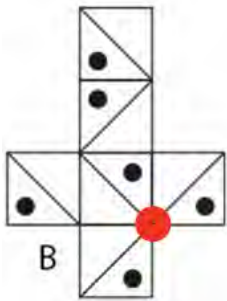
we know that every cube has eight corners IF we check at each corner we can see that every corner at the max two lines are meeting Red circles on the image given above so now check options one by one

- Option A:



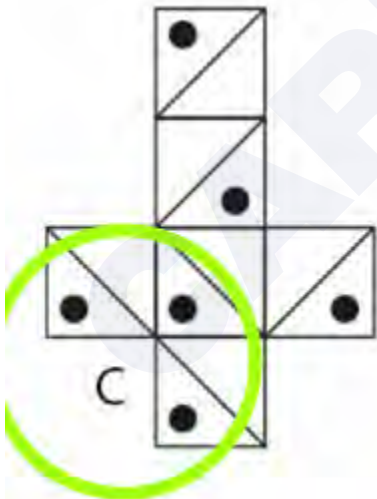
Now if you see the R and P face meeting point, you see two dots side by side and one above, so this pattern can't be seen in this option. Hence, this is incorrect.

- **Option B:**



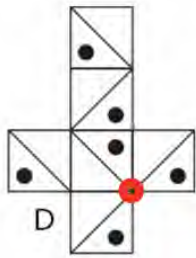
If you see here, three lines are meeting. Hence, this is incorrect.

- **Option C :**



If you see the R and P faces meeting point, you can see 2 dots side by side and one on the faces. This pattern is visible. Here, Hence, This option is correct.

- **Option D :**



If you are also meeting 3 lines, Hence this is incorrect.

Q.48



Option A:



A

Option B:



B

Option C:



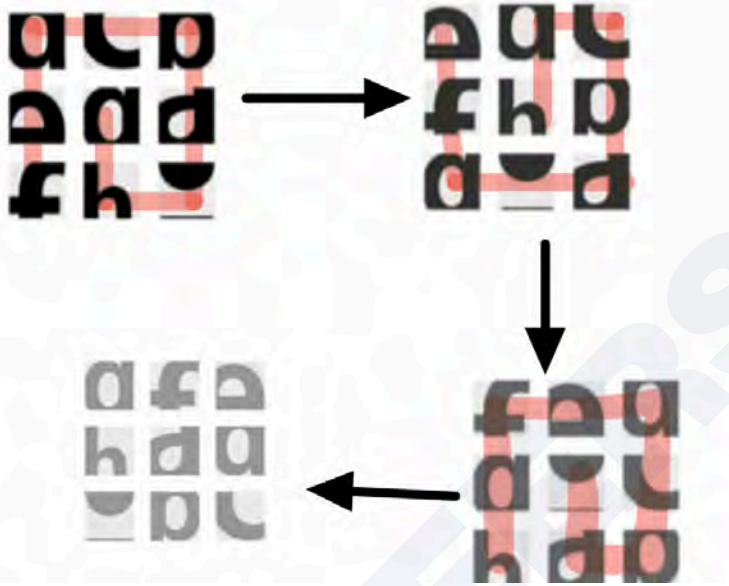
C

Option D:



D

**Solution:** If you observe it, you will note a pattern like this (shown below) and the image is getting lighter.



Hence, option C is correct.

**Q49.** The options show maps of some states of India. In only one of the options, the map has been scaled (either up or down). Which is that option?

**Option A:**



A

**Option B:**



B

Option C:



C

Option D:



D

Solution:



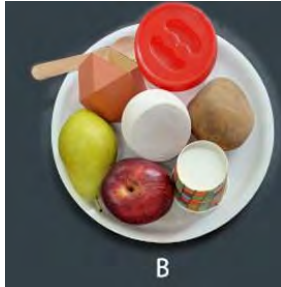
According to the map of India, we can see that option A is Gujarat option B is MP, option C is Maharashtra but option D is scaled. Hence, option D is correct.

**Q.50** Gita placed some objects on a white plate. She took a photo with a camera. Without disturbing the arrangement of objects, she took two more photos while turning the plate. Soon after, Shefali placed the same objects on a similar plate and, under similar lighting conditions, took a photo. Which option shows Shefali's photo?

**Option A:**



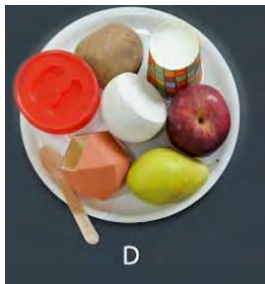
Option B:



Option C:

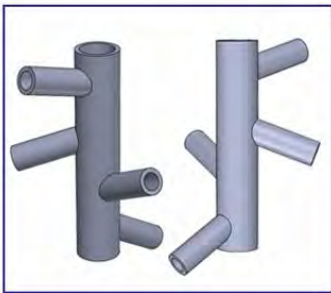


Option D:

**Solution:**

If we focus on the placement of Pear in option A, we can say this doesn't match with other options as the stem of the pear is towards the apple in options B, C, and D. Hence, option A is the correct answer to this question.

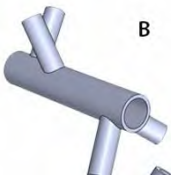
**Q.51** Two views of the same object are shown in the box. Which option depicts the same object?



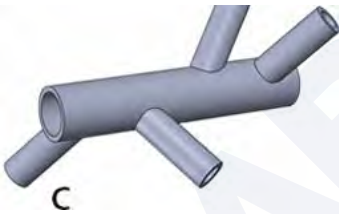
**Option A:**



**Option B:**



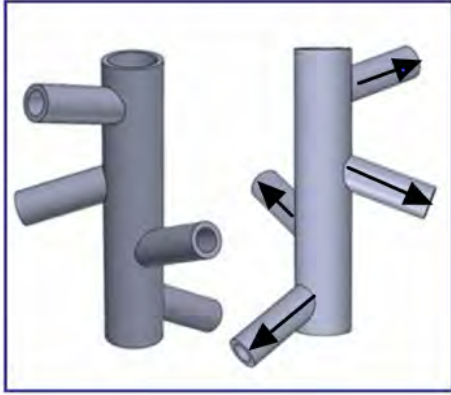
**Option C:**



**Option D:**

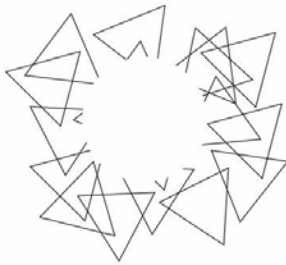


**Solution:**



We can see all 4 arms are in opposite directions, and alternatively, they are placed as shown above, option A is correct.

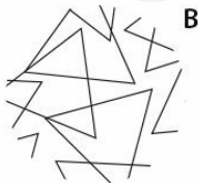
**Q.52** The image shown below is made up of triangles only, from which the central portion is missing. Identify the missing portion.



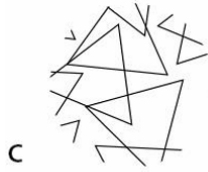
**Option A:**



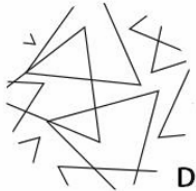
**Option B:**



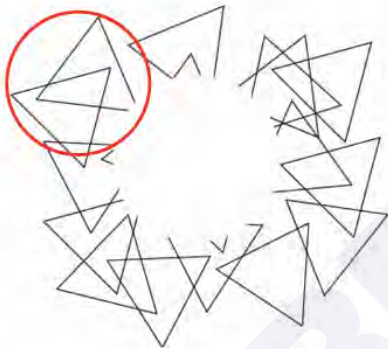
**Option C:**



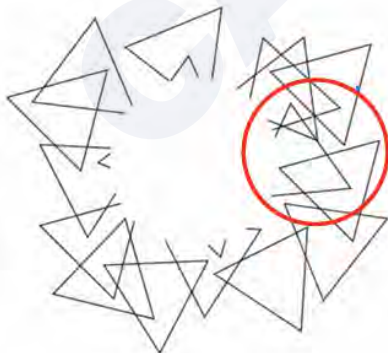
**Option D:**



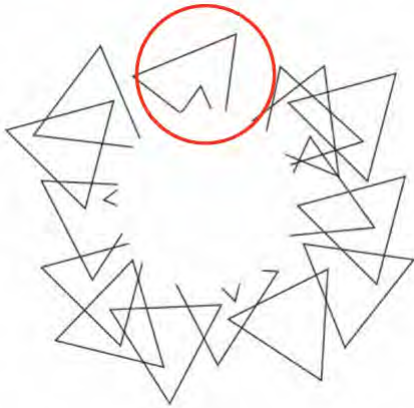
**Solution:**



for this part the apex of the triangle is needed, so option B is eliminated as it doesn't have the apex of the triangle in the left Top corner Now

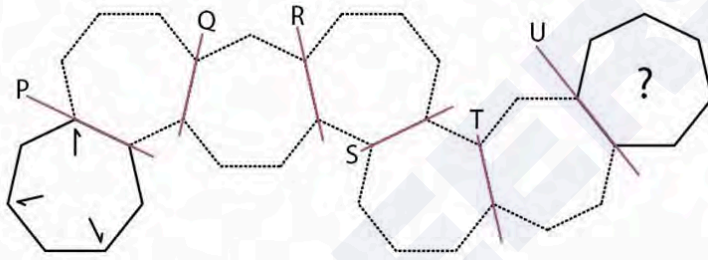


Here half of the part of the triangle is needed which is not in option C so it is also eliminated Now we are left with 2 options i.e., A and D.



The part of this triangle is missing in D Hence option A is correct.

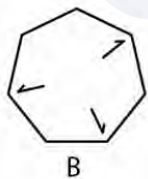
**Q.53** The figure shown below is mirrored along the axes P, Q, R, S, T, and U. What would be the resultant figure?



**Option A:**



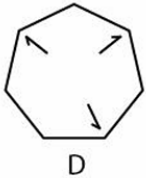
**Option B:**



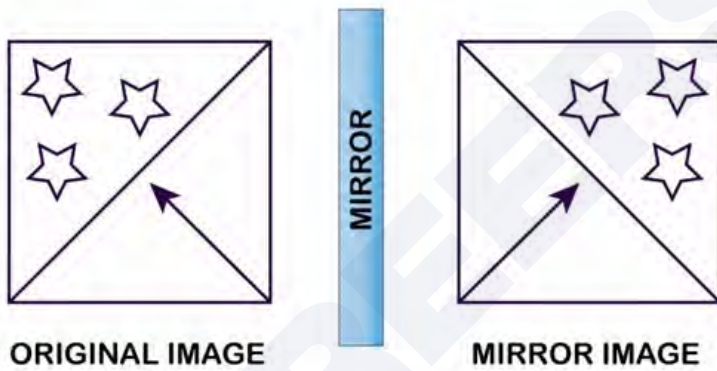
**Option C:**



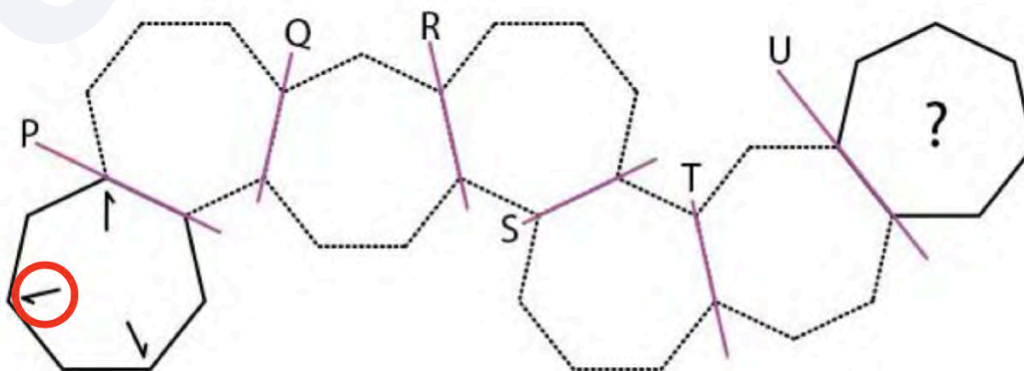
Option D:



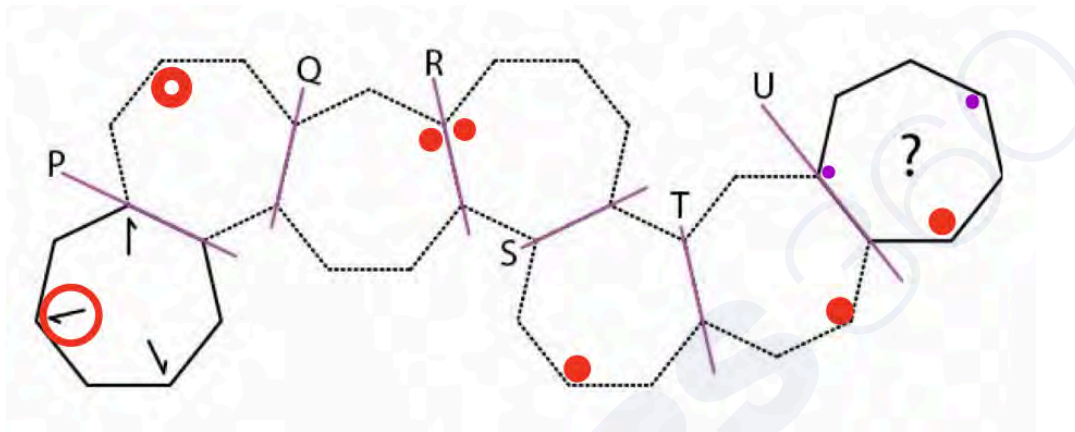
**Solution:** The image of an object that is a mirror is an image or mirror reflection. In this reverse case, the image of an object shows in order as a mirror reflection like the right side of an object, left side image reflection shows a right image for example.



Now according to the question

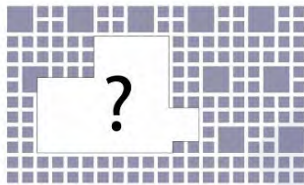


So this arrow will move in the direction given below apart and the remaining two are equally from one another

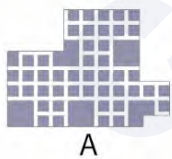


By seeing the positioning of the arrows, we conclude that option B is correct.

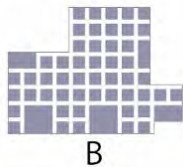
Q.54



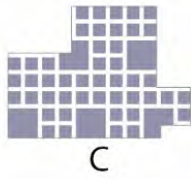
Option A:



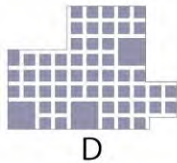
Option B:



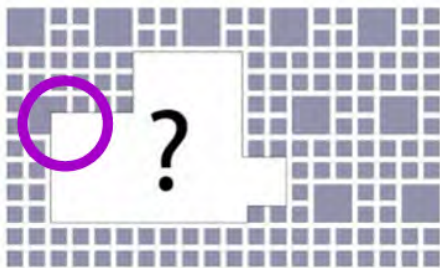
Option C:



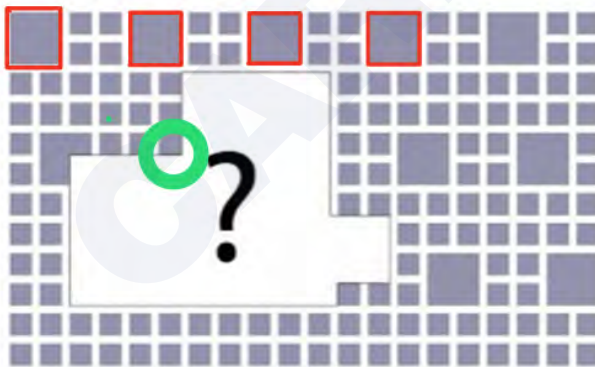
Option D:



Solution:



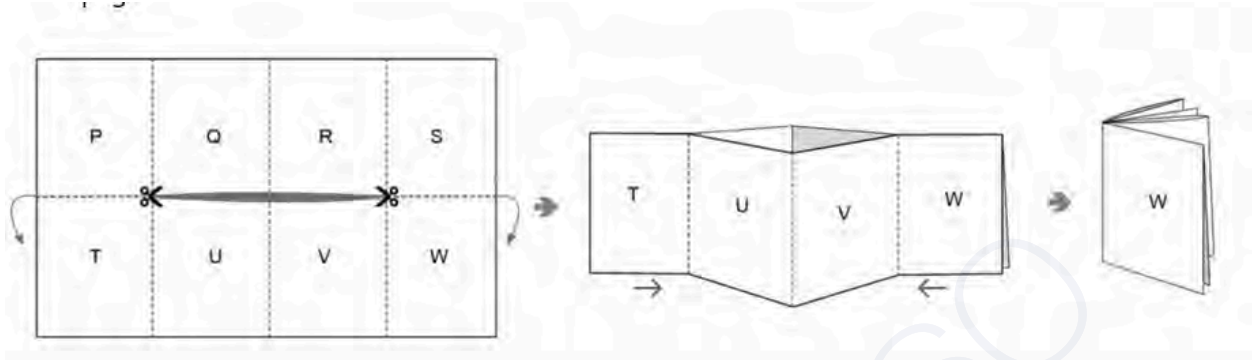
If you see the focused area, we need a portion that can complete the box so options c and B are eliminated. Now we are left with options A and D IF the figure is closely observed, and we can see After every big square Small squares have been placed.



This green part needs to be attached to the figure which can complete this as a big square, so option A can satisfy this. Hence, option A is the correct answer.

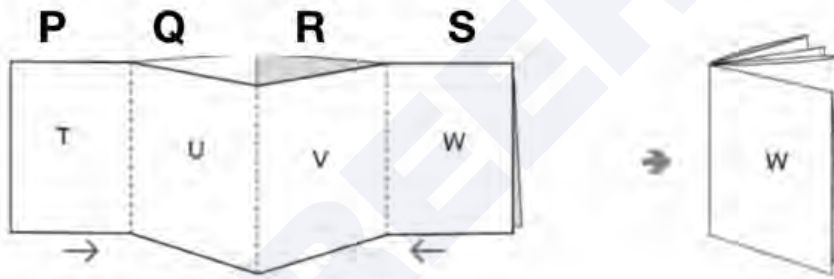
**Q.55** An A4 size paper is cut as shown below and folded across the dotted lines such that it has eight faces named from 'P' to 'W'. It is further folded to make a

small booklet for the purpose of a zine design. From the given options, select the correct sequence of pages.

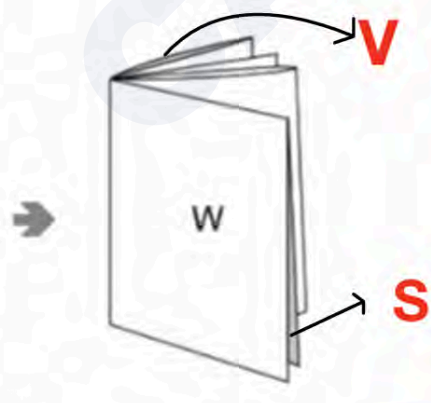


- A. P, Q, R, S, T, U, V, W
- B. W, S, R, V, U, Q, P, T
- C. W, S, R, Q, P, T, U, V
- D. W, V, U, T, S, R, Q, P

Solution:



If there is T then Here it will be P Q R and S and because w is on the top that means at the back it should be V and back of this W there should be s



Now check each option one by one

- **option A:** P, Q, R, and S is correct, but after it should Not be T Hence this option is wrong.
- **Option B:** If we check W, S, and R this is correct but V will not be correct because v is on the opposite side. Hence, this option is wrong.
- **Option C:** If we check this W, S, R, Q, PT, U, V this is the correct sequence.

Hence, option C is correct.

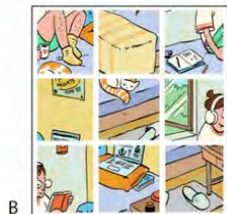
**Q.56** The left image below shows Nandu's study room. The image is sliced into 9 equal parts. From the given options, find the correct set of images.



**Option A:**



**Option B:**



**Option C:**



**Option D:**



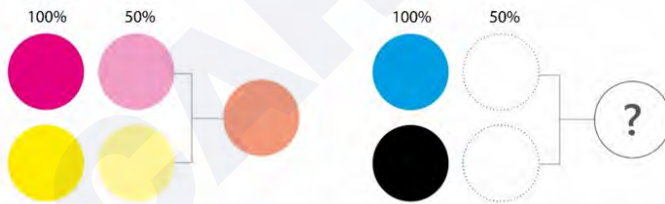
**Solution:**

we have to compare each option with the given figure

**Options C:** This is wrong as the bedsheet has some pattern but in this image, the bedsheet given is Blank **Option D:** This is wrong as the book given original image is orange whereas in the given option it is Blue

**Option A:** This is wrong as the Headphone colour in the original image is white but in the given option it is orange Hence, option B is correct.

**Q.57**



**Option A:**



**Option B:**



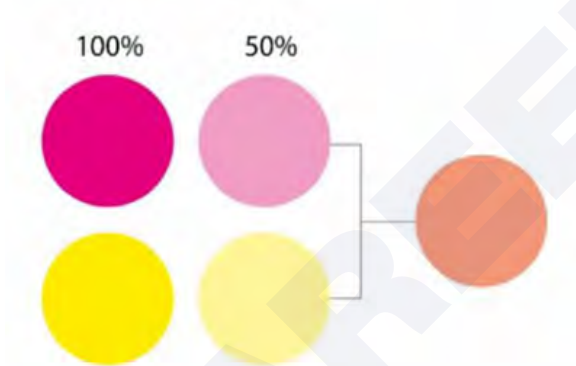
Option C:



Option D:



Solution:



Similarly,

50% Of



is



Now,

If we add

50%



and



we get



Now If we add 50% Blue and 50% Black we end up Not getting options A, B, and C because the Blue colour is absent. Hence, option D is correct.

**Q.58 Fill in the blank with the same font.**

INDIAN \_\_\_\_\_

**Option A:**

S

A

**Option B:**

S

B

Option C:

S  
C

Option D:

S  
D

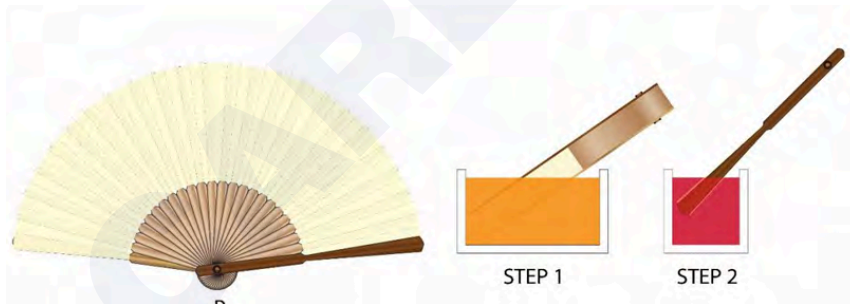
**Solution:**

If you see this carefully, you can see it has the serif  
i.e,

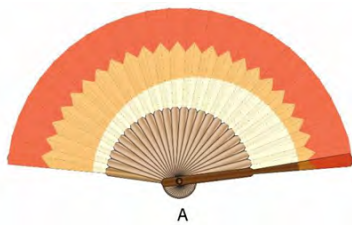


So option A is the correct answer.

**Q.59** A folding paper fan P is dipped in orange colour and then in red colour as shown. Which option is the closest representation of the resultant fan?



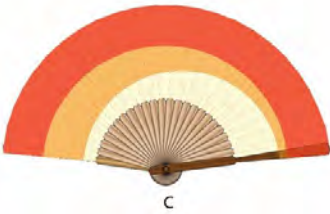
Option A:



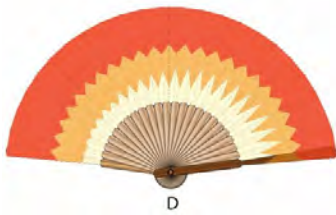
Option B:



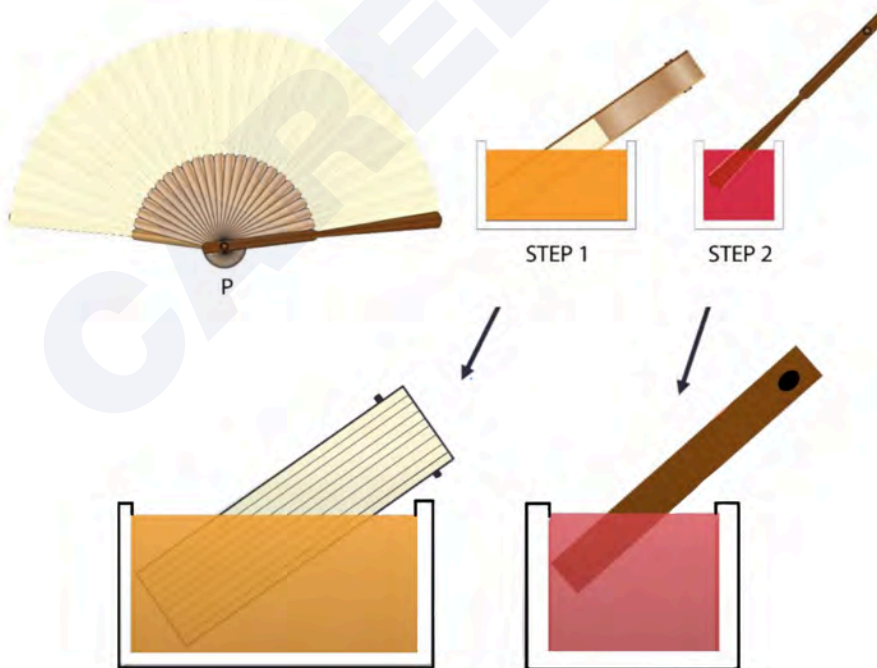
Option C:



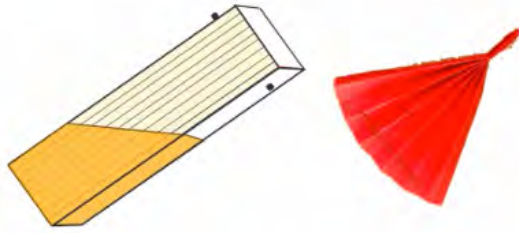
Option D:



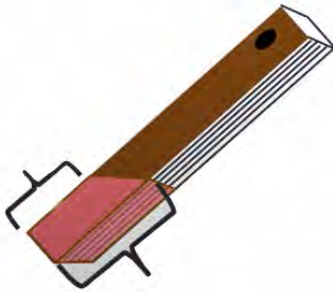
Solution:



We can see a gradual increase in the height of colour.



when it is coloured Red, Each plate has one side coloured Higher than the other, but each one is coloured in the same way.



So you can see option A is correct.

**Q.60** A painting was created on the road as shown in the image. From the given options, identify which image was used to plan the painting (as seen from the top view).



**Option A:**



A

**Option B:**



B

Option C:



C

Option D:



D

**Solution:**

The top view of an object means to look at the object from the front.

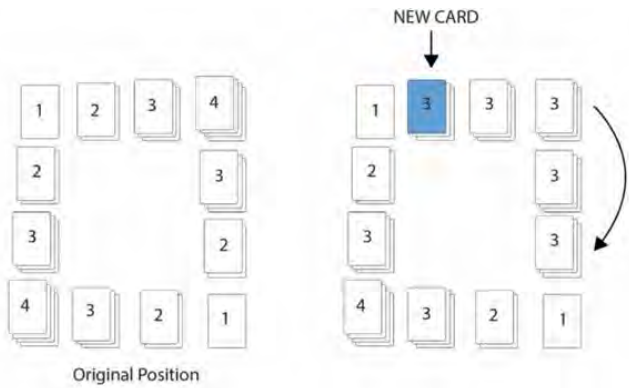
E.g.

This is the top view of the car.



So according to the question, the correct answer is Option C.

**Q.61** A game board was set with multiple decks of cards arranged in such a way that the sum total of the cards on each side was equal ( $1+2+3+4=10$ ). However, a new card was added on one side (blue card) and the cards were rearranged to maintain the rule, namely, that the sum total equals 10. How many cards can be added (starting from the original position as shown on the left) before the game ends, and no more cards can be added? Assume that every position must have at least one card and the sum total rule of 10 must be followed.



- A. 4
- B. 6
- C. 8
- D. 10

**Solution:**

The question presents a scenario where there's a game board initially set up with multiple decks of cards arranged on each side in such a way that the total of the cards on each side equals 10. For instance, on one side, the cards might be arranged as  $1+2+3+4 = 10$ .

However, during the game, a new card (referred to as the "blue card") is added to one side of the board. After adding this card, the existing cards on the same side are rearranged to maintain the rule that the total of the cards on each side remains equal to 10.

The objective of the question is to determine how many cards can be added (starting from the original position) before the game ends, and no more cards can be added. It's important to note that every position must have at least one card, and the total rule of 10 must always be followed on each side of the board.

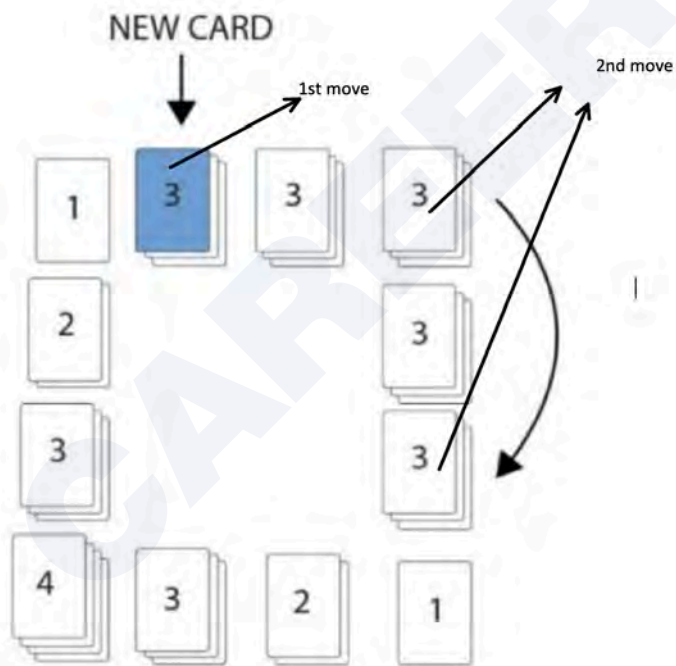
To solve the problem, one needs to carefully analyse the sum of the cards on each side after each addition or removal of cards, ensuring that the sum remains equal to 10 on both sides. The process continues until no more cards can be added without violating the rule.

Now whenever we add or remove a card it will be counted as 1 move

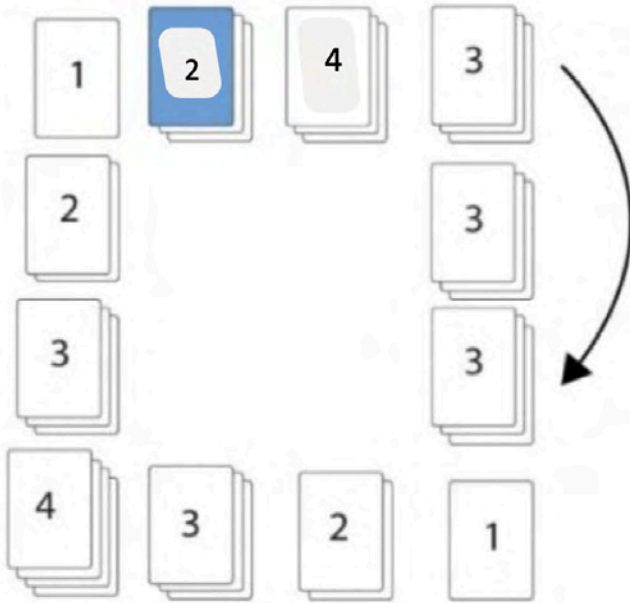


Original Position

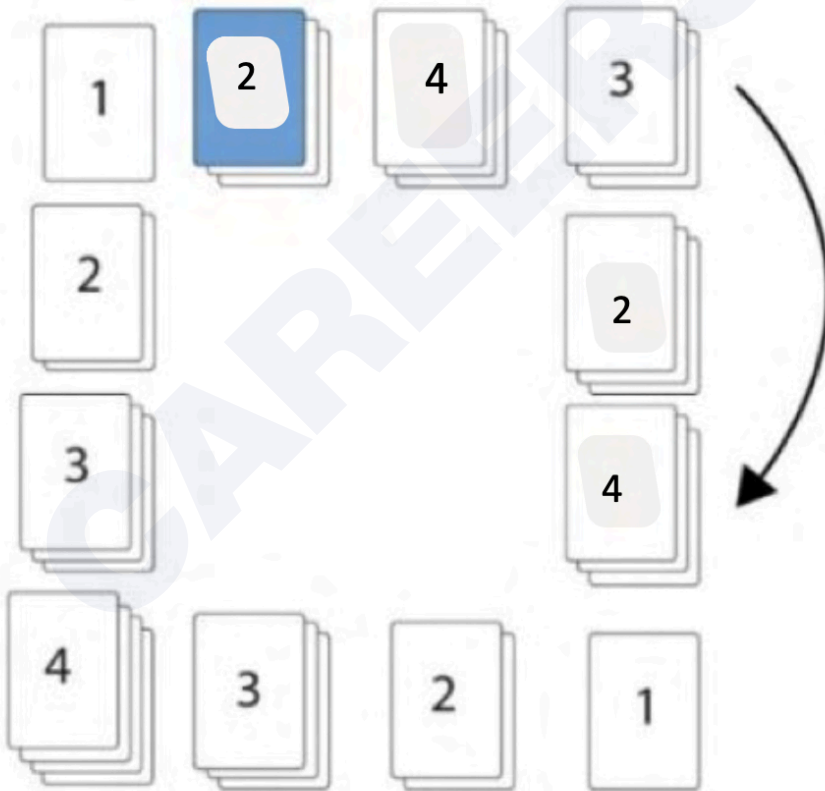
1st and 2nd move



3rd and 4th move



5th and 6th move



Hence, a total of 6 moves. So the correct answer is option B i.e. 6.

Q.62 Fatima is shown kicking the football. Identify the most appropriate illustration of the scene observed from behind.



Option A:



Option B:



Option C:



**Option D:**



**Solution:**

When Fatima's scene is observed from behind, the size of the ball will be smaller than the front view, therefore options B, A, and D are eliminated. Hence, option C is correct.

**Q.63 Identify the correct silhouette of the coloured dragon.**



**Option A:**



**Option B:**



Option C:



Option D:



Solution:

- Option B:



The Highlighted part is different from the original image. Hence, the option B is incorrect.

- Option C:



The highlighted part doesn't resemble the original. Therefore, this option is wrong.

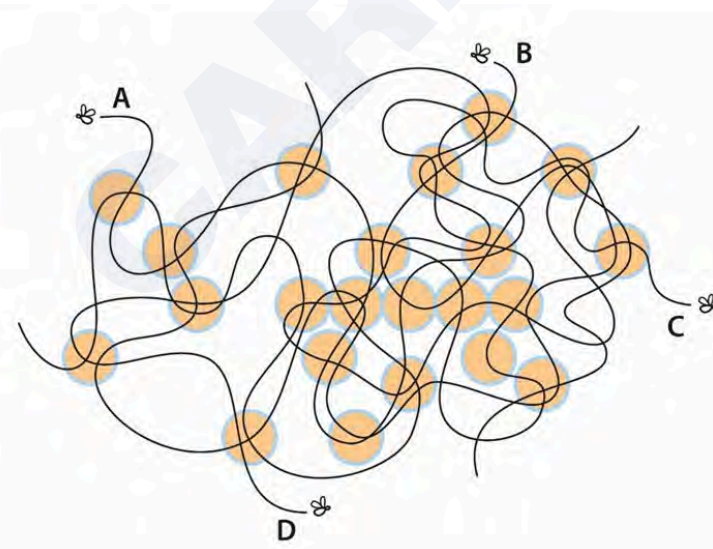
- Option D :



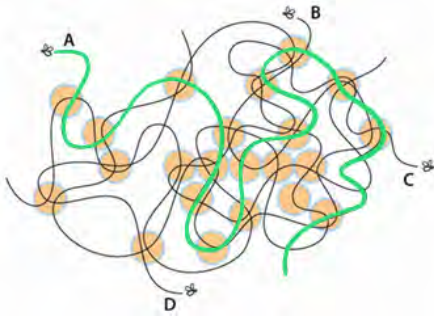
The highlighted part doesn't resemble the original. Therefore, this option is wrong.

Hence, Option A is correct.

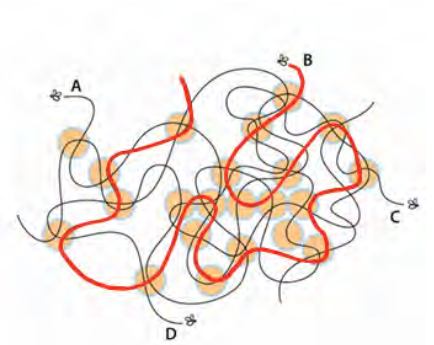
**Q.64** Shown below are the trajectories of 4 flies over the juice glasses. Identify the fly that crossed over the maximum number of glasses.



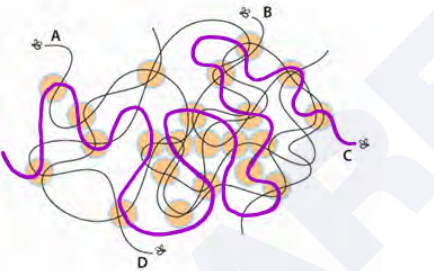
**Solution:**



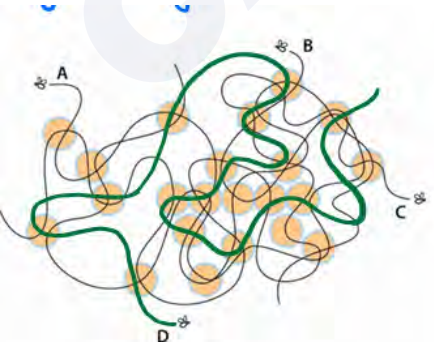
A move through 15 glasses.



B moves through 20 glasses.



C moves through 18 glasses.



D moves through 15 glasses.  
Hence, the correct answer is B.

**Q.65** A list of 8 country names in Vietnamese (shown in red), and their English translations (shown in blue) are given below. The translation list is mixed up. Which of the following statements is TRUE?

Áo, Ba Lan, Bỉ, Đan Mạch, Hà Lan

Na Uy, Phần Lan, Thụy Điển

Finland, Austria, Denmark, Norway,  
Netherlands, Belgium, Sweden, Poland

- A. Đan Mạch is Denmark, Thụy Điển is Sweden, Phần Lan is Poland
- B. Hà Lan is Netherlands, Áo is Austria, and Ba Lan is Poland
- C. Bỉ is Belgium, Hà Lan is Finland, and Na Uy is Norway
- D. Na Uy is Netherlands, Thụy Điển is Denmark, and Phần Lan is Finland

**Solution:**

We can start with the easiest one.

**Đan Mạch**

It means Denmark

**Na Uy**

It means Norway

**Thụy Điển**

It means Sweden

Now if we observe options minutely, we can eliminate option D

**Lan**

It means land

**Áo**

It means Austria

**Bỉ**

It means Belgium

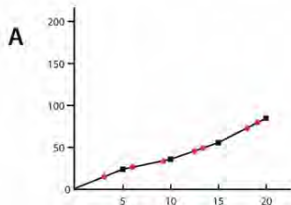
**Phần Lan**

It means Finland

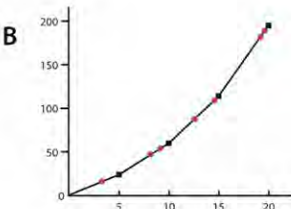
Now if we observe options minutely, we can eliminate options C and A as well  
Hence, option B is correct.

**Q.66** India and Australia are playing in the finals of the World Cup T20 cricket match. India won the toss and decided to bat. At the end of 5 overs, India scored 24 runs with one wicket down. From there on, in every 5 overs, India scored 50% more runs than the previous 5 overs and lost two wickets. From the options, identify the correct graph that shows India's final score.

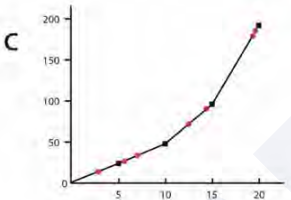
**Option A:**



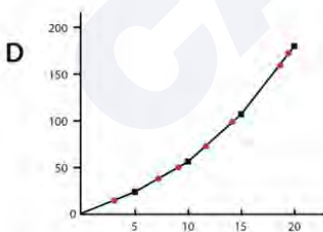
**Option B:**



**Option C:**



**Option D:**

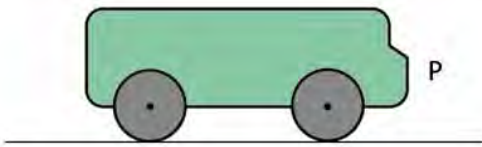


**Solution:**

If we observe the graph carefully, we can see x-axis has overs and y-axis has run. According to the question, in every 5 overs, India scored 50% more than the previous 5 overs and lost 2 wickets so at the end of first 5 overs, If India score 24 runs with one

wicket down, that means in the next 5 overs runs scored will be 36 (i.e,  $24 + 50\% \text{ of } 24 = 24 + 12 = 36$ ) So , if we observe carefully then, Option B is correct.

**Q.67** Figure P shows a profile of a bus with circular wheels on a flat road. The options below show profiles of 4 wheels and corresponding roads. If the 'wheel' always moves without slipping or sliding, which of the options will result in the bumpiest ride?



**Option A:**



**Option B:**



**Option C:**

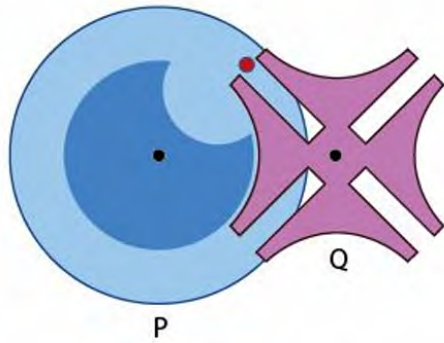


**Option D:**



**Solution:** According to the question we need the bumpiest one but in option A , C it will move smoothly as it has curvature and similarly in option B it has uniformity. Therefore, option D is correct.

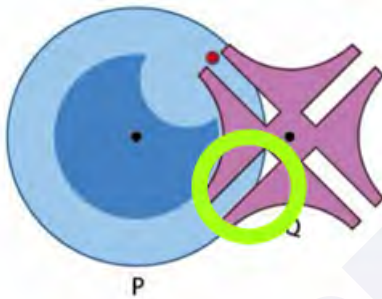
**Q.68** In the figure shown below, the drive wheel P engages with the driven wheel Q through a pin marked in red. Which of the options describes the movement of Q, when P moves in the clockwise direction?



- A. Continuously anti-clockwise
- B. Intermittently anti-clockwise
- C. To and fro
- D. Intermittently clockwise

**Solution:**

When P is moving clockwise then Red pin will make Q move so it will bring it make down so it Q will move anticlockwise but when this pin comes Here,



In this position it will come out of this, and it will stop and again when it will come to this position it will move in clockwise direction Hence Q will move in anticlockwise.

## PART-B

### Q. 69 Sketching

Read and visualize the following:

- A rat is spotted inside a school canteen.
- A school boy is afraid and standing on a stool/chair.
- A brave school girl is chasing the rat out of the canteen.
- A tiffin box is falling on the floor.
- Two school bags and two water bottles are kept on a table.
- A few plates are broken and lying on the floor.

Sketch this scene from the canteen owner's point of view.

Note:

- Make a pencil sketch only
- Do not use colours

Evaluation Criteria:

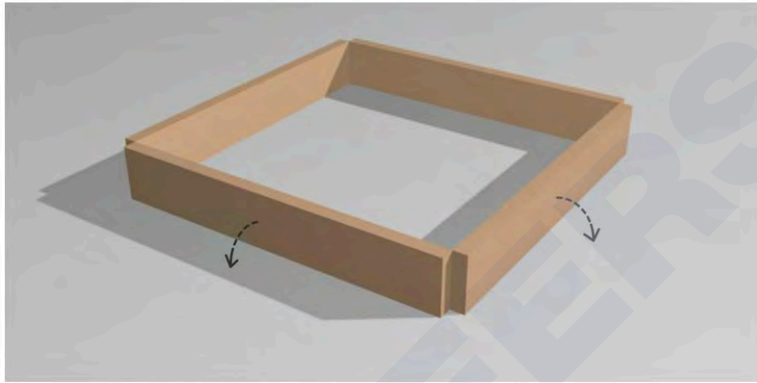
- Perspective
- Proportion
- Composition
- Observation
- Imagination
- Quality of sketch
- Attention to detail



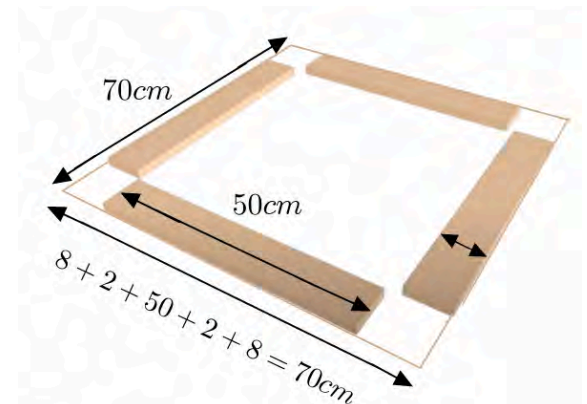
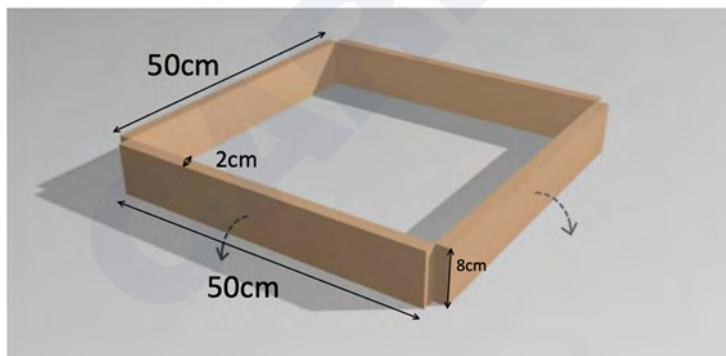
# UCEED 2021

## PART A Section 1: Numerical Answer Type (NAT) questions

**Q.01** Four identical pieces of wood of length 50 cm x 8 cm x 2 cm are arranged as shown in the figure. Another larger square is generated by rotating all the wooden panels along the outer edges and extending the outermost edges till they touch each other. What is the area of this larger square thus constructed?



**Solution:**



As it is a square so side = 70 cm

$$\begin{aligned} \text{Area of square} &= \text{side}^2 \\ &= 70^2 \\ &= 4900 \text{ sq cm} \end{aligned}$$

**Q.02** A cricket team has 10 blue pairs of gloves and 10 white pairs of gloves in a cricket kit. If a batter reaches into the kit and pulls out one glove at a time without

**looking at it, what is the least number of gloves she must pull out to make sure that she has a pair of gloves of the same colour?**

**Solution:** 10 blue pairs of gloves and 10 white pairs of gloves.

10 blue left-hand gloves

10 blue right-hand gloves

Similarly

10 white left-hand gloves

10 right-hand gloves.

Suppose, she pulls out gloves without looking, so the possibility is that she may get a pair in 2 times, but it is a lucky chance and not a surety. To make sure that she has a pair of gloves of the same colour, we need to exhaust all the wrong chances, and also we have to assume the worst possible case.

All wrong chances are,

i) When she chooses only one hand of blue colour =10 times.

ii) When she chooses only one hand of white colour =10 times.

So i) +ii) =10 times+10 times

= 20 times

So, a maximum of 20 times she can be wrong.

Now after 20 times, i.e. on the 21st chance she definitely will get a pair (if not before) whether she chooses a blue glove or she chooses a white glove.

So, the least number of gloves she must pull out to make sure that she has a pair of gloves of the same colour =21.

**Q.03 Chinnu was excited about the New Year when she bought a new calendar to keep on her study table. While playing, her baby sister poked a hole through the entire calendar from January through December, as seen in the image. If every page had the same 5-week table structure for each month, and if all the consecutive months were printed back to back, which date in the month of April has a hole in it?**



### Solution:

We need to remember that the week has 7 days and that after 7 days the week repeats itself.

All the consecutive months were printed back to back, so holes will be on either Thursday or Tuesday.

If we carefully observe the calendar given we can notice that January is that month and on the third Thursday we have a hole whereas December is the 12th month and on the third Tuesday we have a hole, so according to the pattern,

Feb - (2nd month) = Third Tuesday

March - (3rd month) = Third Thursday

April - (4th month) = Third Tuesday.

So, April being the 4th month, the hole will be on 3rd Tuesday.

So now we need to find the date for the 3rd Tuesday of April.



It's a leap-year calendar

No. of days in January = 31

No. of days in February = 29

No. of Days in March=32

No. of days till 1st of April= 31+29+31=91

$$91 = 7 \times 12$$

1st January is on Monday, so 1st April will be on Monday as we know weekdays repeat itself after 7 days

1st April = Monday

2nd April = Tuesday

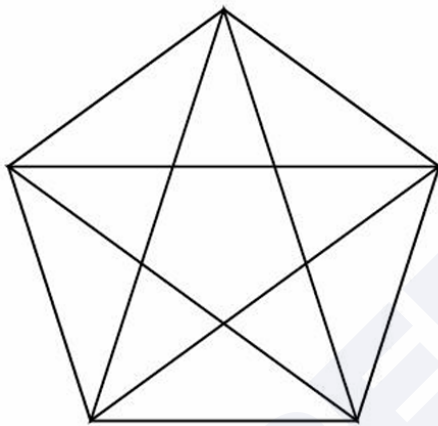
3rd Tuesday will be 2 weeks after

Hence, 3rd Tuesday will be on  $=(2+14)=16$ th April.

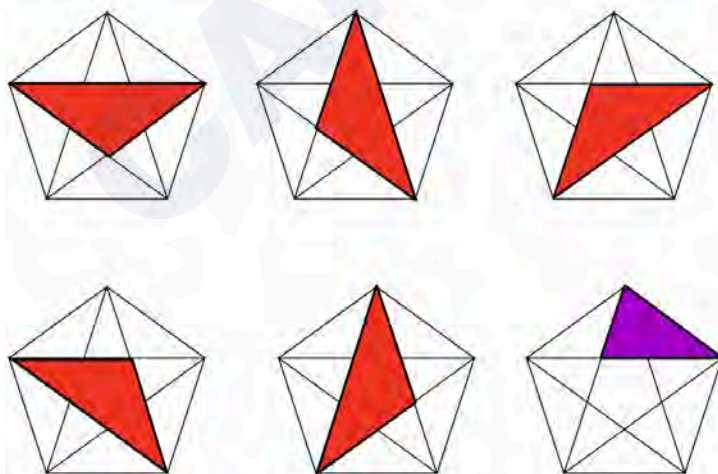
16th April i.e, 3rd Tuesday

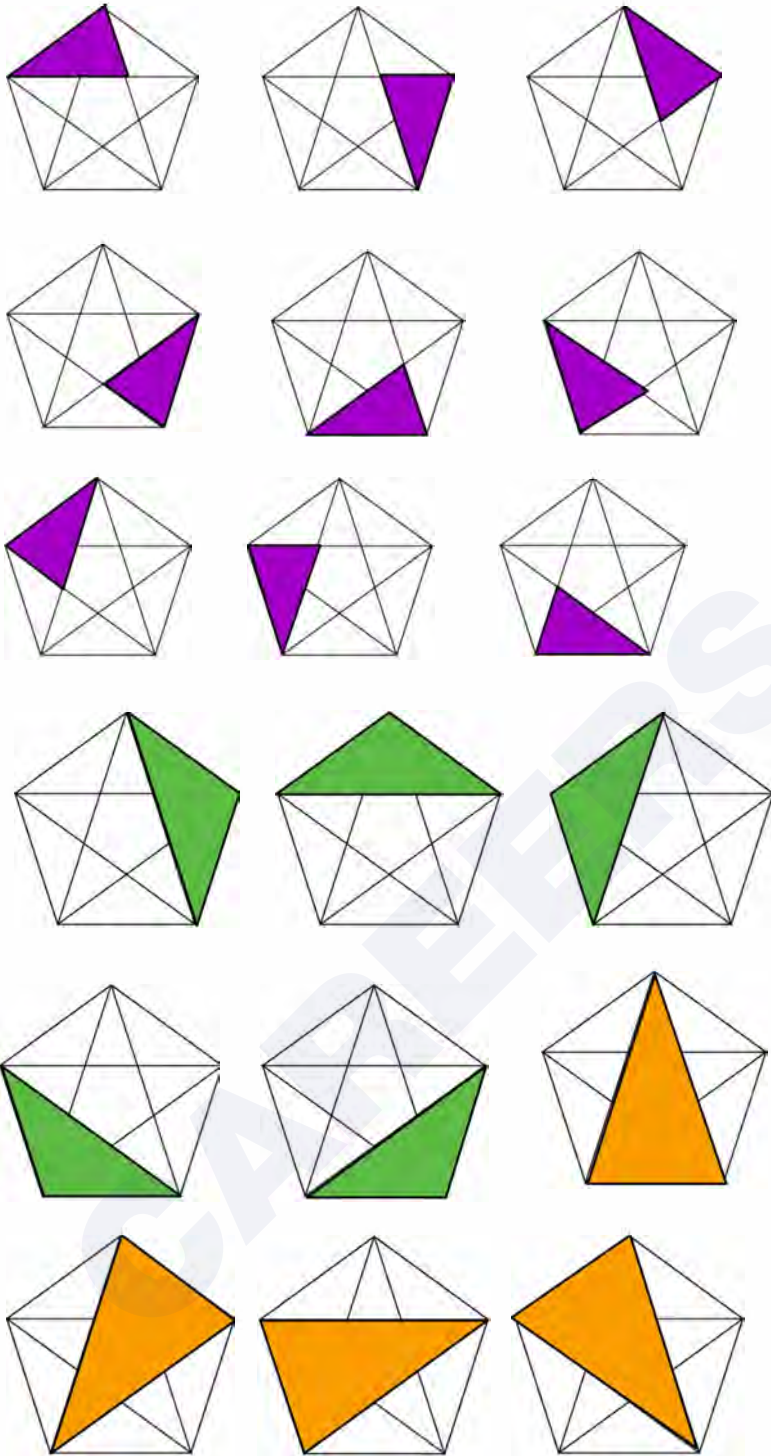
So, the hole on the calendar will be on 16th April.

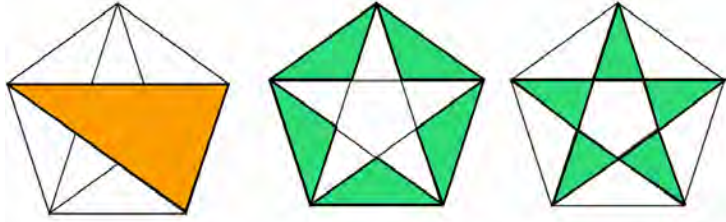
**Q.04 How many triangles are there in the figure shown?**



Solution:

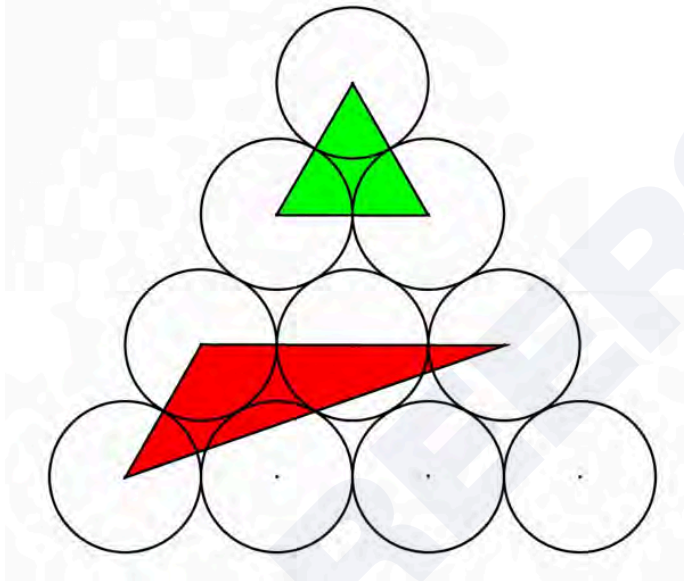




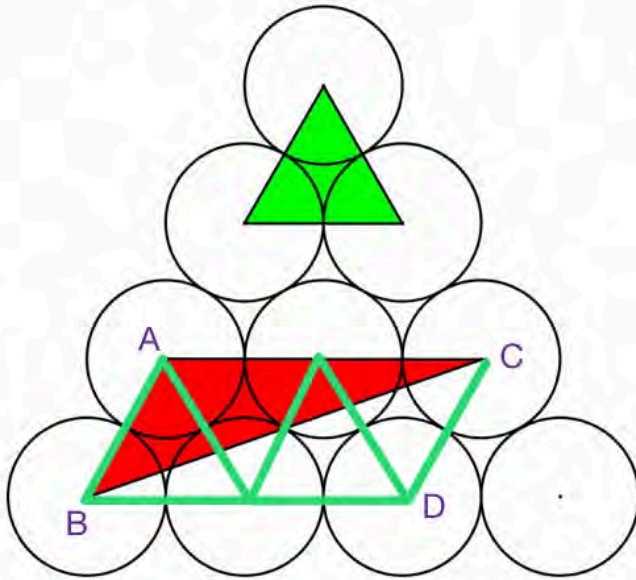


So, a total of 35 Triangles are there in the figure.

**Q.05** The corners of the green and red triangles coincide with the centres of the circles. All the circles have equal diameters, and adjacent circles touch each other. If the area of the green triangle is 3.14, what is the area of the red triangle?



**Solution:**

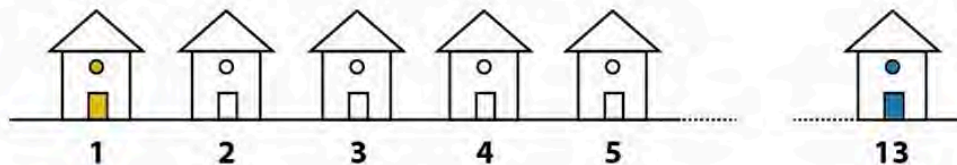


Area of green triangle = 3.14

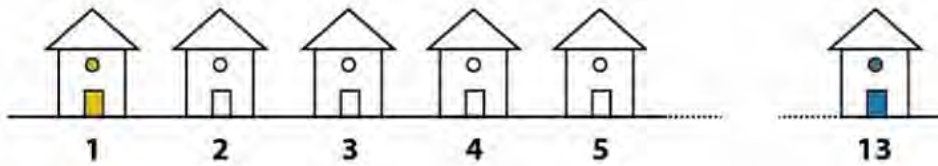
Area of parallelogram (ABCD) = Area of 4 green triangle  
 $= 4 \times 3.14$

Area of red triangle =  $\frac{1}{2} \times \text{Area of parallelogram}$   
 $= \frac{1}{2} \times 4 \times 3.14$   
 $= 2 \times 3.14$   
 $= 6.28$

**Q.06** A Street has 13 houses in a row as shown in the figure. Some residents in the first house tested positive for COVID-19. The virus spreads in two ways: it can spread to the next house, or jump directly to the third house. Residents of house number 2 can get infection in only one way, house number 3 in two ways, house number 4 in 3 ways, house number 5 in 5 ways, and so on. If the virus only progresses from Left to Right direction, in how many ways can the residents of house number 13 get infected?



**Solution:**

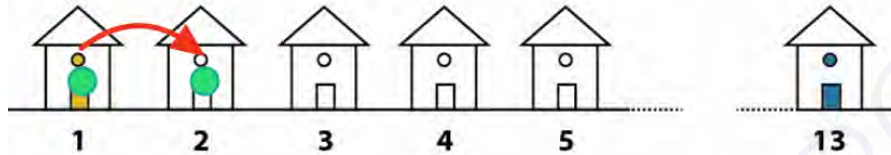


Some residents in the first house tested positive for COVID-19.

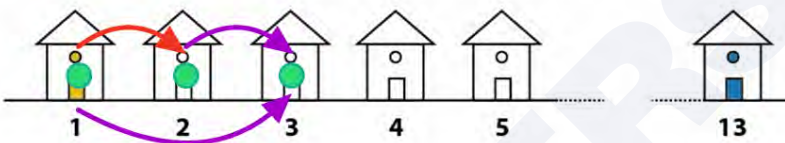
According to the question, the virus can spread in 2 ways:

- 1) It can spread to the next house
- 2) Jump directly to the third house.

So house number 2 can get infection in only one way.



House number 3 can get infection in 2 way

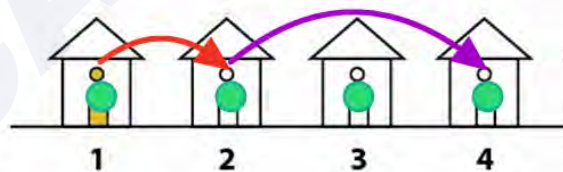


House number 4 can get infection in 3 way

**Way 1**

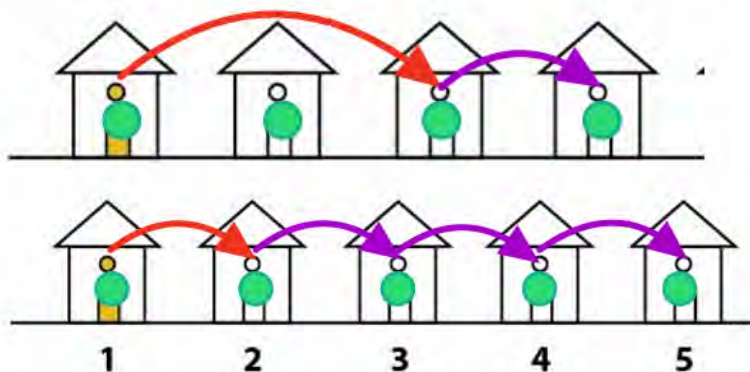


**Way 2**



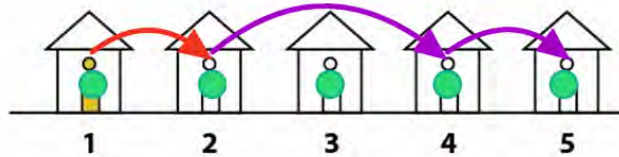
**Way 3**

House

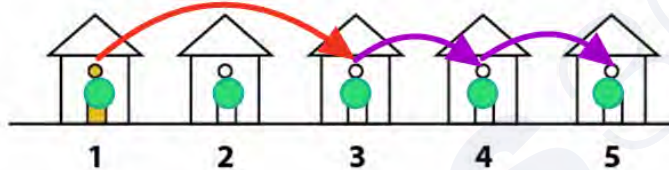


## Way 1

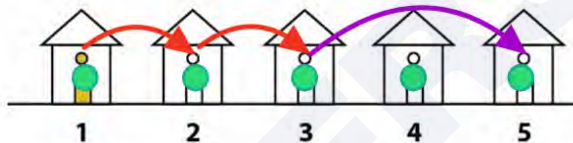
## Way 2



## Way 3



## Way 4



## Way 5



The virus spread in two ways:

House number 'n' will get from either house number 'n-1' or house number 'n-2'

Let the number of ways house number 'n' is infected be denoted as  $H_n$

Then  $H_n$

Number of ways for house number 'n-1' + no of ways for house number 'n-2'

$$= H_{n-1} + H_{n-2}$$

So,

$$H_2 = 1$$

$$H_3 = 2$$

$$H_4 = H_1 + H_2 = 3$$

$$H_5 = 3 + 2 = 5$$

$$H_6 = 5 + 3 = 8$$

$$H_7 = 8 + 5 = 13$$

$$H_8 = 13 + 8 = 21$$

$$H_9 = 21 + 13 = 34$$

$$H_{10} = 34 + 21 = 55$$

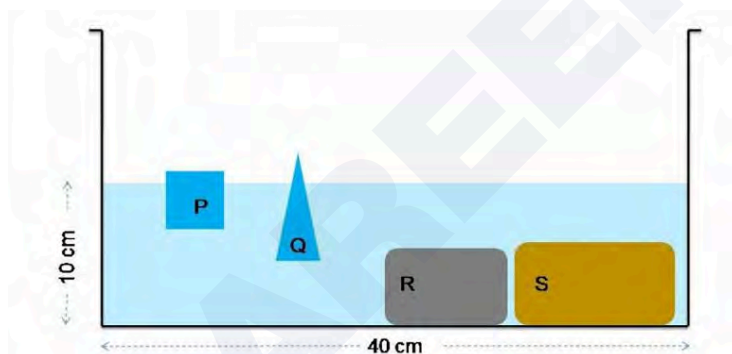
$$H_{11} = 55 + 34 = 89$$

$$H_{12} = 89 + 55 = 144$$

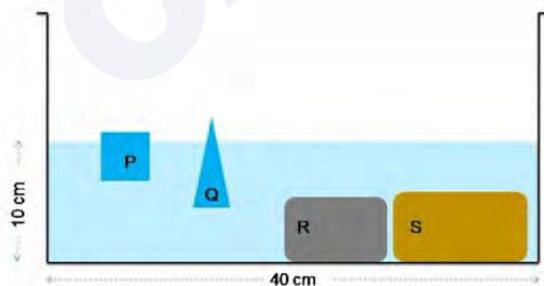
$$H_{13} = 144 + 89 = 233$$

Residents of the house number 13 can get infected in 233 ways.

**Q.07** In the container given below of dimensions (40 cm X 20 cm X 20 cm), four objects are dipped in water. Objects P and Q are made of some light material, while objects R and S are made of iron and copper, respectively. Object P is a cube of edge 4 cm with  $\frac{1}{10}$ th floating above water; object Q displaces 50 cc of water while floating. The volumes of objects R and S are 295.4 cc and 397 cc, respectively. If all the objects are removed from the container, what would be the new water level inside the container, measured from the bottom?



**Solution:**



P – Cube of edge 4 cm with  $\frac{1}{10}$ th floating above water

We know if the body is completely submerged, the volume of fluid displaced is equal to the volume of the body.

$$\text{So volume displaced} = \frac{9}{10} \times 4 \times 4 \times 4 = 57.6 \text{ cc}$$

Q— Displaces 50 cc

R— Volume = 295.4 cc

That means it displaces the same amount of water, i.e, Volume displaces=295.4 cc

S—Volume 397 cc

Volume= water displaced=397cc

$$\begin{aligned} \text{So total volume decreases} &= 57.6 + 50 + 295.4 + 397 \\ &= 800 \text{ cc} \end{aligned}$$

New level:

Volume decreases by 800 cc

Dimension of container=  $40\text{cm} \times 20\text{cm} \times 20\text{cm}$

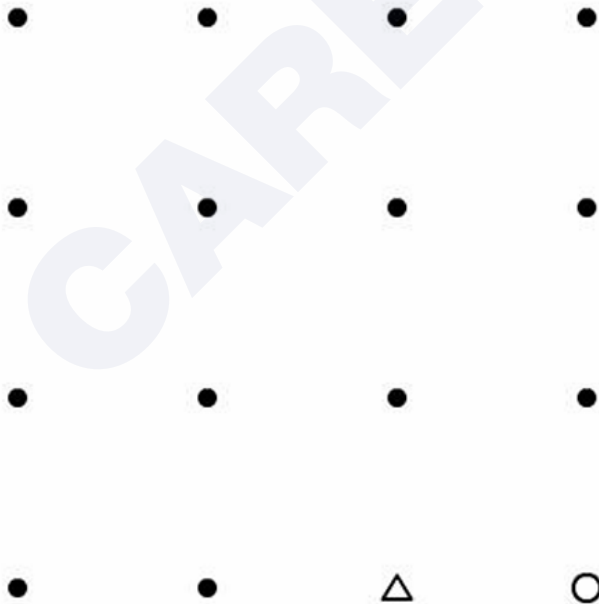
$$\text{Area of the container base} = 40\text{cm} \times 20\text{cm} = 800 \text{ cm}^2$$

$$\text{Decrease in level} = \frac{\text{volume}}{\text{area}} = \frac{800}{800} = 1 \text{ cm}$$

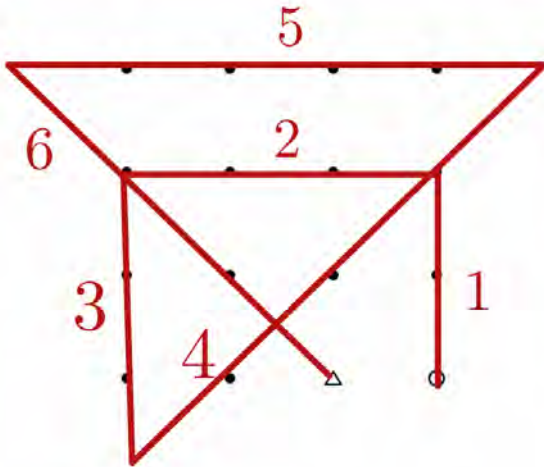
New level =  $10 - 1 = 9$  cm

Hence, the new water level inside the container measured from the bottom is 9 cm.

**Q.08** If you start from the circle and end at the triangle, what is the minimum number of straight lines required to pass through all the dots without retracing any route? You are allowed to pass through a dot more than once.



**Solution:**

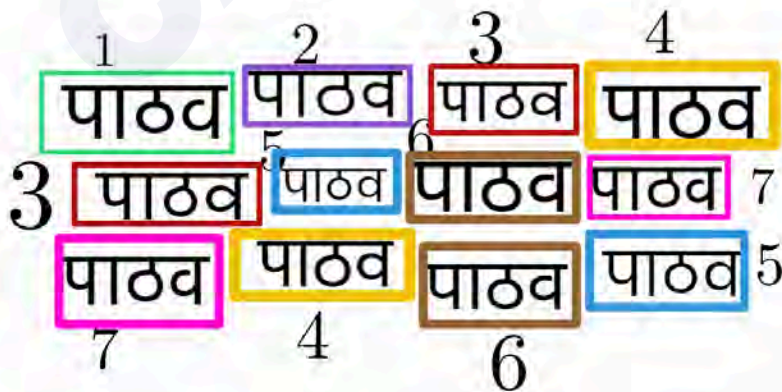


Minimum number of straight lines required 6.

**Q.09** If each word is written in a single font and normal and bold versions of the same font are not to be counted separately, how many fonts are used in the given set of words?

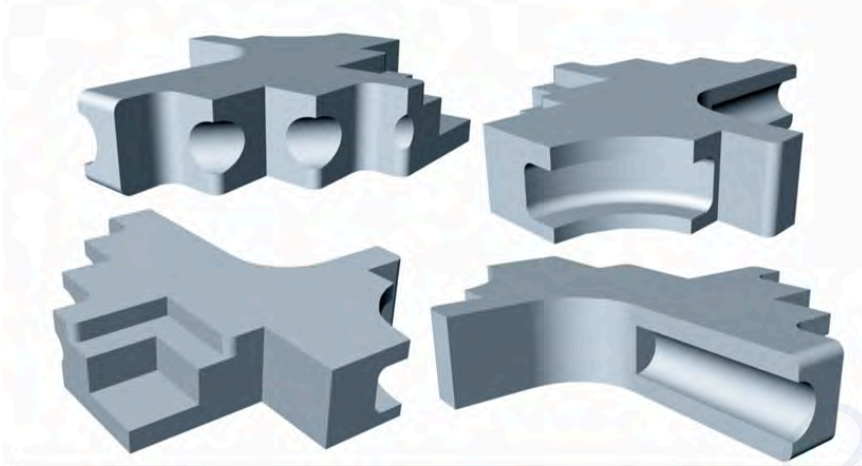
पाठव पाठव पाठव पाठव  
 पाठव पाठव पाठव पाठव  
 पाठव पाठव पाठव पाठव

**Solution:**

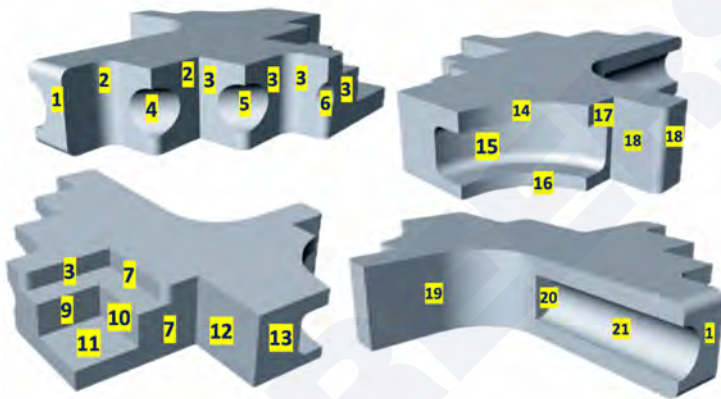


Seven different fonts are used.

**Q.10** The figure shows views of the same solid. Count the number of surfaces.



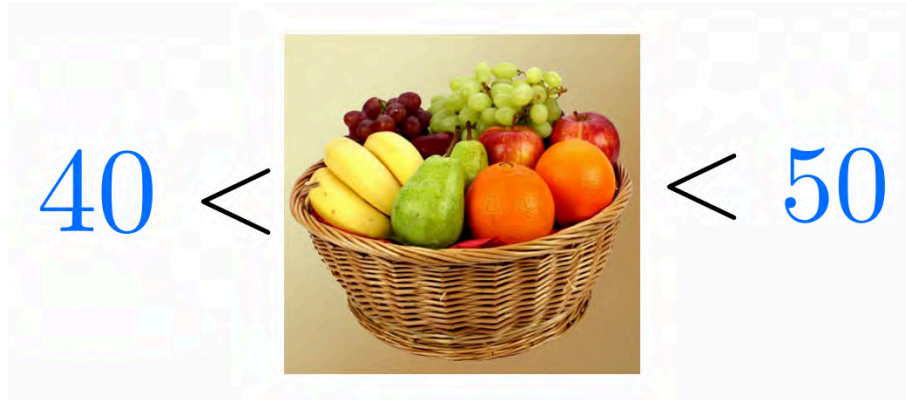
**Solution:** In such questions when the surface is curved, this is counted as a single surface because it is continuous. E.g., Sphere



No. of surfaces=21

**Q.11** There are apples and oranges in a basket that can carry a maximum of 50 fruits. Some fruits are rotten and some are good. The number of rotten apples is twice the number of good apples. The number of good oranges is twice the number of rotten oranges. The number of oranges is thrice the number of apples. If there are more than 40 fruits in the basket, what is the total number of apples and oranges?

**Solution:**



Let

Good apples =  $A_G$

Rotten apples =  $A_R$

Good oranges =  $O_G$

Rotten oranges =  $O_R$

The number of rotten apples is twice the number of good apples

$$A_R = 2A_G \text{ -----1)}$$

The number of good oranges is twice the number of rotten oranges

$$O_G = 2O_R \text{ -----2)}$$

The number of oranges is thrice the number of apples

$$O_G + O_R = 3(A_R + A_G) \text{ .....3)}$$

Total apple and orange

$$O_G + O_R + A_R + A_G$$

$$3(A_R + A_G) + A_R + A_G \text{ from equation 3}$$

$$4(A_R + A_G)$$

$$4(2A_G + A_G) \text{ ..... From eq 1}$$

$$4(3A_G)$$

$$12A_G$$

$$\text{Total number of fruits} = 12A_G$$

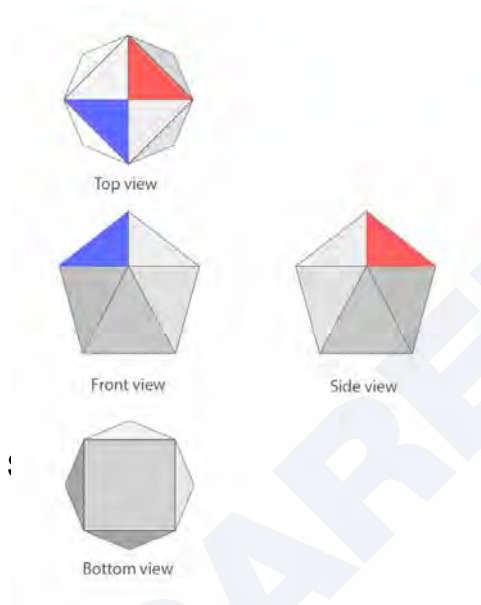
The total number of fruits is a multiple of 12

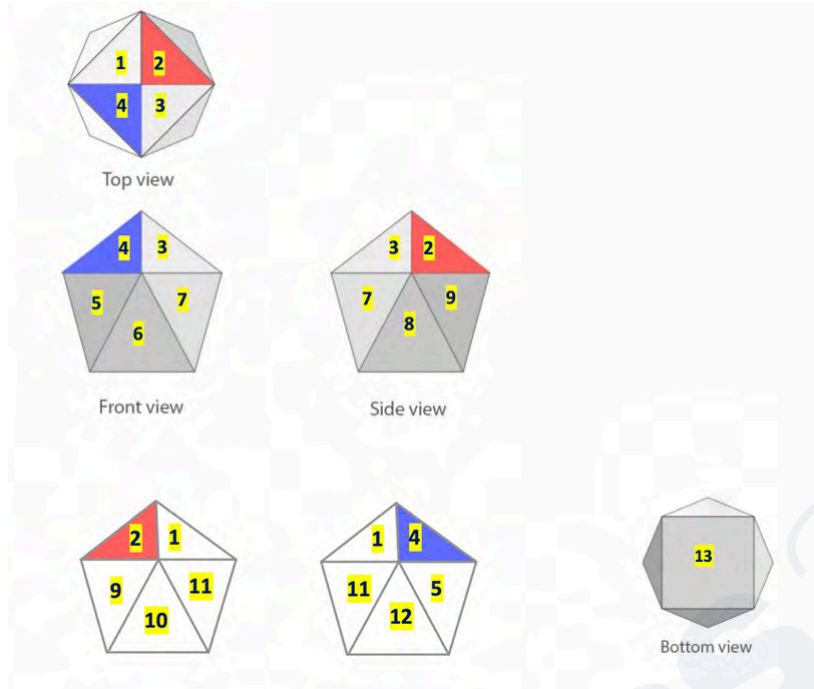
We also know that,



Multiple of 12 between 40 and 50=48

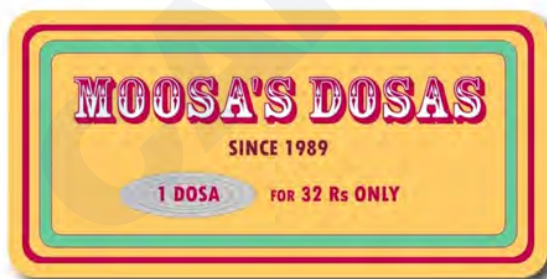
**Q.12 Four views of a convex solid are shown. How many surfaces does the solid have?**





Total surface = 13

**Q.13** When young Moosa started selling dosas on a street corner to support his daughter Lisa's education, his age was six times that of Lisa's. He started selling dosas for ₹2 each, and he increased its price by ₹1 every year. Lisa grew up to be a successful lawyer and on Moosa's 60th birthday, she gifted him with a small shop near their house, the board of which is seen in the image. In which year, Lisa will celebrate her 60th birthday?



**Solution:**

Given, that Moosa started in 1989, and at that time his age was 6 times that of Lisa

He started selling dosa for Rs 2 each.

He increased its price by Rs 1 every year.

Present price =Rs 32

Moosa present age=60

Price increase =32-2=30

This means 30 years have passed as the price in increased by Rs 1 each year.

Moosa present age =60 years

Moosa's age when she started =60-30=30 years

$30 = 6 \times \text{Lisa's age}$

Lisa age=54 years

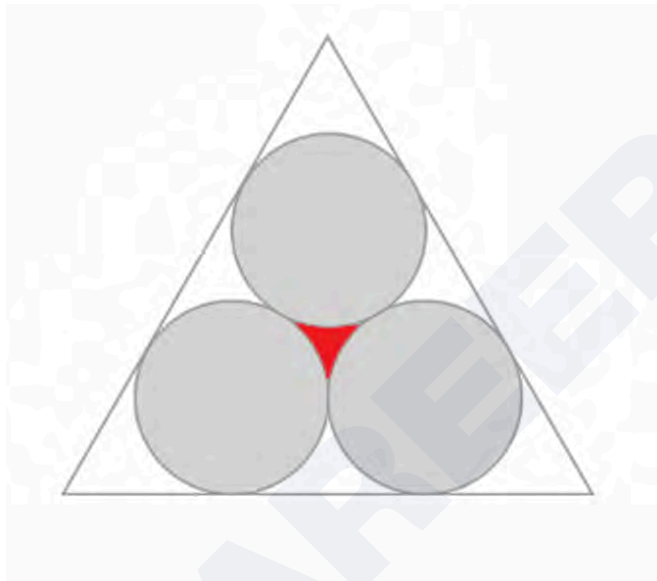
Moosa started in 1989

Lisa was 5 years old in 1989

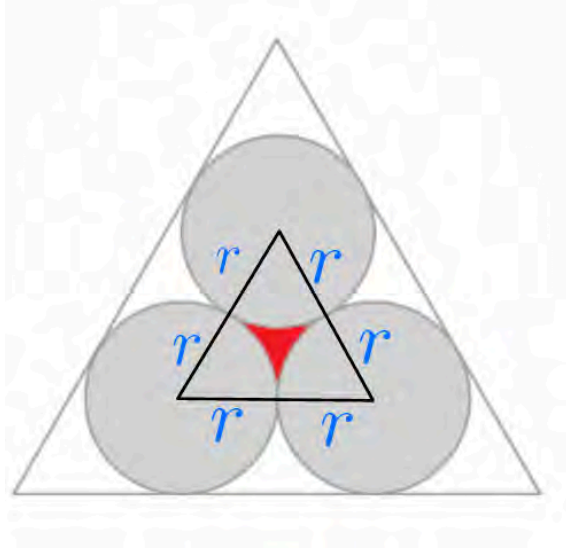
Hence, Lisa was born in 1984

Lisa will celebrate 60th birthday =1984+60=2044

**Q.14** Three circles of radius 10 cm are drawn inside an equilateral triangle as shown below. The area of the red-colored region (in sq. cm., up to two decimal places) in the figure is \_\_\_\_.



**Solution:**



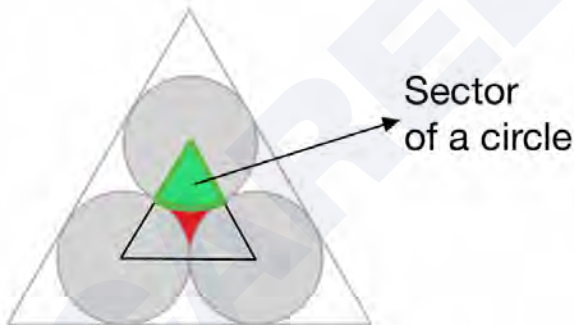
Join the centers of all circle

So the triangle has side =  $2r$

We know that a triangle with all the same sides is known as an equilateral triangle  $r=10$  cm

Side of triangle =  $2 \times 10$   
 $= 20$  cm

Shaded area = Area of triangle - Area of 3 sectors



We know,

Area of equilateral Triangle =  $\frac{\sqrt{3}}{4} \text{side}^2$

Area of sector =  $\frac{60}{360} \pi r^2$

Shaded area =  $\frac{\sqrt{3}}{4} (20)^2 - 3 \times \frac{60}{360} \times \frac{22}{7} \times 10 \times 10$

=  $\frac{\sqrt{3}}{4} \times 400 - \frac{1100}{21}$

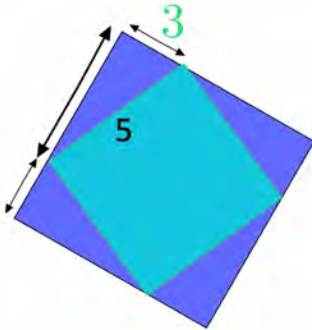
=  $100\sqrt{3} - \frac{1100}{21}$

=  $173.2 - 157.14$

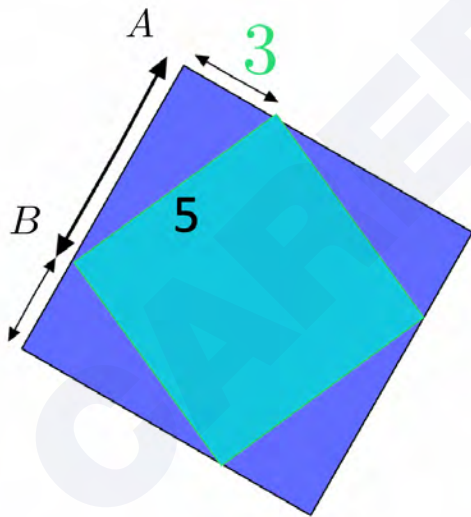
$$= 16.06\text{cm}^2$$

**Q.15** A smaller square of 5 cm is placed inside a bigger square such that all 4 corners of the smaller square are touching the sides of the bigger square. If the smallest distance between the corners of the two squares is 3 cm, what is the area of the bigger square in sq. cm that falls outside the smaller one?

**Solution:**



$$\rightarrow \sqrt{5^2 - 3^2} = \sqrt{25 - 9} = \sqrt{16} = 4$$



Area of the bigger square =  $7 \times 7 = 49\text{sq cm}$

Area of smaller square =  $5 \times 5 = 25\text{sq cm}$

Area of bigger squares that fall outside smaller  
 $= 49 - 25 = 24\text{sq cm}$

**Q.16** A digital clock reads hours and minutes. The sum of the digits it displays at 12:00 is 3 ( $1+2+0+0$ ). At 12:01 it is 4 ( $1+2+0+1$ ) and so on. What is the sum of all the digits it displays from 12:00 to 12:59?

**Solution:**

To find the sum of digits, a clock displays between 12:00 and 12:59

So, [12:00, 12:01, 12:02.....12:58, 12:59]

For hour;

12 will appear 60 times.

So  $(1+2)60 = 3 \times 60 = 180$

For minutes,

[0, 02, 03, 05, 06....58, 59]

Zero will not make any difference.

Count for 1,

[01, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 21, 31, 41, 51]

So the total no. of appearance = 16

Some for [2, 3, 4, 5] Also

Count for 6

[06, 16, 26, 36, 46, 56]

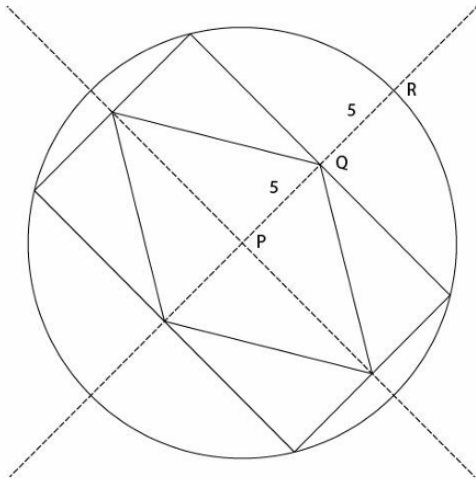
So the total No's of 6's appearance = 6

Same for [6, 7, 8, 9]

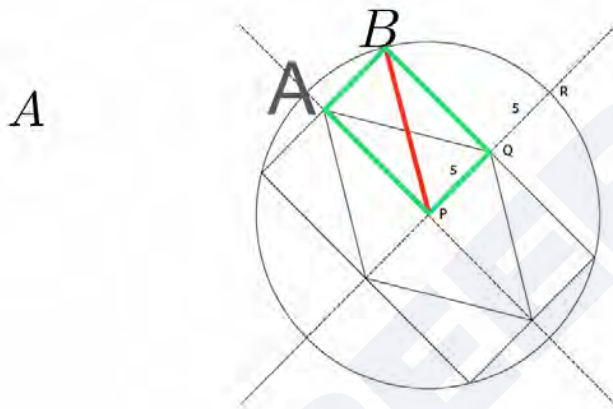
So, total sum = Hour + minute =  $180 + 16[1+2+3+4+5] + 6\{6+7+8+9\}$   
= 600

Hence, the answer is 600.

**Q.17** A rhombus is inscribed in a rectangle which in turn is inscribed in a circle as shown in the figure below. P is the center of all three shapes,  $PQ = QR = 5$  units. What is the perimeter of the rhombus?



**Solution:**



$PQ + RQ = \text{Radius of circle} = 5 + 5 = 10 \text{ cm}$   
 $BP = \text{Radius} = 10 \text{ cm}$   
 $= AQ$  (diagonals of rectangle,  $ABPQ$ )  
 $= \text{Side of Rhombus}$   
 So, the perimeter of Rhombus  $= 10 \times 4$   
 $= 40 \text{ units}$

**Q.18** If colour and size differences are not to be counted as unique, how many types of leaves occur only once?



**Solution:**



These two leaves occur only once, Hence answer is 2.

## Section 2: Multiple Select Questions (MSQ)

**Q.19** Which of the options is/are rotation(s) of the given figure?



**Option A:**



**A**

Option B:



B

Option C



Option D



D

**Solution:**

Rotate the given image 90 degrees clockwise.



Fig 1



Fig 2



Fig 3



Fig 4

If we check figure 4 then this matches with the option A.  
Hence, option A is correct.

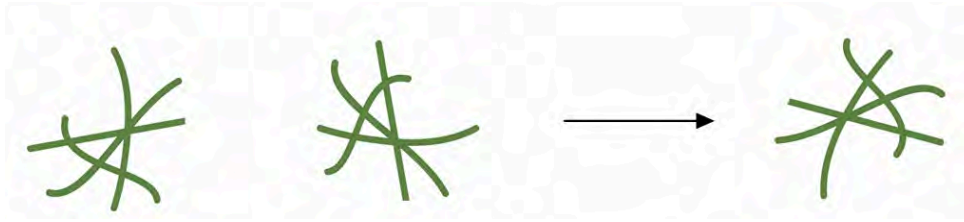


Fig 4

Fig 5

Fig 6

Now fig 4 is rotated 90 degrees clockwise, we get Figure 5 and now when Figure 5 is rotated 135 degrees clockwise we get Figure 6 i.e., option D is also correct. Hence, options A and D are correct.

**Q.20** Consider the following quote from J C Kumarappa's *Economy of Permanence*: "Man comes nearest to his God, the creator, when he utilizes his brain power to marshal mechanical forces to serve his purposes. To do so in a way that will bring blessings and not destruction, he has to follow closely nature's way to get the best out of it. We cannot get the cooperation of nature purely on our own terms. Any attempt to do so will bring violent destruction in its wake."

Which of the options is/are implied by the quote?

- A. Utilizing brain power to marshal mechanical forces to serve our purposes, if not done properly, can lead to destruction.
- B. Utilizing brain power to marshal mechanical forces to serve our purposes can bring man nearest to his God.
- C. While utilizing brain power to marshal mechanical forces to serve our purposes, the best way to proceed is to follow nature's way.
- D. Dealing with nature purely on our own terms will bring violent destruction.

**Solution:**

All the options are implied by the quote.

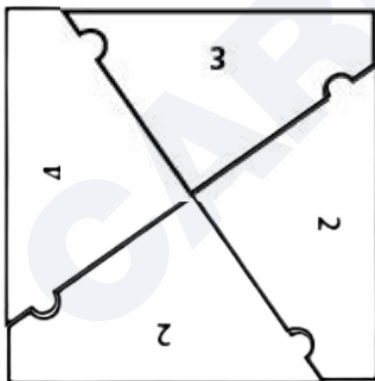
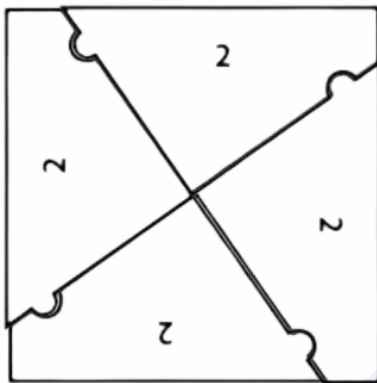
Hence, A, B, C, and D are the correct answer

**Q.21** Which four pieces of a jigsaw puzzle can be combined to form a square?



- A. 1, 2, 3, 4
- B. 3, 2, 4, 4
- C. 2, 2, 2, 2
- D. 2, 2, 3, 4

Solution:

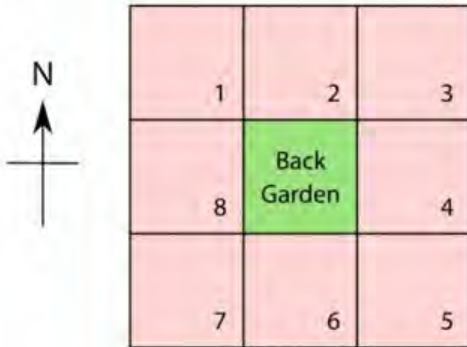


Hence, options C and D are correct.

**Q.22** After retiring, eight friends: Balram, Bhandari, Das, Munshi, Nadkarni, Parmar, Patel, and Sethuraman purchased a square plot of land. They divided the land into 8 equal plots and a common back garden as shown. Parmar was allotted plot number 1. Balram preferred a house on the west. Patel chose to stay the farthest from Nadkarni's house. Munshi and Bhandari became neighbors of

Nadkarni. Sethuraman became a neighbour of Patel. Nadkarni hails from the North East, so he chose the plot in the North East.

Which of the options **MUST BE** true?

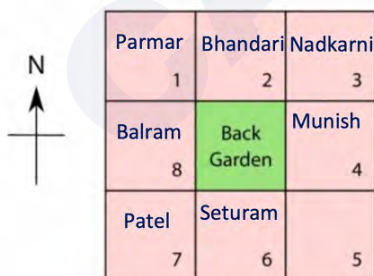


- A. Das stays in plot number 5.
- B. Munshi could be a neighbour of Parmar.
- C. Balram and Nadkarni could be neighbours.
- D. Balram shares a wall with Bhandari.

**Solution:**

According to the question, Parmar stays in plot 1 and Balram offers a plot on the west, so he can choose either 8 or 7. Now Nadkarni hail from the northeast i.e., in Plot 3 as per the question Patel chooses the farthest from Nadkarni so he is on Plot 7. If Patel is on plot 7 then Balram is on 8 farther on Munish and Bhandari are neighbours of Nadkarni, therefore, they are on plot 4 and plot 2 respectively. As Sethuraman is a neighbour of Patel, so he stays in plot 6. Now check the options.

We can say options A and B are correct.



**Q.23** Letters of the alphabet of a font are shown below. The cyan letters H, A, and B illustrate how some of them can be folded once to form new shapes. They may be further transformed by rotation. Which of the black shapes given in the options have been folded once and rotated?

A B C D E F G H I J K L M  
N O P Q R S T U V W X Y Z



Option A:



Option B:



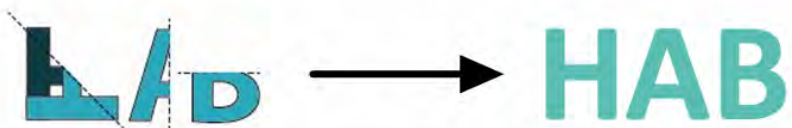
Option C:



Option D:



Solution:



According to the question, we can be flooded once to form new shapes and further transformed by rotation

Option A: It seems that it could either be V or W starts with V



It is rotated upside down but hasn't been folded

Now looking at W, if we fold W at the vertical line, then this section (Red) would be missing. Therefore, option A is incorrect.



Option B:



It looks like an 'O' if we fold the O in half and rotate it 180 degrees we get option B. Hence option B is correct.

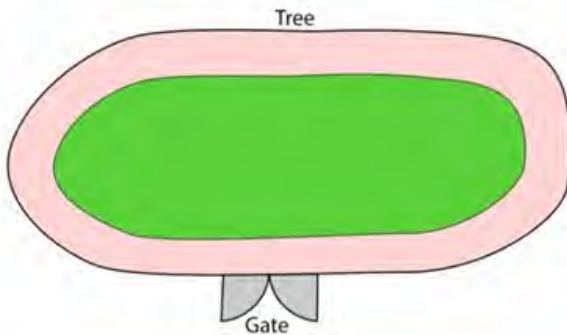
Option C:

It resembles U. If we take U, fold it in half, and flip it upside down, we get the figure that matches option C. Hence option C is correct.

Option D: It can't be W because W has slanted lines while the figure given in option D has a straight line like the M. But the tip here (as shown by the red circle) is flooded horizontally, and the entire figure is rotated 180 degrees. We know only partial folds are allowed because if you look, we can see only the mid-section has been folded. Hence, option D is also correct.



**Q.24** Three friends P, Q, and R go for morning walks around the ground. They start out together from the gate in the same direction but walk at different speeds. R walks half as fast as P. Q walks 1.5 times faster than R. P takes 1 minute to take one round around the ground. If they all stop when R has finished 4 rounds, which of the options must be true?



- A.** Between the start and the end (not counting the start and the end instances), P and R meet each other thrice.  
**B.** Between the start and the end (not counting the start and the end instances), P meets Q only once.  
**C.** Q will overtake R once near the Tree.  
**D.** At the end, P, Q, and R will reach the gate at the same time.

**Solution:**

Let

P walks at speed P

R walks at the speed =  $\frac{1}{2}P$

Q walks at the speed =  $\frac{3}{2} \times R$

We know,

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

ATQ,

P takes 1 minute for 1 round

Then, R takes 2 min for 1 round [As  $\text{speed} \propto \frac{1}{\text{Time}}$ ]

So, R will take 8 minutes to complete 4 rounds.

Option A,

P takes 1 min to cross and R takes 2 min to cross, but the condition here is not to count start and end instances. They meet once in 2 min and thrice in 6 min. Hence, option A is correct.

Option B:

Here we need to find the relation between P and Q

$$R = \frac{1}{2}P$$

$$Q = \frac{3}{2}R = \frac{3}{2} \times \frac{1}{2}P$$

$$Q = \frac{3}{4}P$$

P takes one round and Q takes  $\frac{3}{4}$  th of round at the same time so they meet at the 4th minute and also at the 8th minute, they meet at the end, which we are not supposed to count. Hence, the option is correct as they meet once, i.e., At the 4th minute.

Option C:

We know Q is 1.5 times faster than R.

R takes 2 minutes to complete 1 round and Q takes less than 2 minutes because Q walks faster than R so they meet near the gate not the tree. Hence, option C is incorrect

Option D:

Option D is correct as P, Q, and R will reach the gate at the same time.

**Q.25 Image shows part of a poster made by the CDC in the context of COVID-19. Which of the statements is/are true?**



- A. It effectively communicates physical distancing.**
- B. It is gender-neutral. It promotes mask usage.**
- C. It is faith-neutral and age inclusive.**
- D. It effectively communicates all COVID-19-related safety measures.**

**Solution:**

Option A: Yes, it does effectively communicate physical distancing.



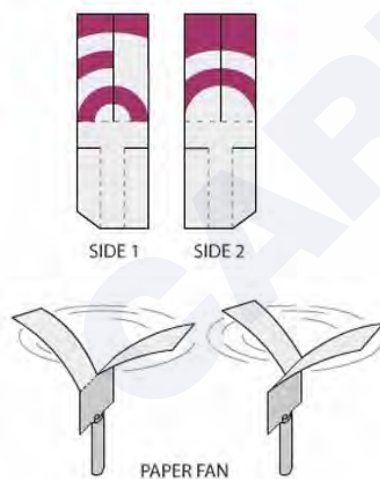
Option B: Yes, it does promote mask usage (as shown in the poster), and since both men and women are shown in the poster. So it is gender-neutral.

Option C: No, nothing in this poster promotes neutrality and age inclusiveness.

Option D: No it only communicates 2 guidelines, i.e., Social distancing and wearing a mask.

Hence, options A and B are correct.

**Q.26** A toy was created using a piece of paper, the two sides of which are shown in the image. When dropped from a height, it spins like a fan. Which of the options depict(s) the correct pattern formed while it spins?



**Option A:**



A

**Option B:**



B

**Option C:**



C

**Option D:**

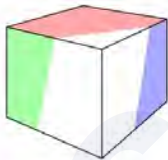


D

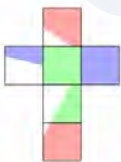
**Solution:**

Side 2 is behind the side 1. So if we observe the paper fan, we can depict that the toy will make patterns as shown in options B and C.

**Q.27 Which option(s) can be folded to form the cube shown?**

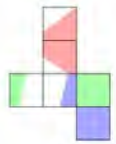


**Option A:**



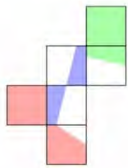
A

**Option B:**



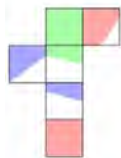
B

**Option C:**



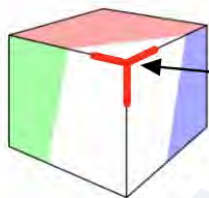
C

**Option D:**



D

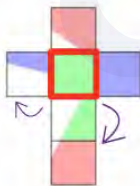
**Solution:**



Common corner

We know colour shares a common corner (as shown above)

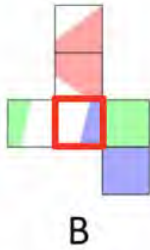
**Option A:**



A

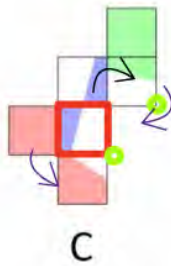
Keep this main green square (Red highlighted) as the top flip the green square down flip this blue square down and also flip this red square down, and we see that the three colours join at a corner, but they don't share a common corner as they do in the large cube. Hence, option A is incorrect.

Option B:



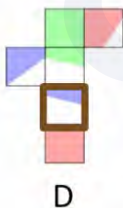
If we consider blue (Red highlighted) to be on top, green flips down and so does the red, then green and red connect like they are connected in the main image. Then blue and green are also connected, and they all share a common corner just like in the main image.

Option C:



Keep the blue square at the top and fold the blue and green square here downwards, then we further fold the green one towards the top blue square to connect them. So blue and green are then connected to the white and of their squares and red will fold down to share a common corner with the blue and the green like the main image. Hence, option C is correct.

Option D:



The blue is connected to the white half of the green squares, which can not be seen in the main image. Hence, option D is incorrect.

So, options B and C are correct.

**Q.28 Pressure cookers are sometimes made using copper and stainless steel. In such a pressure cooker,**

- A. The bottom is made up of stainless steel and the rest is made up of copper because it is aesthetically pleasing.**
- B. The bottom is made up of stainless steel and the rest is made up of copper because copper is a germicide.**
- C. The bottom is made up of copper because it is a better conductor of heat compared to steel and hence it is more energy efficient.**
- D. The bottom is made up of copper because that is the only way such a cooker can be heated using an induction stove.**

**Solution:**

Option A: It is incorrect. Since the purpose of a cooker pressure isn't to be aesthetically pleasing. Its function is to cook food.

Option B: It is incorrect, as the copper isn't a germicide. Germicide is a substance that kills germs.

Option C: It is correct, as copper is a good conductor of heat and that makes it more energy efficient.

Option D: It is incorrect because it isn't the only way a cooker can be heated on an induction stove.

**Q.29 Rep-tile is a shape that can be dissected into smaller copies of the same shape without leaving any remainder. For example, a square can be cut into various numbers of smaller copies of the square shape.**

**If no flip is allowed, which of the options is/are rep-tiles?**

**Option A:**

**Option B:**



B

**Option C**

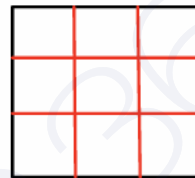
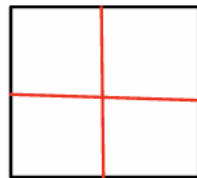


C

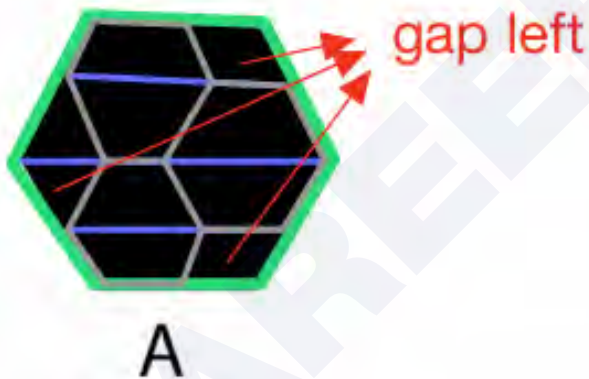
Option D:



**Solution:** A reptile is a shape that can be dissected into smaller copies of the same shape without leaving any remainder, for example, square (as shown below)

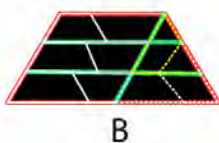


Option A:



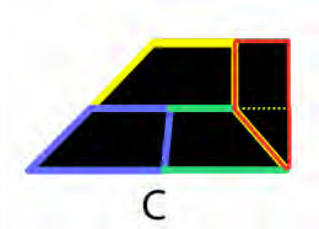
Hence. It is not a Reptile.

Option B:



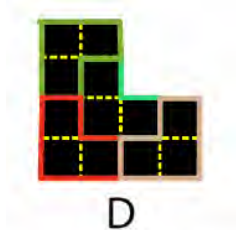
Hence, it is a reptile-shaped figure.

Option C:



Hence, it is a reptile-shaped figure.

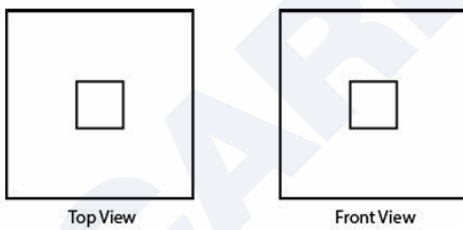
Option D:



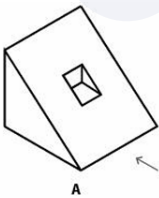
Hence, it is a reptile-shaped figure.

Therefore, options B, C, and D are correct.

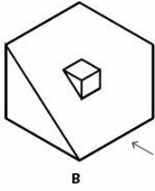
**Q.30** Which of the object(s) given in the options can produce the top and front view as shown in the figure? The arrow shows the direction of the front view.



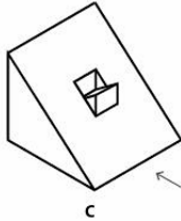
**Option A:**



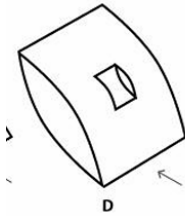
**Option B:**



**Option C:**



**Option D:**



**Solution:**

Option A: The front view and top view are correct.

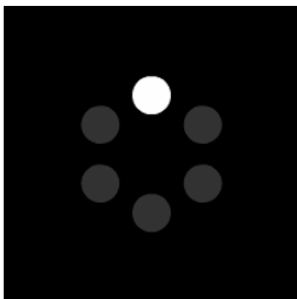
Option B: The front view and top view are correct.

Option C: The front view and top view are correct.

Option D: As the image has a curved surface but when it is viewed from the top and front it appears a square.

Hence, all options are correct.

**Q.31 [This question contains an animated GIF image. Please refer to that image] A designer has created an infinitely looping animation as shown in the image. It has 24 frames playing at a speed of 12 frames per second. Which of the statements is/are true?**



**A. The duration of one circular loop is 3 seconds.**

**B. Each dot turns white for 4 frames in each loop.**

**C. If this animation is played at 8 frames per second, the speed of animation will be faster.**

**D. This animation with the same duration is possible with 6 frames played at 3 frames per second.**

**Solution:**

24 frames playing at a speed of 12 frames per sec

12 frames = 1 sec

1 frame =  $\frac{1}{12}$  sec

24 frame =  $\frac{24}{12}$  sec = 2sec

So, option A is wrong.

We know

1 loop = 24 frame = 6 dots

1 frame =  $\frac{6}{24}$  dots

4 frame =  $\frac{6}{24} \times 4 = 1$  dot

So option B is correct.

Option C: If animation is played at 8 frames per second but the actual speed is 12 frames per second So, animation speed becomes slow in 8 frames/sec

Option C is wrong.

Option D:

3 frame = 1 sec

1 frame =  $\frac{1}{3}$  sec

6 frame =  $\frac{6}{3} = 2$  sec

Option D is correct.

**Q.32 Three squiggles were drawn on three transparent square sheets in semi-transparent ink and piled together. Some sheets may be rotated. Additionally, in some options, some squiggles are different from the ones shown. In which option(s), do the squiggles look different?**

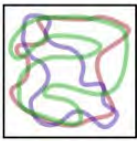


**Option A:**



A

**Option B:**



B

**Option C:**



C

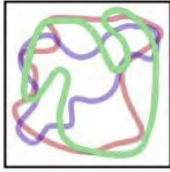
**Option D:**



D

**Solution:**

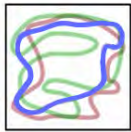
Option A:



A

In option, A a green squiggle different from original figure.

Option C:



C

In option C the blue squiggle looks different from the original figure.  
Hence, option A and C are correct answers where squiggles look different.

**Q.33** A beat policewoman is starting her midnight walk. Starting from the signal P1, she heads west and takes the second right. Thereafter, she continues her journey, taking the second left, second left, third right, third right, and after that she goes and ends her beat walk at the next signal. In the given map, some of the intersections have traffic light signals and are marked with dots. Which of the options is/are true?



- A. The policewoman visits the signal M6 twice
- B. She passes signals M6, P2 and R2 in that sequence
- C. She visits R4 before R2
- D. She ends her beat walk at R3

**Solution:**

Option A :She never visited M6. Hence, option A is wrong.

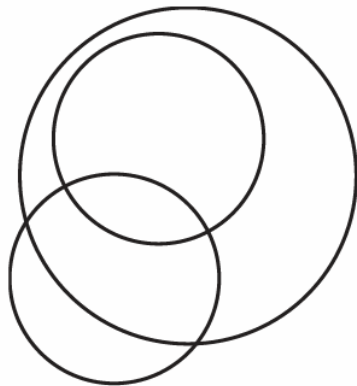
Option B: She never visited M6 and P2. Hence, option B is wrong.

Option C: Yes, this correct as she visited R4 before R2 (as shown in the above image)

Option D: Yes, she ends her beat walk at R3. Hence, option D is correct.

Therefore, option C and D is correct.

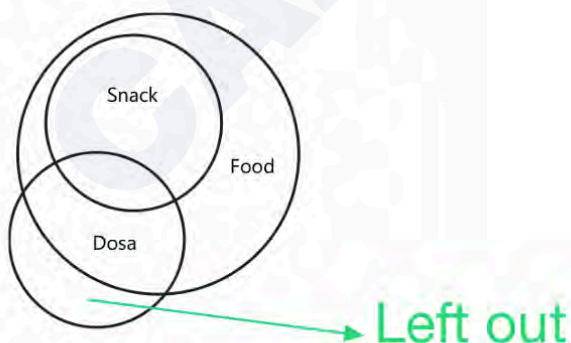
**Q.34 Which of the following relationships can be represented using the Venn diagram shown below?**



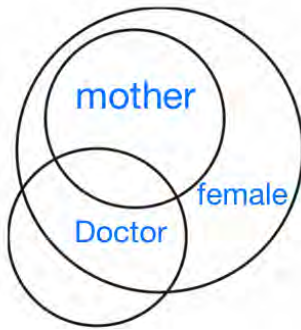
- A. Snack, Food, Dosa
- B. Female, Doctor, Mother
- C. Parrot, Pet, Bird
- D. Designer, Teacher, Painter

**Solution:**

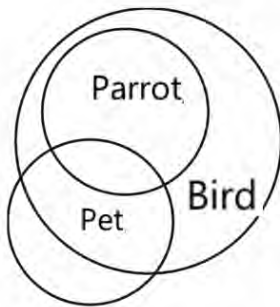
Option A: Dosa can be considered as snack and it, i.e, Dosa is a food and snacks are food as well. So food should contain both Dosa and snack . We have some part of dosa outside the food. Hence, this option is incorrect.



Option B: Doctor could be male or female and a mother could be a doctor, but she is definitely going to be a female. Hence, this option is correct.



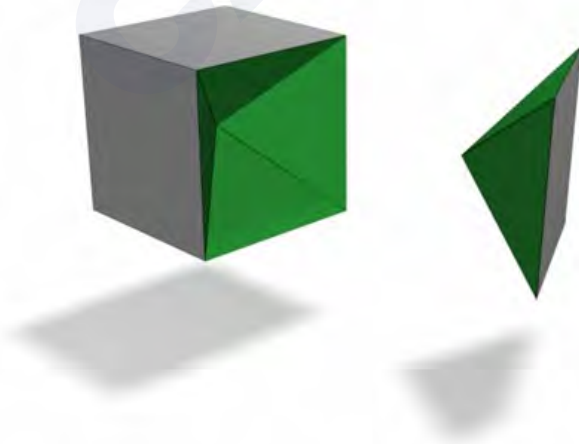
Option C: Parrot is a bird . A bird can be pet, but pet could be another animal too. Hence, this option is correct.



Option D: Designer, teacher and painter all are different profession unrelated to each other.

Therefore, B and C option is correct.

**Q.35** From one side of a solid cube of side 2 units, a square pyramid of height 1 unit was removed as shown in the image, resulting in a solid with 9 surfaces. If one more pyramid of the same dimensions is removed from another side of the resultant solid, how many surfaces can the new resultant solid have?



A. 10

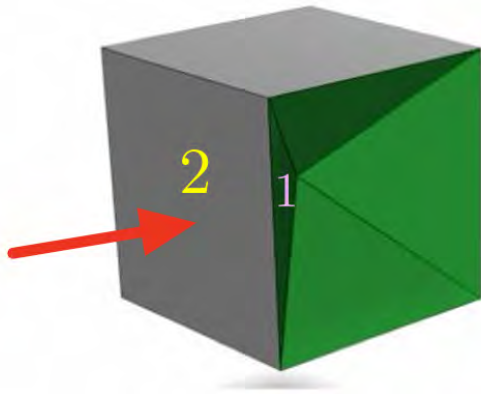
B. 11

C. 12

D. 13

**Solution:**

Step 1



If we remove it from the surface (as shown above) we will lose 2 surfaces but will have 3 new surfaces.

$$\begin{aligned} \text{So total no of surfaces} &= 9 - 2 + 3 \\ &= 10 \text{ surfaces} \end{aligned}$$

Step 2: If removed from behind, the 4 new surfaces will be formed and 1 surface will be lost.

$$\text{So total number of surfaces} = 9 + 4 - 1 = 12$$

Hence, option A and C is correct.

**Q.36** If a solid octahedron as shown in the figure is cut by a plane into two pieces, what is/are the possible shape(s) of the cross-section?



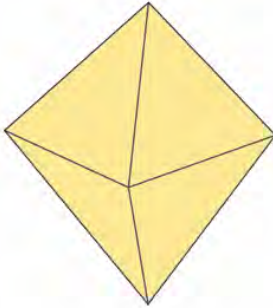
A. Triangle

B. Square

C. Pentagon

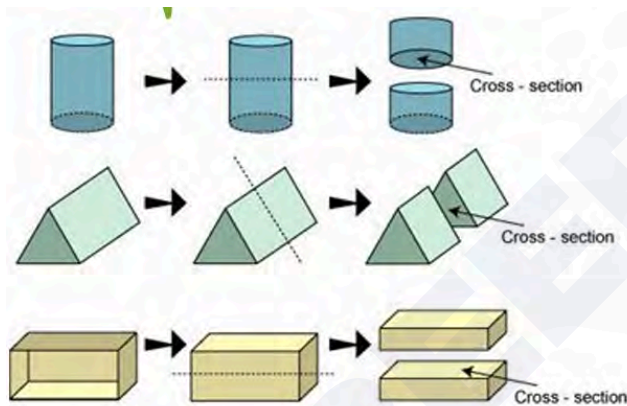
D. Hexagon

**Solution:** A regular octahedron has eight flat triangular faces which are all equal in dimensions, twelve equal edges, and six vertices. It is one of the five Platonic solids.



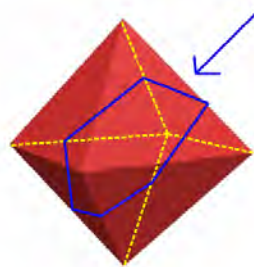
### Cutting of object

Whenever an object is cut, the shape we get depends upon the shape that is being cut. For example:



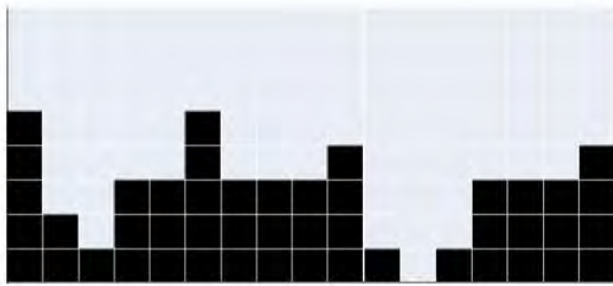
So when a solid octahedron is cut by a plane into two pieces we get square, pentagon and hexagon.

Therefore, B, C, D is correct.



### Section 3: Multiple Choice Questions (MCQ)

**Q.37** Consider the configuration in the given figure. If rotating and flipping are not allowed and pieces given in an option need not be placed in the given sequence, which combination would complete the maximum number of horizontal black rows?



**Option A:**



**Option B:**



**Option C:**

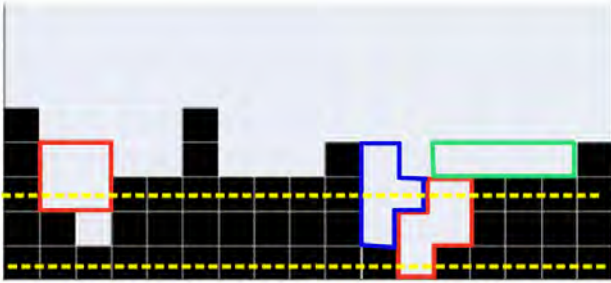


**Option D:**



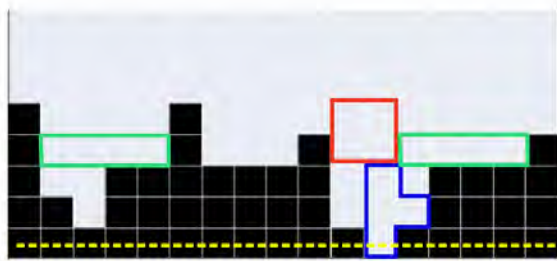
**Solution:**

Option A: As rotation and flipping is not allowed . So we can place them in such a way (as shown below)



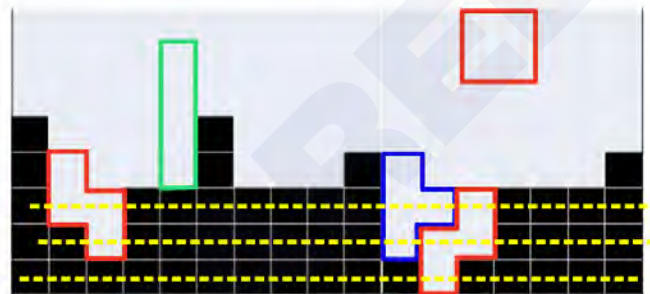
Option A completes 2 rows (as shown above with yellow dotted line)

Option B:



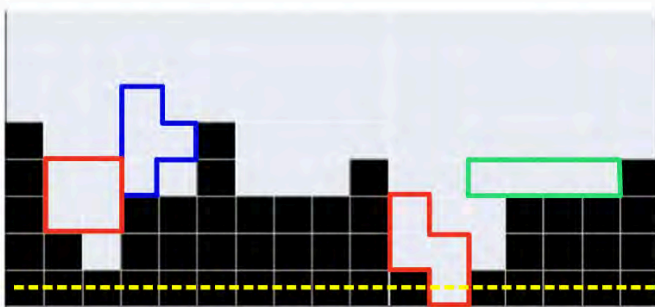
Option B completes 1 rows (as shown above with yellow dotted line)

Option C:



Option C completes 3 rows (as shown above with yellow dotted line)

Option D:



Option D completes 1 rows (as shown above with yellow dotted line)

Hence, option C is the answer.

**Q.38 Which of the options is the correct logo?**

Option A:

**Amul**  
A

Option B:

**Amul**  
B

Option C:

**Amul**  
C

Option D:

**Amul**  
D

**Solution:**



Hence, option D is the correct logo of Amul.

**Q.39**



**A. P – Mauryan Empire, Q – Pallava Empire, R – Vijayanagar Empire, S – Mughal Empire**

B. P – Mughal Empire, Q – Vijayanagar Empire, R – Chola Empire, S – Mauryan Empire

C. P – Mauryan Empire, Q – Chola Empire, R – Vijayanagar Empire, S – Mughal Empire

D. P – Mauryan Empire, Q – Chola Empire, R – Bahmini Sultanate, S – Mughal Empire

**Solution:**



P

It is a great stupa of Sanchi from the Mauryan empire.



Q

Brihadisvara temple, located at Thanjavur, Tamil Nadu. It belongs to Chola empire.



R

It is a stone chariot at Hampi. Furthermore, it belongs to Vijayanagar empire.

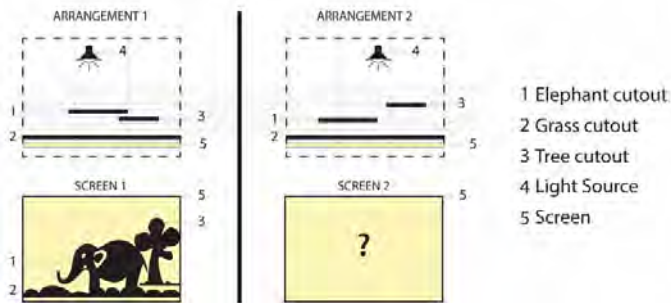


S

It is a red fort or Lal quila in Delhi. It was build by the Mughal empire.

Hence, option C is correct.

**Q.40** Figure on the left represents a screen from a shadow puppetry show with the **ARRANGEMENT 1** behind the screen. Which of the options will be the closest representation of the screen as a result of **ARRANGEMENT 2**?



**Option A:**



A

**Option B:**



B

**Option C:**



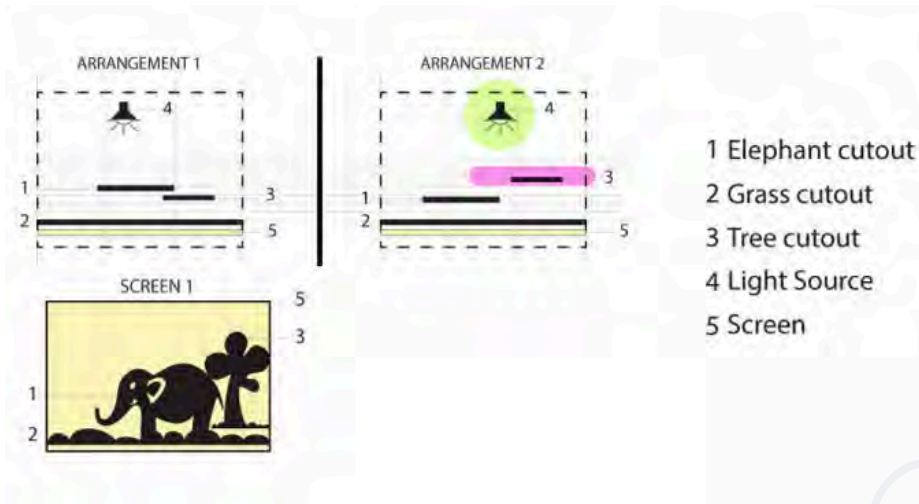
C

**Option D:**



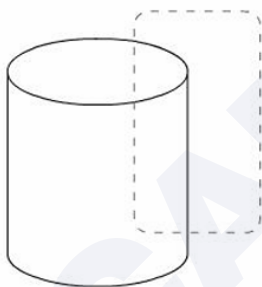
D

**Solution:**



So in arrangement 2 , the three cut out i.e, Number 3 is closer to the light source, and we know any object closer to the light source will project a larger shadow as compared to the one farther away . So we can, the shadow of the projected tree on the screen will be larger . Hence, based on this information, we can eliminate option C and D. Looking at elephant cut out is farther away from the light source, so the projected shadow will be smaller, so based on this information we can eliminate option A. Hence, option B is correct.

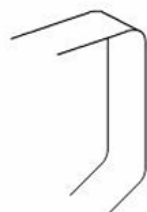
**Q.41** The handle was erased from the drawing of a mug. Which of the options represents the part that was erased?



**Option A:**



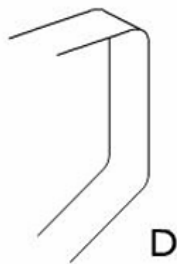
**Option B:**



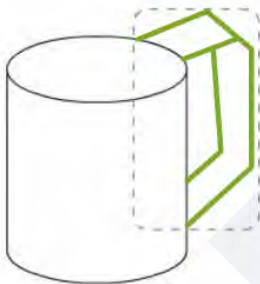
Option C:



Option D:



Solution:



Hence, option B is correct.

Q.42 Which of the options will replace the question mark in the given sequence?

F K ? U Z

- A. C
- B. O
- C. P

D. R

Solution:

Coding Decoding												
1	2	3	4	5	6	7	8	9	10	11	12	13
A	B	C	D	E	F	G	H	I	J	K	L	M
⇕	⇕	⇕	⇕	⇕	⇕	⇕	⇕	⇕	⇕	⇕	⇕	⇕
Z	Y	X	W	V	U	T	S	R	Q	P	O	N
26	25	24	23	22	21	20	19	18	17	16	15	14

F=6, K=11, U=21, Z=26

If we notice that we have a gap of 5 between letters

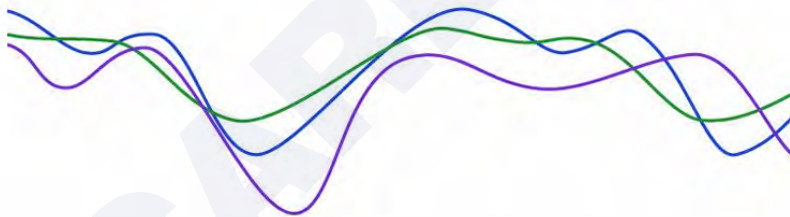
i.e,

$$11-6=5, \quad 26-21=5$$

$$16-11=5$$

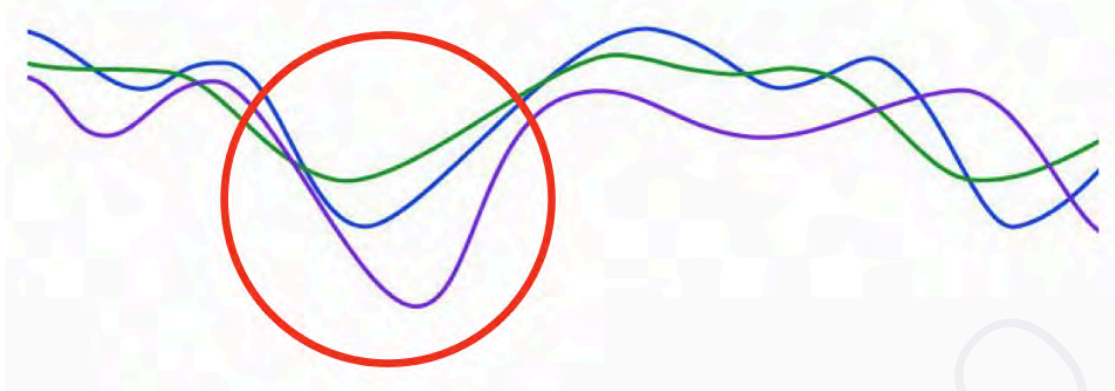
Hence, P i.e, Option C is the correct answer.

**Q.43** Two of the three lines shown below indicate the tracks made by a bicycle. Identify which is the front tyre track and which is the rear tyre track.



- A. Green is front, Purple is rear
- B. Green is front, Blue is rear
- C. Blue is front, Green is rear
- D. Blue is front, Purple is rear

Solution:



Look at the purple track, it is too far away from either blue or green (as shown above) . So eliminate purple track. Therefore, option A and C is ruled out.  
 Now consider blue track , we can see it is always in sync with green track. Hence, we can say blue is front track and green is back track.  
 Hence, option C is correct.

**Q.44** An artwork on a paper creates an illusion of a ladder resting on a wall when the paper is folded and viewed from a specific angle as shown in the image. Which of the options correctly depicts this artwork on the paper when unfolded?



**Option A:**



A

**Option B:**



B

Option C:



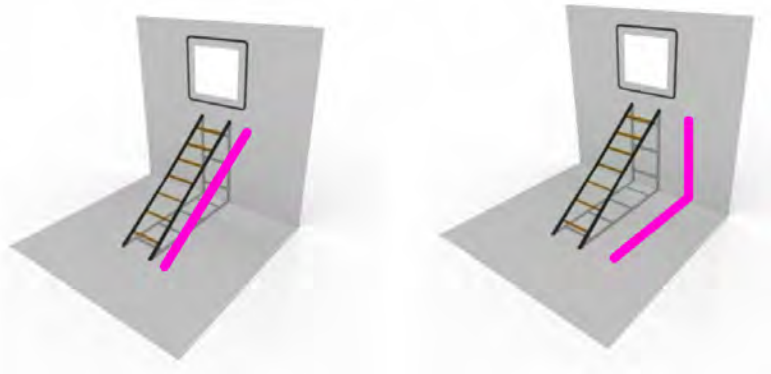
C

Option D:



D

Solution:



**Fig 1**

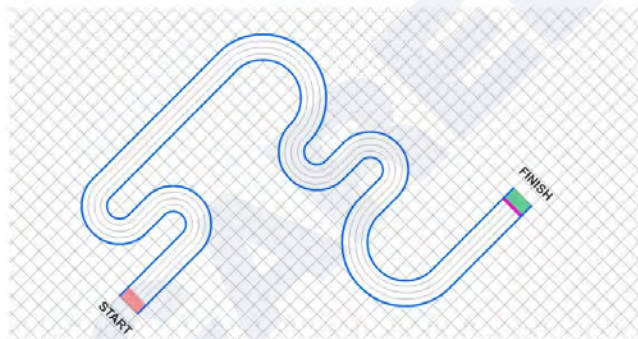
**Fig 2**

Looking at the middle, the ladder looks straight from the angle (figure 1) but in reality it is bent (figure 2) and the bend seen in the shadow will actually be straight in order for the illusion to occur. So now check each option.

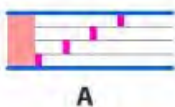
Option A and D is eliminated because in both the option shadow and ladder both are bent.

Now option B is also eliminated as bars of ladder are close to each other so it can't be distorted. Hence, option C is correct.

**Q.45** On a racetrack shown below, choose the correct starting configuration. The athletes are not allowed to change the tracks. Each grid is 2 m x 2 m.

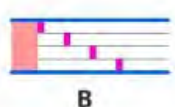


**Option A:**



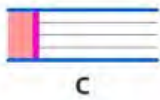
A

**Option B:**

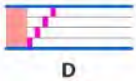


B

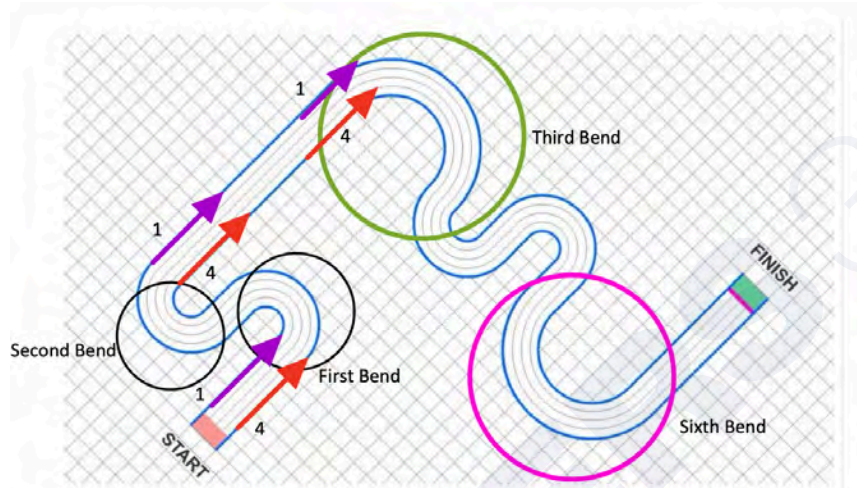
**Option C:**



Option D:



Solution:



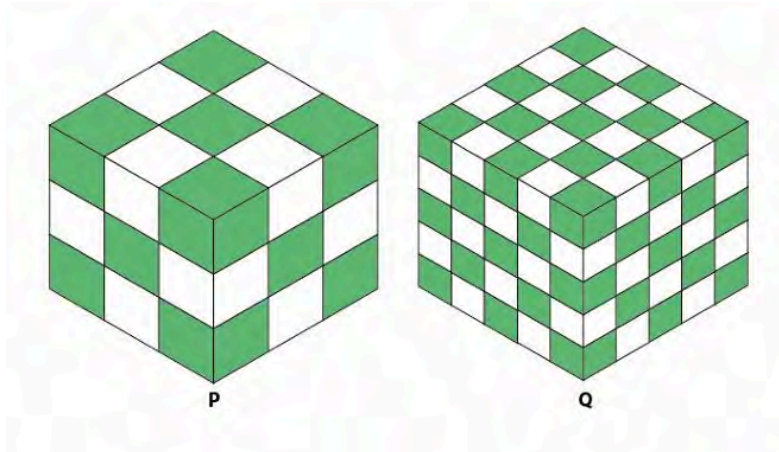
Start with 1 and four. We can see after start we have first bent where 1 (purple) takes the shorter path and 4 (red) will take the longer path.

In second bent, 1st (purple) take longer path and 4th (Red) will take shorter path, i.e, Paths are reversed. So they cancel each other out.

Moving on to big bent (green) , 1 (purple) takes the longer route and first (red) takes the shorter route. But if you look at 6th bent (pink) you will see 1 (purple) get the shorter path and 4 (red) gets the longer path.

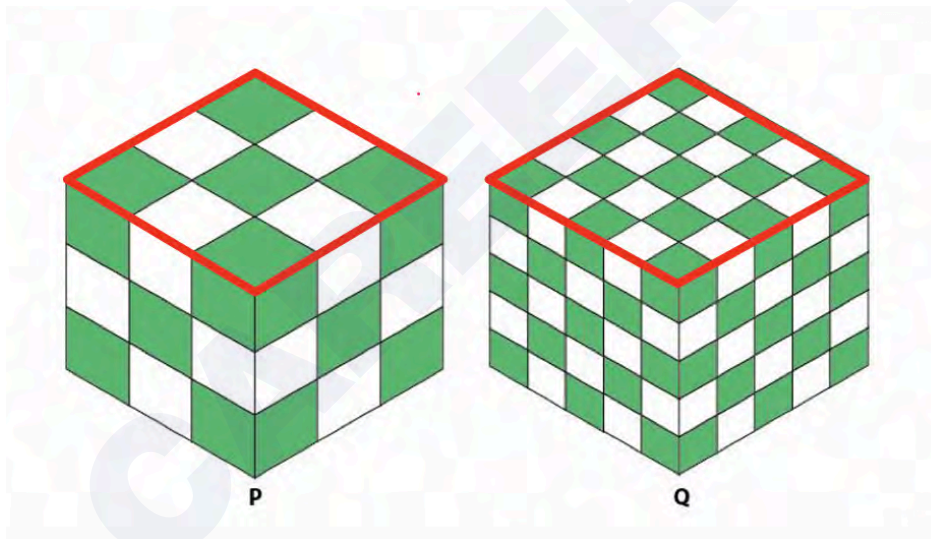
So again it is nullified, similarly others too bent 4th and 6th also get nullified . Since both athletes have an equal distance to cover, so at the start of the race all the athletes will have to stand in a straight line. So answer is option C.

**Q.46** Two identical cubes P and Q are made of smaller cubes in  $3 \times 3 \times 3$  and  $5 \times 5 \times 5$  configurations, respectively, as shown below. Alternate cubes are painted green and white as indicated. Identify the correct option.



- A. The surface area of green is more in P than in Q  
 B. The surface area of white is more in P than in Q  
 C. The surface areas of green and white are the same in P and Q  
 D. The surface area of green is the same, but the area of white is different in P and Q

**Solution:**



In cube P have 5 green squares and 4 white square on the top face of a cube.

Total = 9

$$\therefore G_p = \frac{5}{9} \quad W_p = \frac{4}{9}$$

Similarly

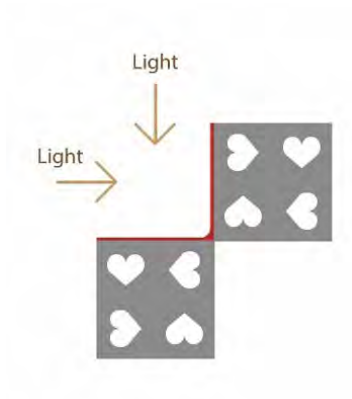
$G_Q$  i.e, Green colour squares in cube Q and  $W_Q$  is white colour squares in cube Q.

$$G_Q = \frac{13}{25} \quad W_Q = \frac{12}{25}$$

$$\frac{5}{9} > \frac{13}{25}$$

So, surface area of P is greater than surface area of Q.  
Hence, option A is correct.

**Q.47** The image shows the top views of an L shaped sculpture resting on a planar ground. When light falls on it at an angle of 45 degrees from the ground in the directions marked as an arrow in the image, the corresponding shadows are formed on the ground. Which of the options is this sculpture?



**Option A:**



A

**Option B:**



B

**Option C:**



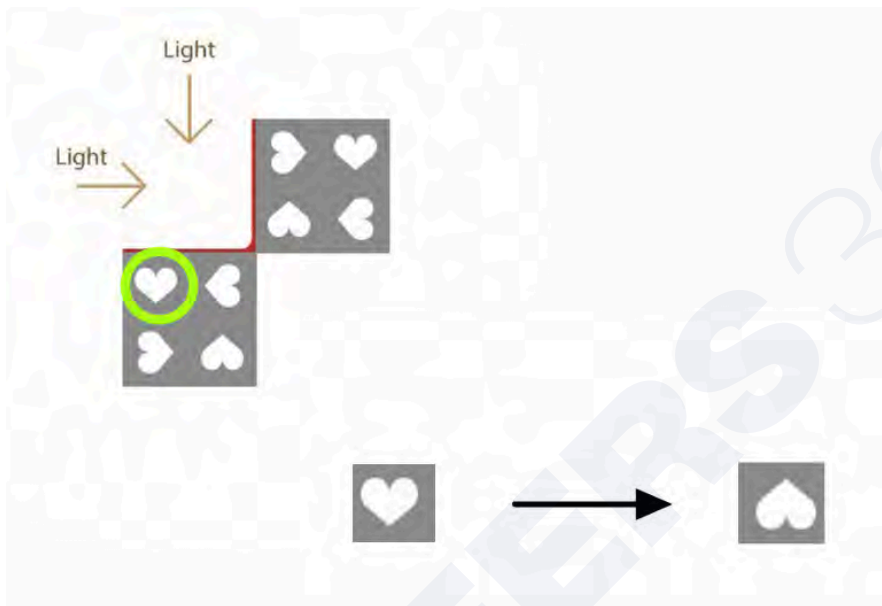
C

**Option D:**



D

**Solution:**



We can see the shadow of highlighted (Green) part (shown above) when light coming from top.

if we minutely observe the options, we can see option D is correct.



D

**Q.48**



Option A:



A

Option B:



B

Option C:



C

Option D:



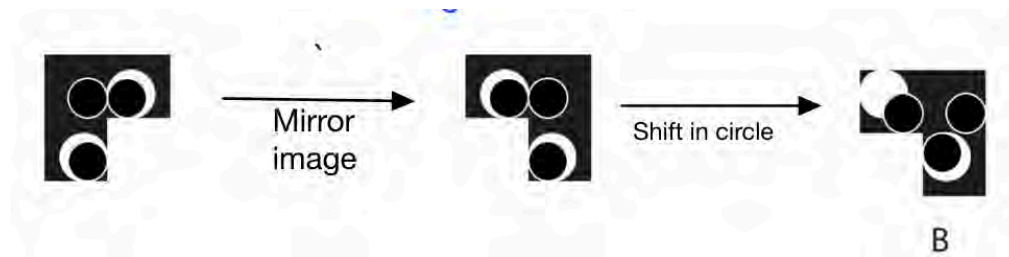
D

**Solution:**

If we observe, the second image is a mirror image of 1st and twist in circle. We get image 2



Now focus on image 3



Hence, option B is correct.

**Q.49** An animator was trying out options of various rough poses while planning a frame of a shot. Mirroring and silhouetting are two aspects that animators need to consider when deciding whether a pose is good or not. (The left and right side having the same pose, i.e. mirrors of one another, are called Mirroring. Silhouetting refers to the shape of the pose if it was a silhouette, i.e. the outline of the pose.) Based **ONLY** on these two aspects, which of the options can be considered the **WEAKEST** pose?

Option A:



Option B:



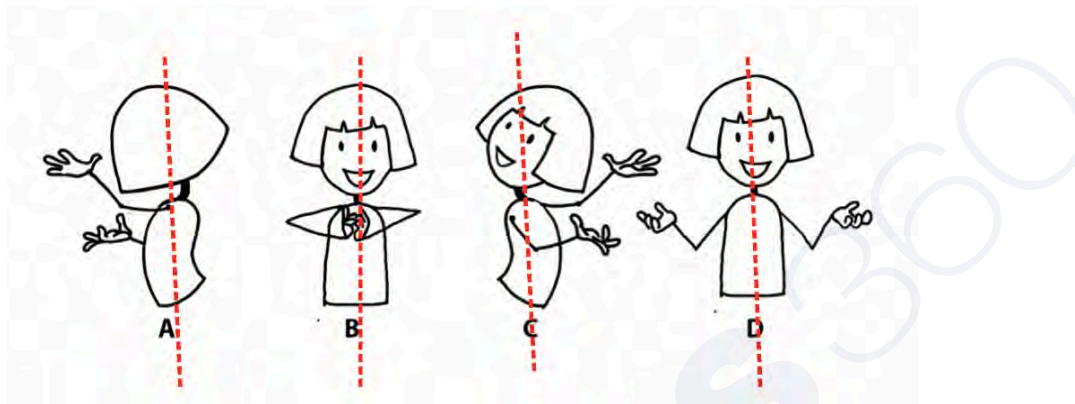
Option C:



Option D:



**Solution:**



D and B are symmetrical, so they are considered weak.

Now compare B and D and check silhouetting, then we can see D is strong to pose compare to B . Hence option B is correct.

**Q.50** At 6:00 pm, the hour hand and the minute hand of an analogue clock are at 180 degrees with each other. After approximately how much time will they be at 180 degrees with each other again?

- A. 48 minutes, 40 seconds
- B. 54 minutes, 33 seconds
- C. 60 minutes
- D. 65 minutes, 27 seconds

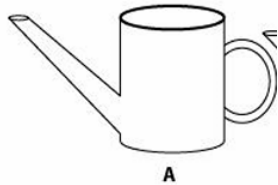
**Solution:**



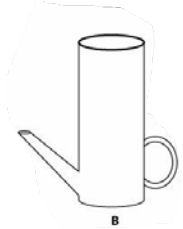
So we can say approximately 65 run passed to be again at 180 degree.  
Hence, option D is correct.

**Q.51 Which of the kettles shown below can hold the most amount of water when placed on an even, horizontal surface?**

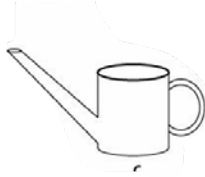
**Option A:**



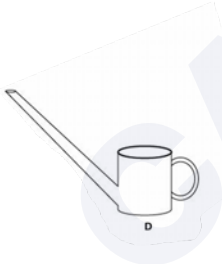
**Option B:**



**Option C:**

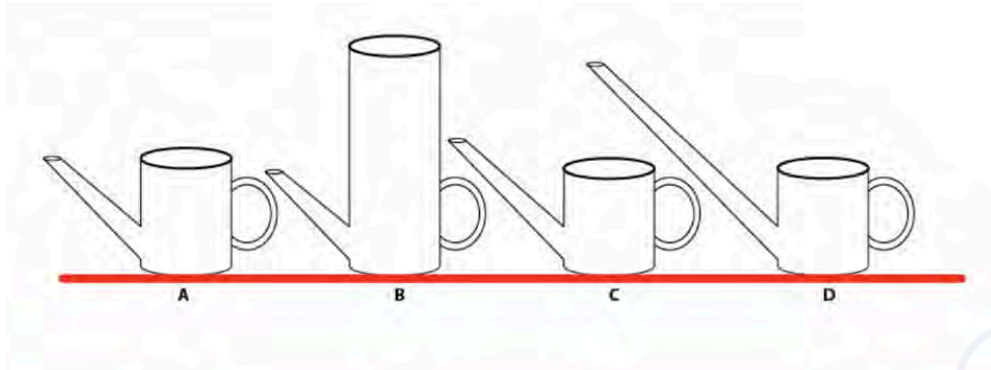


**Option D:**

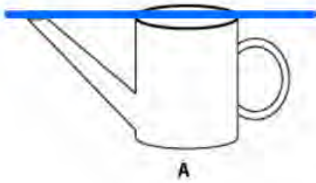


**Solution:**

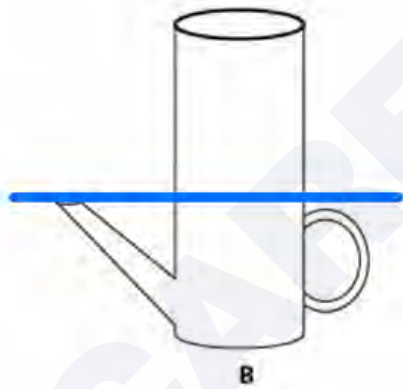
Draw a horizontal surface



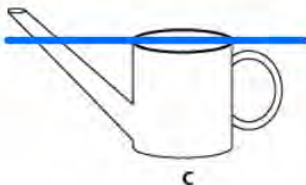
Now



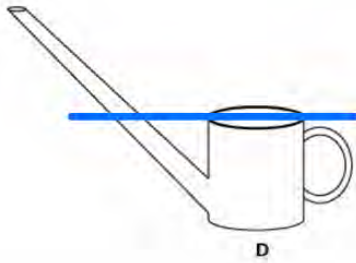
Uptill this level, kettle can hold water



Uptill this level, the kettle can hold water.



Uptill this level, kettle can hold water

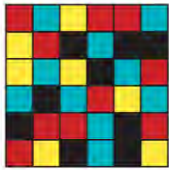


Uptill this level, the kettle can hold water.  
Hence, option A can hold most amount of water.

**Q.52**

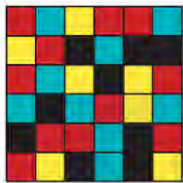


**Option A:**



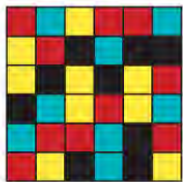
A

**Option B:**



B

**Option C:**



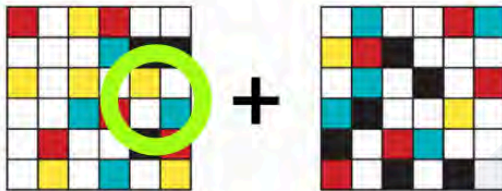
C

**Option D:**



**Solution:**

Option A:



We can see the colour of the highlighted box in the original image is yellow, and in option A it is blue . So this option A is incorrect.

Option B:



B

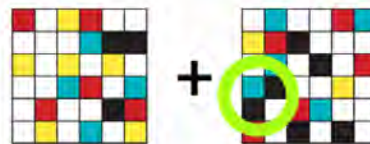
We can see the colour of the highlighted box in the original image is yellow, and in option B it is red. So, this option B is incorrect.

Option C:

We can see the colour of the highlighted box, original image is Blue and in option C. It is Black.

So this option C is incorrect.

Hence, option D is correct.



C

**Q.53 A plane is landing smoothly on the airport runway. Select the correct picture.**

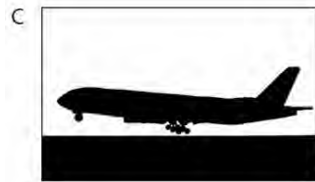
**Option A:**



**Option B:**



**Option C:**



**Option D:**



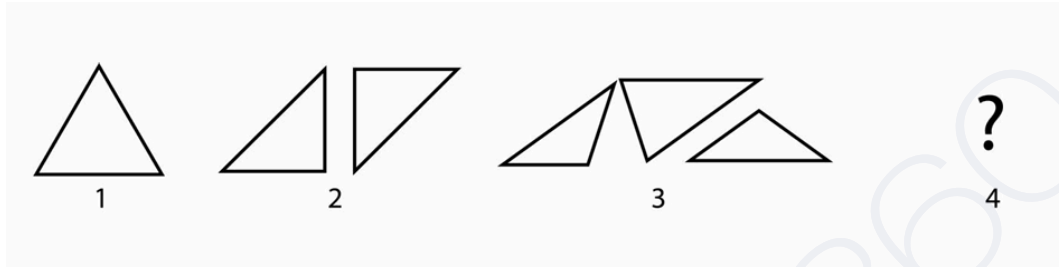
**Solution:**

Landing is the last part of a flight, where a flying aircraft or spacecraft (or animals) returns to the ground. When the flying object returns to water, the process is called alighting, although it is commonly called "landing" and "touchdown" as well.



Hence, we can see option C is correct.

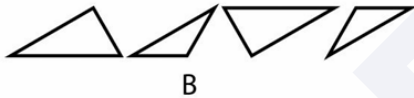
**Q.54** In the series given, the first is an equilateral triangle, the second becomes a square by rearranging the pieces, and the third becomes a regular pentagon without any rotation. Similarly, the fourth becomes a regular hexagon. Which of the options given therefore replaces the question mark?



**Option A:**



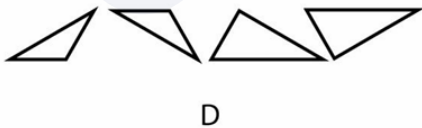
**Option B:**



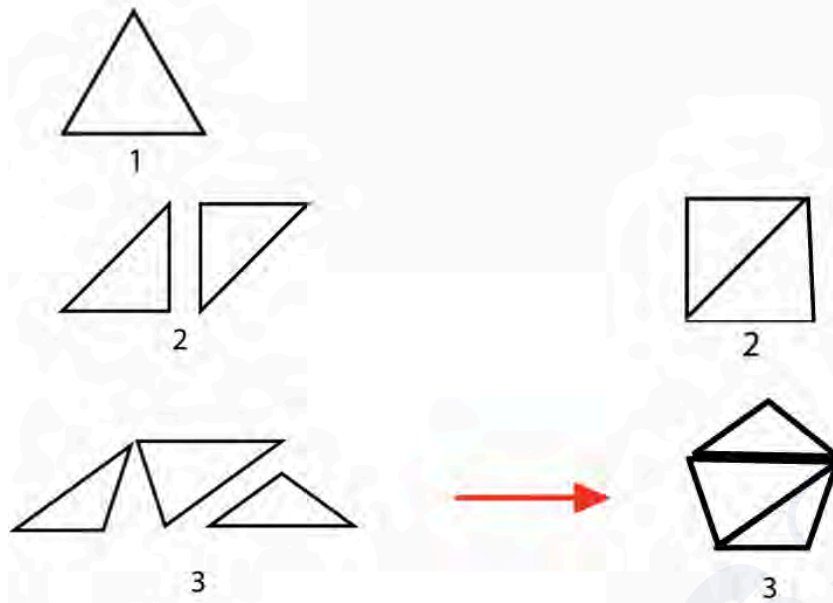
**Option C:**



**Option D:**



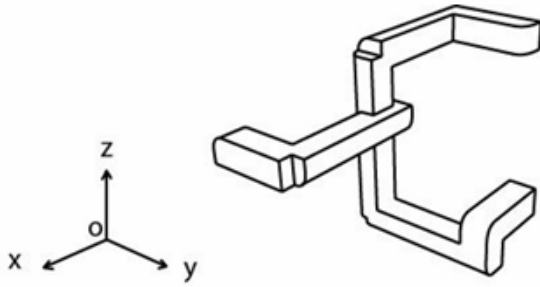
**Solution:**



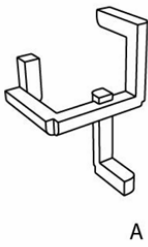
Now checking each option, we can observe option C correct (as shown below)



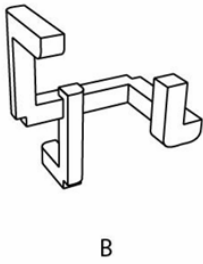
**Q.55** Perspective view of an object is shown. The object is rotated with respect to the fixed coordinate system as indicated: 90 degrees clockwise about x-axis, 90 degrees anti-clockwise about y-axis, 90 degrees anticlockwise about z-axis. All rotations are when viewed from a point on the positive axis towards the origin. Which one of the following perspective view options will be the result of the rotations?



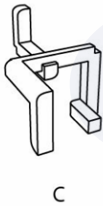
**Option A:**



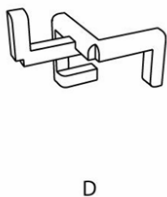
**Option B:**



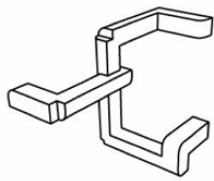
**Option C:**



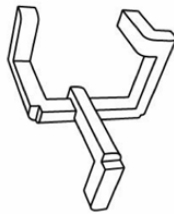
**Option D:**



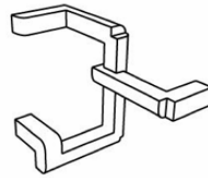
**Solution:**



**Fig 1**



**Fig 2**



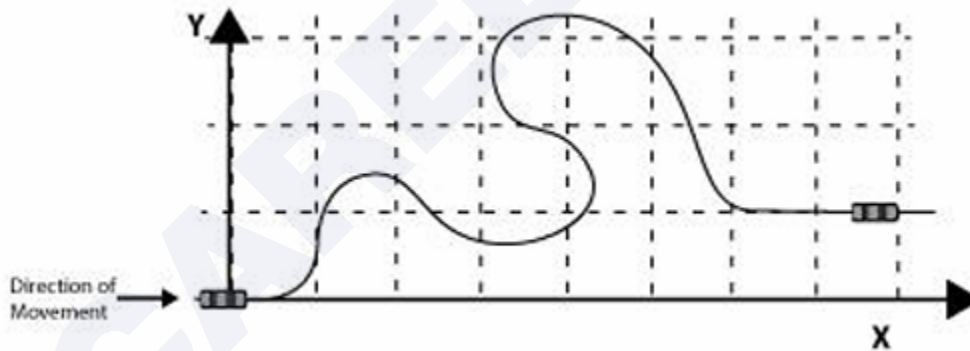
**Fig 3**

**Fig 4**

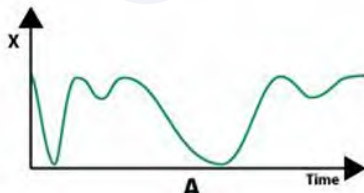
Fig 1 is rotated 90 degree clockwise about x-axis, and we get fig 2 and when fig 2 is rotated 90 degree anticlockwise about y-axis we get fig 3. Now at the end when fig 3 is rotated 90 degree anticlockwise in Z direction we get fig 4. We can see that Fig 4 matches with option A.

Hence, option A is correct.

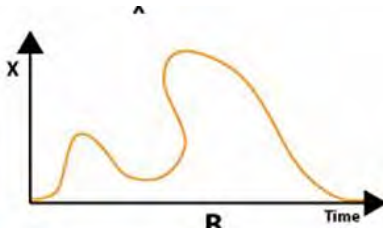
**Q.56 A car moves along a curving road at constant speed. Which of the following graphs correctly show(s) the movement of the car in the X direction with respect to time?**



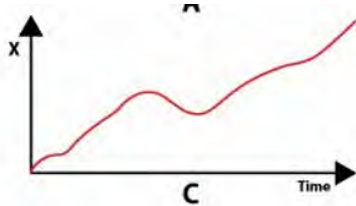
**Option A:**



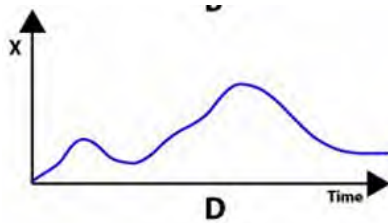
**Option B:**



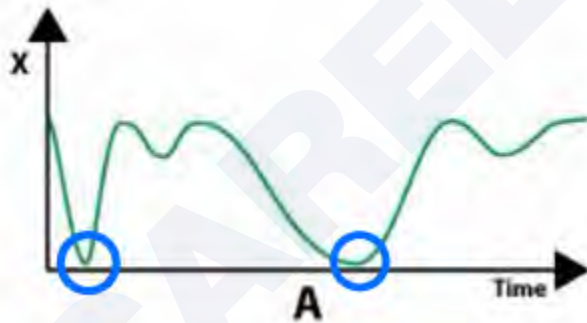
Option C:



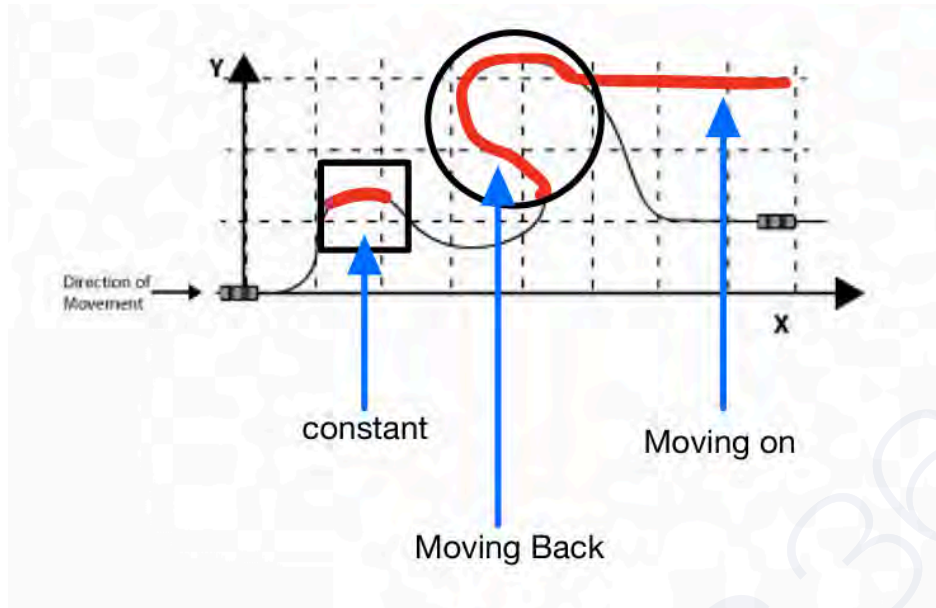
Option D:



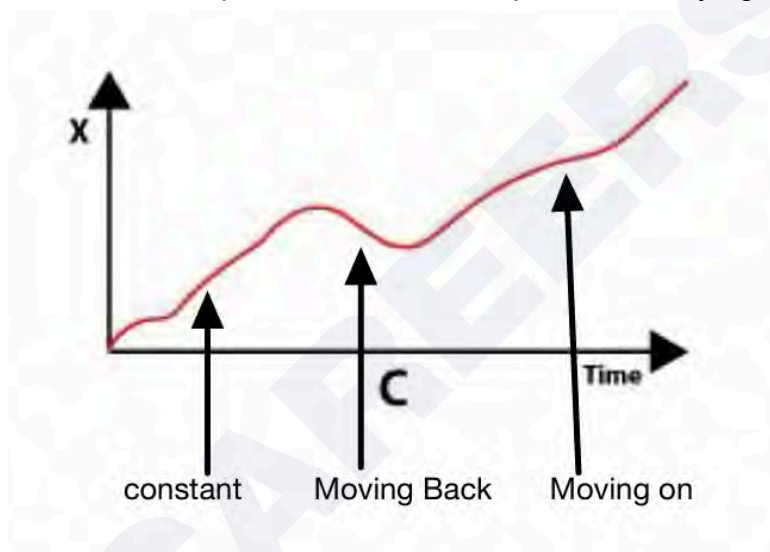
Solution:



If we check option A we can see it comes to zero at 2 points but in actual graph it never comes to zero. Therefore, Option A is incorrect.

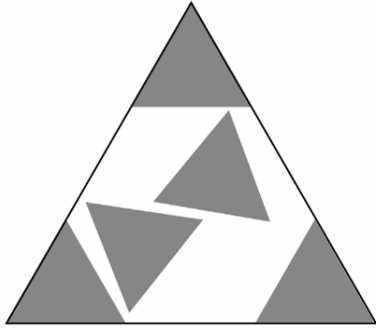


If we observe options, we can see option C satisfying the condition as shown below.



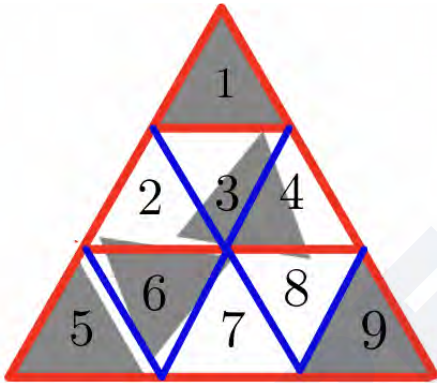
Hence, option C is correct.

**Q.57** Five small triangles of equal size are fitted in a large triangle as shown below. Approximately what percentage (%) of area in the large triangle is empty?



- A. 33
- B. 44
- C. 55
- D. 66

**Solution:**



But in the original figure, we have 5 triangles.

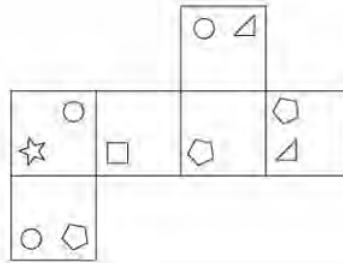
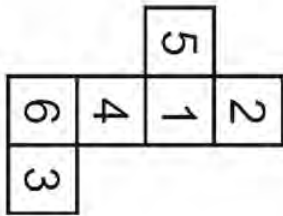
$\therefore \frac{5}{9}$  the part has been filled with their triangle

$\frac{4}{9}$  part is empty

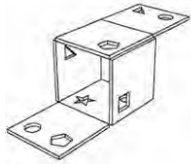
Percentage  $\frac{4}{9} \times 100 \approx 44\%$

Hence, option B is correct.

**Q.58** The image below shows the developed surface of a cube. Which of the options will NOT open up as the shown image?

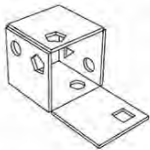


**Option A:**



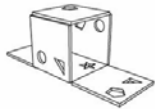
A

**Option B:**



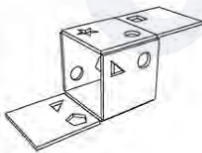
B

**Option C:**



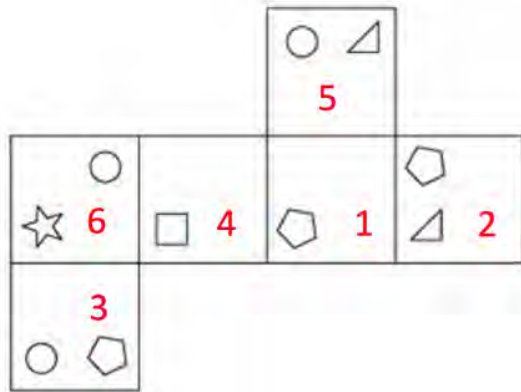
C

**Option D:**



D

**Solution:**

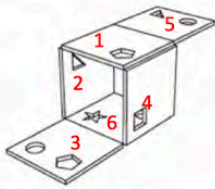


Name the cubes (as shown above)

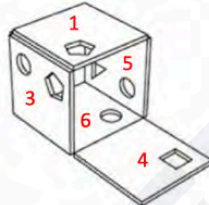
5 is adjacent to 3

6 is adjacent to 1

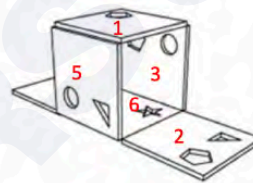
4 is adjacent to 2



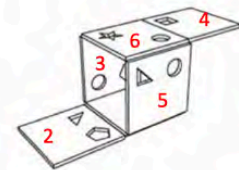
A



B



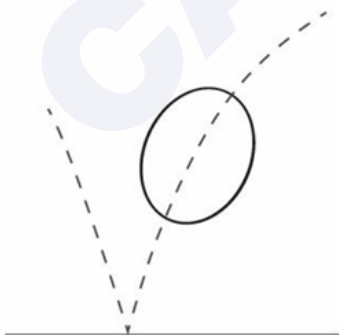
C



D

Option B is not possible, as in cube with No. 5 has incorrect orientation of triangle . Hence, option B is the answer.

**Q.59** A frame of a bouncing ball is shown in the picture. This shows the animation principle of \_\_



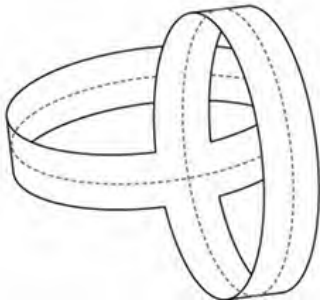
- A. Stretching Principle
- B. Distortion Principle
- C. Squash and Stretch Principle

### D. Motion Principle

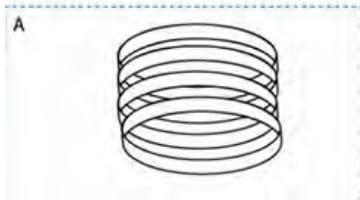
#### Solution:

When bouncing ball goes downward , it slightly squashed and then bounce up, i.e, stretching option C is correct.

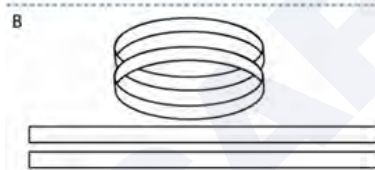
**Q.60** Two paper loops are joined together as shown in the figure below. If you cut the loops along the blue dotted line, what will be the resultant figure?



#### Option A:



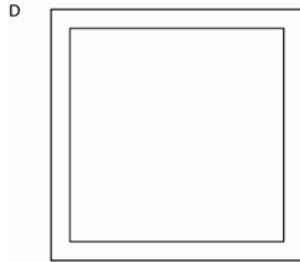
#### Option B:



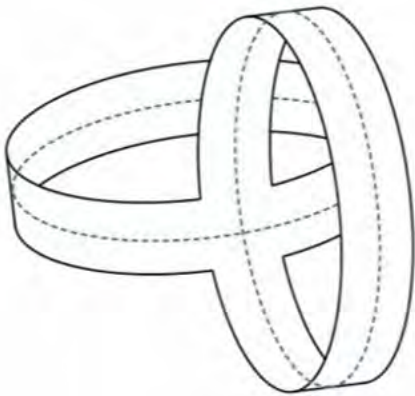
#### Option C:



#### Option D:



**Solution:**

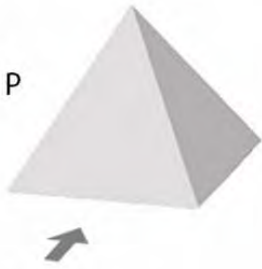


When we cut the loops along the blue dotted line we can see that figure is connected, so if we start cutting it horizontally then go to cut it vertically we get a figure (as shown below) which still remain correct.



Hence, option D is correct.

**Q.61** Reference image of a square pyramid, P, is provided on the left. Assume Q as an identical pyramid created by mirroring P in upward direction. Q was rotated by 135 degrees around the vertical axis and then brought down so that the two pyramids intersect. Which of the options is the resultant view as seen from the given direction arrow?



**Option A:**



A

**Option B:**



B

**Option C:**



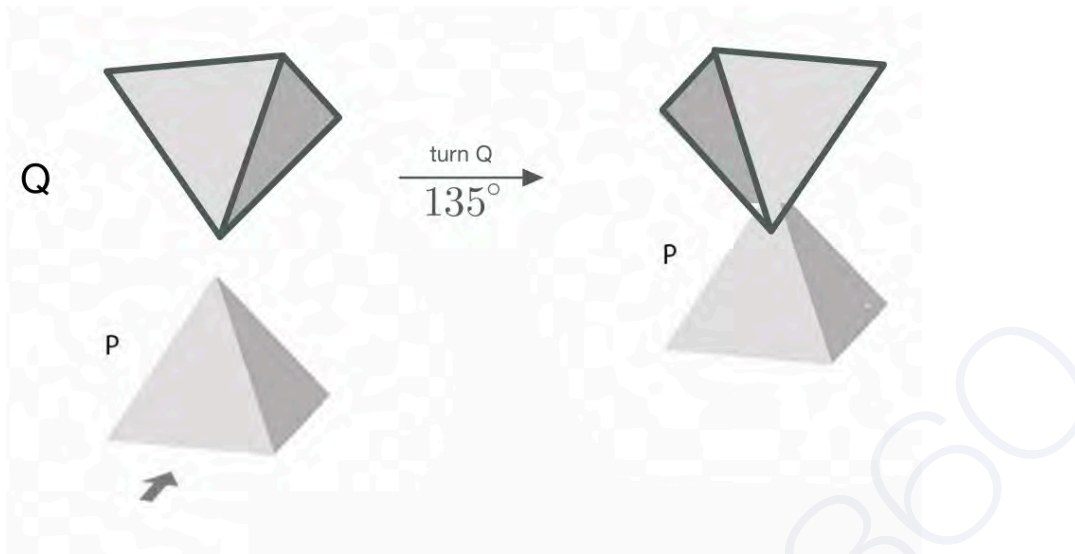
C

**Option D:**



D

**Solution:**



Option B: The part Q is moved 135 degree diagonally so P and Q length can not be same .

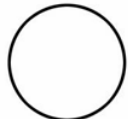
Hence, this option is incorrect.



Option C:  
In this, P is shown at a wrong angle.

Option D:  
In this, Q hasn't been rotated.  
Therefore, option A is correct.

**Q.62** Figure shows the top view of a cylinder with mirror finish kept on a paper on which the word 'WARD' is written. Which of the following images is the best representation of the word and its reflection?



WARD

P

Option A:



WARD

A

Option B:



WARD

B

Option C:



WARD

C

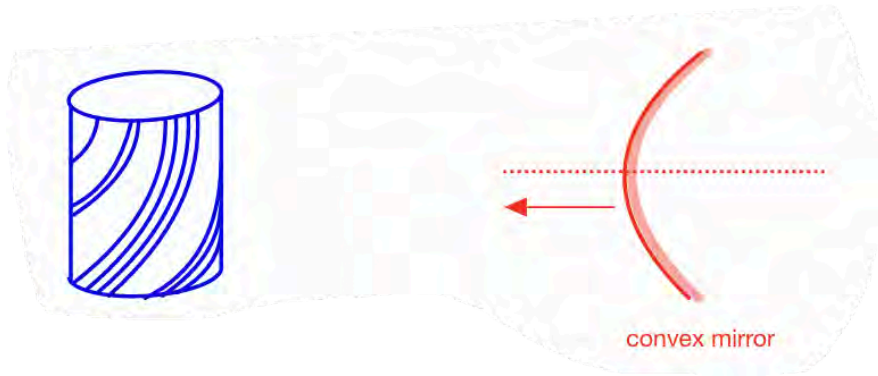
Option D:



WARD

D

Solution:



**Fig 1**

A cylinder looks like this has shown in fig 1 and if it has mirrored surface it's then a convex mirror means the curve is outward and convex mirror do not reflect images bigger than the object i.e, The reflected image will be smaller than the object size. Now looking at the options. Option B is correct.



**Q.63** Which letter is **NEVER** used while printing the calendar, mentioning names of all the days of the week and months in full form?

- A. W
- B. G
- C. K
- D. V

**Solution:**

THE DAYS OF THE WEEK

**SUNDAY**  
**MONDAY**  
**TUESDAY**  
**WEDNESDAY**  
**THURSDAY**  
**FRIDAY**  
**SATURDAY**

We know G K V aren't use in days of week, but W has been used.



As august contains G so option B eliminated.  
 And November contains V so option D eliminated.  
 Hence, option C is correct.

**Q.64** Which option depicts the reflection of the figure given below?



**Option A:**

A 

Option B:

B 

Option C:

C 

Option D:

D 

Solution:

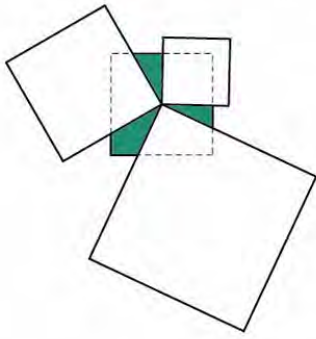






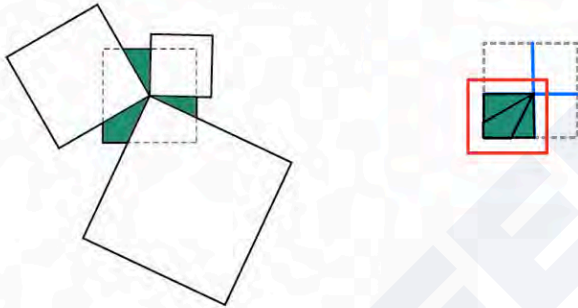
We can see option D is correct.

**Q.65** Three white squares overlap the cyan square such that one of their corners meet at the centre of the cyan square as shown in the figure. What is the ratio of the area of the shaded portion to the original cyan square?



- A. 1/6
- B. 1/4
- C. 1/3
- D. 3/8

Solution:



Looking at the highlighted portion of the square, we can see the shaded cyan region covers one fourth of the area of this square. So the answer is option B.

Q.66



Option A:



Option B:



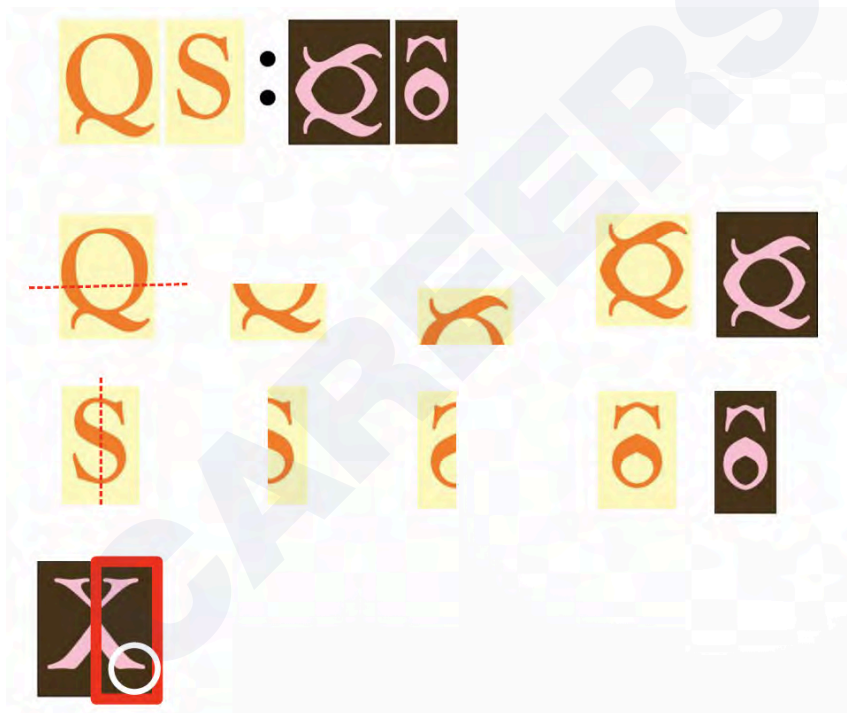
Option C:



Option D:



Solution:



If we look at the red highlighted part, it can't make an in any condition . Therefore, option A is eliminated.

Now check other option.



So, bottom highlighted part of option B doesn't resemble original image (as shown in fig above) Hence option B is also eliminated.



Hence, we can see option D is correct.

**Q.67** P, Q, R, S are competing in the slow cycle race, in which the slowest cyclist wins. A few minutes after the race begins, P is physically ahead of Q. R and S are physically behind Q. S is physically ahead of R. P got eliminated and R overtakes Q. Just reaching before the end mark, S overtakes Q. Which of the options is true?

- A. R is winner
- B. S is winner
- C. Q is winner
- D. Q is runner-up

**Solution:**

Since it is a slow cycle race, so we know option A B and D are all in correct. Hence, option C is correct.

**Q.68** Select the correct logo

**Option A:**



**Option B:**



**Option C:**



**Option D:**



**Solution:**



The correct logo of Axis bank is shown above.  
Hence, option B is correct.

## PART-B

### Q.1 Sketching

[Note:

- 1) This question must be answered in the answer booklet provided by the invigilator
- 2) It is not mandatory for the candidates to mark the Part-B question as 'answered' at the bottom of the screen on the computer]

You are sitting in a well ventilated drawing room. It is 9 in the morning and sun light is streaming through the window on the East casting shadows on the floor. A cat is resting on one of the sunlit patches. A newspaper is placed beside a cup of hot tea on a small side table. There are three freshly watered potted plants in the room; one on the floor and two on the window sill with the watering jug next to it.

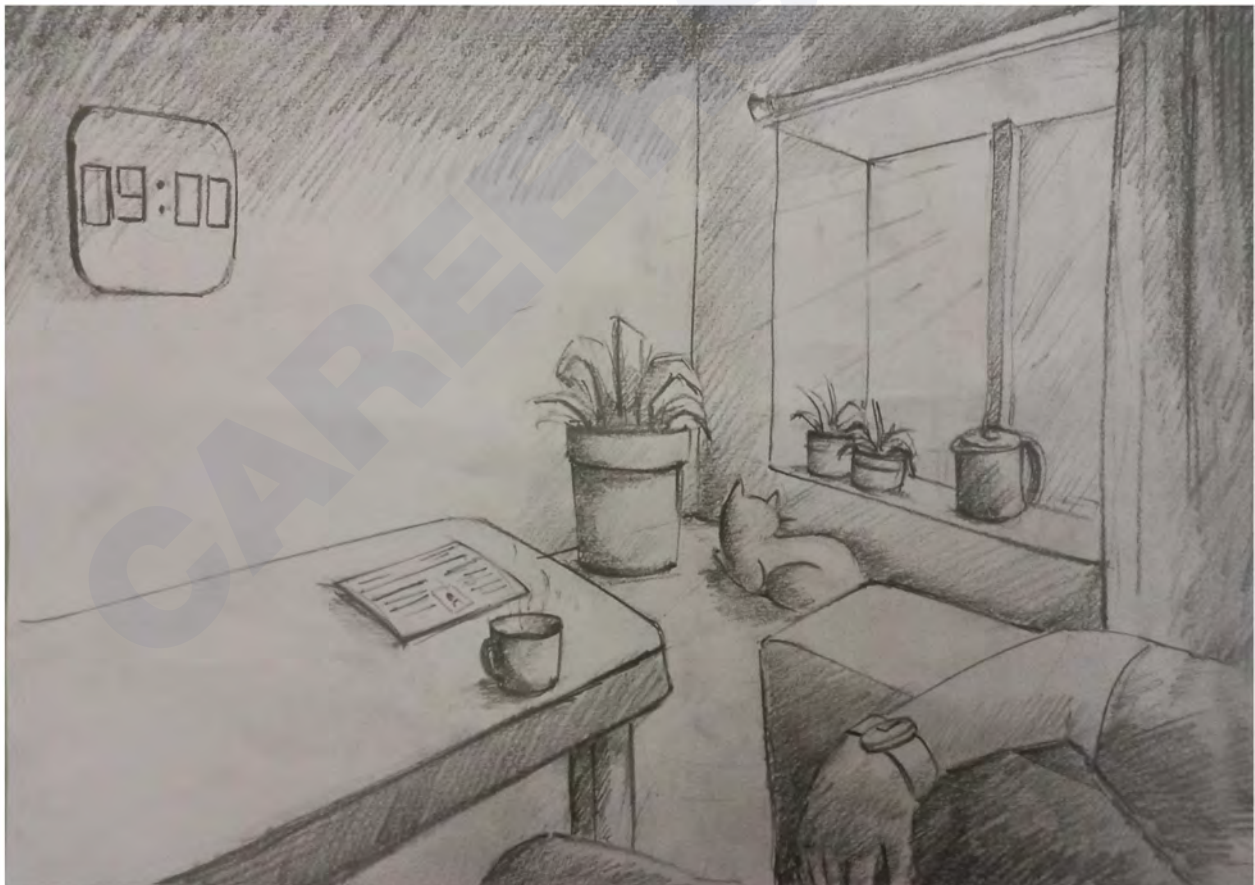
From the above description, sketch the scene from your point of view.

**Note:**

- Make pencil sketches only
- Do not use colours

**Evaluation Criteria:**

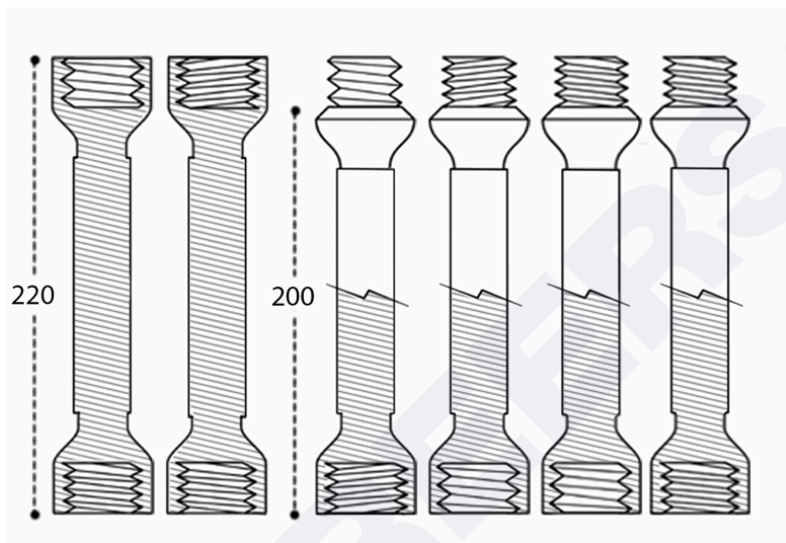
- Observation
- Imagination
- Selection & composition of objects
- Quality of line
- Presentation
- Attention to detail



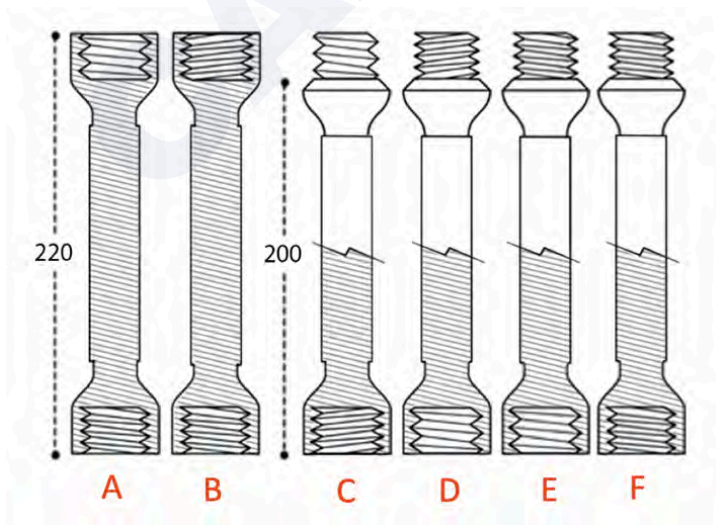
# UCEED 2020

## PART A Section 1: Numerical Answer Type (NAT) questions

**Q.01** The figure shows illustrations of six metal rods which have internal or external screw thread patterns at their ends. The shaded portion in the figure shows the cross-section view. What is the maximum length possible by connecting the rods? Threads cannot be connected partially.



**Solution:**



Let's Name all 6 Metal Rods as AB C D E and F if we observe the external or internal screw thread Pattern we obtain the maximum length possibly by connecting the rods

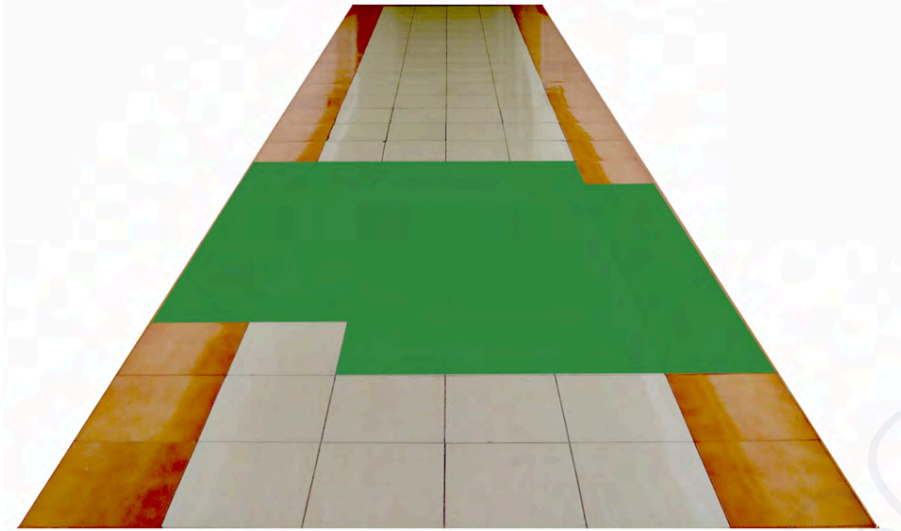


We can observe that the thread pitch of tools A, C, D and E on the side are different. They have 3 threads, while the other threads of the tools have 4 threads. So, all we need is to be careful while fixing them. One of the possible sequences can be D-B-E-C-F which adds up to

$$200+220+200+200+200=1020$$

So the answer is 1020

**Q.02** The attached image shows a corridor floor that is covered with square tiles of the same size. How many tiles are covered by the green patch?

**Solution:**

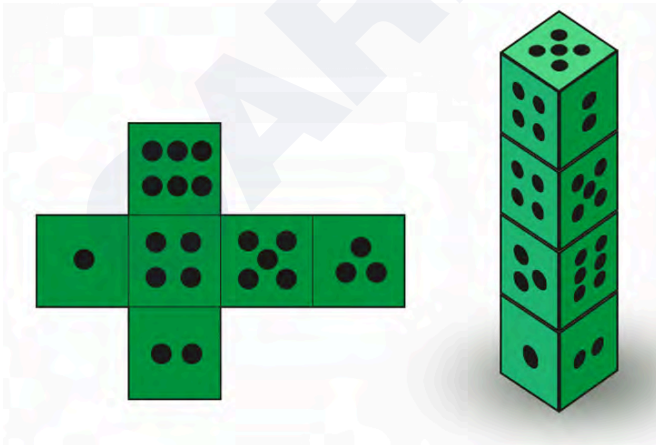
Number of tiles in Row A = 5 (Green)

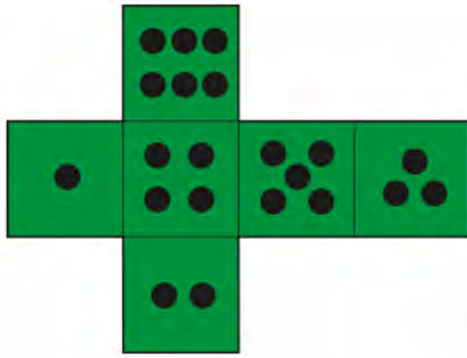
Number of tiles in row F = 4 (Green)

Number of tiles in other rows (B, C, D, E) =  $6 \times 4$   
= 24

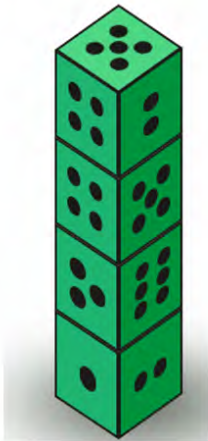
Total tiles =  $5 + 4 + 24$   
= 33

**Q.03** The Figure to the left shows an unfolded pattern of a die. If four such identical dice are stacked one on top of another, as shown on the right, what is the sum of the numbers appearing on the faces which are parallel to the ground?

**Solution:**



In the above dice,  
 6 is adjacent to 2  
 1 is adjacent to 5  
 4 is adjacent to 3

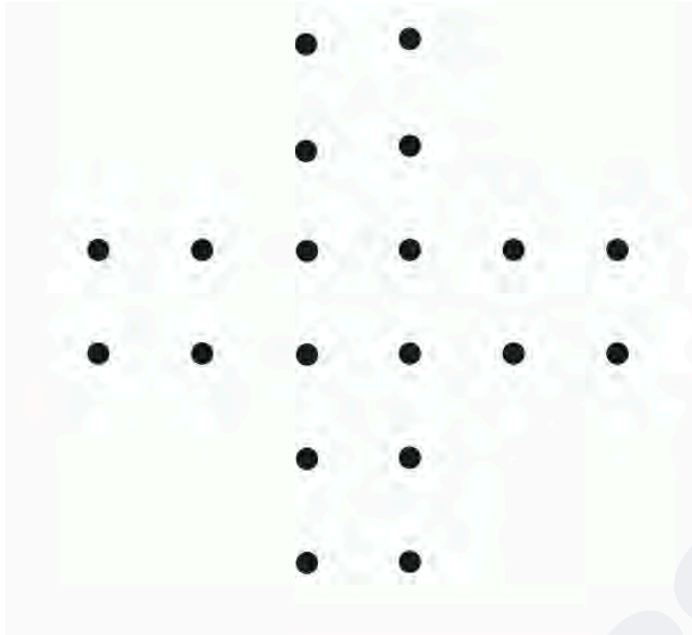


- In the first row of the above image, 1 and 2 dots are visible. So, their adjacent faces shall be, 5 and 6. Therefore, the leftover pair (3,4)
- For the dice in the second row (from the bottom), dots 3 and 6 are visible. So, their adjacent faces shall be 4 and 2 respectively, Therefore, the leftover part is (1,5)
- For the dice in the third row (from the bottom), dots 4 and 5 are visible. So their adjacent faces shall be 3 and 1 respectively, Therefore the leftover part is (2,6).
- In the topmost row, 5 is visible at the top of the dice.
- So, its corresponding pair is 1 (1,5)

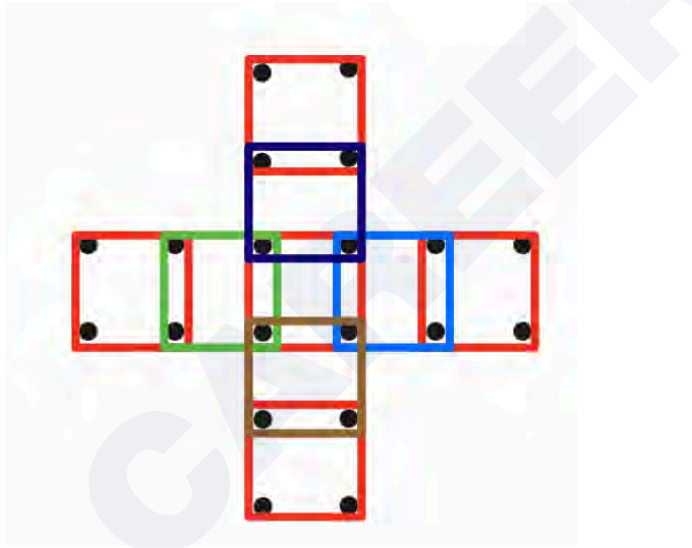
Hence, numbers pair parallel to the ground are (3,4) (1,5) (2,6) (1,5)

Therefore, the sum is  $3+4+1+5+2+6+1+5=27$ .

**Q.04** Twenty points are arranged on a plane as shown in the figure below. What is the highest number of squares that can be drawn using any four points as corners?

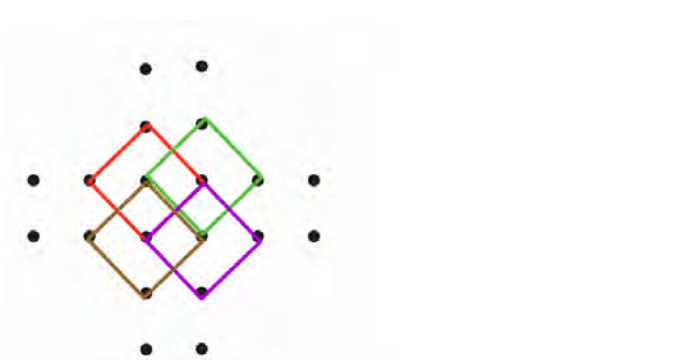


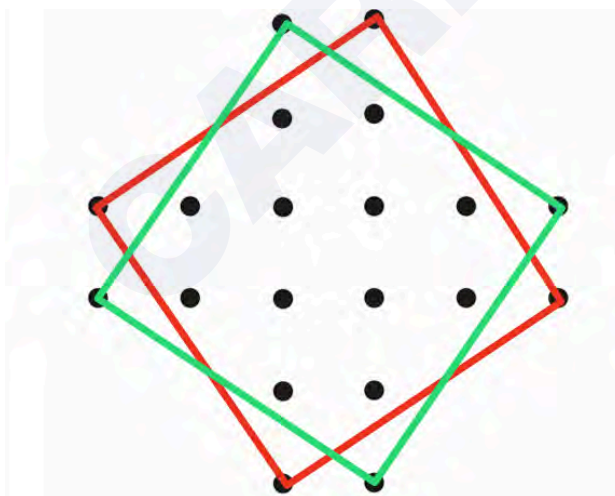
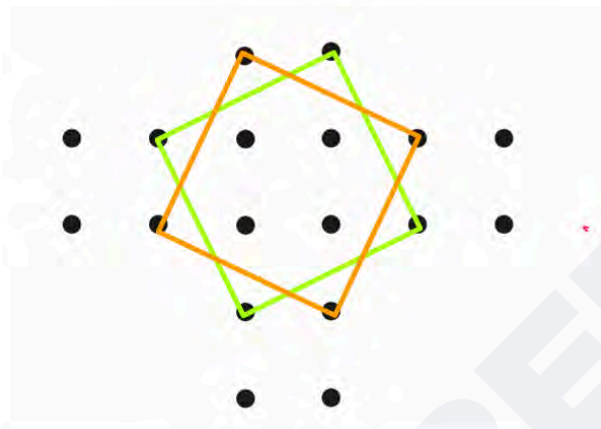
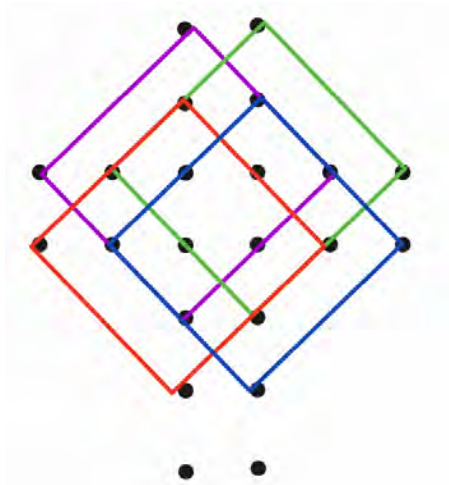
**Solution:**



In the image above, we can see no. of squares =  $4 + 5 = 9$

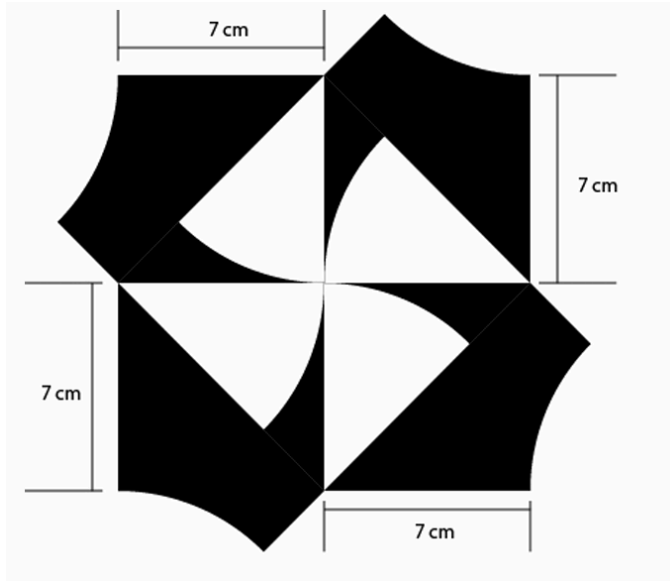
Now, the next possible arrangement of squares i.e., There are four dots at the corner of the square (as shown below)



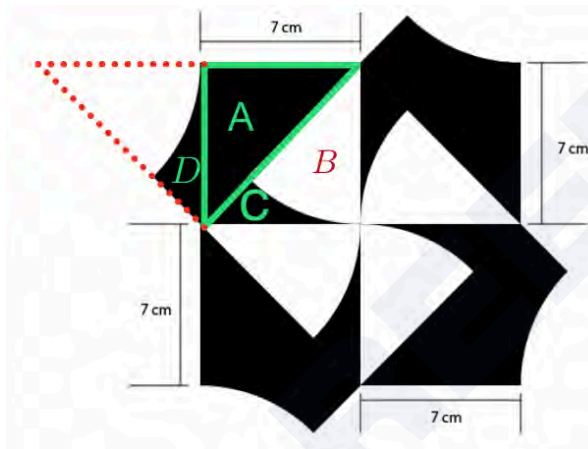


Total number of squares =  $9+4+4+2+2=21$

**Q.05** The Area of the black surface in the following image is \_\_\_\_\_ cm<sup>2</sup>. Note:  
 1. All curves have the same radii. 2. Use the value of pi as  $\frac{22}{7}$



**Solution:**



Part A = Triangle with base = 7 cm and height = 7 cm

Part B = Sector of 45 degrees and radius of 7 cm

Part C = Triangle - Part B

Part D = It is the same as part C i.e., Triangle - Part B

We know,

$$\text{Area of triangle} = \frac{1}{2} \times \text{base} \times \text{height}$$

$$\text{Area of sector} = \frac{\theta}{360} \pi r^2 \text{ [where } r \text{ is radius]}$$

$$\text{Area of part A} = \frac{1}{2} \times 7 \times 7 = \frac{49}{2} = 24.5$$

$$\text{Area of part B} = \frac{45}{360} \times \frac{22}{7} \times 7 \times 7 = 19.25$$

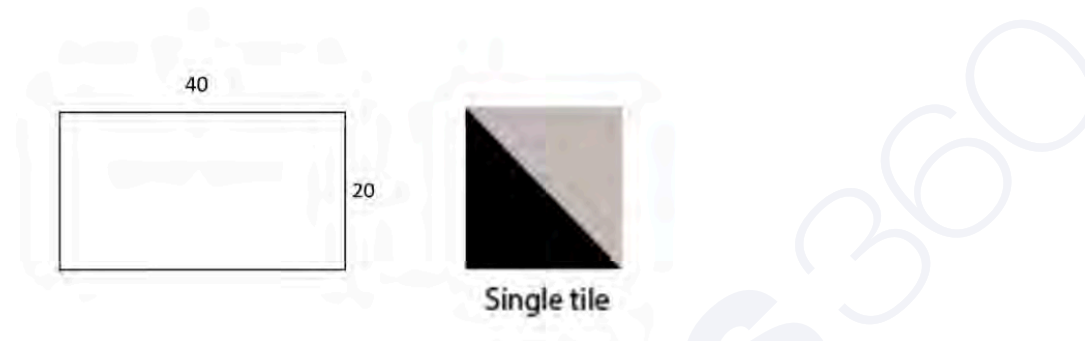
$$\text{Area of part C} = \text{Area of triangle} - \text{area of part B}$$

$$= 24.5 - 19.25$$

$$= 5.25$$

Area of part D=area of part C =5.25  
 Area of 1 pattern in black=24.5+5.25+5.25=35  
 Area of 4 such patterns =  $4 \times 35 = 140$

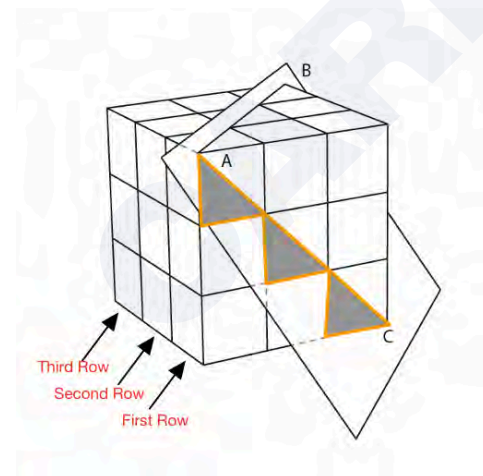
**Q.06** The image is a ceramic tile of dimension 20 cm x 20 cm. How many distinct patterns can you create by using two such ceramic tiles in a rectangular patch of 40 cm x 20 cm on the wall?



**Solution:**

A single tile (of 4 sides) can be arranged in 4 ways (taking sides as a base). Similarly, the second tile can also be arranged in 4 ways. So, the total number of ways of arranging two tiles is,  $4 \times 4 = 16$ .

**Q.07** A cube is created by stacking 27 smaller cubes as shown in the figure. A plane, going through vertices A, B and C, cuts the cube as shown in the figure. How many smaller cubes will get cut?



**Solution:**

In the first row, 3 cubes get cut (as shown above) so we have 3 rows and if 1 row gets 3 cuts. So 3 rows will have  $3 \times 3 = 9$  cuts  
 Therefore, 9 smaller cubes will be cut.

**Q.08** At most how many triangles can appear by adding two straight lines to the figure?



**Solution:**

According to the question, we can add only 2 straight lines.

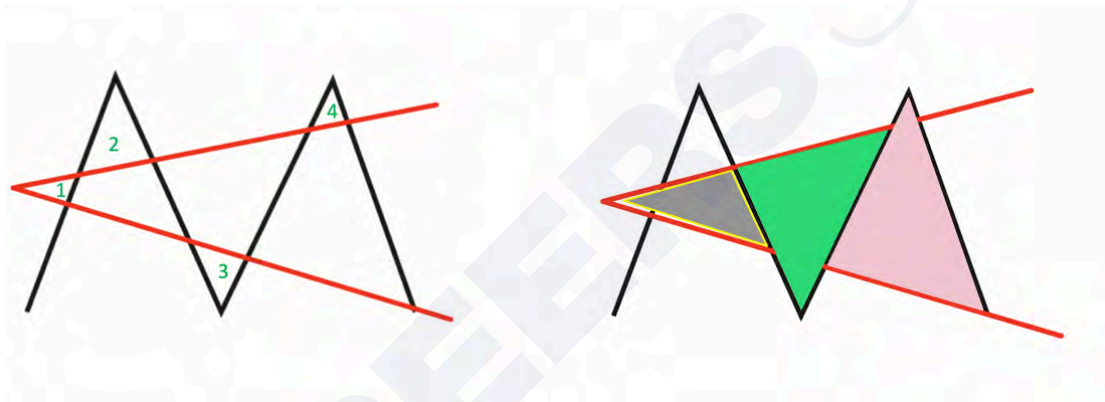


Figure 1

Figure 2

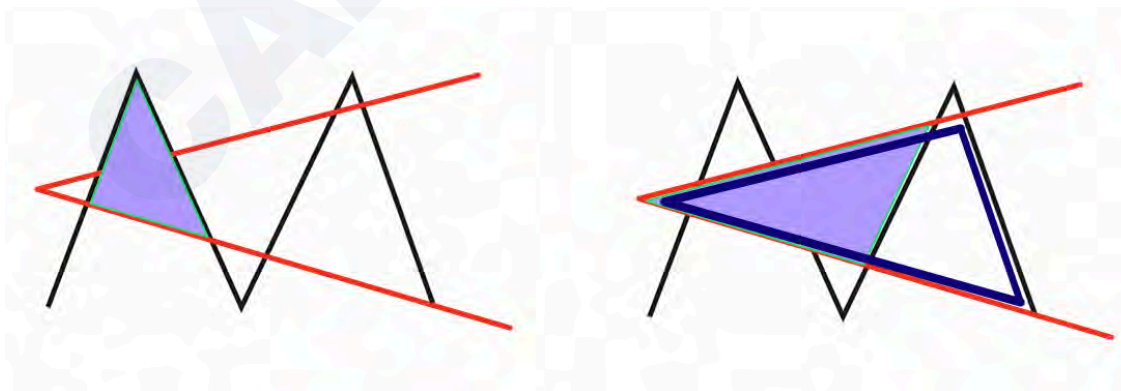


Figure 3

Figure 4

We can see we have 4 triangles in Fig 1

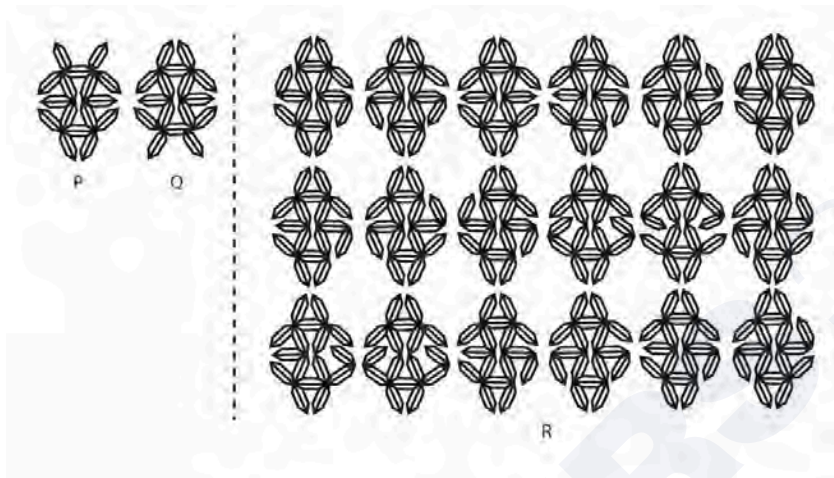
We can see we have 3 triangles in Fig 2

We can see we have 1 triangle in Fig 3

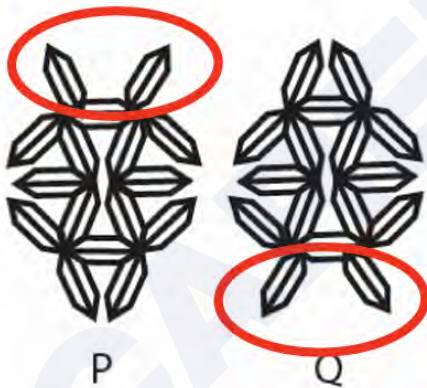
We can see we have 2 triangles in Fig 4

Total triangles =  $4+3+2+1=10$  triangles.

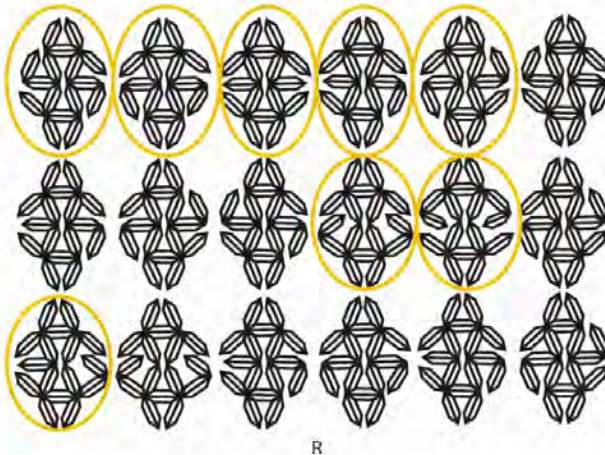
**Q.09** How many distinct motifs appear in the figure on the right? Flips and rotations are to be counted separately, for example, the motifs P and Q are distinct.



**Solution:**



P and Q have openings on one end, so now we have to find unique motifs in the image given (as shown below)



R have 8 unique motifs as they have no opening on any end.  
Hence, the answer is 8.

**Q.10** A family of four—grandfather, father, son and daughter—are caught in heavy rain and are stranded at a bus stop close to their home. However, they have only one umbrella with them. The umbrella can take a maximum of two people without either of them getting wet. The four members of the family take different times to walk from the bus stop to home. The grandfather is slowest of all, taking 10 minutes, followed by the father who takes 5 minutes. The son takes 2 minutes, while the daughter takes only a minute. What is the minimum total time (in minutes) for all four members of the family to reach home without any of them getting wet?

**Solution:**

Time taken by family to walk from bus stop to home:

Daughter = 1 min (fastest)

Son = 2 min

Grandfather= 10 mins (slowest)

Father =5 min

Case 1: Daughter and son will go home, and they will take 2 mins from the bus stop to home, later daughter returns to the bus stop in 1 min

Total time in case 1 = 2 min +1 min=3 min

Case 2: Grandfather and father will go home, and they will take 10 min from the bus stop to home. At home now there will be 3 people i.e, Son, father and grandfather the son will go to the bus as he takes less time among 3 son reaches bus stop in 2 min

Total time in case 2= 10 min +2 min=12 min.

Case 3: As soon as the son reaches the bus stop, both daughter and son will come home in 2 min.

Total time taken in whole iteration= case 1b +case 2+ case 3

= 3+12+ 2 min

=17 min

So, a total of 17 min will be taken for all four members to reach home without any of them getting wet.

**Q.11** Six cards are laid out on a table as shown in the figure below. Each of the cards has a number on one side and a letter on the other side. What is the minimum number of cards you need to flip and see to make sure the rule, “cards that have a vowel on one side always have an even number on the other side” is TRUE?



**Solution:**

According to the question, “ cards that have a vowel on one side always have an even now on the other side”

This statement can be true in 2 conditions:

Condition 1—we should not bother about consonants (non-vowel)

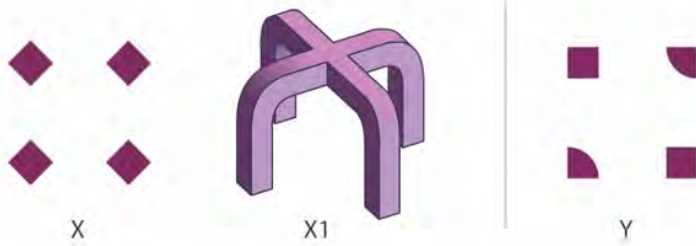
Condition 2- It is not possible that all even numbers must have vowels on the flipped side, but the cards with vowels must have even number

\* We are not bothering consonants that are M and R cards as per condition 1.

\* We are not interested in card number 8 also (according to condition 2)

So we are interested in flipping 3,7 and E cards.

**Q.12** X1 is a 3D form generated from the shape X, using certain 3D operations. It has 14 surfaces in total. If the same operations are carried out on shape Y, how many surfaces would the resulting 3D form have?

**Solution:**

Shape Y will have 16 surfaces.

**Q.13** In 2018, a person spent half the time working, a third in sleeping and one-eighth in cooking. He spent the rest of the time exercising. How many total hours did he spend exercising?

**Solution:**

Foremost, check whether 2018 is a leap year or not

A year is a leap year if it is exactly divisible by 400.

$$\frac{2018}{400} = 5.04 \text{ (not a perfect division)}$$

So 2018 is not a leap year.

Number of days in 2018=365

ATQ,

$$\text{Number of days spent working} = \frac{365}{2}$$

$$\text{Number of days spent sleeping} = \frac{365}{3}$$

$$\text{Number of days spent in cooking} = \frac{365}{8}$$

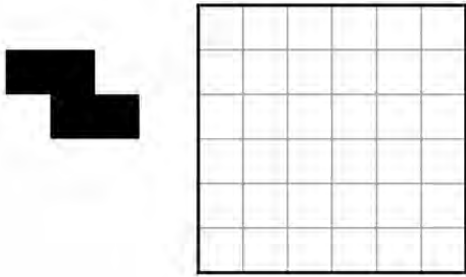
$$\text{Number of days spent in exercising} = 365 - \left( \frac{365}{2} + \frac{365}{3} + \frac{365}{8} \right)$$

$$= \frac{365}{24} \text{ days}$$

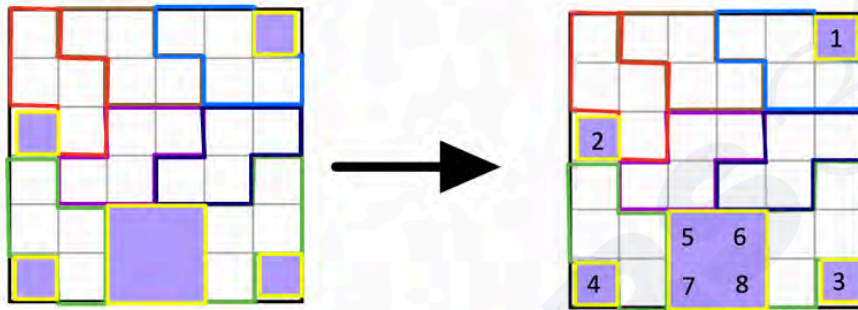
Therefore,

$$\text{The number of hours spent exercising is } 24 \times \frac{365}{24} = 365 \text{ hours}$$

**Q.14** If the given shape in the figure is used to tile the grid on the right without any overlaps, what is the minimum number of units that will be left uncovered? Flips and rotations are allowed.

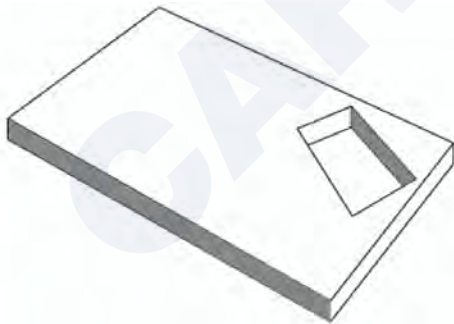


**Solution:**

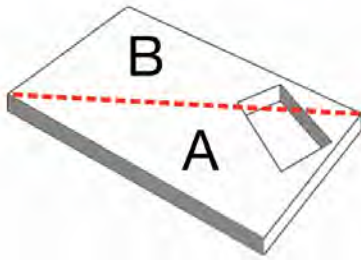


We can see we have eight empty spaces (as shown above with a purple shade)  
Hence, the answer is 8.

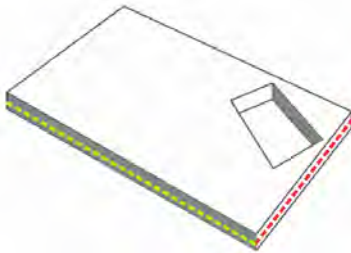
**Q.15** A rectangular wooden plank has another smaller rectangular hole cut into it as shown in the figure given below. What is the minimum number of cutting planes that can divide the wooden plank into four parts of equal volume?



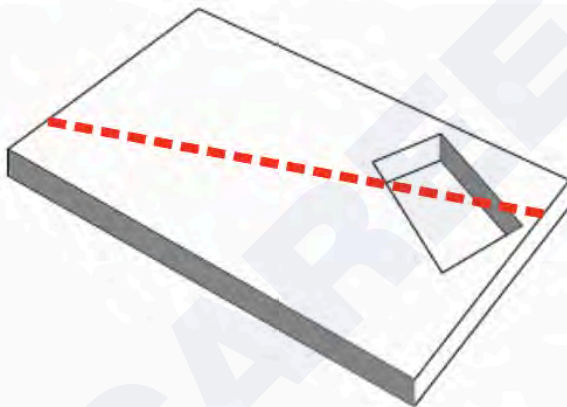
**Solution:**



If we divide the rectangular wooden plank from the middle, we can notice that the wooden part is more in part B because it has fewer holes part in its area, so this is not possible because we need equal volume.



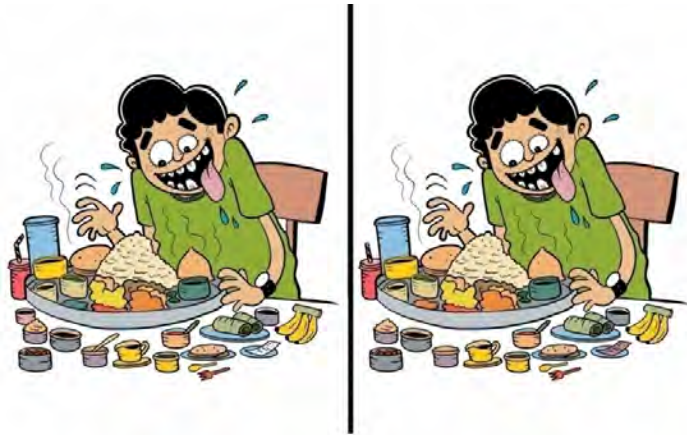
We can divide it along the height to get an equal volume (as shown above)



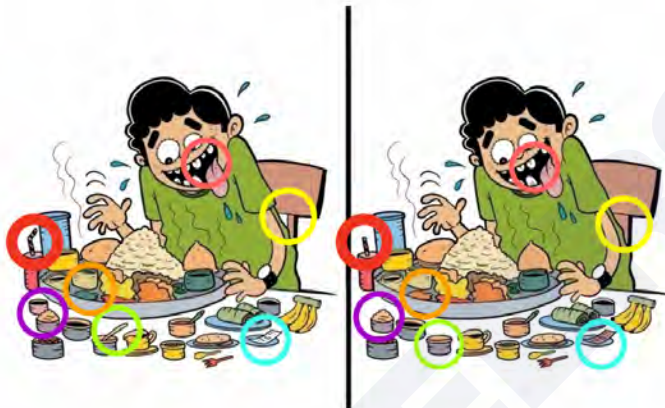
We can also divide it from the top and consider the hole to be divided equally in both parts.

So number 2 times cutting of the plane was done.

**Q.16 Count the number of differences between the two images shown below.**

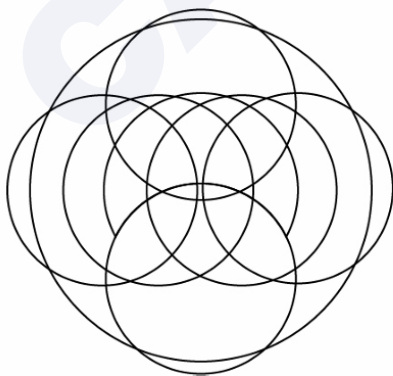


**Solution:**

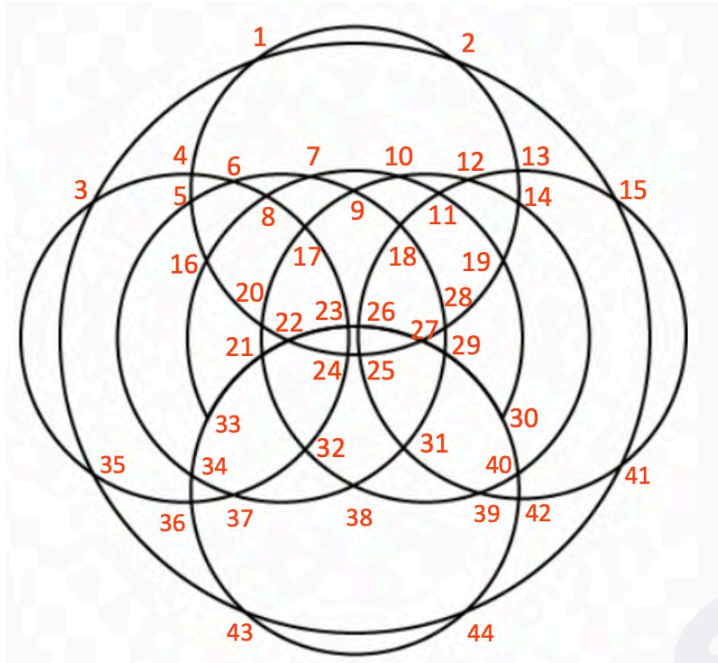


A total of 7 differences exist.

**Q.17** An intersection is where two or more lines and/or curves meet or cross. How many intersections are there in the figure?

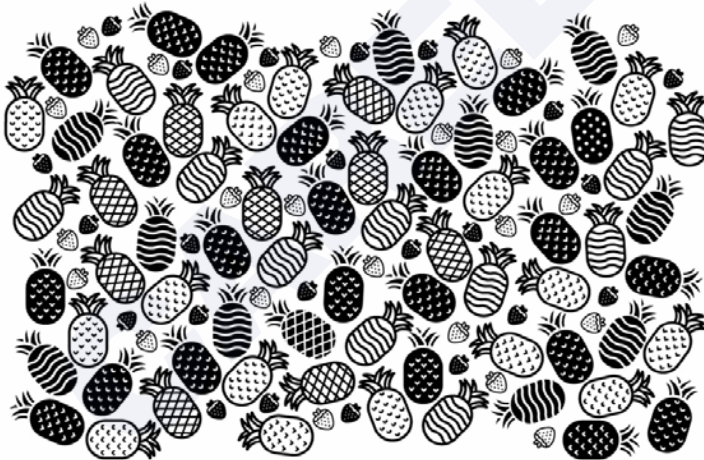


**Solution:**

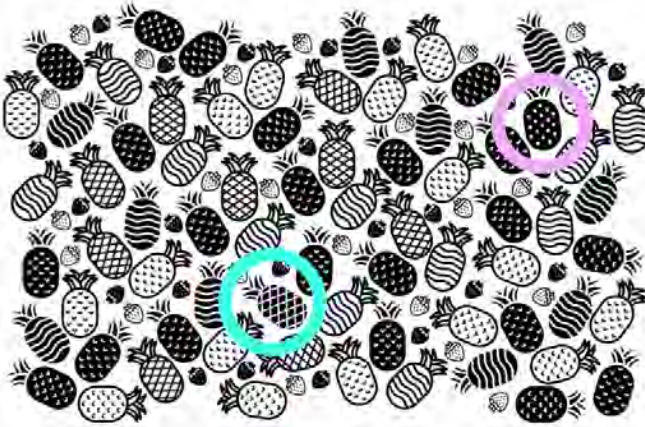


We have 44 intersections in the figure.

**Q.18** There are different types of pineapples in the given figure. How many pineapples appear only once?



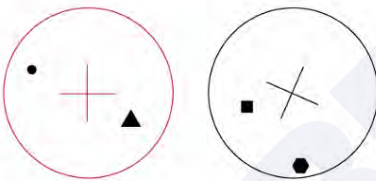
**Solution:**



There are 2 different types of pineapples

## Section 2: Multiple Select Questions (MSQ)

Q.19 Two transparent discs with markings on them are shown. Which of the options can be created by overlapping and/or rotating them?

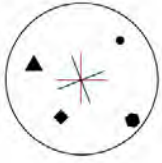


Option A:



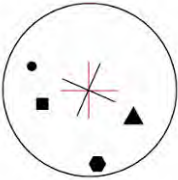
A

Option B:



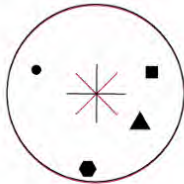
B

Option C:



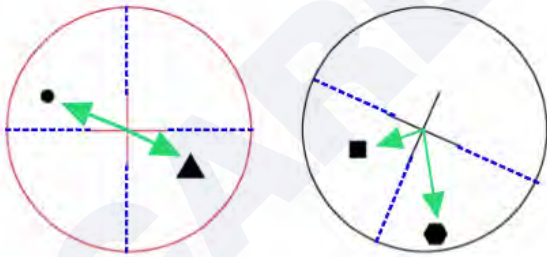
C

Option D:



D

Solution:



- + In the centre of the first circle in red, the circle and triangle. Shapes lie opposite to each other. We need to identify a similar pattern for a second circle. Now if we observe options, then options A and C satisfy the condition. Hence, options A and C are correct.

**Q.20** Read the paragraph given below and answer the question that follows: ...  
 Turtle describes the computer as an evocative object, one that raises new questions regarding our common sense of the distinction between artefacts and intelligent others. Her studies include an examination of the impact of

computer-based artefacts on children's conceptions of the difference between categories such as "alive" versus "not alive" and "machine" versus "person." In dealing with the questions that computer-based objects evoke, children make clear that the differentiation of physical from psychological entities, which as adults we largely take for granted, is the end product of a process of establishing the relationship between the observable behaviour of a thing and its underlying nature. Children have a tendency, for example, to attribute life to physical objects on the basis of behaviours such as autonomous motion or reactivity, though they reserve humanity for entities evidencing such things as emotion, speech, and apparent thought or purposefulness. Turkle's observation concerning computational artefacts is that children ascribe to them an "almost aliveness" and psychology while maintaining their distinctness from human beings: a view that, as Turkle points out, is remarkable among other things for its correspondence to the views held by those who are the artefacts' designers.

Which of the following statements is/are TRUE of the paragraph above?

- A. Turkle argues that children get confused when encountering computational artefacts and mistake them as human-like
- B. Turkle argues that children can differentiate between physical and psychological entities by establishing the relationship between how a thing behaves and its nature
- C. Turkle concludes that children and adults react and categorize computer-based artefacts in a similar manner
- D. Turkle finally concludes that children have a hard time understanding computer artefacts, whereas adults can understand these artefacts far more easily.

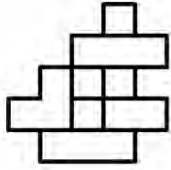
**Solution:**

Statement B is True.

**Q.21** Shown below is a T-shaped image on a transparent sheet of paper. Which of the options IS/ARE made by overlapping and/or rotating multiple copies of the transparent sheet?

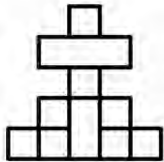


**Option A:**



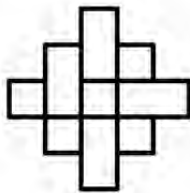
A

Option B:



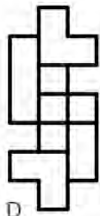
B

Option C:



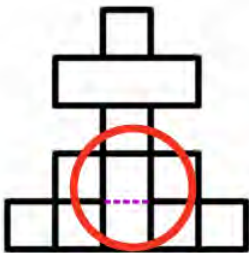
C

Option D:



D

Solution:



B

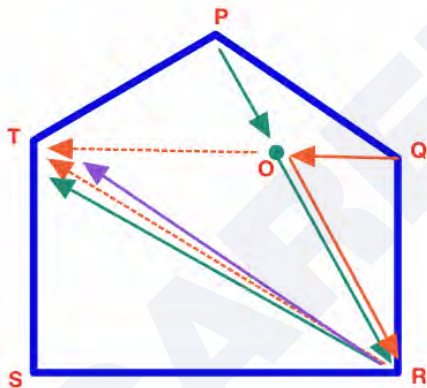
If we go through the options, then option B has a missing transparent line, as highlighted in the image above. So, all other options are correct. Hence, A, C and D are correct.

**Q.22** Five friends Puru, Qadir, Roy, Sham and Tom live on five vertices of a regular pentagonal ground in a clockwise order. One day while Puru was walking to meet Roy, met Qadir who was on the way to meet Tom. Qadir changed his mind and decided to go with Puru to meet Roy. After meeting Roy, all three went to Tom's house for a cup of tea.

If all of them took the shortest routes cutting through the ground, which of the following statements is/are TRUE?

- A. Till Tom's place, Qadir walked more distance than Puru
- B. Till Tom's place, Puru walked more distance than Qadir
- C. Till Tom's place, Qadir walked double the distance than Roy
- D. While returning to their respective homes from Tom's place, Puru has to travel the least.

**Solution:**



**Solution:**

P's travel is denoted by a green line (as shown above)

Q's travel, denoted by an orange line (as shown above)

R's travel, denoted by a purple line (as shown below)

ATQ,

P and Q started from their respective position, and they both met at the green dot (shown above). After they meet at the dot, they walk together and reach R from P's home, 3 that is P, Q and R travel to T's home.

Assuming that all the friends walk at the same speed.

Now check the options.

Option A: Actually, the distance travelled by P and Q to reach the green dot (O) is the same.

$PO=QO$ . Hence, the distance travelled by P and Q are the same.

Option B: Q is opposite to T, just like R is opposite to P. So till Tom's place, both P and Q travel the same distance.

Option C: Since  $PO=QO$

$QO+OR=PO+RO$ , which is equal to RT. R walked a distance RT while Q walked a distance

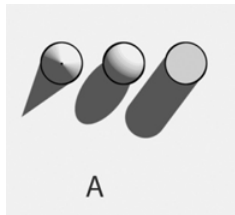
$QO+OR+RT=2RT$

Option D: It is clear from the image that P travelled the least.

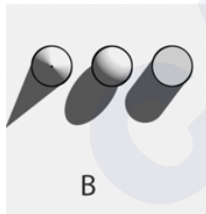
Hence, options C and D are correct.

**Q.23 A sphere, a cylinder and a cone, with equal heights, are resting on a surface along a straight line. If the source of light is fixed and the light rays are parallel, which of the options show(s) the shadows correctly?**

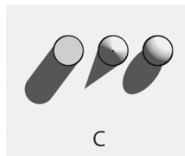
**Option A:**



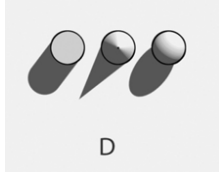
**Option B:**



**Option C:**



**Option D:**

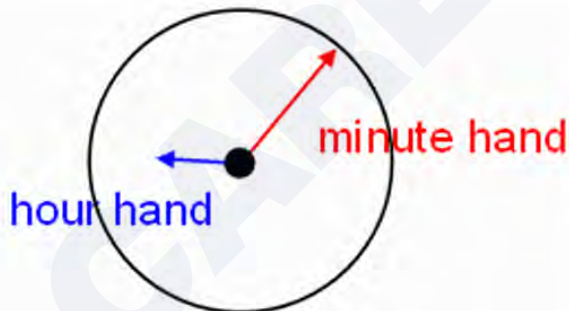
**Solution:**

By observing the shadow, it is clear that the light source is somewhere at the top right to the 3 objects. So, the length of the shadows cast by the three objects varies and are not of the same length. But in B and D the shadow of objects is of the same length.

Therefore, the A and C options is correct.

**Q.24 Which of the following statements would you consider to be TRUE about the hour and minute hands of analogue clocks?**

- A. The hour hand and the minute hand would make 90 degrees angle with each other 24 times in a day
- B. The hour hand and minute hand will overlap less than 24 times in a day
- C. The hour hand and minute hand will overlap exactly on the hour number marker only once every half-day
- D. The hour hand and minute hand will make acute angles to each other for almost as long as it will make obtuse angles to each other during the entire day

**Solution:**

Option A: The minute hand overtakes the hour hand on 44 occasions in 24 hours to give a 90-degree angle. Hence, the statement is false.

Option B: The hands overlap about every 65 minutes, not every 60 minutes. The hands coincide 22 times in a day. Hence, the statement is true.

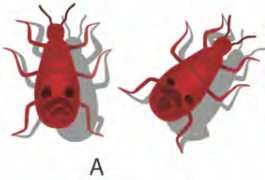
Option C: This statement is also true.

Option D: This statement is also true.

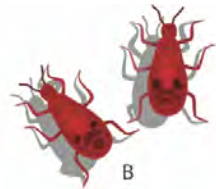
Hence, B, C and D are correct answers.

**Q.25** Two friendly bugs were on their usual walk in the northeast direction. When the sun was in the east, they had an argument and one of them turned 45 degrees anticlockwise and walked away. Which of the images below correctly represent(s) their shadow now, when viewed by a person from the top?

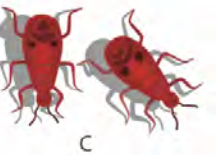
**Option A:**



**Option B:**



**Option C:**



**Option D:**



**Solution:**



So when the Sun is in the east, the shadow will be on the left and now when we check options, we can eliminate A and C as the shadow of the bug is on the Right. Hence, B and D are correct answers.

**Q.26** A pencil with a pentagonal cross-section was sharpened using a pencil sharpener. Which of the options correctly represent(s) a side view of the pencil?

**Option A:**



A

**Option B:**



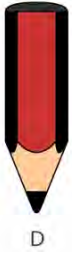
B

**Option C:**



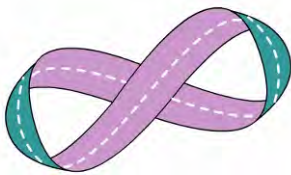
C

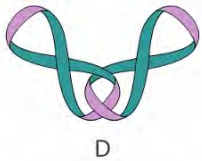
**Option D:**

**Solution:**

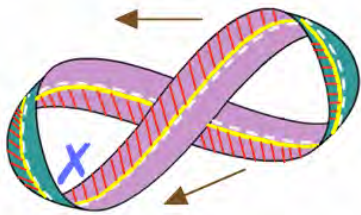
When we sharpen a pencil using a sharpener, the sharp edges would be the first to be cut maximum. A is the opposite of this concept, while C has some edges which have lesser cuts. B and D are the same, just that D is a slightly rotated version of B.

**Q.27** A paper strip with a different colour on each side is joined as shown in the figure. If this strip is cut along the dashed line, which of the options correctly represent(s) the result(s)?

**Option A:****Option B:****Option C:****Option D:**



**Solution:**



We can see the cross-section of the cut part (Red lines).  
Hence, options C and D are correct.

**Q.28** Sundays are longer than Mondays. Mondays are shorter than Fridays. Wednesdays are shorter than Saturdays, which are in turn shorter than Sundays. Thursdays are shorter than Saturdays. Tuesdays are longer than Saturdays. Wednesdays and Thursdays are both longer than Fridays. If all of these are true, which of the options is/are also TRUE?

- A. Wednesdays could be as long as Thursdays.
- B. Tuesdays could be the longest days of the week.
- C. Mondays are the shortest days of the week.
- D. Fridays could be as long as Sundays.

**Solution:**

Given

Sunday > Monday -----1)

Monday < Friday -----2)

Wednesday < Saturday .....3)

Tuesday > Saturday ---4)

Thursday, Wednesday < Saturday -----5)

Thursday, Wednesday > Friday .....6)

Statement A: From equations 5 and 6 we can say that there is a possibility that Wednesday could be as long as Thursday.

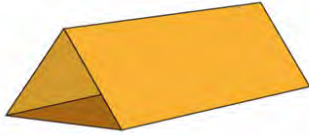
Statement B: From equation 3. We can say Tuesday could be the longest day of the week

Statement C: From equation 1, 2 and 6

We can say Monday is the shortest day of the week.

Statement D: This can't be said. Hence, option D is wrong.

**Q.29** Which of the options **CANNOT** be folded along the dotted lines into a package as shown in the image? For simplicity's sake, cut lines have not been shown in the given schematic. The cross-section of the package is an equilateral triangle.

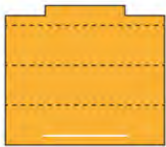


**Option A:**



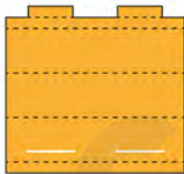
A

**Option B:**



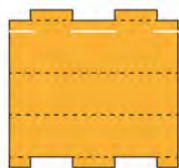
B

**Option C:**



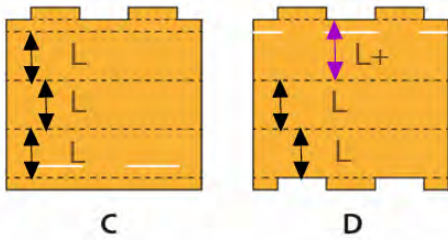
C

**Option D:**



D

**Solution:**

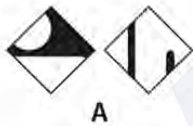


If we observe option C, the arrow shows (in the above image) the length of the side, which is equal to  $L$ . In option D, if we try to fold along the dotted line, we can see one of the sides has greater breadth, and height (shown by purple arrow) and its dimension is more than  $L$ . But actually, it should be  $L$ . So option D cannot be folded into the required shape.

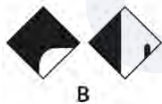
**Q.30** Each of the options shows a pair of two different pieces. Which of the options CAN NOT be cut out of the given figure?



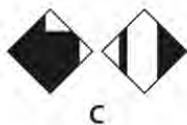
**Option A:**



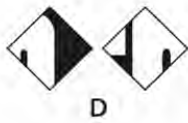
**Option B:**



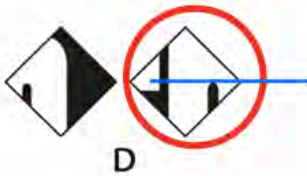
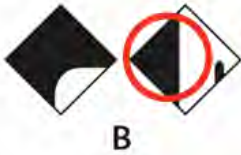
**Option C:**



**Option D:**



**Solution:**

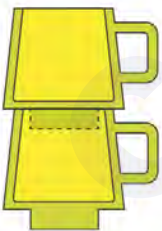


As shown in the image above in option B the white hand is missing (highlighted by red circle)

For option D the blue horizontal line, the level of the inseam (two leg joints), and the hand are not as shown in the question.

Hence, B and D are correct answers.

**Q.31** Shown below is an image that represents how cups should stack on top of each other in a stable manner. Among the given different types of cups, which of the cups **CANNOT** stack on itself in a stable manner?



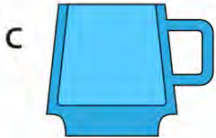
**Option A:**



**Option B:**



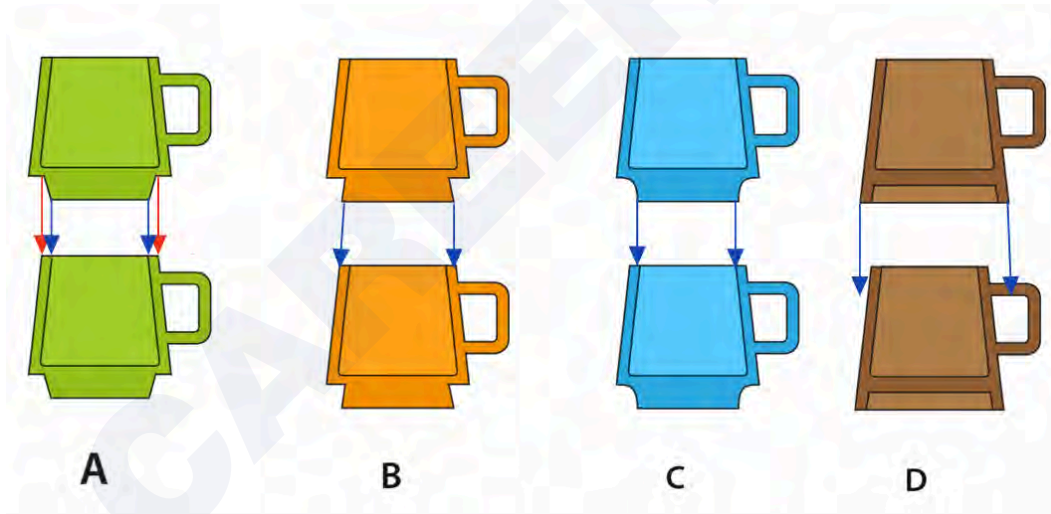
Option C:



Option D:

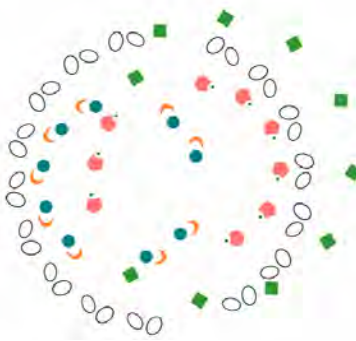


Solution:



As we can see above, A, B and C cannot be stacked on themselves. Hence, options A, B and C are the correct answer.

**Q.32** In the image shown, objects have been duplicated and rotated. Which object(s) is/are NOT arranged around a perfect circle?



Option A:



Option B:



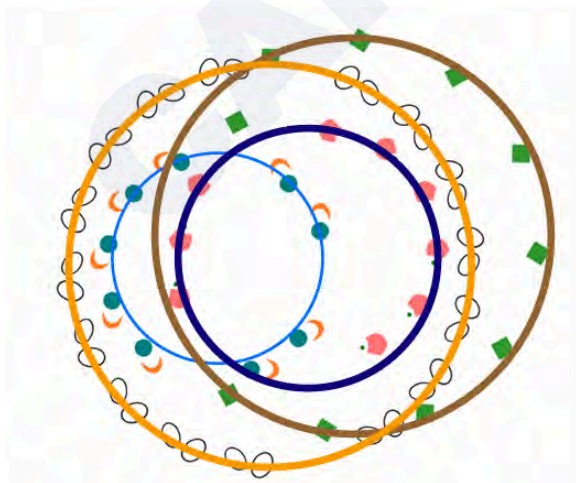
Option C:



Option D:

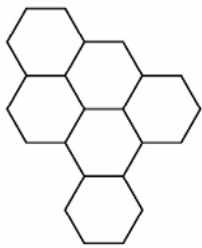


Solution:

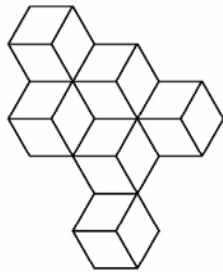


As shown in the image above, B, C and D are not following the circle pattern.

**Q.33** Figures 2 and 3 can be derived from Figure 1 by overlapping some of the given options one at a time. If flipping and rotations are allowed, which option(s) will allow you to derive figures 2 and 3?



1

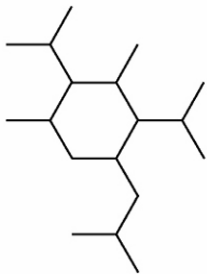


2



3

**Option A:**



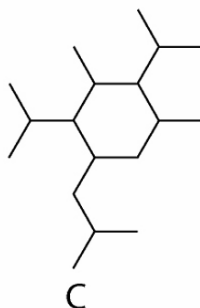
A

**Option B:**

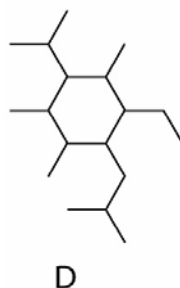


B

**Option C:**



**Option D:**



**Solution:**

Option A can be overlaid on the top of 1, without any alteration.

Option B can be overlaid on top of 1, after flipping B horizontally.

Option C can be overlaid on top of 1, after flipping C vertically.

Option D has one extra and one missing, so it can't be overlaid.

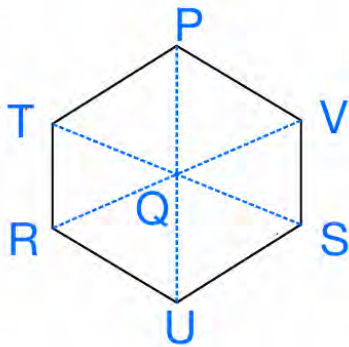
Hence, options A, B and C are correct.

**Q.34 P, Q, R, S, T, U, and V are bees living in separate cells of a 2D hive made of hexagonal cells. T and V are neighbours of P. R and S are neighbours of U. V does not share a wall with T, U or R. Q, being the queen, shares a wall with everyone. Which of the options must be TRUE?**

- A. S and V are neighbours
- B. R and T are neighbours
- C. P and U share a wall
- D. S and T are not neighbours

**Solution:**

In such a question, we need to follow the instructions given in the question.



Hence, by looking at the options we can say option A, B and D are correct.

**Q.35** The figures show four different schematics of two flexible strings. If all the ends are pulled tight, which of the options will form a knot?

**Option A:**



A

**Option B:**



B

**Option C:**



C

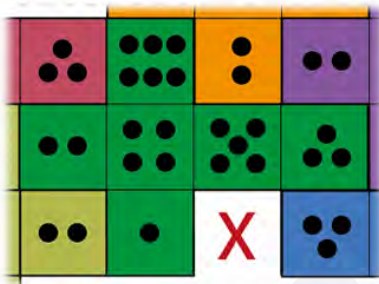
Option D:



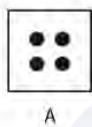
Solution:

When all the ends are pulled tight, then options B and D will form the knot.

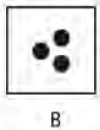
**Q.36** Seven identical playing dice are unfolded in an identical manner. Six of the unfolded dice are laid out on a flat surface and are arranged to touch each other without overlapping. The figure shows a portion of the arrangement. Which face(s) from the seventh unfolded dice CAN NOT replace X if overlap must be avoided?



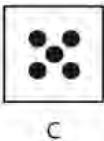
Option A:



Option B:



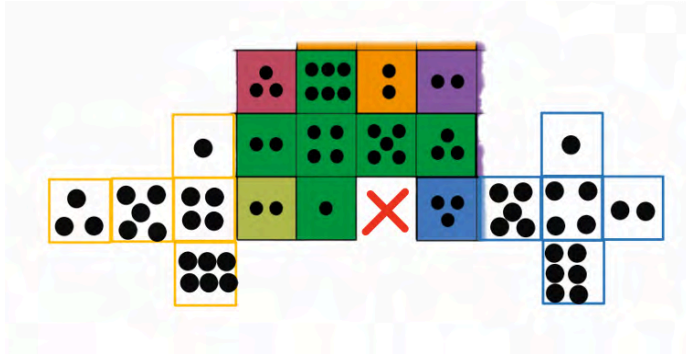
Option C:



Option D:



**Solution:**



The above shows one of the possible orientations for the yellow and blue dice. This X can be filled by 4 dots, 5 dots, or 6 dots. So we can have more than 1 solution to this question.

### Section 3: Multiple Choice Questions (MCQ)

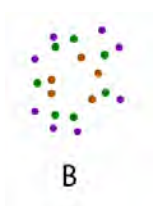
**Q.37** Which option will replace the question mark?



**Option A:**



**Otion B:**



Option C:



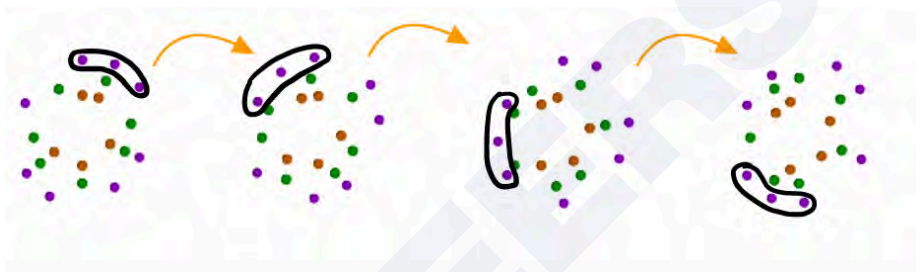
C

Option D:



D

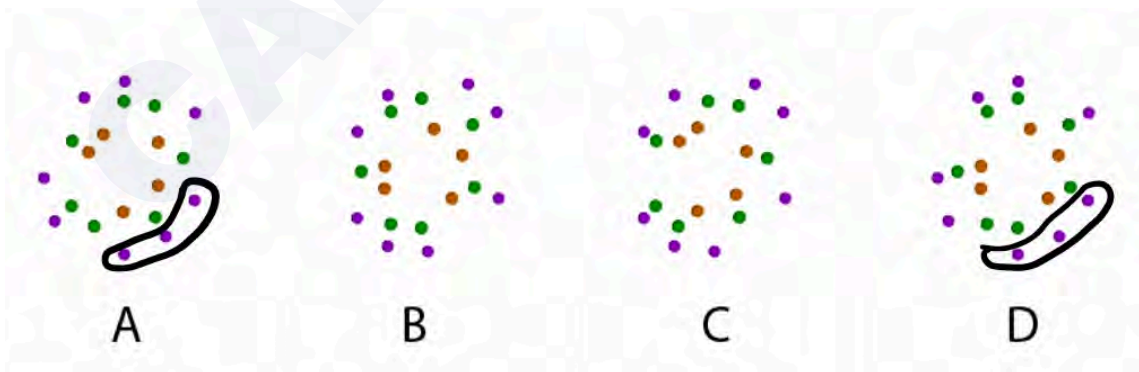
Solution:



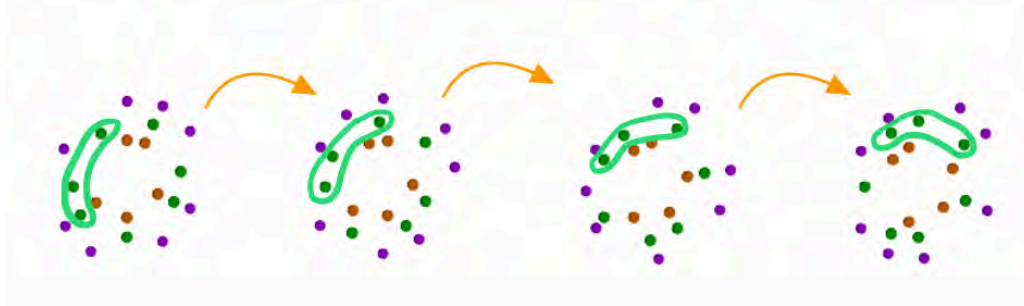
Observe the three violet dots in every pattern from left to right. As we can see, the 3 dots are moving counterclockwise in every pattern.

So for the next pattern, check out all the options.

Options A and D satisfy further.

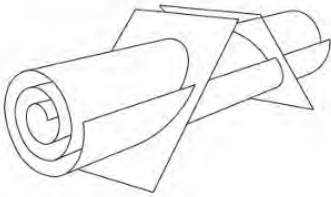


Further again, observing green dots (as shown below)

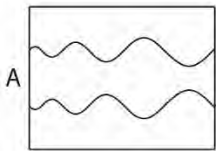


We can eliminate option D. Hence, option A is correct.

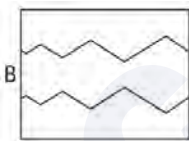
**Q.38** A paper strip is rolled and then cut with two planes at 45 degrees as shown below. The middle part of the cut paper is unrolled. Which of the options represents this part?



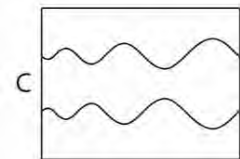
**Option A:**



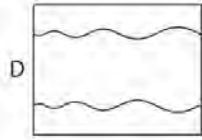
**Option B:**



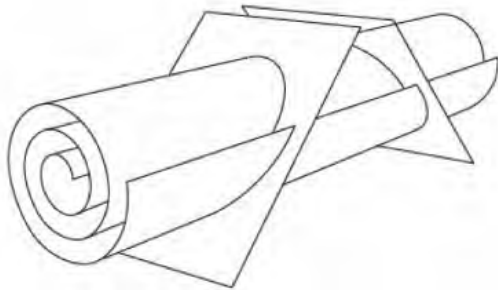
**Option C:**



**Option D:**

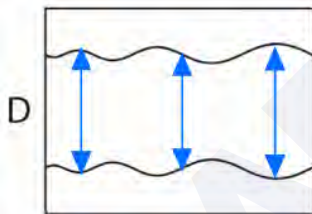


**Solution:**



We know that whenever paper is rolled it is rolled tightly together, and when we cut that they will be in zigzag and at equal distance. Now when we see the image given above, we can notice the internal roll is small (that circle is small) whereas the outer rolled part has a bigger circle formed.

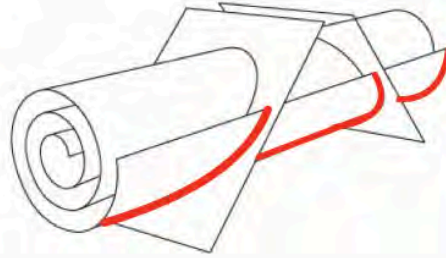
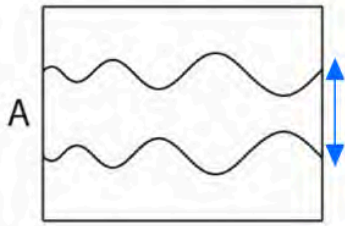
Option D: Eliminated as small and big circles can't form the same image at equidistant.



Option B: Eliminated as circle formed when cut can't make triangular zigzag



Option A:



We can see on the right side image that the distance is increasing, but this option is not showing appropriately. Hence, A is wrong.  
Therefore, option C is correct.

**Q.39** The phrase shown below uses a particular font. Which of the options belongs to the same font?

**มโหฬาร นชราต**

Option A:

**ศษ**  
A

Option B:

**ศษ**  
B

Option C:

**ศษ**  
C

Option D:

# ศย

D

Solution:



The first image below shows all the horizontal ends, and the second image shows all the vertical ends. This kind of end is shown in option D (highlighted by a green circle) Hence, option D is correct.

**Q.40** Aastha is sailing a paper boat in still water. Which of the given options represents the reflection correctly?

Option A:



Option B:



Option C:

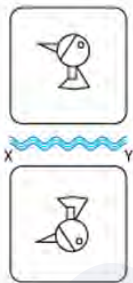


Option D:



Solution:

The reflection of an object into the water is its water image. It appears by inverting an object vertically, i.e. upside down. The water image of the figure looks like the mirror image of the figure in case the mirror is horizontally at the bottom of the figure.

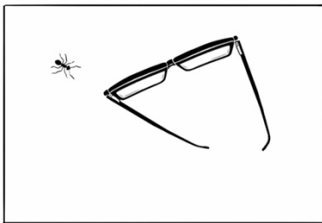


Astha's leg is a little behind and the other leg is near the water, so the near-water leg's knee will be longer in the water image. So, in options A and C near the leg has a short knee which is not possible. Hence, both the option is eliminated.

Now focusing on the eye we can eliminate option D as Astha is looking towards water but option D it is away.

Hence, option B is correct.

**Q.41 An illustration of a walking ant and a pair of glasses lying on the table surface is shown. Which is the correct illustration from the ant's current point of view?**



**Option A:**



**Option B:**



**Option C:**

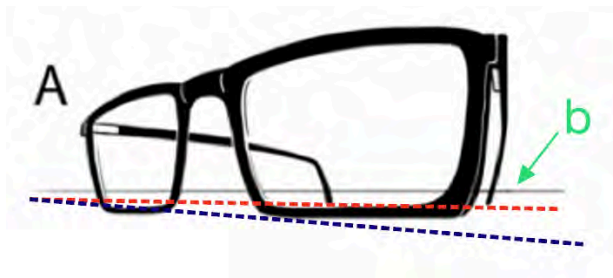
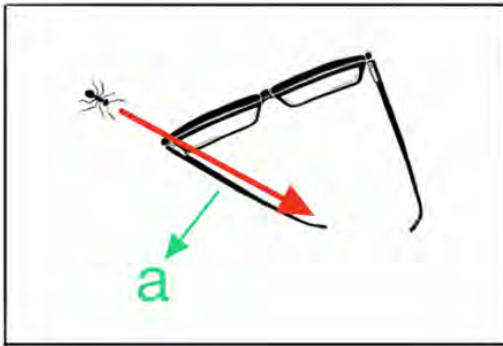


**Option D:**



**Solution:**

If we observe the direction of the ant travel, it is almost parallel and in line with the left frame 'a' as shown in the image below. So, the frame will appear the least to its view.



Hence, option A is correct.

As shown in the second image, the position of point b should be higher along the vanishing line (red dotted) to that of the vanishing line in the blue dash. This is because, in view, the nearest object to the eye appears closer to the bottom of the image (and bigger) while the farthest object to the eye appears smaller. And also away from the bottom of the image.

**Q.42** If drassoglitive means woodboard  
 frassopoolts means bodystudy  
 glitivedrassy means foodwood  
 dressowoolts means digitalscreen  
 Then which word would mean screensize

- A. dressoissics
- B. dressodrasso
- C. issicsdresso
- D. drassodresso

**Solution:**

drassoglitive means woodboard....1)  
 frassopoolts means bodystudy....2)  
 glitivedrassy means foodwood....3)  
 dressowoolts means digitalscreen....4)

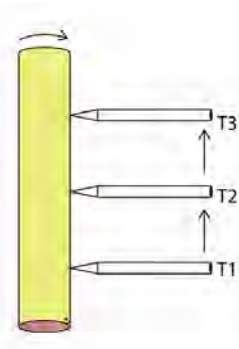
From EQ 1 and 3

We can say glitive means wood, dresso means board, drassy means food

Now if we see equation 4, that is dresswoolts means digital screen which implies screen means dresso.

Hence, option C is correct.

**Q.43** A rolled yellow paper cylinder is rotating clockwise direction at a constant rate of 1 revolution / 60 seconds. A pencil is touching the paper cylinder and is moving from T1 to T2 in 10 seconds and stops for 10 seconds. Then it moves to T3 in the next 40 seconds (total time=60 seconds) as shown in Figure 2. What would be the graph on paper when it is unrolled?



**Option A:**



A

**Option B:**



B

**Option C:**



C

**Option D:****Solution:**

The travelling of the distance from T1 and T2 is faster as compared to T2 and T3. So the pencil inducing from T1 and T2 will have a steeper angle than the pencil line drawn from T2 and T3.

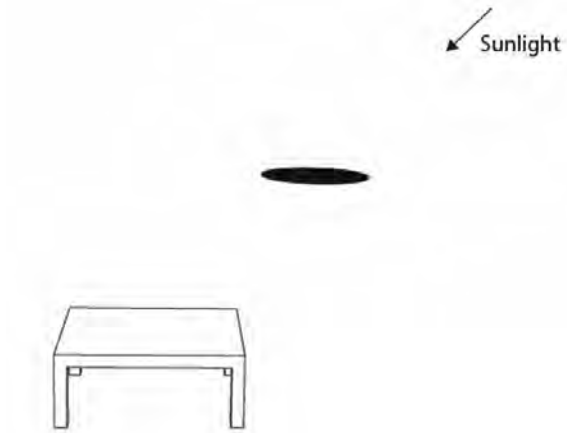
In option, the motion is shown from right to left. Also, the line drawn will be quite straight from start to end, regardless of the speed of the cylinder or the speed of the pencil's vertical movement.

Another observation is to focus on, the width (horizontal measure) of the steep line drawn in the position T1 and T2 will be the same as the width (Horizontal line) of the pencil drawn. When the pencil is not moving. It is because, in 10 seconds, the cylinder will move to only a particular amount.

The next observation would be the width (horizontal) line from T2 and T3 will be  $\frac{40}{60}$  times the width of the whole pencil mark (60 = total time and 40 sec = time for T2 and T3)

Hence, option A is correct.

**Q.44 An opaque circular disc is parallel to the table-top. A beam of sunlight casts its shadow on the tabletop, as shown in the figure. Which of the options represents the shape of the shadow as seen in the top view of the table?**



**Option A:**



A

**Option B:**



B

**Option C:**



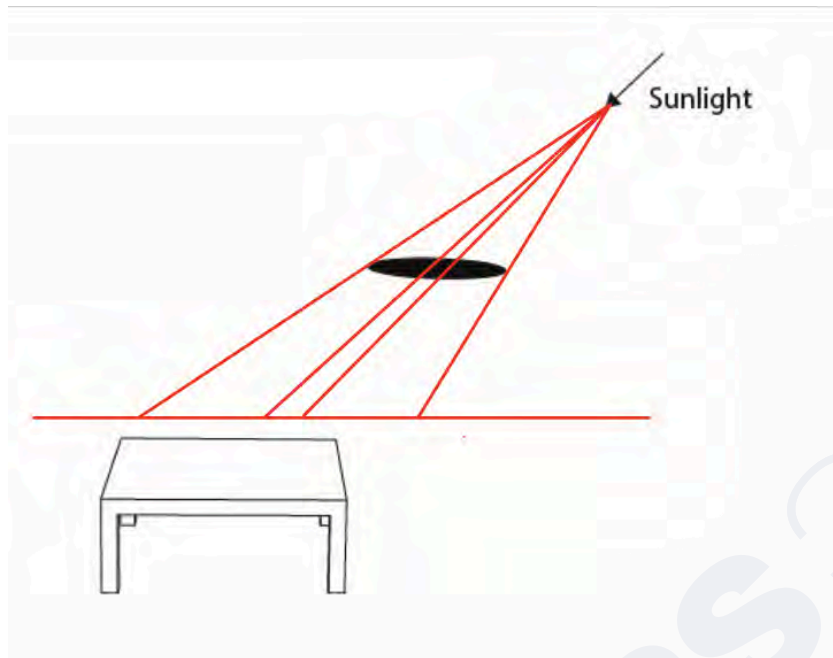
C

**Option D:**



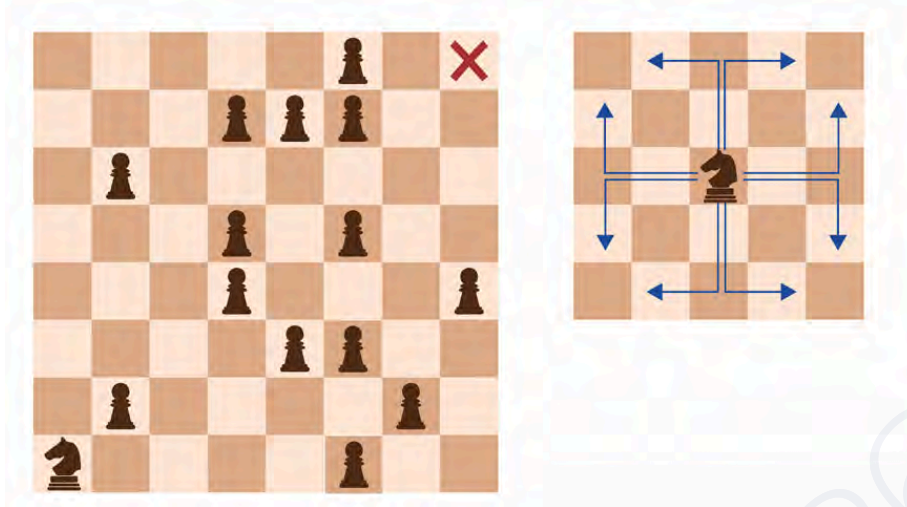
D

**Solution:**



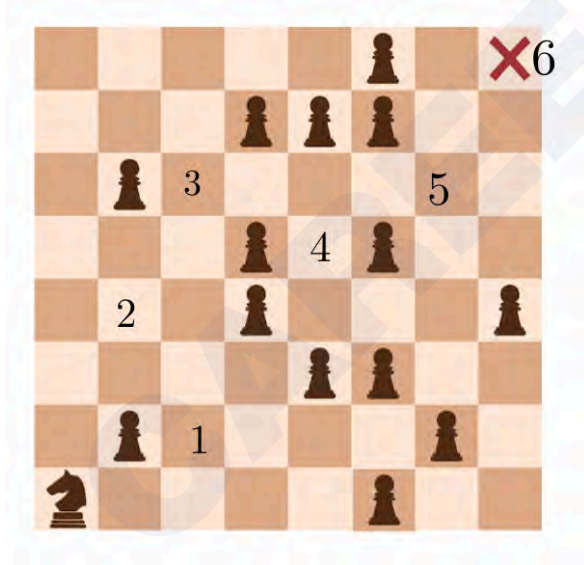
When the light rays fall on the opaque object, they will tend to project along the corners as shown in the figure above. However, since the object is circular, its projection onto a plane (the ground) that is parallel to the object will retain its shape. The only difference is the object shadow will appear enlarged. Hence, option C is correct.

**Q.45** In a given version of chess, no piece can capture another piece. Instead, each piece is on a mission. In the scenario shown in the figure on the left, the knight is on a mission to the diagonally opposite square marked by X. Assuming that no other piece moves, what is the minimum number of moves it will take the knight to reach there? (Note: In chess, the knight moves as shown in the figure on the right. The knight cannot land on any square that has a pawn, but can jump over it.)



- A. 5
- B. 6
- C. 7
- D. 8

Solution:



The moves of the knight are shown above form (with numbers). The knight in the 6th move will jump to X.

Hence, option B is correct.

**Q.46 Three options are made out of the same set of pieces WITHOUT flipping. Which of the options is NOT possible?**

**Option A:**



A

Option B:



B

Option C:



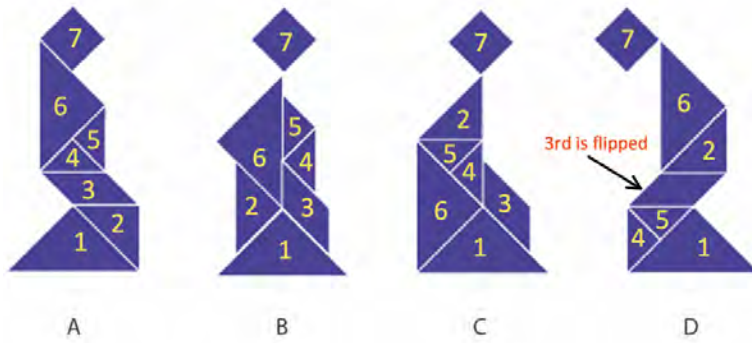
C

Option D:



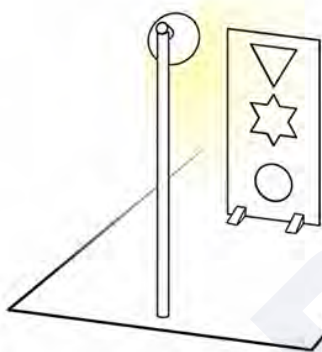
D

Solution:



Hence, option D is not possible flipping is not allowed.

**Q.47** A 10 cm tall card with some cut-outs is placed on a long table in front of a lamp in a dark room as shown in the figure. The lamp is 15 cm tall and is placed 15 cm in front of the card. Which of the options shows the correct shadow cast by the card?



**Option A:**



**Option B:**



B

Option C:



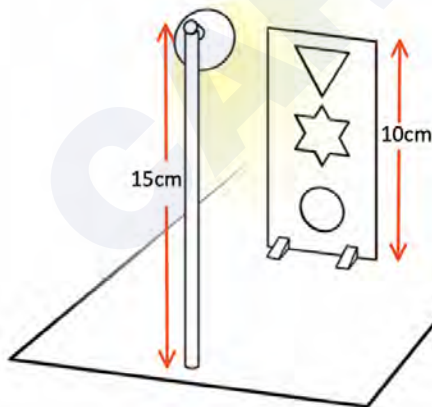
C

Option D:



D

Solution:

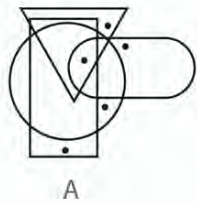


The cut-out is not parallel to the ground so, the top edges of the shapes in the cut-out will project farther than the bottom edge (vertex) of the triangle. Similarly the star and the circle projection will be stretched.

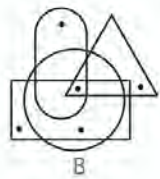
Now we can see the height of the circle from the ground is lesser than the height of the triangular cut, w.r.t the light source the elongation of the projection of the circular object will be lower than that of the triangular projection, with the star projection being in the mid of the two. Hence, option C is correct.

**Q.48 Which is the odd one out?**

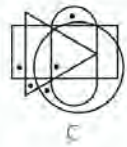
**Option A:**



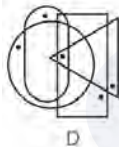
**Option B:**



**Option C:**



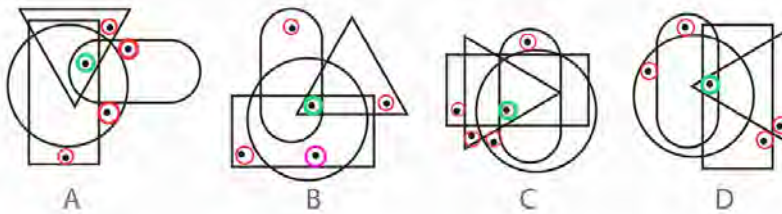
**Option D:**



**Solution:**

If we observe the pattern, we find 2 points.

- 1) Each shape has an individual dot which is not shaped by any other shape.
- 2) Intersections of all shapes share a single dot.



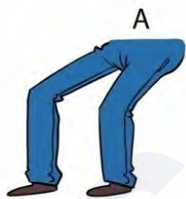
Now only in B, a dot within the circle has been shared by a circle and the rectangle (Pink highlighted. Hence, this is wrong.

Answer option B is the odd one out.

**Q.49 Identify the correct set of legs for Mr Kumar to balance his body as he carries a heavy box.**



**Option A:**



**Option B:**



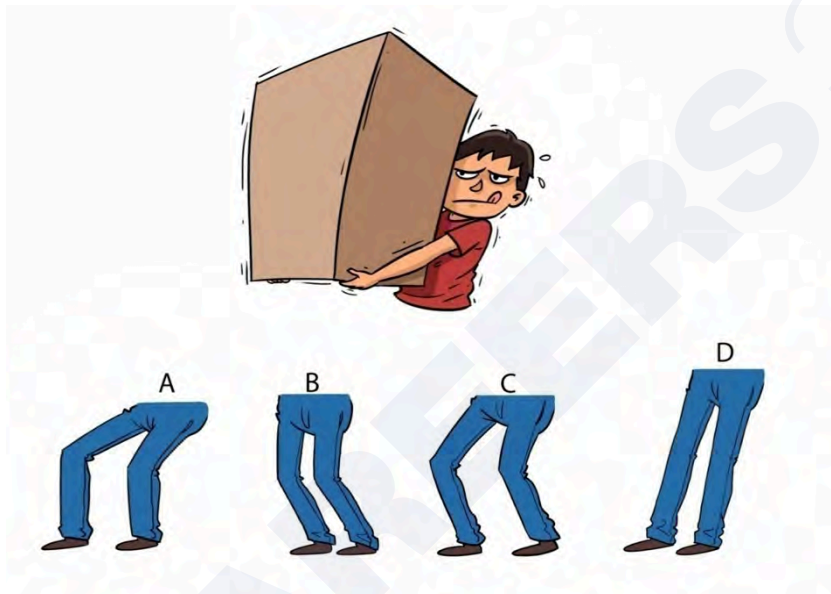
**Option C:**



Option D:



Solution:



Option D: Two legs in front while he is leaning back, that too with heavyweight, will make him fall behind.

Option A: Legs with such a position won't allow a person to move and will collapse or fall.

Option B: Similarly, in this position of the leg, a person will fall.

Hence, option C is correct.

**Q.50 Front and back views of a solid are shown. Which of the options can be folded to form this solid?**

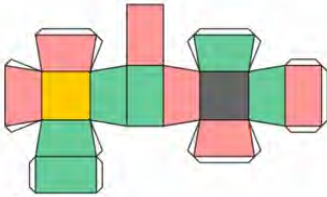


**Option A:**



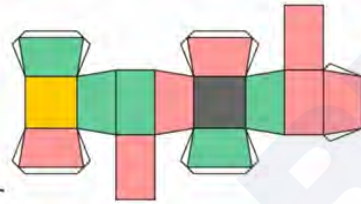
A

**Option B:**



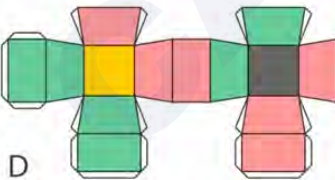
B

**Option C:**



C

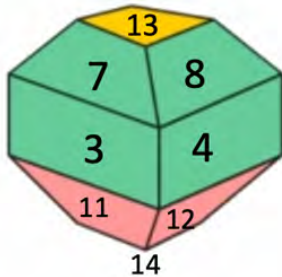
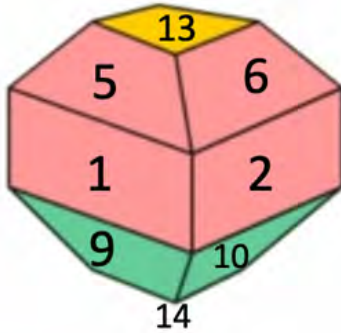
**Option D:**



D

**Solution:**

The colour of the solid walls, mountain uniformity (inside and outside)



The above image has 6 pink and 6 green shaded faces and 1 yellow.

Yellow faces should be connected with 2 green and 2 pink faces, whereas grey (14) is connected with 2 green and 2 pink shaded faces.

Considering the above statement, check the options.

Option A: It has 5 green shaded faces, which is wrong. Hence, option A is wrong.

Option C: It has 7 pink shaded faces. Hence, this option is wrong.

Option D: The yellow face arrangement is not appropriate.

Hence, option B is correct.

**Q.51** Shown below is a paint splatter on a wall surface. A paint squeegee is pulled over it. Which of the options correctly represents the part of the pattern formed?



**Option A:**



**Option B:**



**Option C:**



**Option D:**

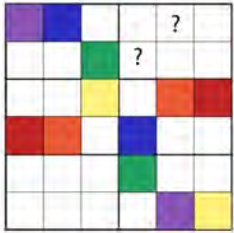


**Solution:**

When a point squeegee is pulled over, we get the pattern formed in option D.

**Q.52** The adjacent figure has six compartments. Each compartment consists of six squares. These squares are to be filled with six different colours in such a

way that each row, each column and each compartment should have all six colours. Which of the options will replace the question marks?



Option A:



A

Option B:



B

Option C:



C

Option D:



D

Solution:

1	2	5	4	3?	6
6	4	3	5?	2	1
2	3	4	1	6	5
5	6	1	2	4	3
4	1	6	3	5	2
3	5	2	6	1	4

This is similar to the game of sudoku. Let's give a unique number for each colour (as shown above) and based on that try to solve the puzzle.

Violet=1 , Blue = 2 , Green =3 , yellow = 4, Red =5, orange =6.

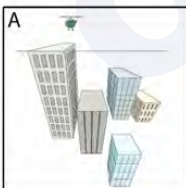
The first question mark is filled with 3 (green) and the second question mark is filled with 5 (red)

Hence, option C is correct.

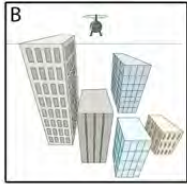
**Q.53 A giant creature is walking towards a group of buildings in the city. Which is the correct perspective from the creature's point of view?**



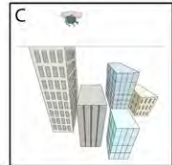
**Option A:**



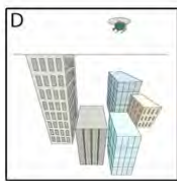
**Option B:**



**Option C:**



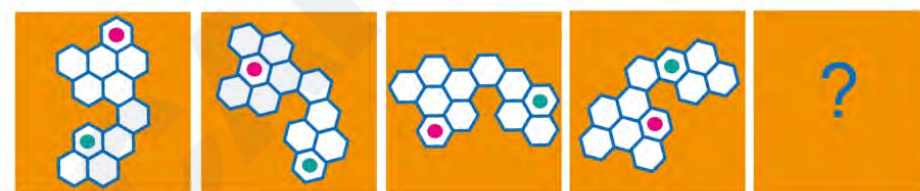
**Option D:**



**Solution:**

The dragon's eye level is the same as the tallest building height, and the helicopter is flying above its eye level and to the left of it. Hence, option C is correct.

**Q.54 Which of the options will replace the question mark?**



**Option A:**



**Option B:**



B

Option C:



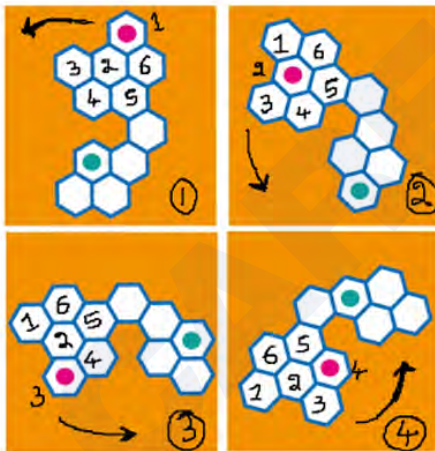
C

Option D:



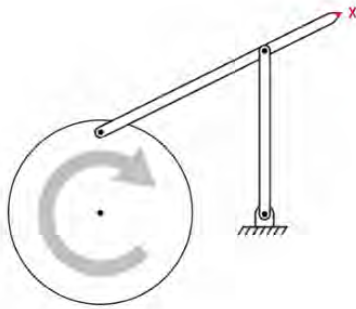
D

Solution:



We can see the pattern movement (as shown above)  
 So the next dot will be on 5th November. Therefore, option B is correct.

**Q.55** The figure shows a mechanism with a disc, two bars and a static surface connected to each other with hinges. The disc rotates about the hinge at its centre as shown. What is the path traced by point X (endpoint of the longest bar) in this planar set-up?



**Option A:**



**Option B:**



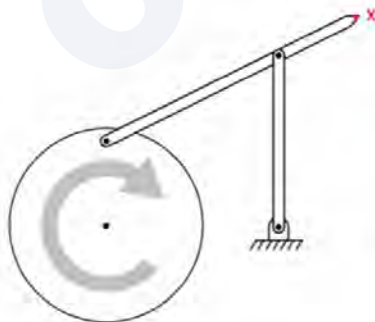
**Option C:**



**Option D:**



**Solution:**



The path traced point by X (endpoint of the longest bar) in the planar set-up will not make a sharp edge or point. Therefore, Options B and C are eliminated.

Now observe A and D we can eliminate A because the path traced here is thin by the hinge at its far point of the bar. Hence, D is correct.

**Q.56** Identify the correct representation of lighting for this scene, given that the lightning strike is the only light source.

**Option A:**



**Option B:**



**Option C:**



**Option D:**

**Solution:**

According to the question, lightning is the only source. Now we can see that the area which is bounded by the towers inside which the lightning is happening will be lit while the tower will cast a shadow on the outer side of the towers.

With this information, we can eliminate options B and C. Now, we know that lightning will be from the clouds, so the clouds should be lit from outside. So D is also eliminated. Hence, option A is correct.

**Q.57 Which of the following lakes has the largest area?**

**Option A:**



**Option B:**



**Option C:**



C

Option D:



D

**Solution:**

Option A has 36 squares.

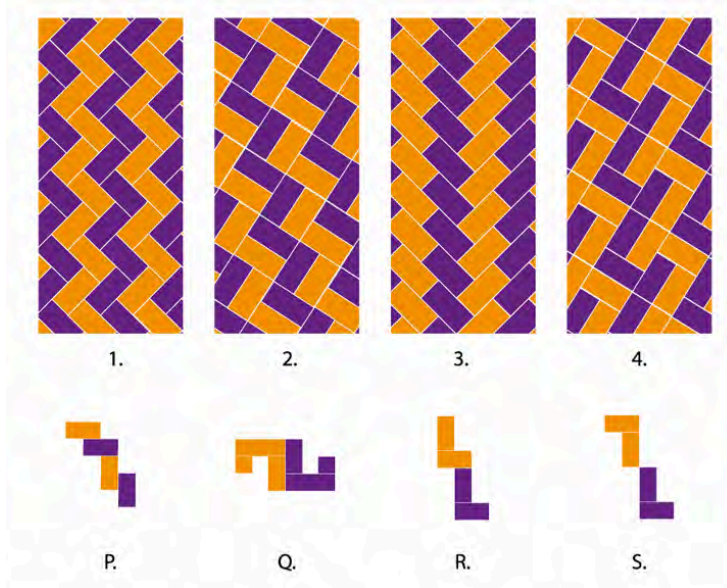
Option B has 37 squares.

Option C has 34 squares.

Option D has 42 squares.

So option D has the largest area.

**Q.58** Which of the given options matches the patterns (1,2,3,4) with tiles (P, Q, R, S) correctly?



- A. 1-S, 2-P, 3-Q, 4-R
- B. 1-R, 2-Q, 3-P, 4-S
- C. 1-Q, 2-S, 3-R, 4-P
- D. 1-R, 2-S, 3-P, 4-Q

**Solution:**

**Q.59 Which of the options correctly shows the silhouettes of the given image?**



**Option A:**



**Option B:**

B



Option C:

C



Option D:

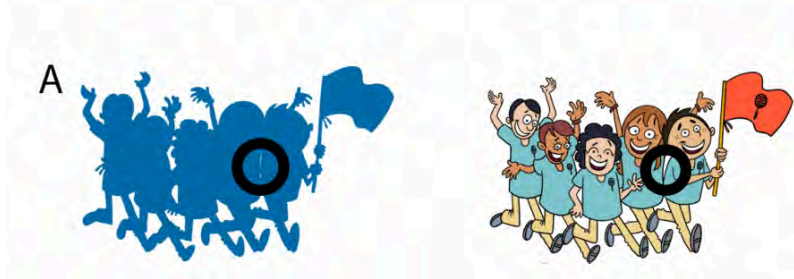
D

**Solution:**

A silhouette is the image of a person, animal, object or scene represented as a solid shape of a single colour, usually black, with its edges matching the outline of the subject. The interior of a silhouette is featureless, and the silhouette is usually presented on a light background, usually white, or none at all. The silhouette differs from an outline, which depicts the edge of an object in a linear form, while a silhouette appears as a solid shape.



Now see the original image.  
And check each option one by one.  
Option A:



We can see less gap in silhouette. Hence, this option is incorrect.

Option B:



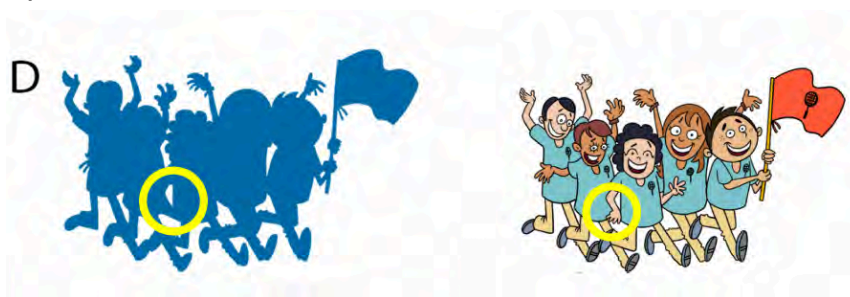
This has no abnormality or defect as compared to the original image. Hence, option B is correct.

Option C:



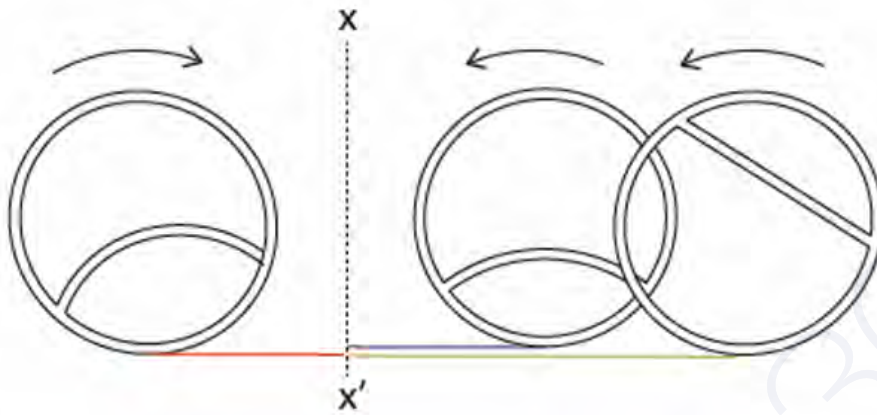
We can see less gap in silhouettes. Hence, this option is incorrect.

Option D:



Figures missing in silhouette. Hence, the option is incorrect.

**Q.60** Three rings are shown in the figure. They roll in the specified directions and stop when the centres of all the rings coincide at line  $XX'$ . What pattern would they make?



**Option A:**



**Option B:**



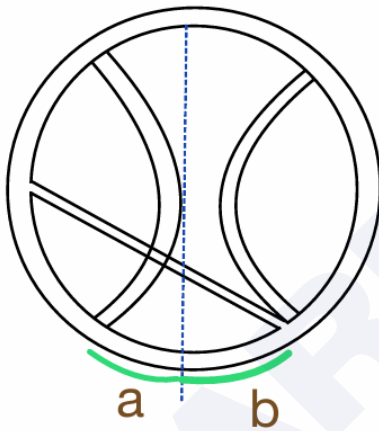
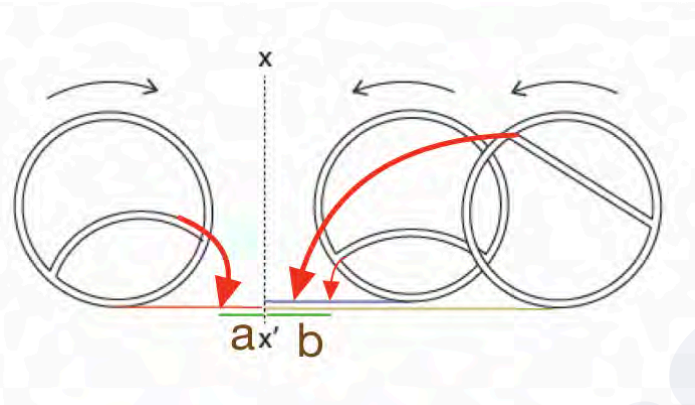
**Option C:**



**Option D:**

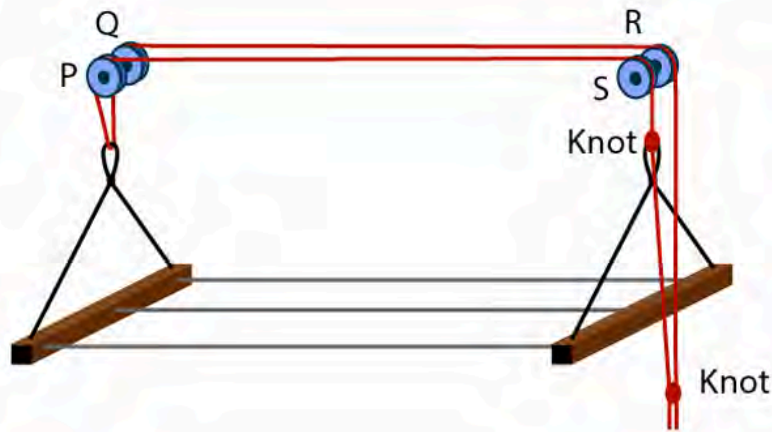


**Solution:**

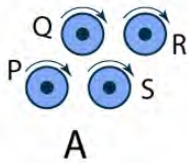


The position of the points on the circles will roll and position as shown by red arrows. In option B if we draw a vertical section line X-X' the position of the above points should be oriented at the same circular distance on either side as shown above. Hence, option B is correct.

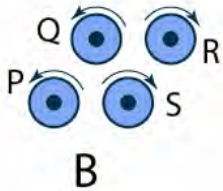
**Q.61** Figure shows a clothesline attached to four independent pulleys P, Q, R & S. Which of the options represents the correct rotation of pulleys that would result in lowering the clothesline?



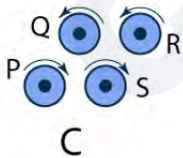
Option A:



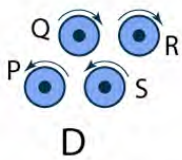
Option B:



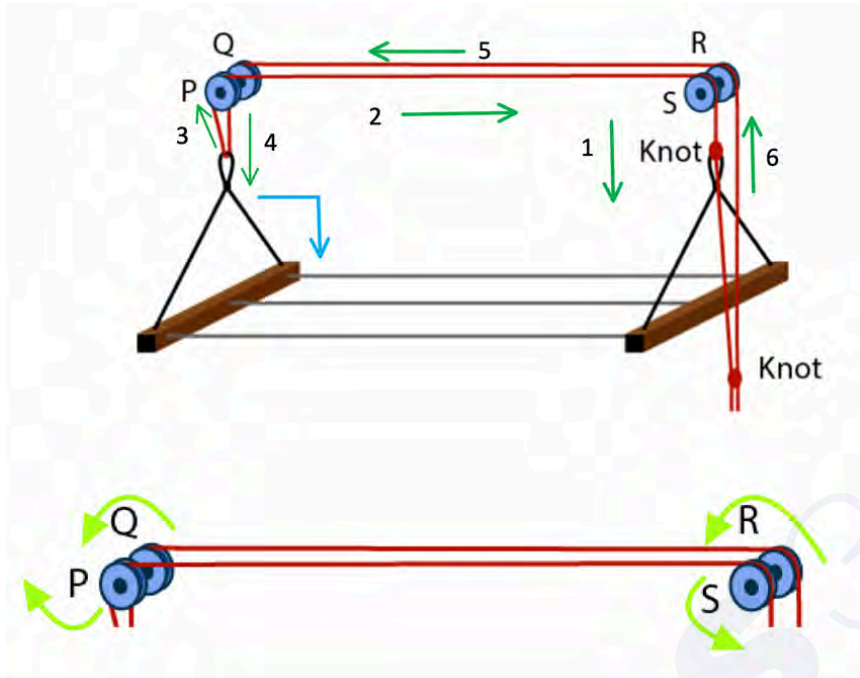
Option C:



Option D:



Solution:



So we can observe the options and find the correct sequence and direction of rotation of the P, Q, R and S wheels as shown in option C. Hence, option C is the correct answer.

**Q.62** Which of the options will replace the question mark?



**Option A:**



A

**Option B:**



B

**Option C:**



C

Option D:



D

Solution:



We can observe that question mark will be replaced by option A as in the above colour pattern the pair of boxes have somewhat lighter and darker version of each other.

**Q.63** Assume that the English alphabet was redesigned, and the new alphabet had alternating upper case and lower case letters. The alphabet starts with uppercase A, and

- 1) all upper case letters were rotated clockwise by 90 degrees
- 2) all lower case letters were rotated anti-clock wise by 90 degrees

Using the new alphabet, the word "HELP" would be written as:

Option A:

A



Option B:

B

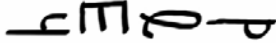


Option C:

C



Option D:

D 

**Solution:**

Given– New alphabet have alternating upper case and lower case letter and the conditions are:

- 1) all upper case letters were rotated clockwise by 90 degrees
- 2) all lower case letters were rotated anti-clock wise by 90 degrees

Alternatively, we can say alphabets with add no. have upper case , whereas with even number have lower case. Firstly, number the alphabets (as shown below)

A	B	C	D	E	F	G	H	I	J
1	2	3	4	5	6	7	8	9	10
K	L	M	N	O	P	Q	R	S	T
11	12	13	14	15	16	17	18	19	20
U	V	W	X	Y	Z				
21	22	23	24	25	26				

**HELP**

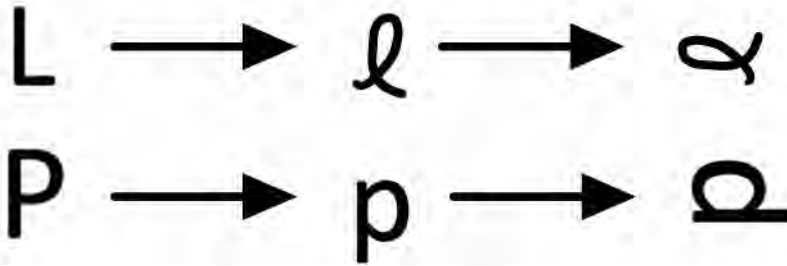
8 5 12 16

H → h → 

all upper case letters were rotated clockwise by 90 degrees

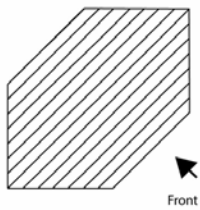
E → 

all lower case letters were rotated anti-clock wise by 90 degrees

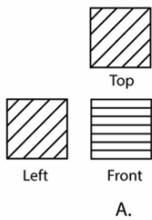


Hence, option B is correct.

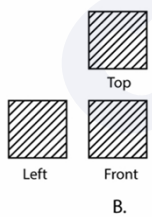
**Q.64** If the given figure represents a cube in 3D, which of the options correctly represents its views from different sides?



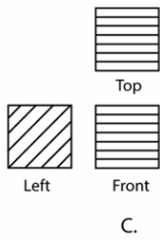
**Option A:**



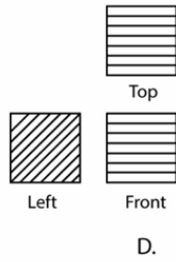
**Option B:**



**Option C:**



**Option D:**



**Solutions:**

It can have more than one option. Hence, the question can't be answered.

**Q.65** A square is cut into 4 pieces. One of the pieces is shown on the left and the remaining three are in the options. Which of the options is NOT a part of the square?



**Option A:**



**Option B:**



**Option C:**



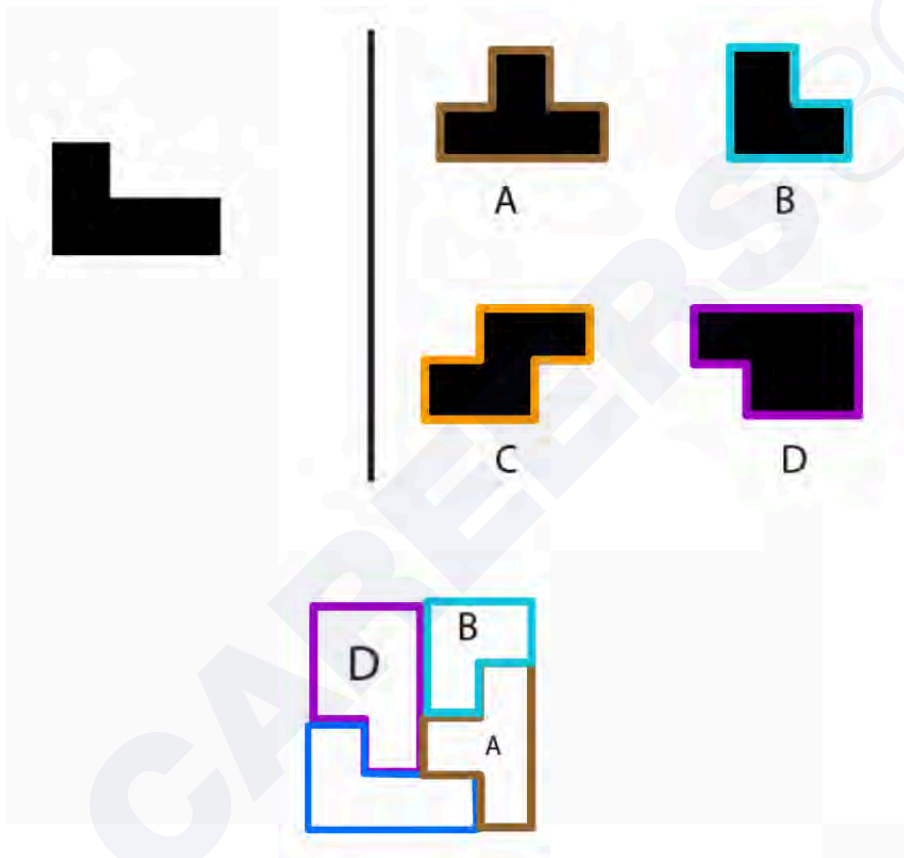
C

Option D:



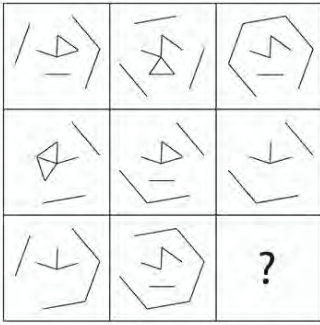
D

Solution:



Hence, using option A, B and D square can be made.  
Hence, option C is not a part of the square.

**Q.66** In the figure given below, which of the options will replace the question mark?



**Option A:**



A

**Option B:**



B

**Option C:**



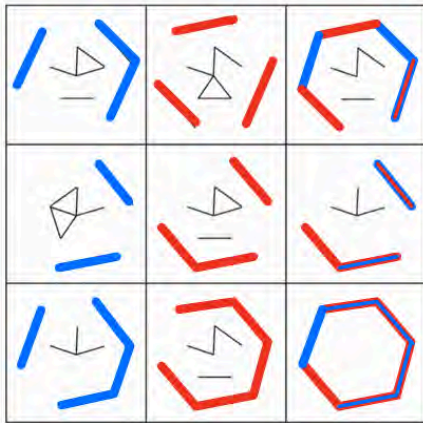
C

**Option D:**

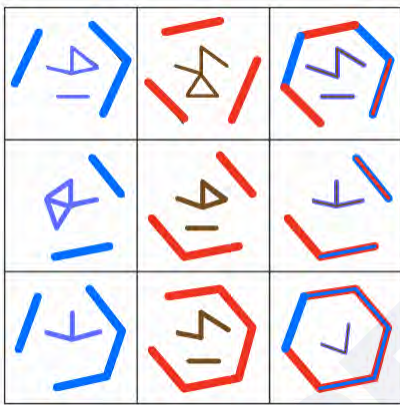


D

**Solution:**



If we observe above, we can see the question mark place will form a hexagon. Now option A and D is eliminated.



If we observe the internal part of the figure, we can see that the common will come into result.

Hence, option B is correct.

**Q.67 Which of the options can be associated with all the objects?**



**Option A:**



A

**Option B:**



B

**Option C:**



C

**Option D:**

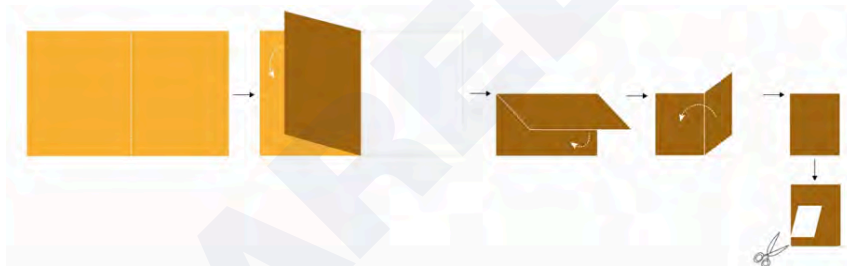


D

**Solution:**

The object shown film/ video, idea, sea travel , person with gun, direction senses , fish represent the sea, so this might represent general or navy person. So might fit. Hence, option C is correct.

**Q.68 Select the correct option**



**Option A:**



A

**Option B:**



B

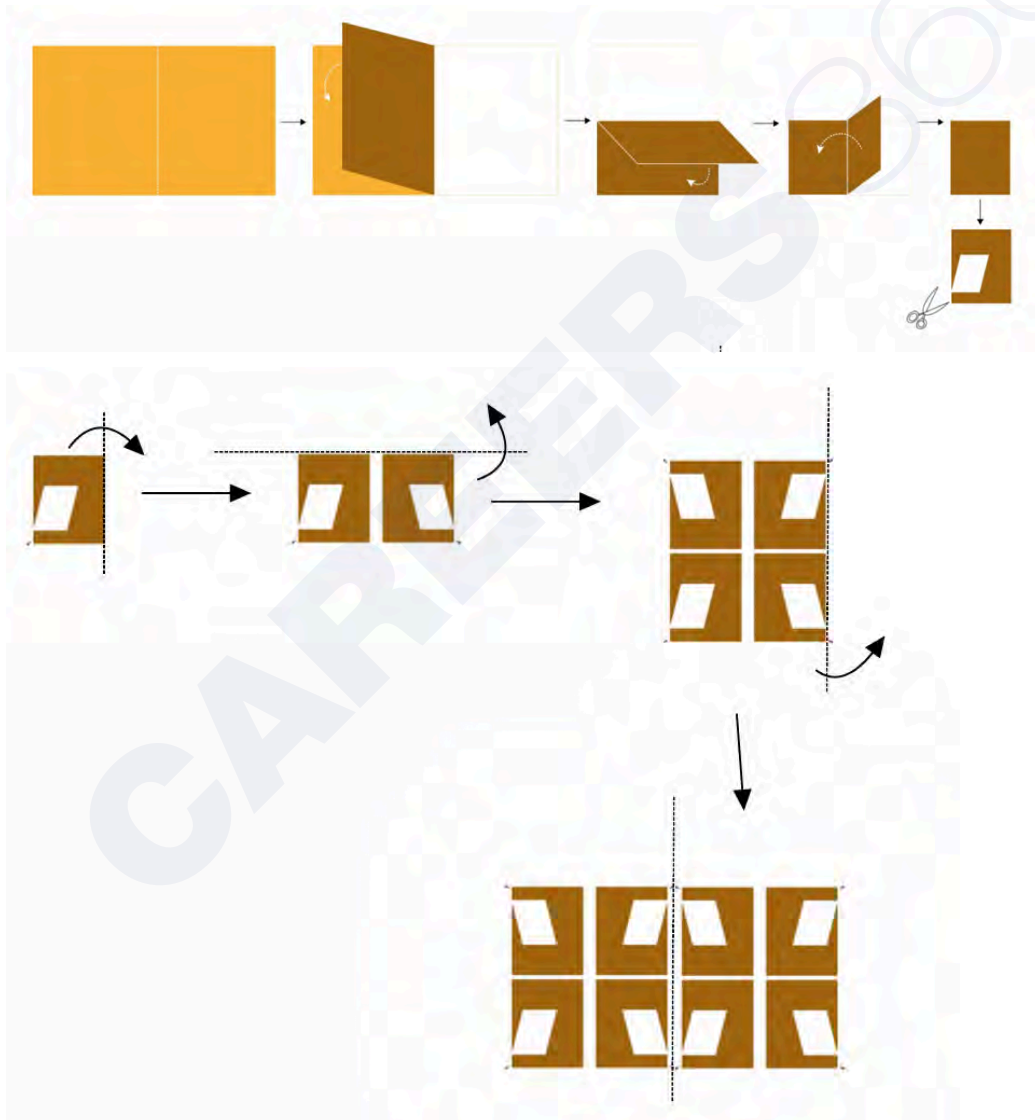
**Option C:**



Option D:



Solution:



After the cut, we unfolded the paper in a reverse direction of the fold (right to left) as shown above.

Hence, option A is correct.

## PART-B

### Q1. Sketching

Prof. Shastri was checking maths papers when she got a call from her husband. Mr. Shastri was upset that she forgot the diet lunch box that he had specially prepared for her. He was also annoyed that she left the dining table in a mess with all her papers and books piled up. He further accused her of cheating on her diet by eating canteen Pakodas and Aloo Parathas for lunch. Prof. Shastri tried to pacify him by saying that she had been working since morning as she needed to finish checking papers and writing her research proposal by 5 pm that evening and that she even had a headache from skipping lunch. Mr. Shastri was not convinced and reminded her that she hadn't even read the diet book he had sent and was probably using it as a paper weight in her office. He concluded that she wasn't serious about her health and proceeded to declare that he will not be cooking for her from then on. Prof. Shastri hung up the phone and in frustration ordered her fifth cup of tea from the canteen and her second plate of Pakodas.

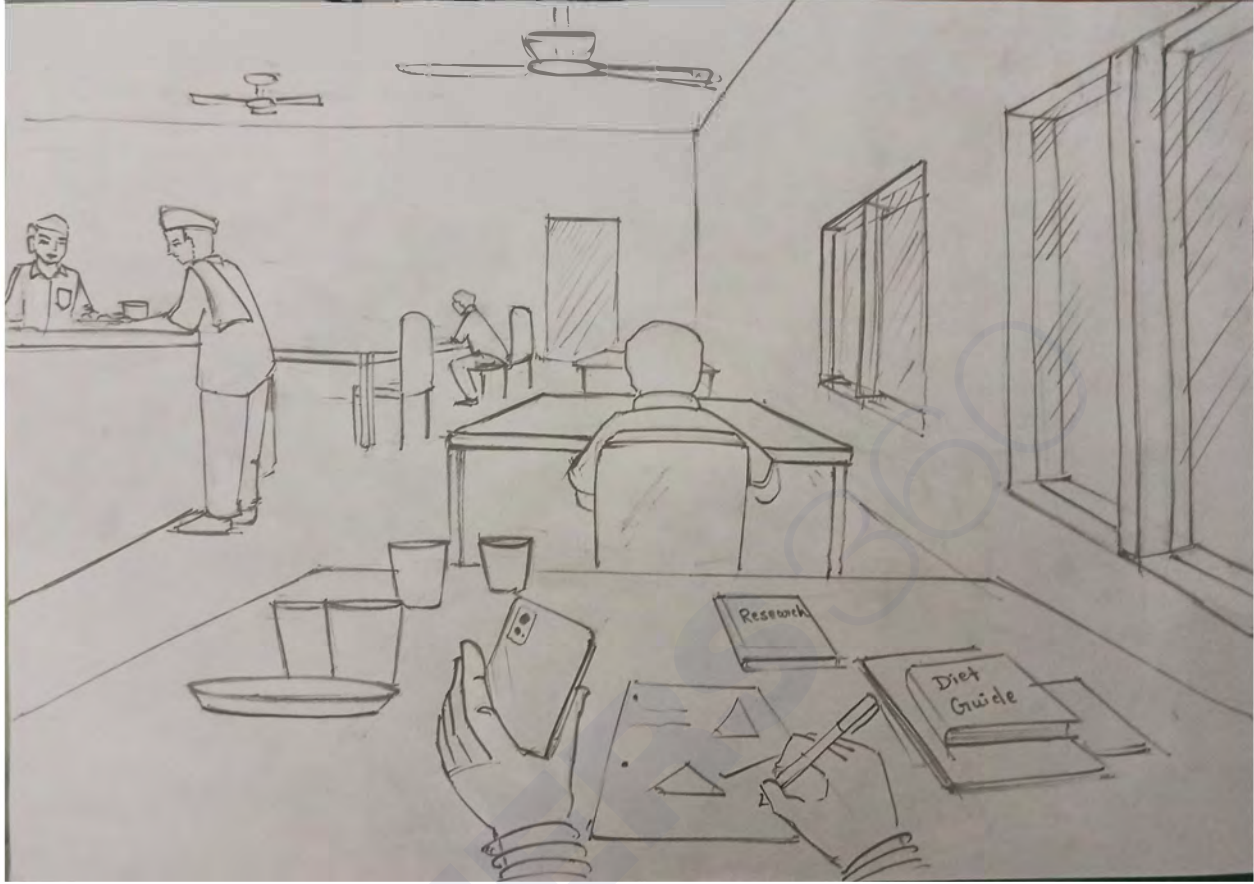
From the above description, sketch Prof. Shastri's desk from her usual point of view.

**Note:**

- Make pencil sketches only
- Do not use colours
- Do not draw Prof. Shastri

**Evaluation Criteria:**

- Observation
- Imagination
- Selection & composition of objects
- Quality of line
- Presentation
- Attention to detail



CAREERS360

# UCEED 2019

## Part A - Section 1: Numerical Answer Type Questions

Q.01 Shown below are sole designs of slippers, of which some are matched-pairs (one left foot and one right foot). Identify the total number of matched-pairs in the image.

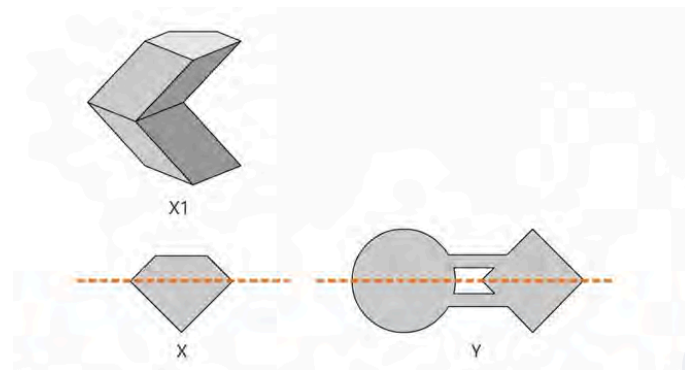


Solution:



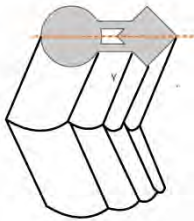
We can observe the sole minutely and can find L1 matching R1, L2 matching R2, L3 matching R3 but L4 has its copy form so we have a total of 3 matched pairs.

**Q.02** X1 is a 3D form generated from the shape X, using certain 3D operations. It has 11 surfaces in total. If the same operations are carried out on shape Y, how many surfaces would the resulting 3D form have?



**Solution:**

The surfaces will be extruded to a solid (as shown below)



No of surfaces in the front =10  
 No of surface in the right=2  
 No of surfaces in the back=8  
 No of surface in the left=0  
 No of surfaces in the top=1  
 No of surfaces in the bottom=1  
 Total no of surfaces=22

**Q.03** Fifteen people from different places came together for a family reunion. Each one of them had two gifts each for every other person. When the gifts were exchanged, they hugged each other. What is the difference between the number of hugs and the number of gifts exchanged?

**Solution:** Total no of people =15

According to the question, every person got 2 gifts the other.

Let's assume the first person got gifts from 14 other persons.

Total gifts he receives are  $14 \times 2 = 28$

So, total no of gifts exchanged =  $15 \times 28$   
 $= 420$

Now, according to the question, hugs were exchanged.

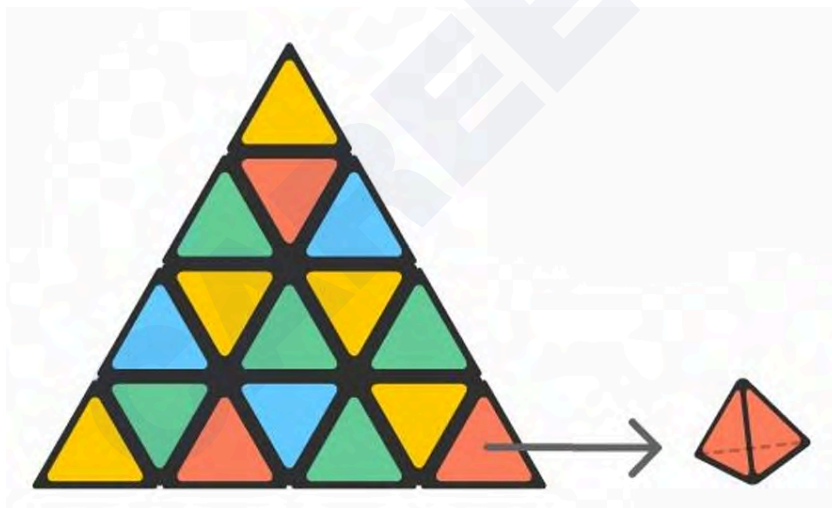
- First person hug 14 others, So total hug he got=14
- Second person 14 others, but his hug with first has already being counted, so total he has 13 new hug=13

Similarly for remaining

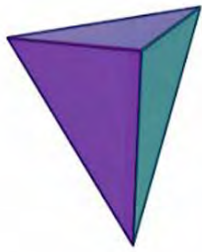
So total hugs  
 $= 14 + 13 + 12 + 11 + 10 + 9 + 8 + 7 + 6 + 5 + 4 + 3 + 2 + 1 + 0$   
 $= 105$

Difference =  $402 - 105$   
 $= 315$

**Q.04** A tetrahedral puzzle is made of smaller tetrahedrons. Shown below is one side of the puzzle and a small tetrahedron. Assuming that all the faces of the puzzle are the same, how many small tetrahedrons are there on the faces of the larger tetrahedron?



**Solution:** A tetrahedron is a polyhedron composed of four triangular faces, six straight edges and 4 vertices.



So, In the given figure from front face, we have 16 tetrahedrons,  
 From left face we have 4 tetrahedrons, so these 4 won't be counted again, so Total  
 $16 - 4 = 12$  new tetrahedron we have so far. Now we know left side will also be  
 touching right side from behind, so in this case 3 more from backend are common. So  
 total tetrahedron we have,  
 $12 - 3 = 9$  New tetrahedron.  
 Now from bottom,  $9 - 2 = 7$   
 So total no of tetrahedron =  $16 + 12 + 9 + 7$   
 $= 44$  ans

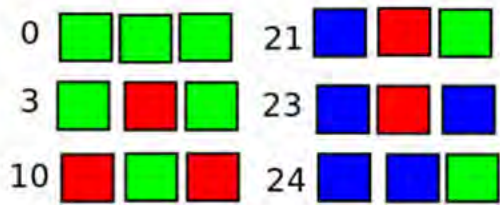
**Q.05** The picture shows decimal numbers encoded in colors in some other number system. Encodings of six numbers have been given in the picture on the left. The picture on the right shows a multiplication that we need to perform. What decimal number represents the result of this multiplication?

0		21		
3		23		
10		24		

**Solution:**

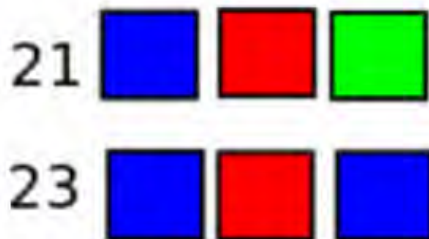
0		21		
3		23		
10		24		

**Figure 1**



**Figure 2**

If we observe the blocks, we can find that green is 0 and red is 3 on 2nd position. Now on the right side of figure 2 we have some other codes.



On the above fig the colour difference between the two is only a blue block [ As we know green is 0]

$$\text{So } 23 - 21 = 2$$

Blue block = 2 [on the third position]

But

$$\text{Blue} + \text{red} + \text{blue} = 23$$

$$\text{Blue} + 3 + 2 = 23$$

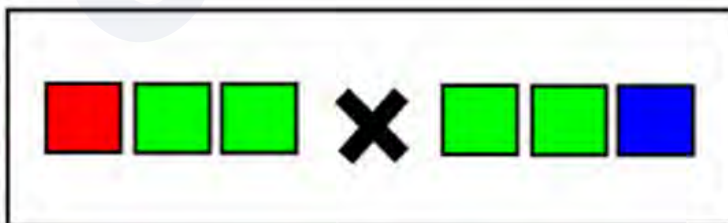
If we observe it carefully we can see that if the position of blue is lesser than the value is 2 and if the position is first it is  $23 - 5 = 18$

So we have so far observed

First position, Blue=18, Red=9

Second position, Blue=6, Red=3

Third position, Blue=2, Red=1



$$9 \times 2 = 18$$

18 answer

**Q.06** A cube has its six faces numbered 1 to 6. A school boy tosses up the cube twice and notes down the two numbers appearing on top in these two tosses. He multiplies these two numbers and notes down the multiplication result. How many unique multiplication results can he possibly get through this tossing game?

**Solution:** Dice have 6 faces

Let R1= Dice rolled the first time

And R2= Dice rolled a second time

R1	R2					
----	----	--	--	--	--	--

1	1	2	3	4	5	6
2	2	2	6	8	10	12
3	3	6	9	12	15	18
4	4	8	12	16	20	24
5	5	10	15	20	25	30
6	6	12	18	24	30	36

So these are the multiplication possibility for 2 dice rolled.

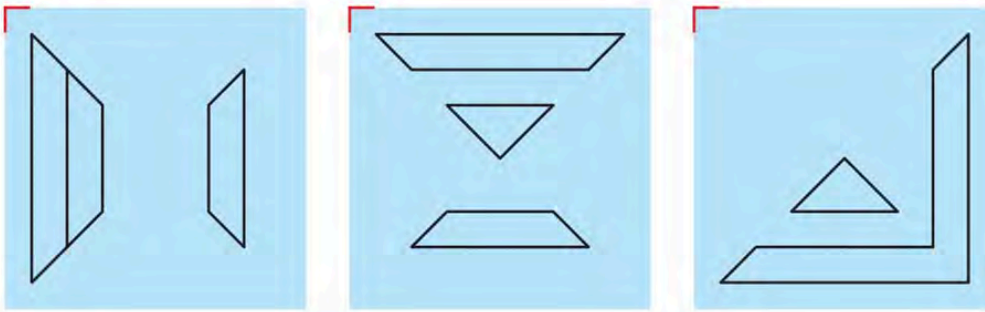
So we need to find unique,

Unique are  $\rightarrow$  1, 2, 3, 4, 5, 6, 8, 10, 12, 9, 15, 18, 16, 20, 24, 25, 30, 36

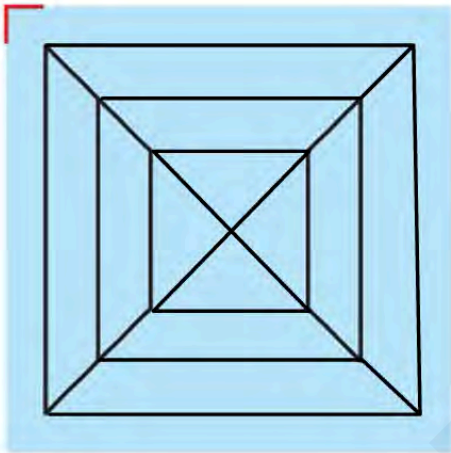
So total 18 are unique

Answer=18.

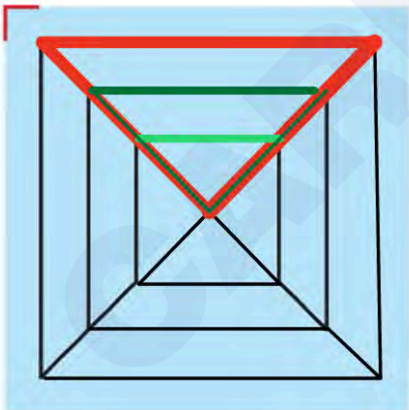
**Q.07** Three transparent glass pieces with different engravings are shown below. They are to be overlapped, one on top of the other, with the red corner exactly matching each other. What is the total number of triangles in the resultant figure?



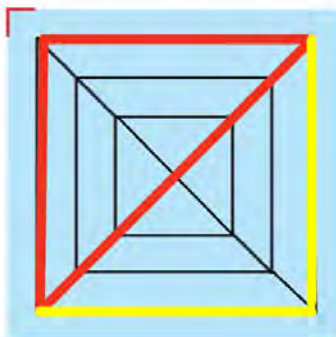
**Solution:** According to the question we have to overlap one on the top of other, with the red corner exactly matching each other we get,



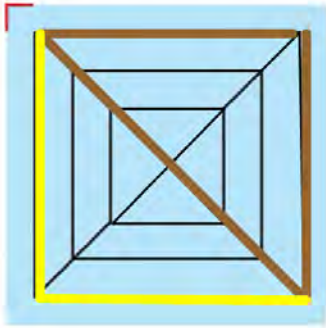
So now the total no of triangles are



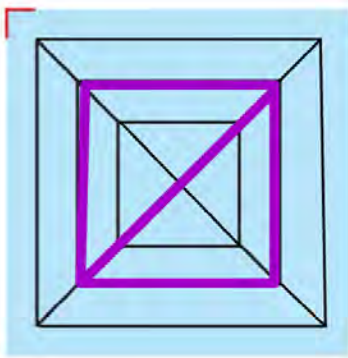
3 Triangles  $\times$  4 = 12 *triangles*



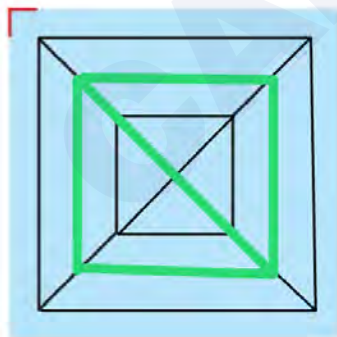
I.e,  $12+2=14$



2 Triangle  
I.e,  $14+2=16$

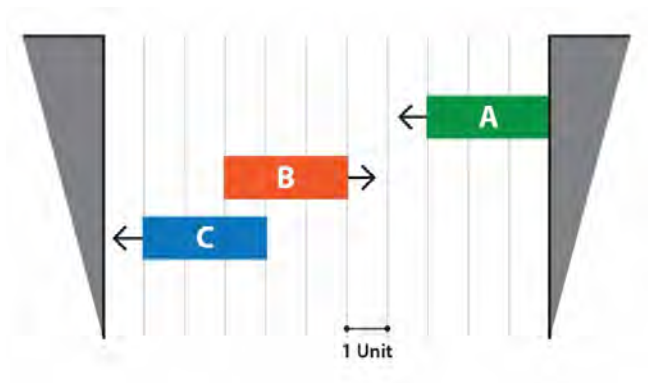


2 Triangle  
 $16+2=18$

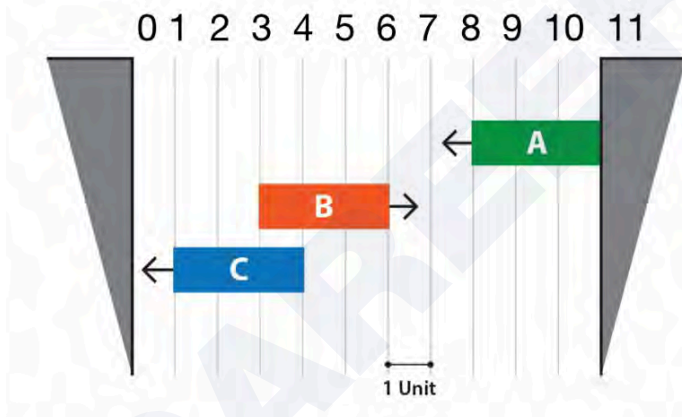


2 triangles  
 $18+2=20$   
Total no of triangles =20.

**Q.08** A diagram of three blocks A, B and C and their direction of movement is shown below. The blocks move continuously in units and change directions after hitting the side walls. From the given position, if block A moves at a speed of 2 units per second, and block B and block C move at a speed of 1 unit per second, what is the least time (in seconds) that is required for all blocks to align exactly one below the other?



**Solution:**



We can see the correct position of A from the end is 8.

Current position of B = 3

Position of C = 1

Now A is moving at 2 units per sec, so position A

$8 \rightarrow 6 \rightarrow 4 \rightarrow 2 \rightarrow 0 \rightarrow 2 \rightarrow 4 \rightarrow 6 \rightarrow 8$  So on

Now position of B

$3 \rightarrow 4 \rightarrow 5 \rightarrow 6 \rightarrow 7 \rightarrow 8$  [At 8 it will stop and moves back]

.....  $5 \leftarrow 6 \leftarrow 7 \leftarrow 8$

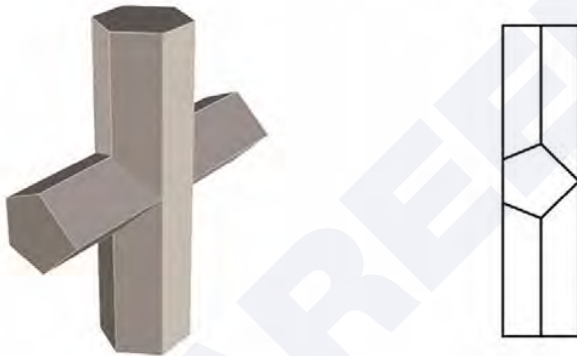
Now position of C,

$1 \rightarrow 0 \rightarrow 1 \rightarrow 2 \rightarrow 0 \rightarrow 2 \rightarrow 4 \rightarrow 6 \rightarrow 7$ .....

Time(Sec)	0	1	2	3	4	5	6	7	8
A	8	6	4	2	0	2	4	6	8
B	3	4	5	6	7	8	7	6	5
C	1	0	1	2	3	4	5	6	6

We can see at the 7th second the positions are matter. Hence, T see is the correct answer.

**Q.09** A UNION of two solids, a pentagonal prism and a hexagonal prism, is shown below. The side view (on the right) depicts how the solids intersect. Visualize the new solid formed by their INTERSECTION (the part common to both of them). How many surfaces will the new solid have?



**Solution:**

A prism is a three-dimensional solid which has identical faces at both ends. The other faces are flats. A prism is named after its base.

For example.

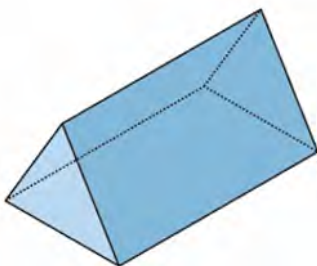


Fig: Triangular Prism.

We can see (in the figure given in the question) we have two solids, i.e, Pentagonal prism and Hexagonal prism.



If we observe, we have 5 surfaces definitely.



Here two more surfaces.

Similarly, at the back, we have 2 more surfaces.

So, Total surfaces  $5+2+2=9$  surfaces

**Q.10** A solid object made of cubes is shown below. This object is symmetric about all three axes, and does not contain cavities (no hollow spaces). How many cubes does the solid contain?



**Solution:**

A Cube is a solid three-dimensional figure, which has 6 square faces, 8 vertices and 12 edges.

Now looking at the given figure we know it is symmetrical all the way from top to bottom and from front to back so start with layer by layer

Top layer has 5 cubes =5

Second layer has 5+8 cubes =13

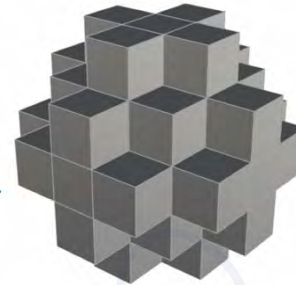
Third layer 13 +8 cubes =21

Fourth layer is similar to second layer =13

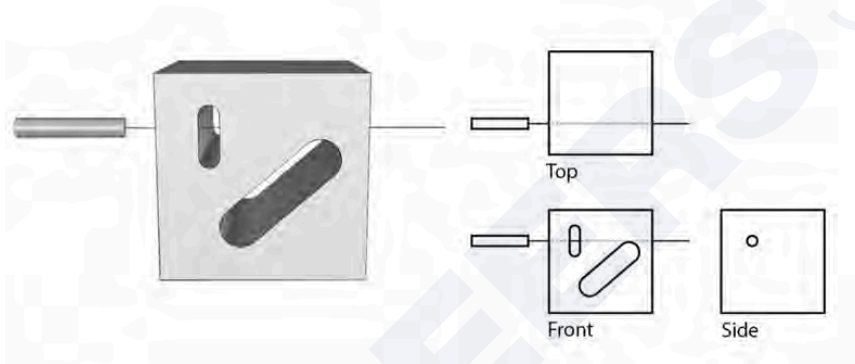
Fifth layer is similar to first layer =5

Total =5+13+21+13+5=57

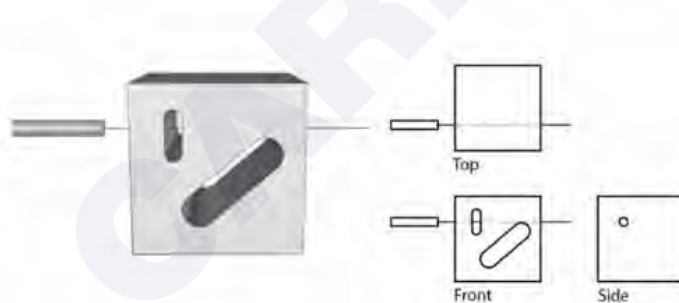
Hence, this figure has total 57 cubes.



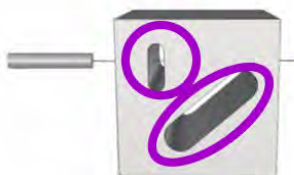
**Q.11 A solid is drilled using a cylindrical drill in a direction, as shown below. How many surfaces will the solid have after the drilling is complete?**



**Solution:**



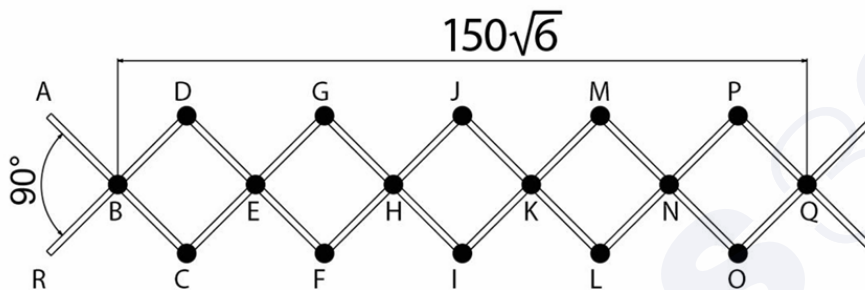
As this is a cube so it has 6 surfaces, when we see the figure we observe we have 2 more surfaces as shown below.



So total 6+2 surface, i.e, 8 surfaces.

When drilling is done, 2 more surfaces will be created  
So, total surfaces = 8 + 2 = 10 surfaces.

**Q.12** The figure below shows a hinged structure made up of 12 sticks. The structure can be elongated and compressed by changing the angle ABR. As shown in the figure, the distance between B and Q is  $150\sqrt{6}$  (one hundred and fifty times root six) units when the angle ABR is 90 degrees. What will this distance be when the angle ABR is changed to 60 degrees?



**Solution:**

**Q.13** In a new form of decimal system, the numbers 0 to 9 are represented by a new set of symbols. For example, the equation  $1 + 4 = 5$  is represented as equation (i). If in the solution to equation (iv) one digit appears twice, what number will replace the question mark?

$$(i) \quad 1 + \pi = \tau$$

$$(ii) \quad \pi + \nu = \omega$$

$$(iii) \quad \pi\sigma - \sigma = \nu$$

$$(iv) \quad \nu\nu\nu + \omega\sigma\sigma = ?$$

**Solution:**

- (i)  $1 + 4 = 5$   
(ii)  $4 + 3 = 7$   
(iii)  $20 - 6 = 14$   
(iv)  $1212 + 333 = ?$

$1 + 4 = 5$	i.e. $1+4=5$
$4 + 3 = 7$	i.e. $4 + 3 = 7$
$20 - 6 = 14$	i.e. $20 - 6 = 14$
$1212 + 333 = ?$	i.e. $1212 + 333 = ?$

Now let's say  $3$  is either 2 or 3 so take it

$$4 + 3 = 7 \quad \text{i.e. } 4+3=7$$

That means  $7$  is 7

$$20 - 6 = 14$$

Assume it  $20 - 6 = 14$  for  $20$

this has been in range of 20 so the subtracting

We get 14.

So the equation is  $20 - 6 = 14$   $20-6=14$

$6$  This denotes six  
Now,

$$1212 + 333 =$$

$\underline{3} \ 1 \ \underline{3} + x6 = \underline{\quad}$  [The resultant should have one digit twice ]

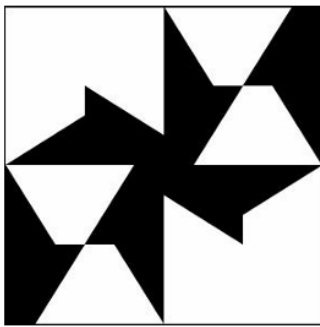
And if it is 8 then we get  $313+86=399$

And, if it is 9 then we get  $313+96=409$

But we need to have one digit twice, so x is B

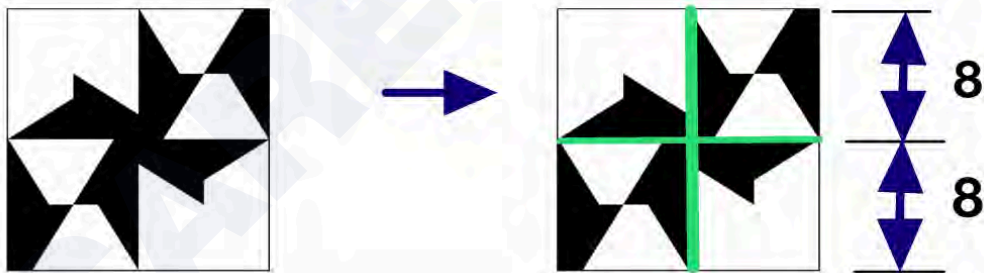
Hence, the final answer is 399.

**Q.14** What is the area (in  $\text{cm}^2$ ) of the black portion, if the square is of length 16 cm?



**Solution:**

Given side of square=16



We have 4 small squares with side 8 cm

Area of square is  $side^2$

$$8^2 = 64\text{cm}^2$$

So, every small box has area  $64\text{cm}^2$ .

Considering 1 small box.



We can see that white part is half of black part

$$\text{Area of black part} = \frac{64}{2} = 32$$

So we have 2 similar shape squares. Their total area of 2 boxes 1st and 3rd is  $32+32=64$

Now,



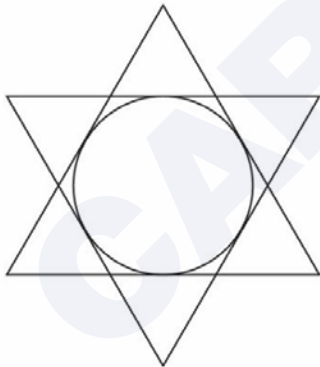
In this, black part is  $\frac{1}{4}$ th times the total area.

$$\text{Area} = \frac{1}{4} \times 64 = 16$$

We have 2 similar shape square (i.e, 2nd and 4th) so  
Area =  $16+16=32$

$$\text{Total area} = 64+32=96\text{cm}^2$$

**Q.15** The figure shows two concentric equilateral triangles with a circle within, such that the circle touches all the edges of the triangle. If the radius of the circle is  $\sqrt{3}$  (square root of three), what is the total length of the star shaped outer border formed by the two intersecting triangles?



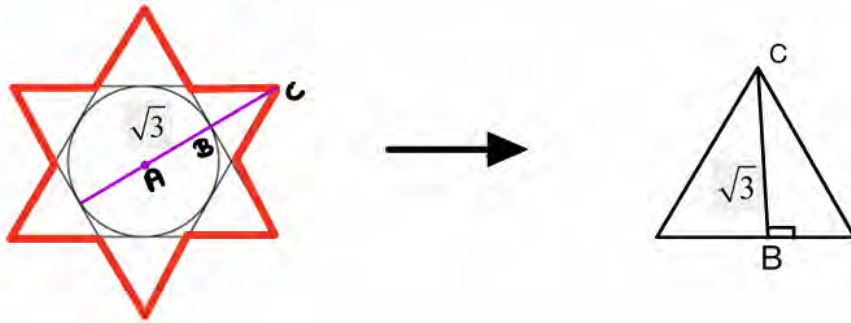
**Solution:**

Given,

Two concentric equilateral triangles [an equilateral triangle is a triangle in which all three sides have the same length]

$$\text{Radius of the circle} = \sqrt{3}$$

To find: Length of star shaped outer border, i.e.,



AB radius of circle =  $\sqrt{3}$

AB = BC =  $\sqrt{3}$

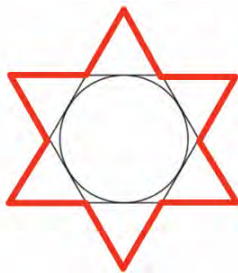
BC = Height of equilateral triangle

We know,

Height of equilateral triangle =  $\frac{\sqrt{3}}{2} \times \text{side}$

$$\sqrt{3} = \frac{\sqrt{3}}{2} \times \text{side}$$

Side = 2



Total length (red lines) =  $2 \times 12 = 24$

**Q.16** Except for one number, all the four-digit numbers given below are written using a single font. Identify the number that does not use the same font as the other numbers.

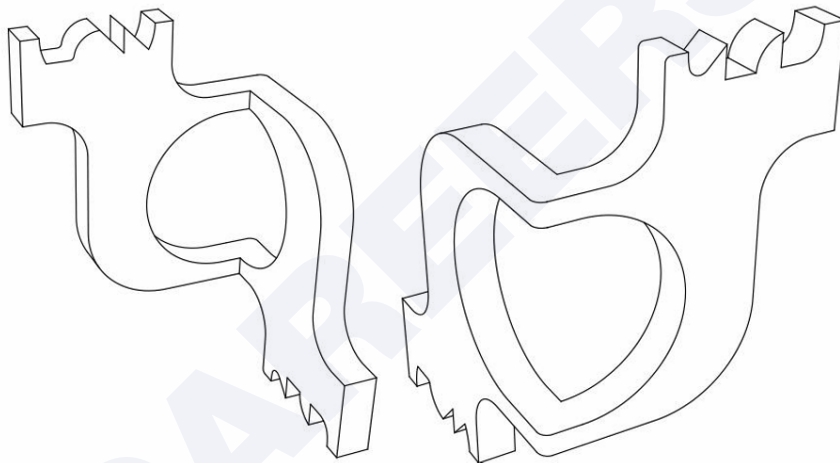
3697 5574 1767 6367 5985  
 1676 7514 3683 3270  
 8431 3584 2018  
 1450 1070  
 3601 1847 4208 1190 8075  
 6063 8504 2044  
 1502 7070 4338 3015  
 6049 1342 8075 4852

**Solution:**

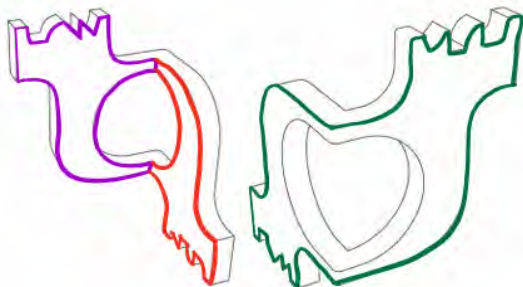
3697 5574 1767 6367 5985  
 1676 7514 3683 3270  
 8431 1070 3584 2018  
 1450 4208 1190  
 3601 1847 8504 8075  
 6063 2044  
 1502 7070 4338 3015  
 6049 1342 8075 4852

We have to compare the font 0 to 9 and if we observe carefully we can say 1190 has different form. So 1190 is the answer.

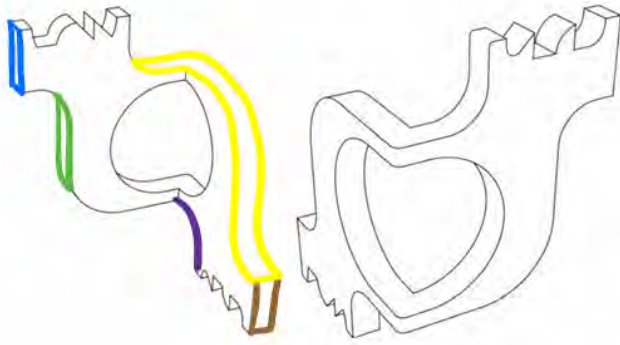
**Q.17 Two perspective views of the same solid object are shown below. Count the total number of surfaces in the object. Assume hidden surfaces to be flat.**

**Solution:**

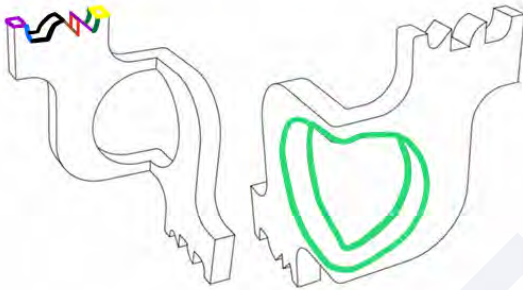
There are the two view of same solid object



Hence, we have 3 surfaces.



Here we have 5 surfaces  
So total so far=8



So we can see 1 inside, 7 at the top, 7 at the bottom.  
So, total surfaces are=8+1+7+7  
=23 surfaces.

**Q.18** The image given below is made out of separate pieces. What is the least number of pieces that need to be moved and/or rotated and/or flipped for achieving symmetry about the central vertical axis?



**Solution:**

**Q.19** A logo was designed by creating a pattern of orange petals using four semicircles. These petals were then inscribed in a green circular shape with an inner diameter of  $14\sqrt{2}$  (fourteen Times Square root of two) units, what is the area of the orange part in the logo? (Assume  $\pi = 22/7$ )



**Solution:**



Area of half petal = Area of quadrant (white triangle) – Area of triangle (white)

$$= \frac{1}{4} \pi r^2 - \frac{1}{2} \times \text{base} \times \text{height}$$

$$= \frac{1}{4} \times \frac{22}{7} \times 7^2 - \frac{1}{2} \times 7 \times 7$$

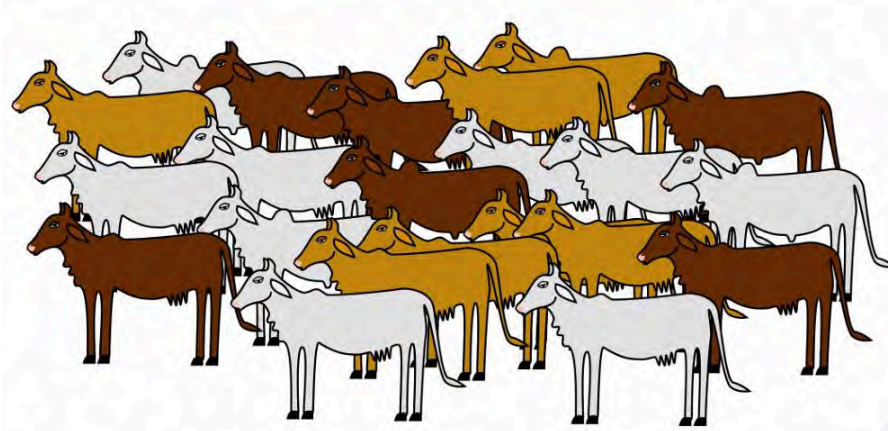
$$= \frac{1}{4} \times \frac{22}{7} \times 7 \times 7 - \frac{49}{2}$$

$$= 38.5 - 24.5$$

$$= 14$$

We have 8 half petals =  $8 \times 14 = 112$

**Q.20** Shyam runs a dairy. In his cattle herd, each white cow gives 12 litres of milk, each brown cow gives 7 litres of milk and each yellow cow gives 10 litres of milk every day. He has drawn a sketch of his herd, which is shown below. Using this sketch, calculate the amount of milk (in litres) produced by his dairy per day?

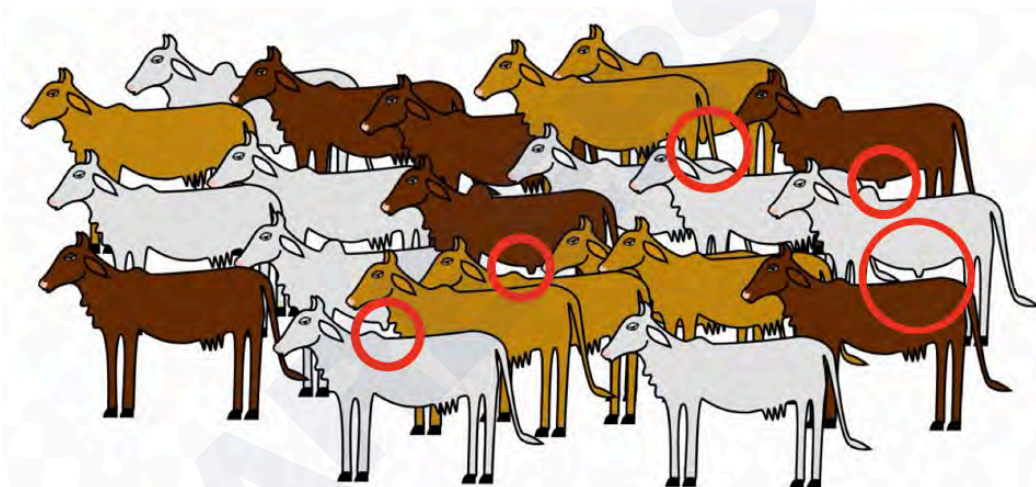


**Solution:** White cow gives = 12 litres each

Black cow gives = 7 litres each

Yellow cow gives=10 litres each

If we observe it carefully because we want cow but in the sketch you have same bulls as well (as shown below)



Total no of white cows =6

Total no of brown cows = 4

Total no of yellow cows = 6

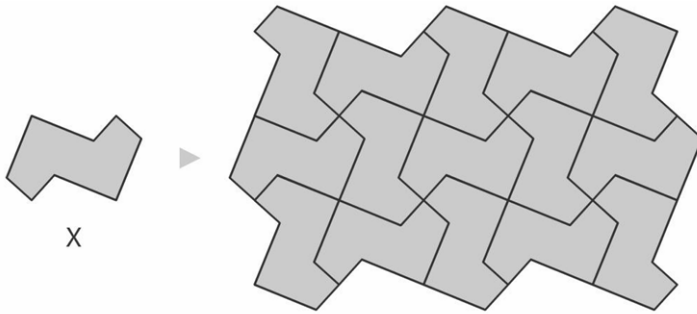
Total milk produced=  $12 \times 6 + 7 \times 4 + 10 \times 6$

=  $72+28+60$

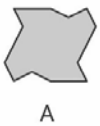
=160 litres.

## Section B: Multiple Select Questions

**Q.21** Tile X was used to create a seamless pattern when arranged as shown below. Which tile(s) from the options will create a seamless pattern (pattern without gaps)?

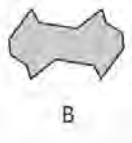


**Option A:**



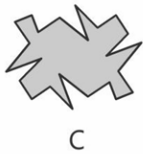
A

**Option B:**



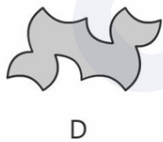
B

**Option C:**



C

**Option D:**

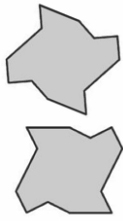


D

**Solution:**

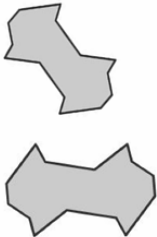
We need to create a seamless pattern check option one by one

Option A:



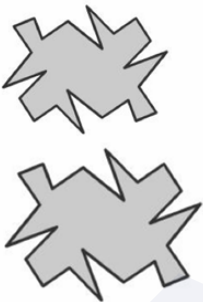
If we visualize the above, we can see they can't create seamless pattern

Option B:



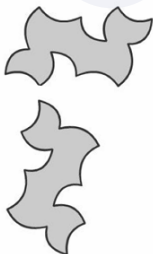
Seamless pattern can not be crated

Option C:



If you visualize this carefully, you can see that this can create a seamless part.

Option D:



This can create a seamless pattern as one can fit inside the other.  
Therefore, C and D options are correct.

**Q.22 Which of the following statements related to Indian musicians is/are TRUE?**

**A. Ustad Allah Rakha and Ustad Zakir Hussain are known for playing the Tabla**

**B. Pandit Nikhil Banerjee and Ustad Vilayat Khan are known for playing the Sitar**

**C. Ustad Ali Akbar Khan, Ustad Amjad Ali Khan and Dr. L. Subramaniam are known for playing the Violin**

**D. Pandit Ravi Shankar and Pt.Hariprasad Chaurasia are known for playing the Shehanai**

**Solution:**

Ustad Ali Akbar khan was an Indian Hindustani classical musician of the Maihar gharan, known for his virtuosity in playing the Sarod.

Option C is eliminated

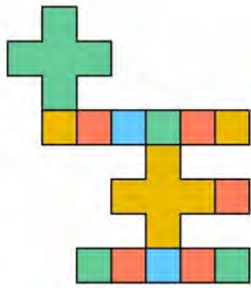
Pandit Ravi Shankar was an Indian sitarist

Option D is also eliminated.

Hence, option A and B is correct.

Artist	Instrument
Ustad Allah rakha	Tabla
Zakhir Hussain	Tabla
Pandit Nikhil Banerjee	Sitar
Pandit Ravi Shankar	Sitar
Ustad Vilayat khan	Sitar
Ustad Ali Akbar khan	Sarod
Ustad Amjad Ali khan	Sarod
Dr L Subramanian	Violin
Pt. Hariprasad Chaurasia	Basuri

**Q.23 Which of the options on the right can be formed by folding the profile shown on the left?**



Option A:



Option B:



Option C:



Option D:

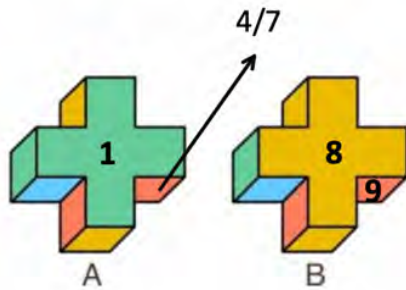


Solution:



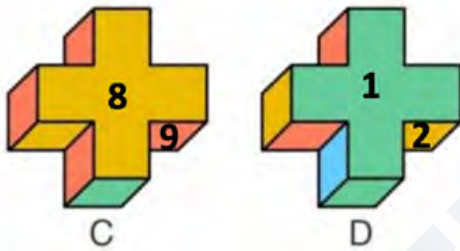
Option A: If we see green is face. So red should be 4 or 7 which is not here in option. Hence, option A is wrong (as shown below)

Option B: If yellow is face than red face should be 9 which is right. Hence, option B is correct.



Option C: This option is also correct (as shown below)

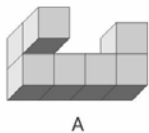
Option D: This option is also correct (as shown below)



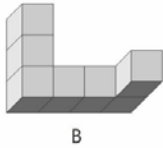
**Q.24** In a 3D structure made of cubes of equal size, an L shaped hole is made by removing a few cubes, as shown on the left. Which of the 3D structures in the options on the right would successfully pass through the L shaped hole, given that they are also made of cubes of the same size?



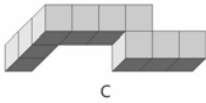
**Option A:**



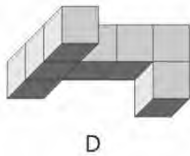
**Option B:**



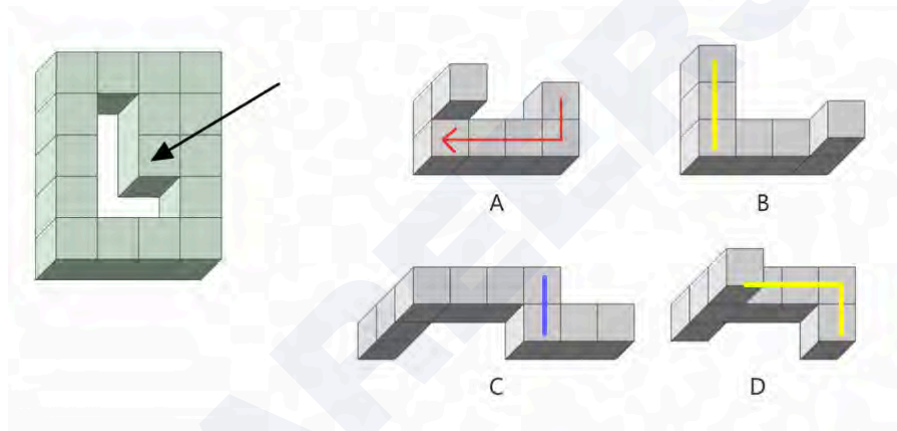
**Option C:**



**Option D:**



**Solution:**



When we are passing through the given cube, we need to consider the No. of cubes and the space given.

Now in option A:

This can move as shown by the arrow.

Option B: Here we have 3 cubes and similarly in the original 3-D structure we have 3 cubes, so it can pass.

Option C: Here we have 2 cubes and in original cube as well have hole consists of 2 cubes. So it can pass through an L shaped hole.

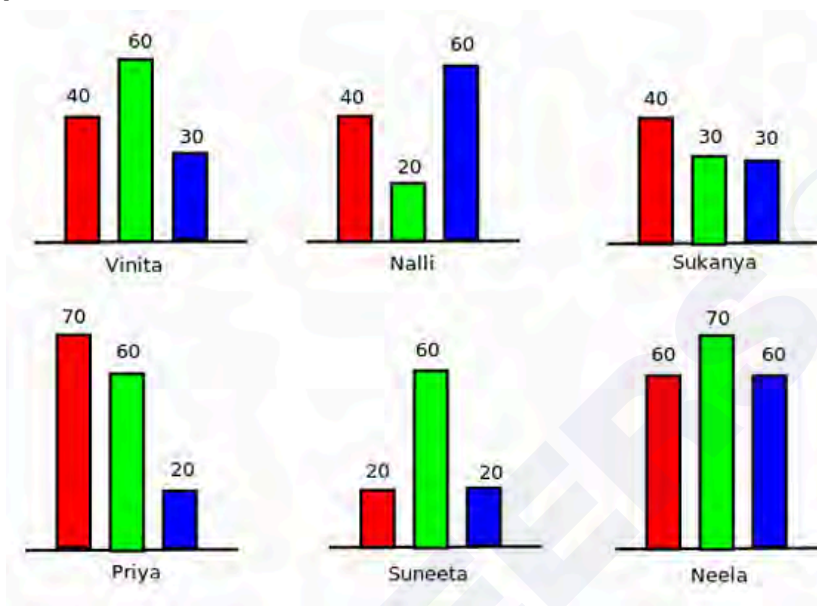
Option D: This can also pass through an L shaped hole.

Hence, option A, B, C and D all are correct.

**Q.25** The figure given below shows six bar charts corresponding to the volume of agricultural produce from farms of various farmers. The actual quantities are also

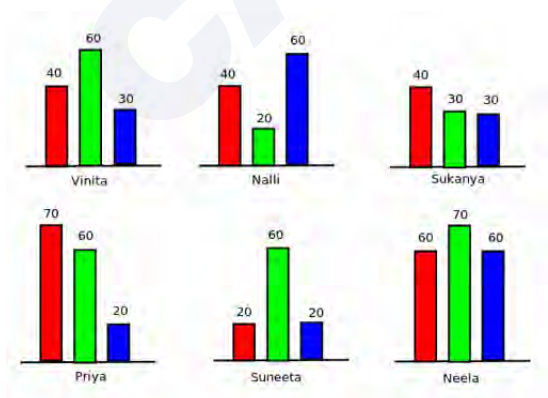
shown in the figure. Red bars indicate tomatoes, green bars indicate leafy vegetables, and blue bars indicate berries. Assume that they have seen each other's bar charts. Who can correctly make at least one of the following statements?

- (i) Everyone who produced any one item more than what I produced, she also produced every other item more.  
(ii) Everyone who produced one item less than what I produced, she also produced at least one other item less.



- A. Vinita  
B. Priya  
C. Neela  
D. Suneeta

**Solution:**



Statement 1

Consider Vinita, Vinita can say about Nalli that she produce one item more than Vinita. But don't produce every other item more. Hence, vinita can't make statement 1. Similarly, we can check and find that none of these make statement 1.

Statement 2 Consider vinita and compare it will Nalli, and we say yes Nalli has produce green bar less than vinita, but she don't produce other item less than vinita. So vinita can't make the second statement.

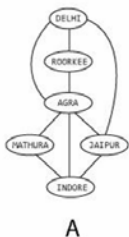
Similarly, we have to check for every other person.

We can find in case of Neela, Neela can be compared with Suneeta, as Suneeta produce green bar less than Neela, and she also produce Red and blue bar less than Neela. Therefore, Neela can say this about Suneeta. Now compare Neela with the rest other person we can find Neela can make statement 2 with all of them.

Hence, option C is correct.

**Q.26** The figure shows four road networks. Which of these four road networks can be traversed by a traveller, such that the following challenge can be satisfied: "The traveller must cover all the roads in the network. She is allowed to visit a city more than once, but she is not allowed to travel on any road more than once. Also, the traveller must come back to the city where she starts."

**Option A:**



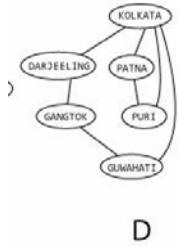
**Option B:**



**Option C:**



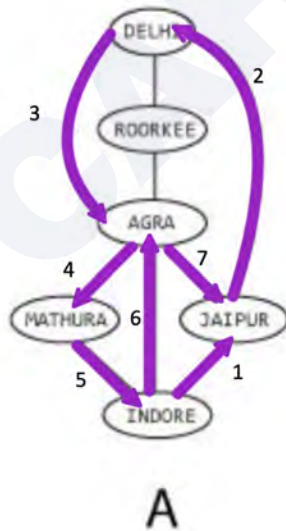
Option D:



**Solution:**

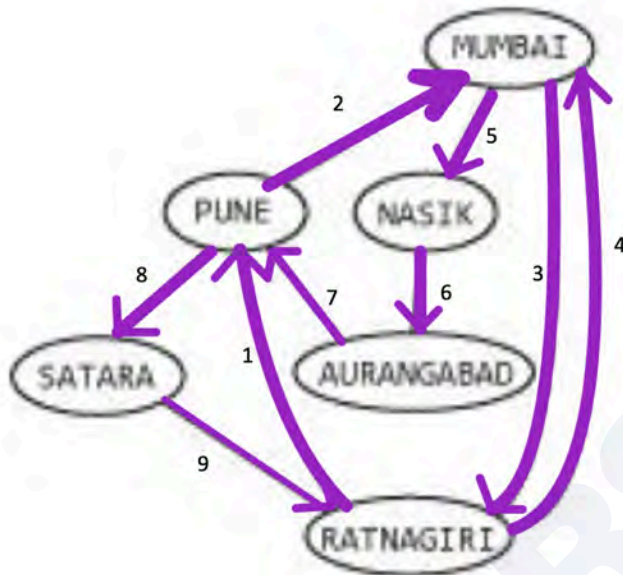
According to question. The traveller must cover all the roads in the network. She is allowed to visit a city more than once, but she is not allowed to travel on any road more than once. Also, the traveller must come back to the city where she starts. Now check option one by one.

Option A:



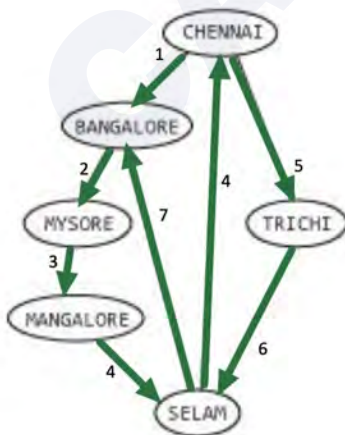
After 7 the path will have to be repeated. Therefore, this option is not satisfying the condition.

Option B :



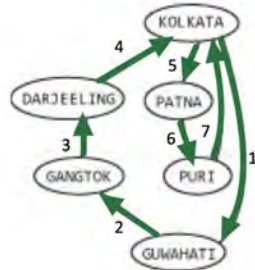
We can see no path is travelled more than once and covered all the cities. Hence, option B is correct.

Option C:



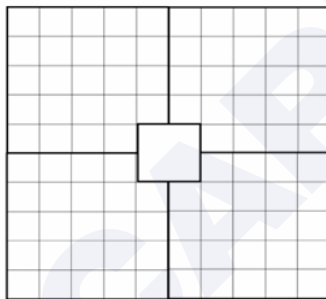
We travel all the cities and no routes repeated, but didn't come back to the point where it starts . Hence, this option is wrong.

Option D :



We can see no path is travelled than once and we covered all the cities. Hence, option D is correct.

**Q.27** The grid of squares shown in the figure is to be tiled (covered with tiles) with the tiles shown in the options. The covering tiles must not overlap and should not have gaps around them. Only four squares in the middle are not to be tiled. Once a tile is chosen, other tiles must be of that type only. Tiles can be flipped and rotated if required. Which of the tiles can be used to tile the given grid?



**Option A:**



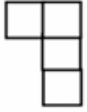
A

**Option B:**



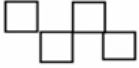
B

**Option C:**



C

Option D:



D

**Solution:** In these type of question we have to observe the grid and based on that check the given option carefully.

If we overlap option A and B we can see it will overlap the centre tile as shown below.

Fig 1 - Shows overlapping for option A

Fig 2- Shows overlapping for option B.

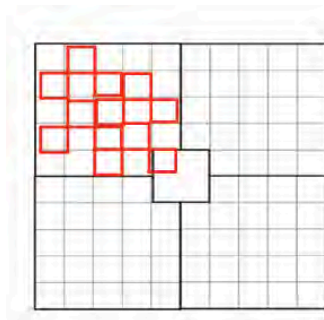


Fig 1

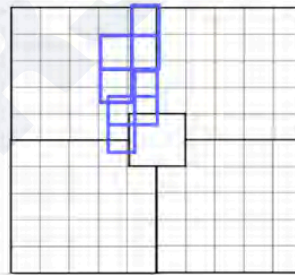


Fig 2

Now checking option C and D we can observe that tiles won't cover the centre tile. Hence, option C and D is correct answer.

**Q.28 Suresh, Biju and Tina bring one gift each. When they meet, they swap their gifts in such a way that no one gets back what they had brought with them. The gifts are, a book, a pen, and a ball.**

**Suresh says: I gave my gift to the one who gave away the ball.**

**Biju says: I received my gift from the one who gave the gift to the one who gave away the ball.**

**Tina says: I got what I always wanted.**

**Biju says: But Tina, you had to give away your pen.**

**Which of these statements is/are TRUE?**

**A. Tina gets the Ball**

- B. Tina gets the Book**
- C. Suresh gets the pen**
- D. Biju gets the Book**

**Solution:**

Condition 1

It may be possible that Suresh may give gift to Biju than Biju will give to Tina and Tina to Suresh.

Condition 2

Biju will give to Suresh, Suresh to Tina and Tina to Biju.

Out of these 2, one condition is possible.



Suresh says: I gave my gift to the one who gave away the ball.

That means Suresh is not having ball, so from beta condition (given above) we can say either Biju have ball or Tina have that Ball.

Biju says: I received my gift from the one who have gift to the one who gave away the ball.

According to this, if we consider condition 2 than we can eliminate this condition as Biju received a gift from one who gave ball, but Suresh isn't gifting ball. Hence, condition 2 is eliminated.

So condition 1 is perfect path.

Tina says: I got what I always wanted.

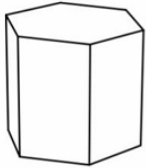
Biju says: But Tina, you had to give away your pen.

So above two statement we can say. Tina is having Pen. So Tina will give pen to Suresh. So Suresh will get pen and Suresh says I gave my gift to the one who gave away the ball so Biju must be having ball. Now, Biju gifted this to Tina. So Tina will get Ball and at loss Biju will get Book.

Hence, correct option are A, C and D.

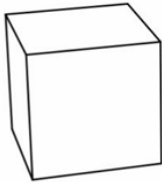
**Q.29** If the geometric solid blocks, shown below, are cut along a single flat plane, which of these can have the cross-section of a regular hexagon (all sides equal)? Assume, all blocks are extruded from polygons with sides of equal length.

**Option A:**



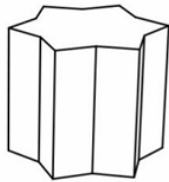
A

**Option B:**



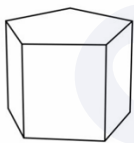
B

**Option C:**



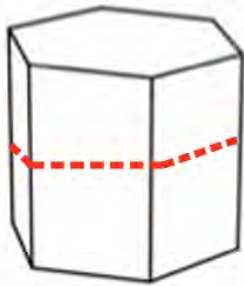
C

**Option D:**



D

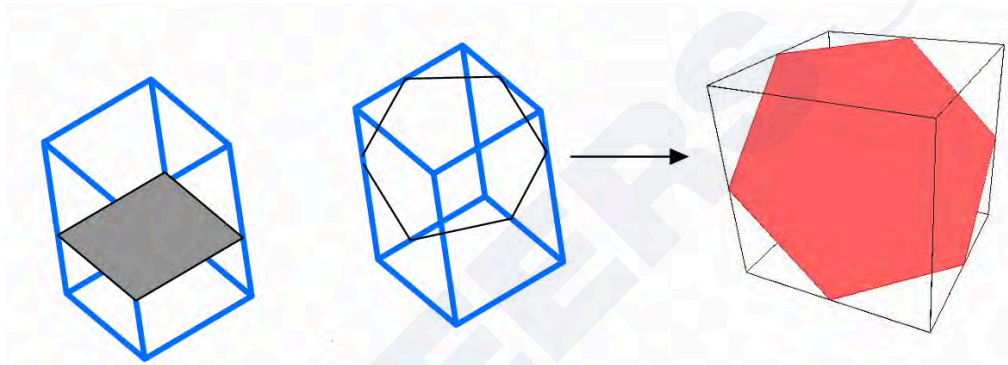
**Solution:**



A

If we cut Option A, we will have the cross-section of Regular Hexagon (as shown above) A is correct.

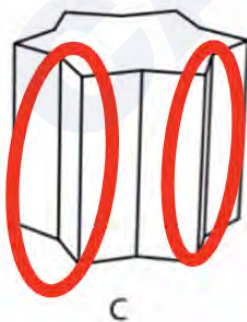
If we cut B horizontally then we get the cross-section of square but if we cut it at an angle it will give cross-section of Hexagon (Regular)



Square cross-section

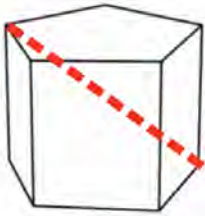
Regular hexagon cross-section

Now if we check option C we can see there are sides which are going inside (as shown below) So if we cut it we are not going to have a cross-section of a regular hexagon.



C

Now at last check option D if we cut D even slanted (i.e, at an angle) we are not going to have cross-section of regular hexagon.

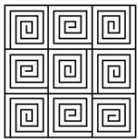


D

Hence, option A and B are correct.

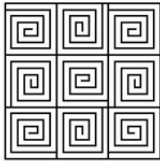
**Q.30** The following patterns are made on a wall by using ceramic tiles. Which of the given patterns is/are made from a single type of tile?

**Option A:**



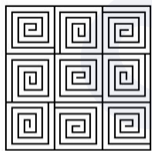
A

**Option B:**



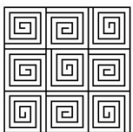
B

**Option C:**



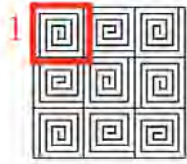
C

**Option D:**



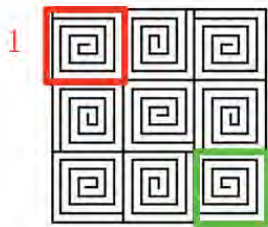
D

**Solution:**



A

If we check first tile we can see the spiral is going anti clockwise. Now if we see the starting point of spiral is in upward direction whereas ending is just opposite to it i.e. In downward direction . This condition is followed by every other tile.

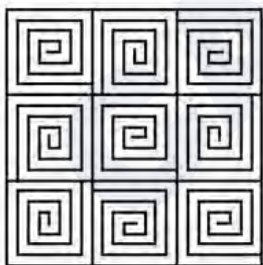


B

If we first tile, we can see the spiral is going anticlockwise. Now if we see the starting point of spiral is in upward direction whereas ending is just opposite to it i.e, In downward direction. This condition is violated by the last tile (Highlighted by green).

Here it is going clock wise direction. Hence, B is eliminated.

Similarly, if we check for option C and D we can find option D has mismatched (as shown below).



C



D

Hence, option A and C is correct.

**Q.31 Which of the following statements about the areas of Indian states is/are TRUE?**

**A. Arunachal Pradesh is larger than Kerala**

- B. Punjab is larger than Assam**  
**C. Chhattisgarh is larger than Jharkhand**  
**D. West Bengal is larger than Uttarakhand**  
**Solution:**



Statement A: Yes the area of Arunachal Pradesh this is greater than Kerala (we can observe this in the image of Indian map given above)

Statement B: No, the area of Punjab is not greater than Assam.

Statement C: Yes, the area of Chhattisgarh is larger than Jharkhand.

Statement D: This statement is also true as. West Bengal has an area larger than Jharkhand.

Hence, A and D are true statements.

**Q.32 Image P shows a portion of a larger photograph. Some operations have been done on that photograph using an image manipulation software. Image Q shows a portion of the resulting photograph. Identify the option(s) that specifies/specify the correct operations.**



- A. Rotate clockwise by 90 degrees, flip horizontally, then rotate clockwise by 90 degrees
- B. Rotate clockwise by 180 degrees, then flip horizontally
- C. Rotate clockwise by 180 degrees, then flip vertically
- D. Rotate clockwise by 90 degrees, flip vertically, then rotate clockwise by 90 degrees

**Solution:**  
Option A:



Fig 1

fig 2

fig 3

fig 4

Option B:

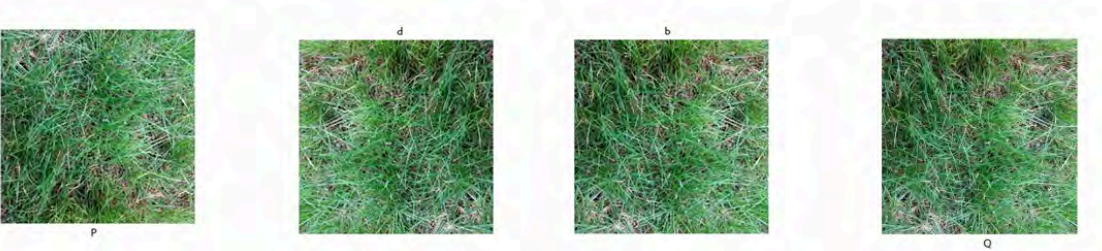


Fig 5

fig 6

fig 7

Option C:



Option D:



Hence, option B and D are correct.

**Q.33 Which of the following birds is/are native to (found in) India?**

Option A:



A

Option B:



B

Option C:



C

Option D:



D

**Solution:**

A is Coucal - A widespread resident in the Indian Subcontinent and Southeast Asia

B is Jungle babbler (*Argya striata*) is found in the Indian subcontinent. They are gregarious birds that forage in small groups of six to ten birds, a habit that has given them the popular name of "Seven Sisters" in urban Northern India, and Saath bhai (seven brothers) in Bengali.

C is The toco toucan, also known as the common toucan, giant toucan or simply toucan, is the largest and probably the best known species in the toucan family. It is found in semi-open habitats throughout a large part of central and eastern South America.

The white-bellied drongo (*Dicrurus caerulescens*) is a species of drongo found across the Indian Subcontinent.

Hence, birds given in option A, B and D are native to India.

**Q.34 The word given below uses a particular font. Which option(s) belongs/belong to the same font?**

# Soulful

Option A:

2

A

Option B:

3

B

Option C:

6

C

Option D:

5

D

Solution:



Soulful

2

A



B

6

C



D

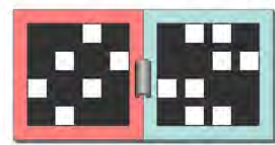
Hence, option B and D belongs to same font.

**Q.35** A set of two frames with square openings when perfectly overlapped with each other allow light though it in certain patterns. Shown below are four sets of such frames. These frames are either hinged (A and B) or pivoted (C and D) to

each other. Assuming that the red frames are fixed, and the blue frames are allowed to move, which option(s) will allow light to pass through, as in the pattern shown on the left?



Option A:



A

Option B:



B

Option C:



C

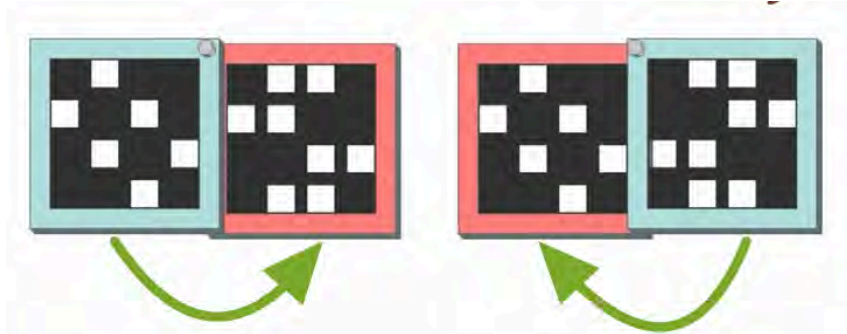
Option D:



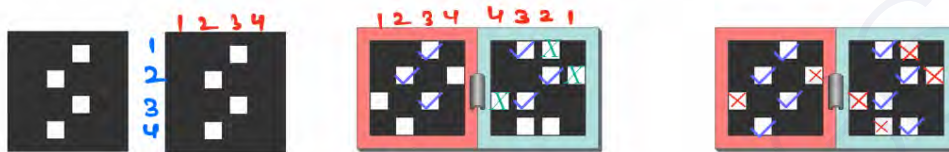
D

**Solution:**

According to question A and B frames are hinged but C and D are pivoted so they are moved on to red (as shown below)



Option A:



As we know, red are fixed and more can move. So we can find out that in first row (fig 1) we want hole at 3. This is satisfied by both red and blue frames. So when blue is overlapped, 2 (blue) will overlap. Now in row 2, the whole is Oct 2 so we have this in both red and blue frames row 3, we need hole at position 3, and we have that hole in both red and blue frames and position 1 hole of frame red will get black. Similarly in row 4 we have a black at position 2 and in red and blue frame also we have hole at position 2 and 3 of blue position will get block.

So we are getting the pattern in option A similarly we can check for other options and see that option A and C are correct.

**Q.36 Refer to the tools below and read the statements. Based on what you can see, which of the following options is/are correct?**



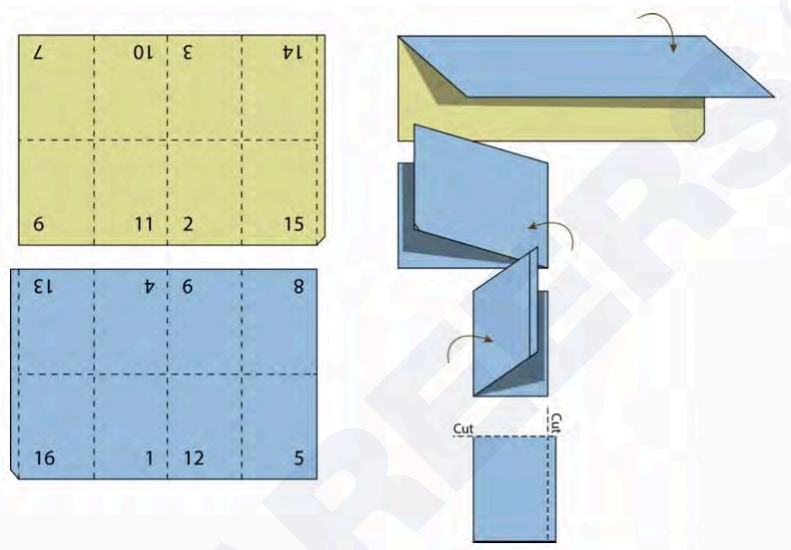
- A. All tools have atleast one common working principle
- B. All of them can be used for cutting fabric
- C. Only one has spring back element, at least one has provision to crack nuts
- D. Three of them have a provision to crack nuts

**Solution:**

All the tools given are use for cutting something or other, but not cutting fabric. Only first have spring back element and second can crack nuts.

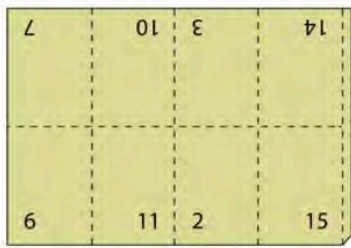
Hence, statement A and C is correct.

**Q.37** Multiple pages of a book are often printed on a single sheet. The sheet is later folded and cut appropriately to get the pages in a correct sequence and orientation. Mistakes happened while printing this particular 16-page booklet. The sheet was printed with pages numbered and oriented as shown on the left. The sheet was folded and cut in the sequence as shown on the right. Given this, which of the options is/are TRUE about the final booklet?



- A. Page 13 appears before page 10
- B. Page 11 is the last odd-numbered page
- C. Page 4 is the first even-numbered page
- D. All pages appear in the correct orientation

**Solution:**

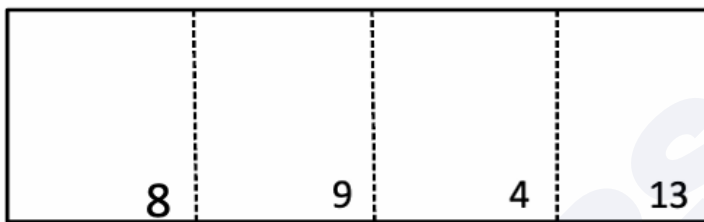


Front Side

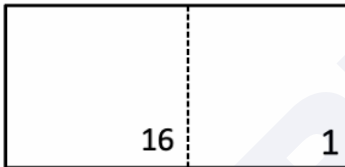


Back Side

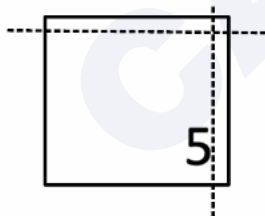
When we fold top part, we will get (operation 1)



Now fold from right to left (operation 2)



Now fold left to right (operation 3)



Now imagine the edge are cut

So the order we get is

5,6,7,8,13,14,15,16,1,2,3,4,9,10,11,12

Now checking options we can see option A B and D are correct

**Q.38** A bag contains 20 socks, of which 10 are white and 10 are black. If the socks are drawn without replacement, which of the options is/are TRUE?

**A.** If 1 sock is drawn at random, the chance that it is white is 50%

**B.** If 2 socks are drawn at random, the chance that both of them are the same colour is 50%

**C.** If 3 socks are drawn at random, the chance that at least two of them are the same colour is higher than if only 2 socks are drawn at random

**D.** If 4 socks are drawn at random, the chance that at least two of them will be the same colour is higher than if only 3 socks are drawn at random

**Solution:**

We know  $\text{Probability} = \frac{\text{favourable outcome}}{\text{total number of outcome}}$ .

Option A:

Probability that one of the drawn socks is white =  $\frac{\text{No. of white socks}}{\text{total socks}} = \frac{10}{20} = 0.5 = 50\%$

Option B:

Chances that both are of same colour =  $\frac{10}{20} \times \frac{9}{19} = 0.23 = 23\%$

Hence, option B is wrong

Option C:

Probability of getting at least two of them are of same colour are:

WWB, WBB, WWW

So we can say that the possibility of two of them of some colour is 100%

Hence, option C is correct.

Option D:

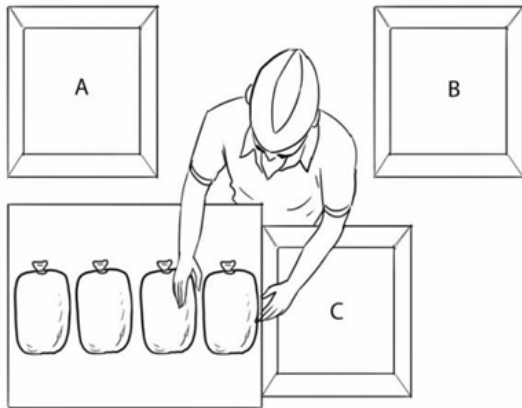
When 3 socks were drawn the chances of getting 2 of them as same colour was 100% and when 4 socks are drawn the chances that 2 of them of same colour is 100% as well for example

WWWB, WWBB, WBBB, WBWB, WBBW, etc.

Therefore, option D statement is false as the possibility is same not higher. Hence, option D is wrong

Therefore, A and C is correct.

**Q.39** In the figure below, a person is putting small packets of potatoes in one of the bins A, B or C. The packets are placed on a table, and the bins A, B and C are placed on tables which are lower in height as compared to the table on which the packets rest. Which of the following statements is/are TRUE?



- A. Lifting the bag from the table and placing it in bin B will be less effortful compared to lifting and placing it in bin C**
- B. Lifting the bag from the table and placing it in bin A will be more effortful compared to sliding it in bin C**
- C. Lifting the bag from the table and placing it in bin B will be less effortful than sliding it to bin C**
- D. Sliding the bag from the table to bin C will be less effortful than lifting it and placing it in bin C**

**Solution:**

Option A : As B is farther compared to bin C with reference to table, so efforts will be more in B. Hence, the statement is wrong.

Option B: As A is farther compared to bin C with reference to table, so efforts will be more in B. Hence, the statement is correct.

Option C: As B is farther compared to bin C with reference to table, so efforts will be more in B. Hence, the statement is wrong.

Option D: Yes, sliding will be less effort than pulling.

Hence, the statement is correct.

Therefore, option B and D is correct.

**Q.40 In a town, there are four kinds of persons: Mizrabs, Frets, Dictions and Scripts. People of any given kind play exactly two musical instruments. An instrument is played exactly by people of two kinds. Some Mizrabs play Tabla. Some Frets play Sitar. The kind that plays Harmonium does not play Sarod. The kind that plays Tabla does not play Sitar. Mizrabs and Dictions do not play the**

same instrument. Frets and Scripts do not play the same instrument. Dictions do not play Harmonium. Which of the following is/are TRUE?

- A. Frets do not play Tabla
- B. Scripts play Tabla
- C. Mizrabs play Harmonium
- D. Dictions play Sitar

**Solution:**

Person	Mizrabs	frets	Dictions	scripts
Musical Instrument 1	Tabla	sitar	sarod	tabla
Musical Instrument 2	Harmonium	sarod	sitar	harmonium

Now check options we can see that options A, B, C and D all are correct.

## Section C: Multiple Choice Questions

**Q.41**

ඡන්තීස්ගඬ් = Chhattisgarh

කේරල = Kerala

පන්ජාබය = Punjab

ගුජරාතය = Gujarat

Maharashtra = ?

**Option A:**

A. තමිල්නාඩුව

**Option B:**

B. රාජස්ථාන්

**Option C:**

C. ත්‍රීපුරා

Option D: —

D. මහාරාෂ්ට්‍ර

**Solution:**

Basically this is coding decoding type of question, so try to find out element which is common and then try to compare.

ඡන්තීස්ගඪ් = Chhattisgarh

කර්ල = Kerala

පන්ජාබ් = Punjab

ගුජරාතය = Gujarat

Maharashtra = ?

A. නම්ලනාඩු

B. රාජස්ථාන්

C. ත්‍රීපුරා

D. මහාරාෂ්ට්‍ර

This shape is common, and the letter common here are sound Ra, so in Maharashtra we get Ra sound

Therefore in option we need this common shape, Hence option A is eliminated, now option B is also eliminated because it comes in beginning. We need Ra sound in the middle, so only option D satisfies the condition.

Therefore, option D is correct.

**Q.42** The word given below uses a particular font. Which option belongs to the same font?

प्रसिद्ध

Option A:

A

Option B:

B

Option C:

C

Option D:

D

**Solution:**

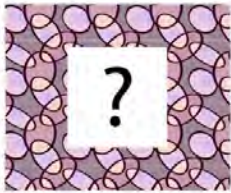
We need to identify the particular font

This part only matches with option A

A

Hence, option A is correct.

Q.43 Which option will replace the question mark?



Option A:



A

Option B:



B

Option C:



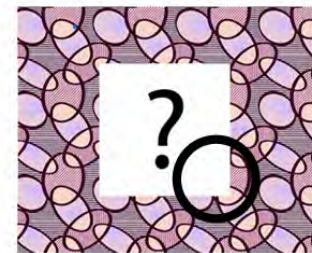
C

Option D:

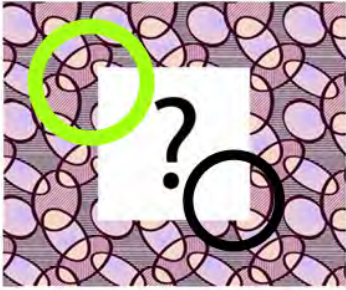


D

Solution:

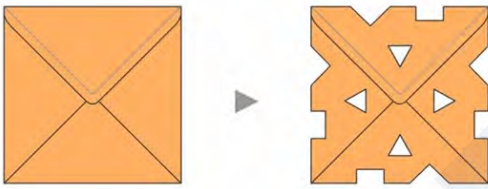


To complete this pattern we need minor part of oval shape .  
So option C and D is eliminated.

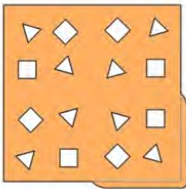


To complete this we need a small oval which is need to be completed also a oval whose line is cut. So option B is correct.

**Q.44** An envelope made of a single piece of paper is taken, and a few cuts are made on it. The envelope and the cuts are shown below. Identify the resulting figure when the envelope is unfolded?

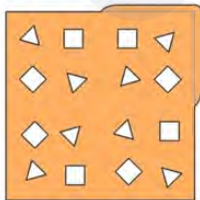


**Option A:**



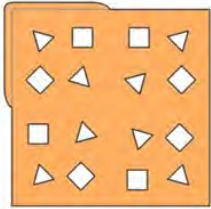
A

**Option B:**



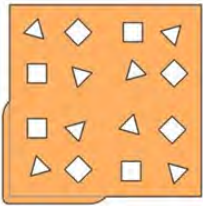
B

**Option C:**



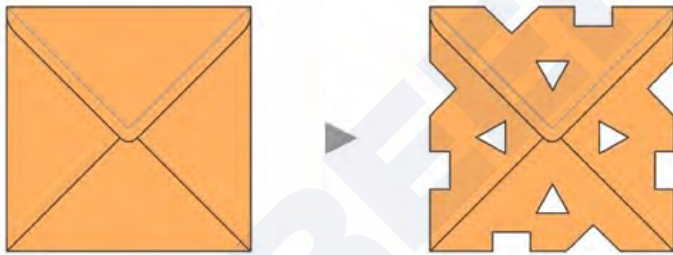
C

**Option D:**



D

**Solution:**



In these kinds of question, go with elimination method.

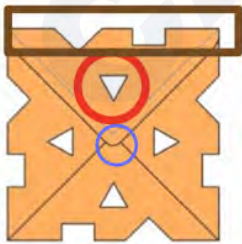
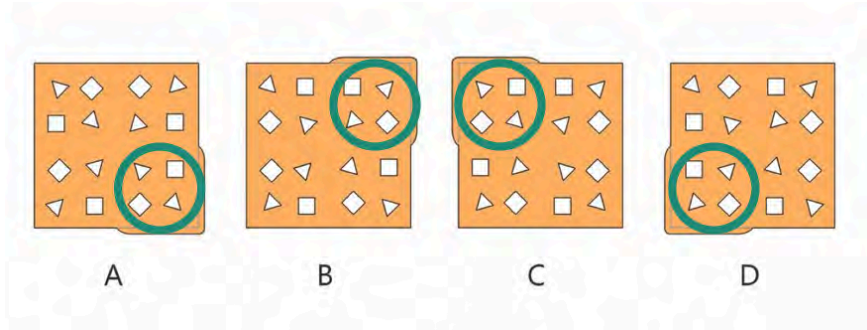


Figure 1

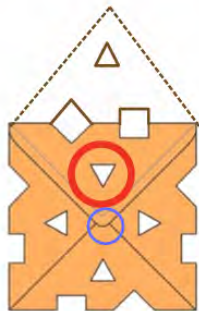
Let's look at this top cover (as shown in the above image) at the centre of which a triangle has been cut. Now when this is going to open up, the triangle will point towards the corner (Highlighted with purple)

Now check options, we can see none can be eliminated so far.

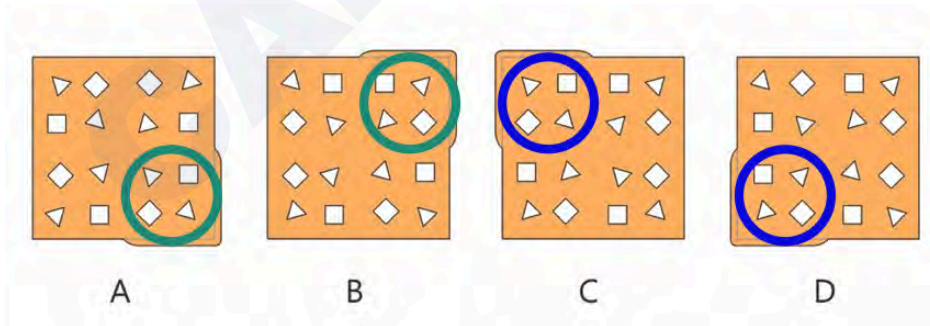


Now when figure 1 is opened, the  $\Delta$  cut will be one outside but opposite to that, there will be another triangle that is painting towards the centre of the paper. So this condition is satisfying by all the given options.

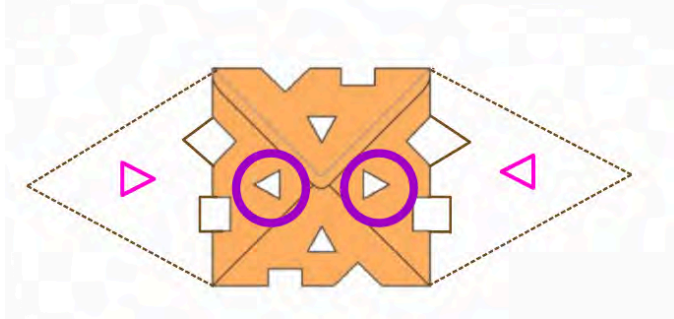
Now let's look at the cut (figure 1) that is highlighted with brown. When this is open up we get square and square and right square top is parallel to bottom of triangle (as shown below)



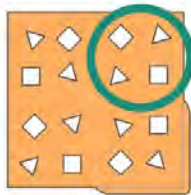
So we can eliminate C and D (as shown below)



Now, look at the other 2 cuts that are made (shown below)



We can see that the triangle (pink) are pointing inside  
So A is eliminated as (shown below)



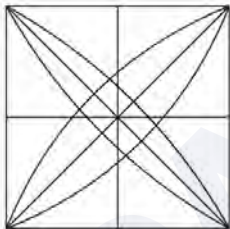
A



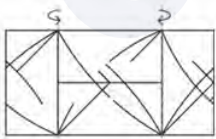
Triangles are pointing in the same direction

Hence, option B is correct.

**Q.45** Shown in the four figures A, B, C, and D on the right, are broken lines drawn on a transparent sheet. Each figure is folded over along the dotted lines as shown. Identify the correct option that will generate the motif shown on the left.

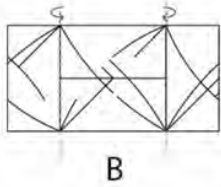


**Option A:**

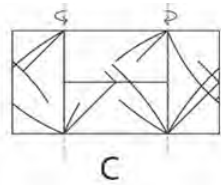


A

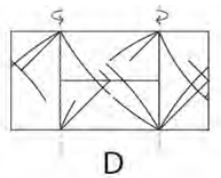
**Option B:**



**Option C:**



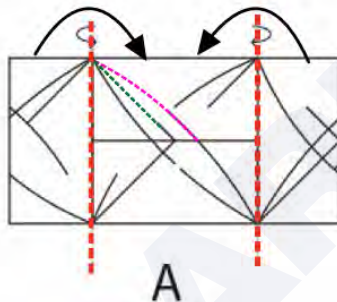
**Option D:**



**Solution:**

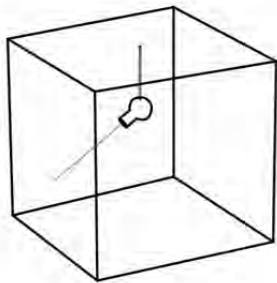
This question is purely based on observation.

Option A:

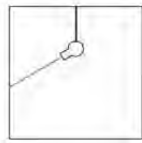


We can see overlapping can be done in option A as shown above. Hence, only option A is the correct answer.

**Q.46** A light source is attached to a rod fixed in the centre of the ceiling of a square room. This source rotates 360 degrees with the rod as its axis. This source projects a red beam of light onto the four walls of the room. This setup is shown in the isometric view and the side view in the figure below. Identify the correct path of the beam of light on the four walls of the room.

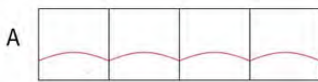


Isometric View

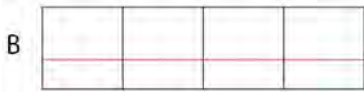


Side View

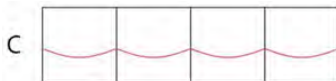
**Option A:**



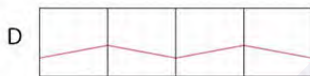
**Option B:**



**Option C:**

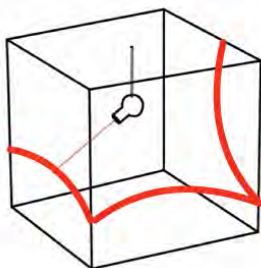


**Option D:**



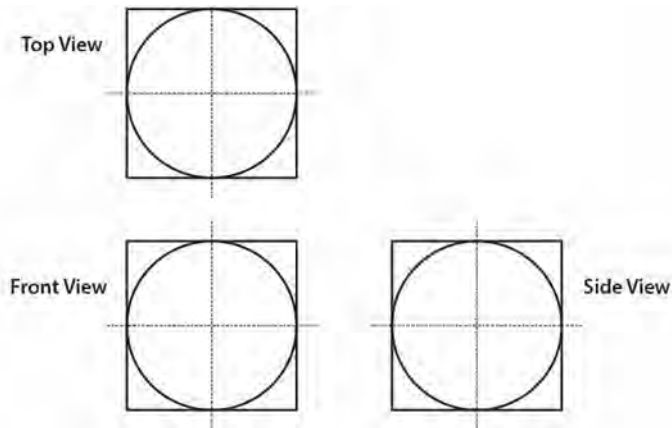
**Solution:**

Imagine that the light is falling at the centre of the wall, so the distance from the source of light to the surface is the least when it is at the centre. When light is travelling to the bottom floor so it will at a point lower than at the centre, that make this to create a path which is highest at the centre and going slightly lower towards the edges (as shown below)



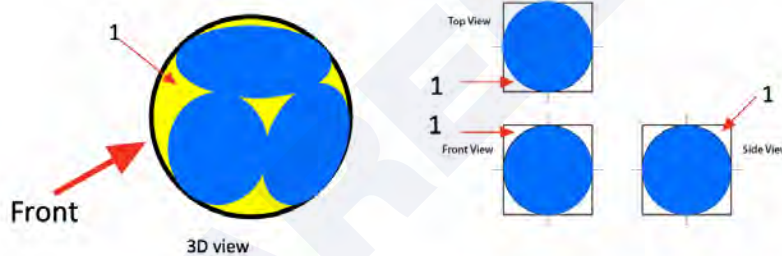
Hence, option A is correct.

**Q.47** The figure below shows the top view, the front view, and the side view of a three-dimensional solid object. What is the minimum number of surfaces that a solid, with these views, can have? Assume that there are no hidden lines.



- A. 12
- B. 14
- C. 16
- D. 30

**Solution:**



Above image shows the 3 D view and the corresponding Top, front and side view. 1 denotes the curved surface in 3-D view. The same surface will be visible on the top, front and side views . So surface 1 shouldn't be counted thrice, but only one.

No of surface in the top view =5  
 No of surface in the bottom view= 5  
 No of surfaces in the front view=1  
 No. of surfaces on the left side=1  
 No. of surfaces in the back view=1  
 No of surfaces on the right side view=1

Total surfaces= $5+5+1+1+1+1= 14$

Hence, option B is correct.

**Q.48** Sheetal is running. Which option denotes the most natural pose?

Option A:



Option B:



Option C:



Option D:



Solution:



We can see in the image above that when the right leg steps ahead, then the left hand comes forward and right hand goes behind.

Now we can eliminate option A, B and D

Hence, option C is correct.

**Q.49 Identify the correct profile of the cricketer that corresponds to the given front pose.**



**Option A:**



**Option B:**



B

Option C:



C

Option D:



D

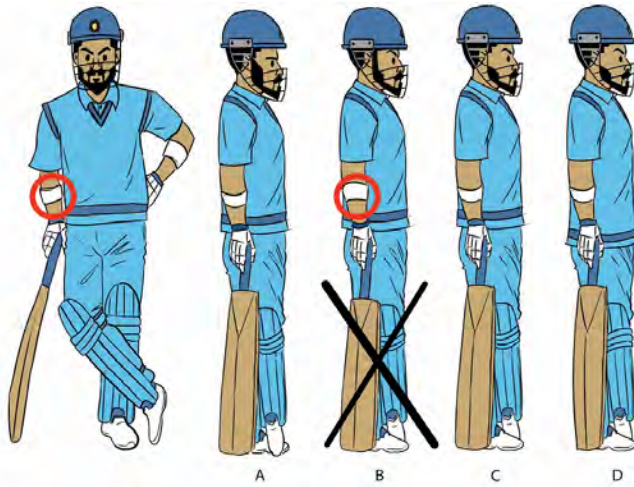
**Solution:**

We need to check each part of the figure, compare and eliminate.

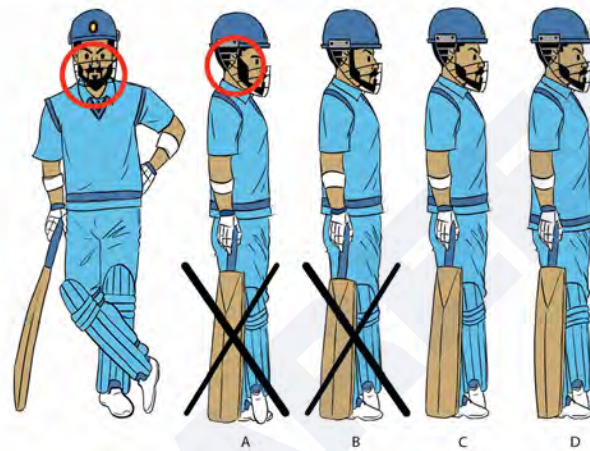
Step 1:

The curve of hand band in the side view should be like the curve in the original image, i.e, downward.

Hence, option B is eliminated.

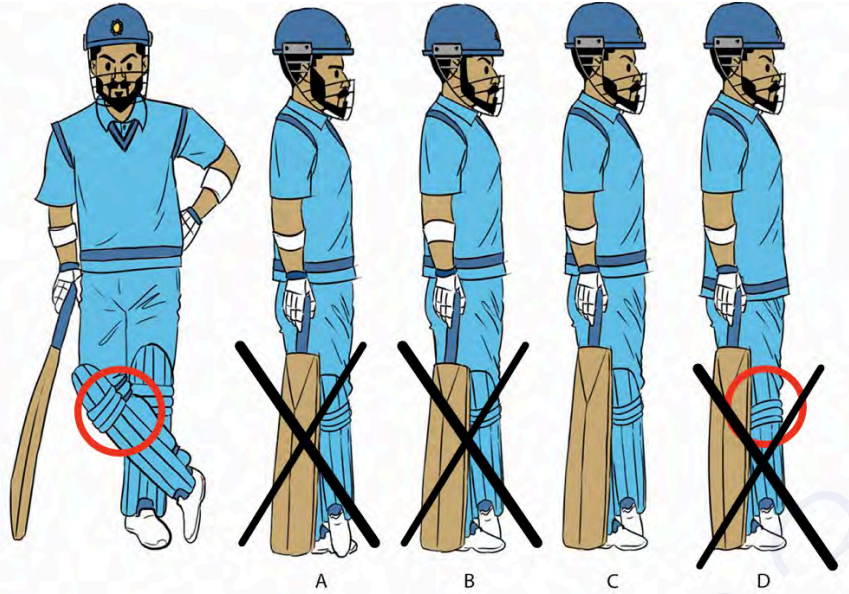


Step 2: The beard cut should be to the horizontal level of the moustache. Option A is also eliminated.



Step 3:

The curve of padding should be upward as the batsman leg is crossed. So, option D is eliminated as well.



Hence, option C is correct.

**Q.50** Seema on the left, is looking in a mirror. Which option shows her reflection correctly?



**Option A:**



A

**Option B:**



B

Option C:



Option D:



**Solution:**

The image of an object as seen in a mirror is its mirror reflection or mirror image. In such an image, the right side of the object appears on the left side and vice versa. A mirror-image is therefore said to be laterally inverted, and the phenomenon is called the lateral inversion.

**Example.**



Now ATQ,



Hence, option C is correct.

**Q.51** Kavita is holding a lit torch below her face as she narrates a ghost story to her friends in a dark room. Which option shows the lighting correctly?

Option A:



A

Option B:



B

Option C:

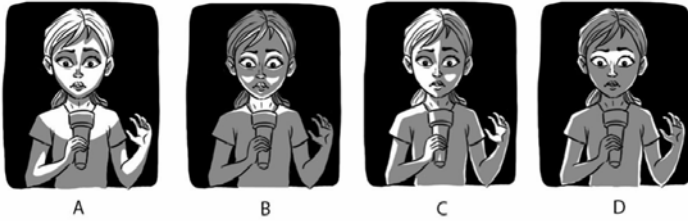


Option D:



D

**Solution:**



We know she is holding a torch below her face in a dark, and no other source is there in this room.

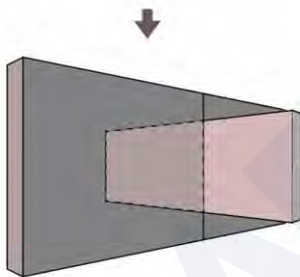
Option A:

When she is holding a torch in her hand, light can't lighten up her shoulder. Hence, A is eliminated.

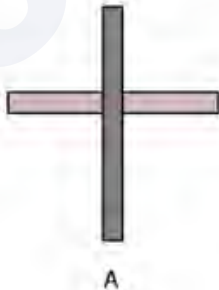
Option C: Left side is fully lighted, seems light is coming in from left side. Hence, option C is wrong.

Option D: No light on chin, which makes this option is incorrect. Hence. Option B is correct.

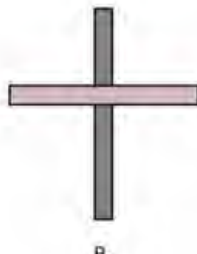
**Q.52 Which option correctly represents the top view for the given perspective view?**



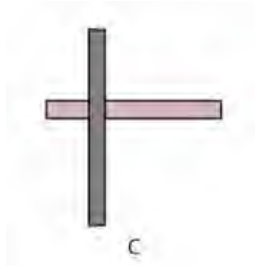
**Option A**



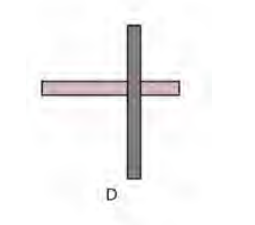
**Option E**



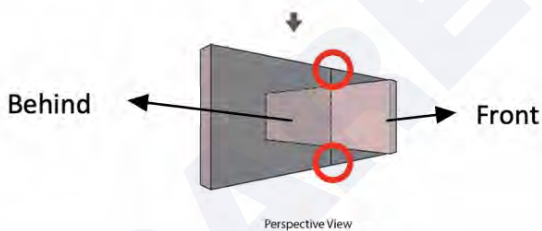
Option C:



Option D:



Solution:



Perspective view is given, so we here to find out top view. If we observe the perspective view, we have this big grey board and this beige piece is intersecting it through centre but it not there at top and bottom (as highlighted above), also the piece behind seems to be bigger as compare to front side.

Option B: If we observe the option we can eliminate option B as big grey part should be continuous but in B it is distorted. Hence, this option is wrong.

Option A: Beige part is equal in this, which is not the case. Hence, this option is wrong.

Option C:

The front portion shown in this is bigger than the back portion, which is not the case in perspective view.

Hence, this option is wrong.

Hence, option D is correct.

**Q.53** A milkman is returning from his trip on his bicycle. He has two empty containers of 5 litres and 3 litres hanging on one side of the bicycle, and a full 8 litres milk container on the other side. He was not able to ride the bicycle properly. So he stopped and decided to distribute the milk, so that the load becomes balanced on the both sides of the bicycle. Unfortunately, he has forgotten his measuring cup on his last stop.

How many minimum turns will it take for him to be able to distribute the milk into two equal halves to balance the load? Ignore the weight and other material properties of the containers and the bicycle.

- A. 6
- B. 7
- C. 8
- D. 9

**Solution:**

He has 8 litres of can which is full and on the other hand he has 2 empty cans of 5 and 3 litres.

ATQ,

Steps	Milk in 8 L Can	Milk in 5 L can	Milk in 3L can.
0	8L	0	0
1	3L	5L	0
2	3L	2L	3L
3	6L	2L	0
4	6L	0	2L
5	1L	5L	2L
6	1L	4L	3L
7	4L	4L	0

So in total 7 litres will be taken by him to distribute the milk into two equal halves to balance the load.

Hence, option B is correct.

**Q.54** Four students P, Q, R and S are shown a box which contains a few white balls, and a few red balls. Their teacher asks each of them individually to make a statement. The teacher knows that exactly one of them is a liar and others are not. From the statements that they make, the teacher is able to find out who the liar is. Given below are the statements made by the students. Who is the liar?

**P says:** There are an equal number of red balls and white balls.

**Q says:** P is a liar and there are 3 red balls and 2 white balls.

**R says:** Q is not a liar, and there are some red balls and some white balls in the box.

**S says:** R is not a liar.

- A. P is the liar
- B. Q is the liar
- C. R is the liar
- D. S is the liar

**Solution:**

Start with the options and start eliminating them

Option A:

P is a liar

If P is a liar, then we have the unequal number of red and white balls.

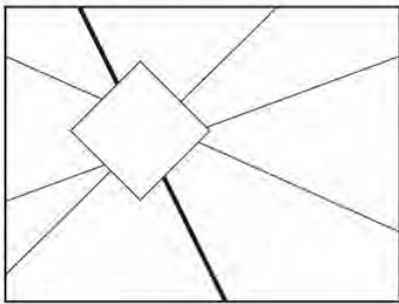
Q says: P is a liar and there are 3 red balls and 2 white balls, then this statement B is true.

R says: Q is not a liar, and there are some red balls and some white balls in the box. Then this statement is true.

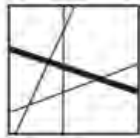
S says :R is not a liar, this statement is True as well.

Hence, option A is correct.

**Q.55** Shown below is an image with straight lines, in which, a tilted-square has been cut out. From the given options, identify the missing cut out of the square that completes the original image.

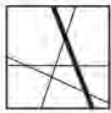


Option A:



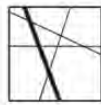
A

Option B:



B

Option C:



C

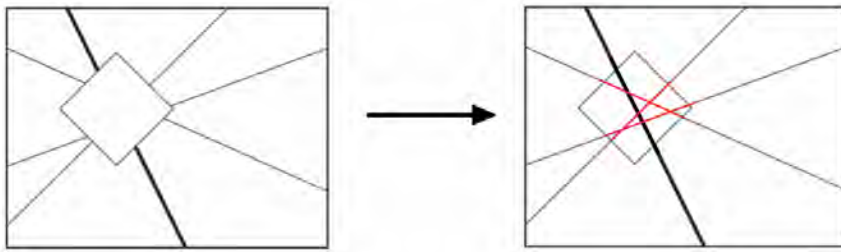
Option D:



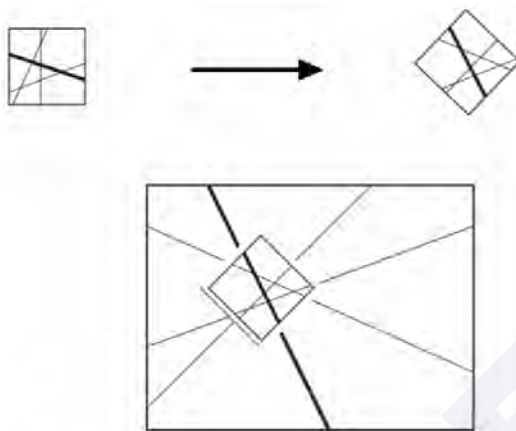
D

**Solution:**

In such question, check each option one by one. Now, before that, try to complete the image.



Option A : If we rotate the figure in option A we get the fig which exactly fits in the given square (as shown below)



Hence, option A is correct.

**Q.56** A T-shirt with folding marks and the folding sequence is shown on the left. The folding is done backwards and perfectly along the lines. After completing all the folds, the T-shirt is then turned around. Identify the correct folded T-shirt from the options on the right.



Option A:



A

Option B:



B

Option C:



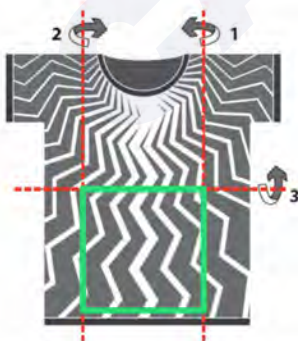
C

Option D:

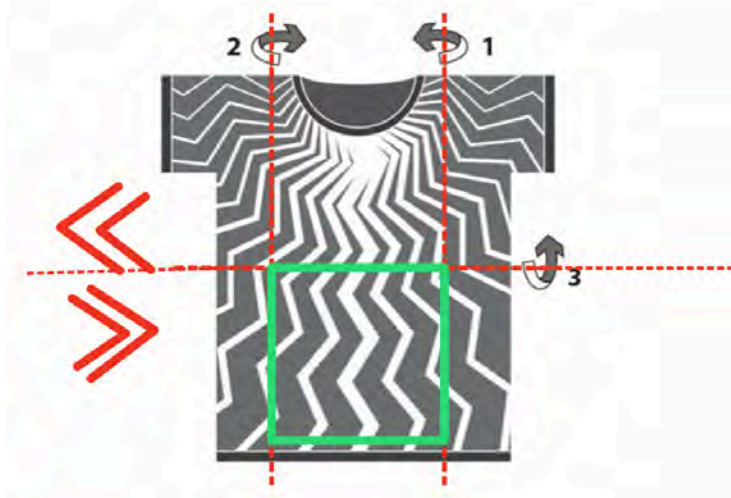


D

Solution:



At the end of 3 folds and when turned back, the bottom portion as highlighted in green will cover the rest of the folds. However first this part is going to put up so take middle most zigzag as reference (as shown below)

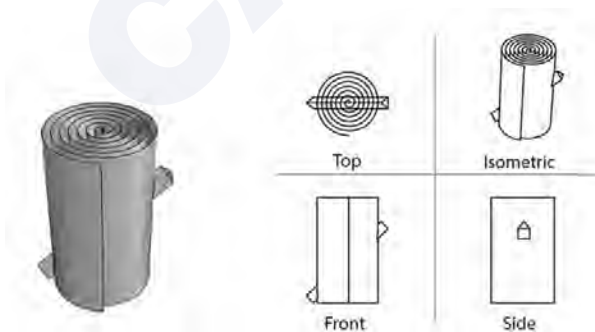


So Option A and D is eliminated.



When we observe option B and C, we can see a thin line in B (as shown above)  
Hence, option C is correct.

**Q.57** A paper strip is rolled and then punched by a triangular punch, as shown below. After unrolling the paper strip, what would be the pattern of holes on the paper?



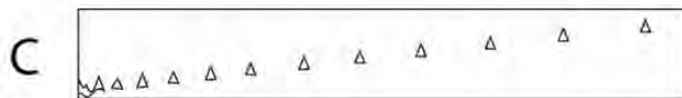
**Option A:**



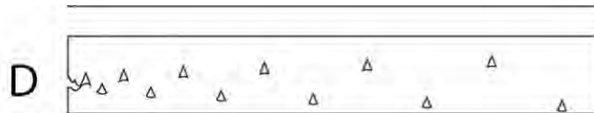
Option B:



Option C:



Option D:



Solution:

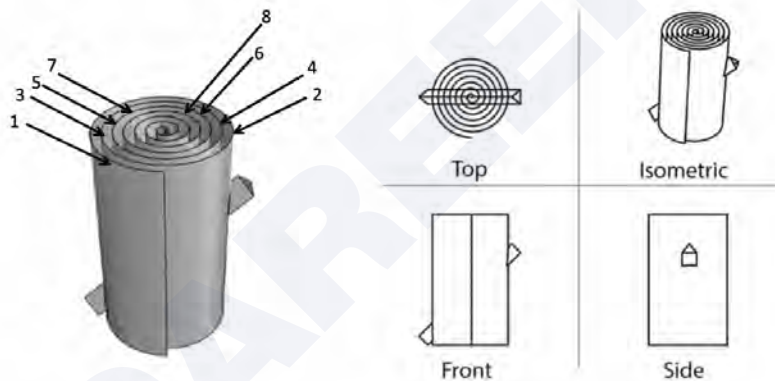


Fig 1

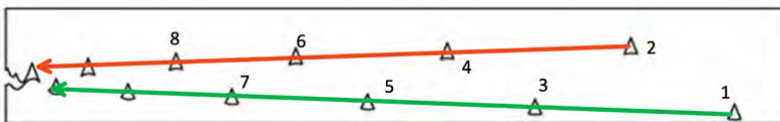


Fig 2

As shown in the image above, the cut happens alternating as marked with No. in consecutive way.

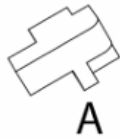
When the cuts made, their alignment will be increasing on one side and decreasing on other side (as shown in fig 2)

Hence, option D is correct.

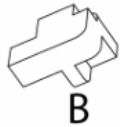
**Q.58** Identify the option that will replace the question mark.



**Option A:**



**Option B:**



**Option C:**



**Option D**



**Solution:**

If we observe then we can find it is the same object which is turning slightly.



**Option A:**

The turn/ twist is much here, and it turned fully to the side.

**Option C:**

It is falling forward and twisting very less.  
Hence, option C is correct.

**Q.59 How should the two solids be joined in order to form a tetrahedron?**

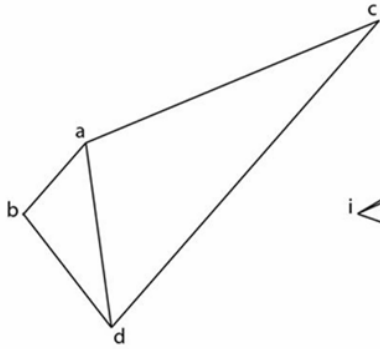


Fig 1

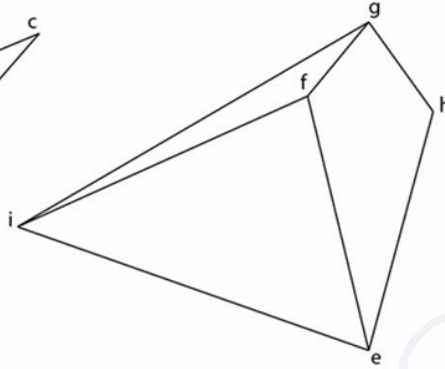


Fig 2

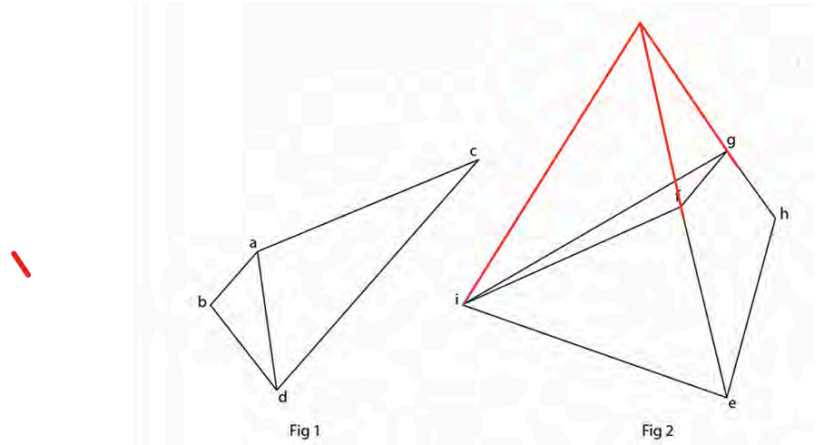
- A. ci, ag, be
- B. af, bg, ci
- C. ae, ci, bf
- D. ci, ae, dh

**Solution:**

A Tetrahedron is a polyhedron composed of four triangular bases, six straight edges, and four vertex corners.  $\therefore$  A Tetrahedron is also known as a triangular pyramid.

For example





Turn fig 1. And twist to make it fit over the gfi force.

So,

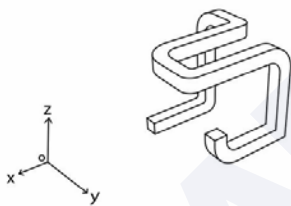
'A' will be match 'f'

'B' will be match of 'g'

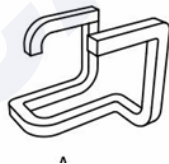
'C' will be match of 'i'

Af, bg, ci hence option B is correct.

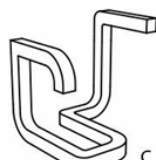
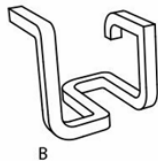
**Q.60** Perspective view of an object is shown below. The object is rotated 180 degrees around y-axis (when viewed from a point on the positive y-axis towards the origin) and then similarly rotated 180 degrees around z-axis. Which of the following perspective view options will be the result of the rotations? Assume positive x and y axes point in the direction of the viewer.



**Option A:**

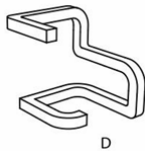


**Option B:**

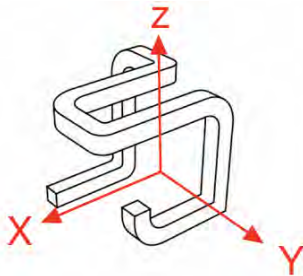


Option C:

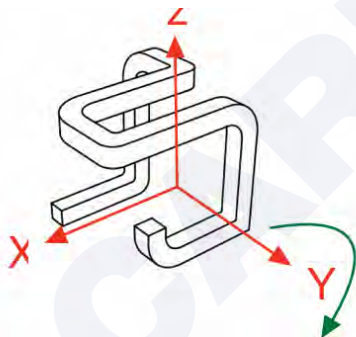
Option D:



Solution:



So firstly the object will be rotated 180 degree around y-axis (as shown below)



Now after rotating 180 degree around y-axis , next move is to move 180 degree around Z-axis. We get option A.

Hence, option A is correct.

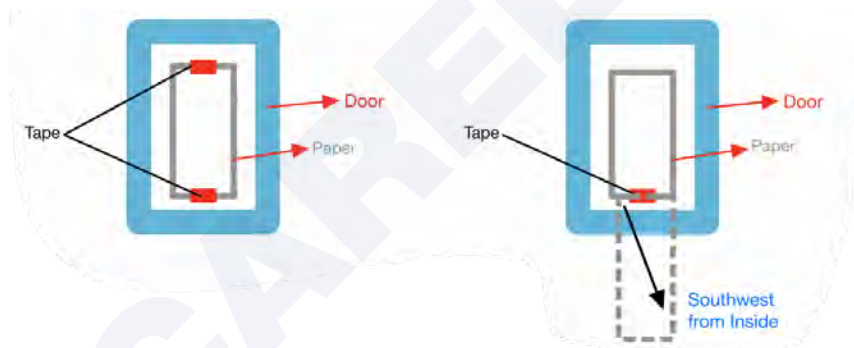
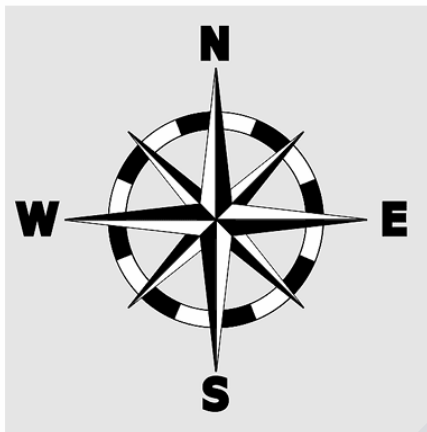
**Q.61** On a glass entrance door of a building, there is an arrow sign pointing towards the newly shifted office space on the first floor. The sign is printed on a paper and pasted on the outside of the door using two tapes, one at the top-middle, and the other at the bottom-middle. Due to the frequent use of the door, the top tape is peeled off, and the paper falls with the bottom tape holding it. After falling, from inside the building, one can see the arrow sign pointing

towards the Southwest direction. If that is the case, in which direction was the arrow sign originally pointing to (as seen from outside)?

- A. Southeast
- B. Northeast
- C. Northwest
- D. North

**Solution:**

We know the directions



**Fig 1**

**fig 2**

Fig 2 When the top tape peeled off, the paper falls and bottom tape holding it. From inside the building one. We can see the arrow sign pointing towards the southwest direction.

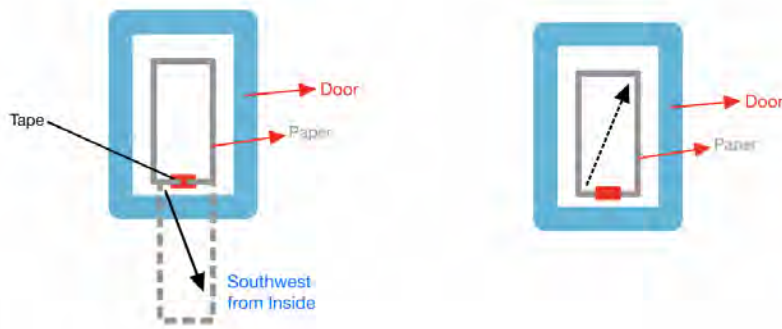
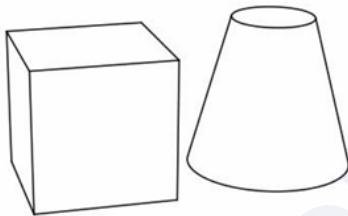


Fig 3 when paper folded is back.  
 So the new direction of the arrow is south-east.  
 Hence, option A is correct.

**Q.62** A cube and a truncated cone are shown below. The cube has dimensions  $10 \times 10 \times 10$  units. The truncated cone has a base diameter of 12 units, height of 11 units and top diameter of 6 units. Imagine these two solids are intersecting while positioned coaxially on the same base. Further, imagine the cube vanishes completely along with the intersected portion of the truncated cone. What remains?



**Option A:**

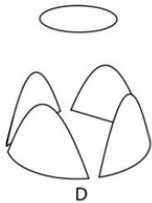
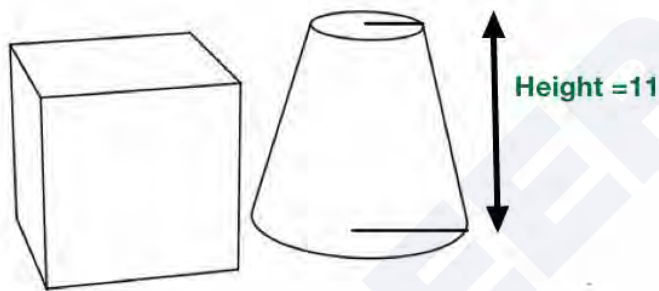


**Option B:**



**Option C:**

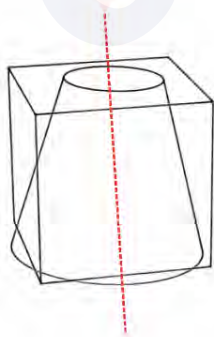


**Option D:****Solution:**

We can observe that cone is slightly taller than cube.

Coaxially means Co+ axial that is they both have common axis

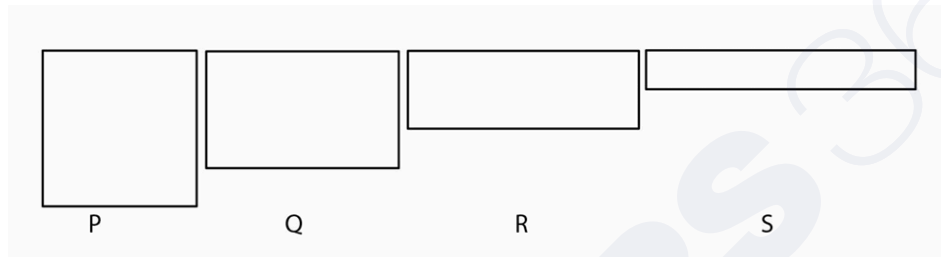
Now visualize as diameter of cone is larger than base of cone, so some part of the base of cone will come out and also if we see the height then cone is larger than cube so some part of the cube of diameter 6 will come out. So the cube get vanished, only the part which is coming out will remain (as shown below)



If we observe it carefully, we can eliminate B and D in one go, but if seen minutely we know some bottom part has straight lined and gap between top and bottom should be more. So option

C is eliminated. Hence, option A is correct.

**Q.63 Afreen is a teacher. She decides to give biscuits to her students Javed, Jai, Joshua and Jaspreet. She has biscuits of four different sizes, all of which have the same perimeter and thickness. The proportions of the biscuits are shown below. She asks Javed, Jai, Joshua and Jaspreet, in that order, to pick biscuits in descending (largest to smallest) order of volume. Which biscuits should Jai and Jaspreet pick up respectively?**



- A. Q and R
- B. P and S
- C. Q and S
- D. P and R

Solution:

If thickness and perimeter is same, then volume of the biscuit depends upon on the area.

We know,

$$Volume = Area \times thickness$$

So,

$$Volume \propto area \quad [\text{As thickness is constant}]$$

For biscuit P,

Left side of square=4 unit

$$Area = 16 \text{ unit} \quad [\text{area of square } side^2]$$

$$Perimeter = 16 \text{ units} \quad [\text{perimeter of square} = 4 \text{ side}]$$

For biscuit S,

As perimeter should be=16

S is nothing, but a rectangle.

We can see length > breadth.

So let length =7 unit

Breadth =1 unit

Perimeter of rectangle  $= 2[L + B]$

$$16 = 2[7 + 1]$$

$$16 = 16$$

Length  $= 7$  unit, breadth  $= 1$  unit.

Area of rectangle  $L \times B = 7 \times 1 = 7 \text{ unit}^2$

So, P (area)  $>$  S (area)

P is the largest and S is the smallest.

Javed will pick largest  $= P$

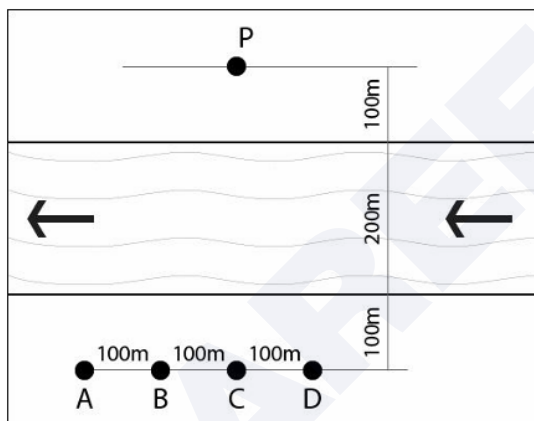
Jai will pick Q

Joshua will pick R

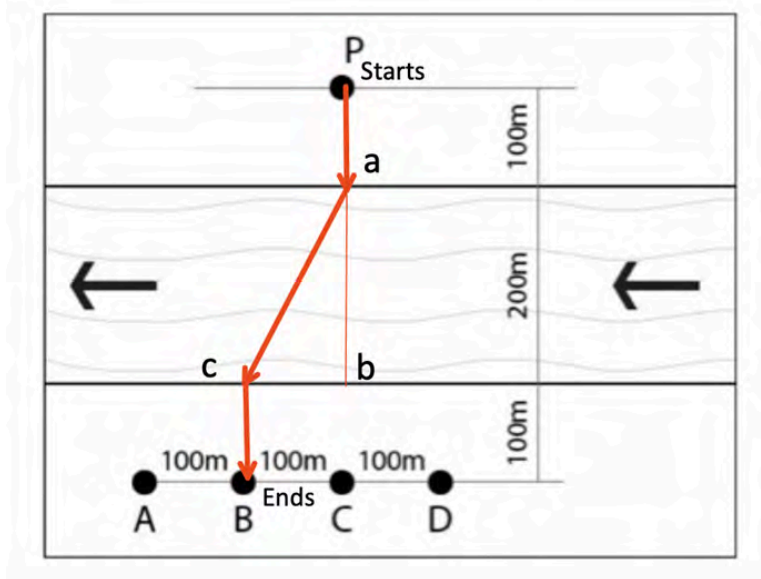
And Jaspreet will pick S

Hence, Q and S i.e., Option C is correct.

**Q.64** A crocodile at point P sees four meatballs at A, B, C and D across the river. The crocodile moves with the same speed on ground as well as in water. If the speed of river is half the speed of crocodile, which meatball can it catch in the shortest time?



**Solution:**



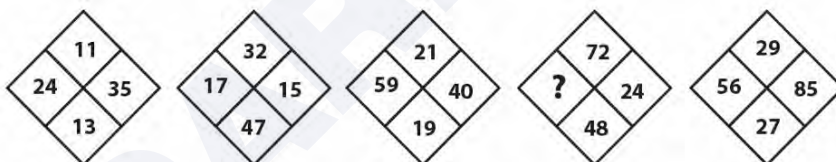
Crocodile starts from P and go straight and reach a but when enters the water it is going to move in direction to reach b but because of pressure that is exerting from water will move its path c (purple path)

Now,

Let crocodile covers 200 m in 1 min, and we know the speed of river is half the speed of crocodile so it will move 100 m in 1 min i.e. Half of 200m. So crocodile go straight and reach B

Hence, the answer is B.

**Q.65 Which number will replace the question mark?**



- A. 21
- B. 24
- C. 28
- D. 30

**Solution:**

In pattern 1, (Choose small no first and then add)

$$11+13=24$$

$$24+11=35 \quad \text{(add the sum with the smallest no.)}$$

Pattern 2,

$$17+15=32$$

$$32+15=47$$

Pattern 3,  
 $21+19=40$   
 $40+19=59$

Pattern 5,  
 $29+27=56$   
 $56+27=83$

Pattern 5  
 $?+24=48$   
 $?+48=72$

So check options

Option A:  $21+24 \neq 48$

Option B:  $24+24=48$

$24+48=72$

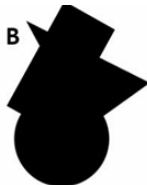
**Q.66** Which black shape from the options will match the white shape in the figure, using simple rotation.



Option A



Option B:



Option C:



Option D:

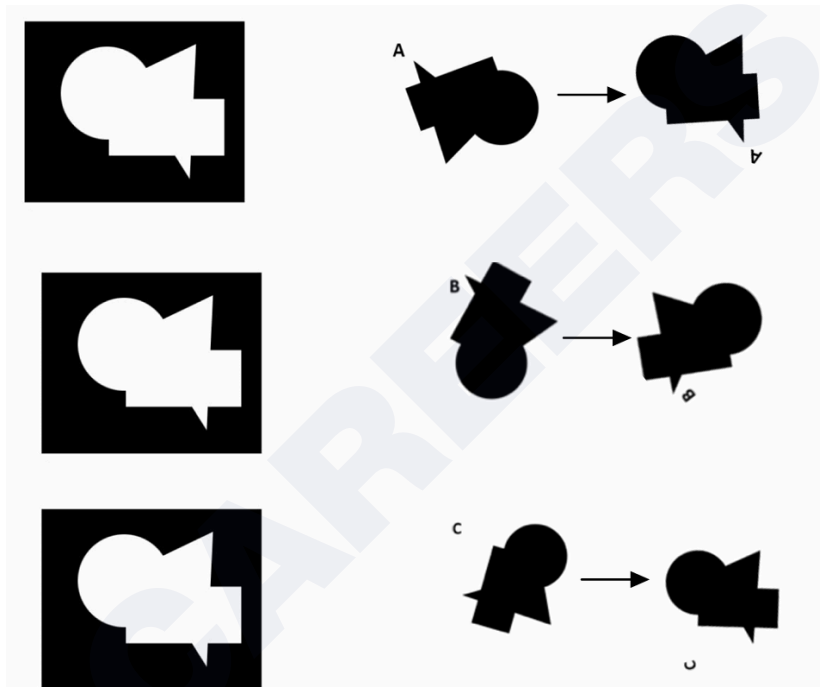


**Solution:**

In such question, we need to observe option one by one.

If we rotate option A we can see that the straight (bottom) is missing.

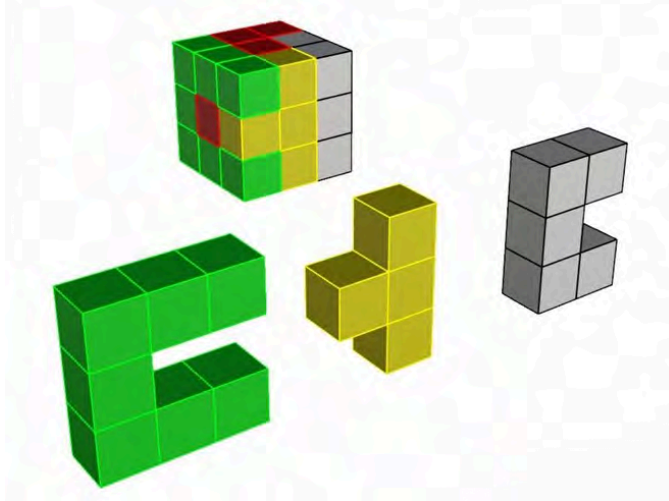
Option B rotated won't fit the image. Hence, this option is wrong.



In option C we can see that straight is matched. And the rotated fig can easily fit into the shape.

Hence, option C is correct.

**Q.67** The figure below shows a  $3 \times 3$  cube with 4 colours. The same coloured shapes are detached and shown separately for reference. Identify the shape of the red block from the given options.



Option A:



A

Option B:



B

Option C:



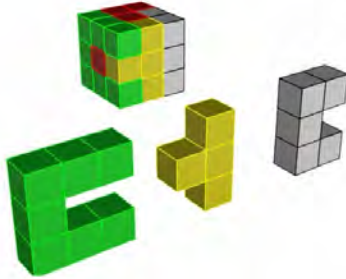
C

Option D:



D

Solution:



First count total no of blocks i.e. Its  $3 \times 3$

So 1 layer has 9 cubes and 3 layers have 27 cubes.

Now count no of cubes in the shapes those are detached and shown separately

Green colour=7 cubes

Yellow colour=4 cubes

Grey colour=5 cubes

So we can say red should have  $=27-(7+4+5)$

$$=27-16$$

$$=11 \text{ cubes.}$$

Option A has 10 cubes

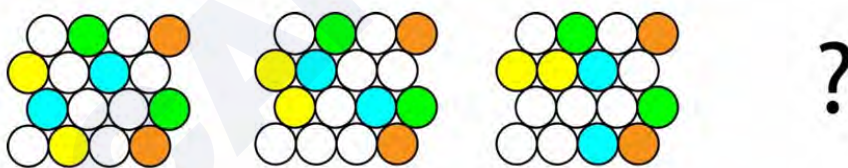
Option has 11 cubes

Option C has 9 cubes

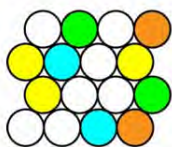
Option D has 12 cubes

Hence, option B is correct.

**Q.68 Which option will replace the question mark?**

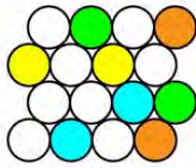


**Option A:**



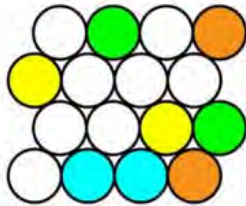
A

**Option B:**



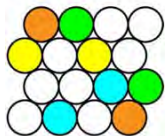
B

Option C:



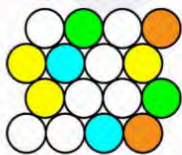
C

Option D:

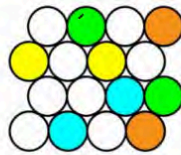


D

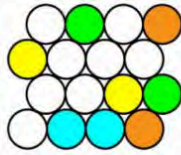
Solution:



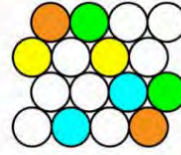
A



B



C



D

Now observing each option we know that the blue circle will move one step a head, similarly the rest others, and we get the image which is some of the option B. Hence option B is correct.

**Q.69 B is correct** Jaya, Sushama, Rama, Dilip, Sudhir and Arun are doctors working in a hospital specializing in gynaecology, neurosurgery, paediatrics, orthopaedics, anaesthesia and intensive care, not necessarily in that order. What is Rama's specialization if the following conditions are to be met:

- Jaya, Arun and Sushama work together.
- Neurosurgeons always need the help of orthopaedic surgeons in the operation theatre.
- Orthopaedic surgeries cannot happen on the same days that gynaecological surgeries happen.
- Gynaecologists need paediatricians on standby during their operating hours.
- Though Sudhir and Dilip work together, neither has ever met Sushma in the hospital.
- All specializations except intensive care need to work with Arun, the anaesthetist.
- Doctors don't work together other than as mentioned above.

- A. Neurosurgery**
- B. Intensive care**
- C. Orthopaedics**
- D. Paediatrics**

**Solution:**

So in such question, read step by step and note down all the given details in order to reach the final answer.

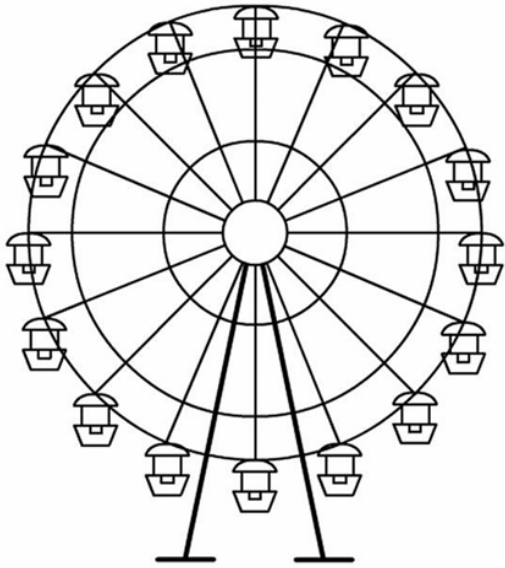
As according to question, a Gynaecologist needs a paediatrician on stand by during operating hours, which implies that they work together. Similarly, orthopaedic surgeries can't happen on the same days that gynaecologist and paediatrician are not working together Neurosurgeons always need the help of orthopaedic surgeons in the operation theatre So this mean that Neurologist and Orthopaedic work together.

Dilip and Sudhir have never met Sushma.

Consider Sushma belongs to Gynaecologist (we can say that Jaya, Arun are with sushma). Sudhir and Dilip belongs to Neuro and Ortho. A run is Anathiest. Rama is left over, and we can say that he left over work is intensive care. Hence, B is the correct answer.

**Q.70 Shown below on the left is a Ferris wheel which is not in motion. A photographer has clicked a photograph of the Ferris wheel while it was rotating at**

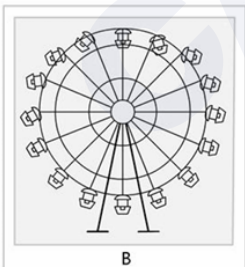
its maximum speed in an anti-clockwise direction. Which of the options below is the image that he has captured?



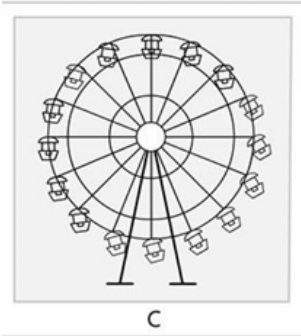
**Option A:**



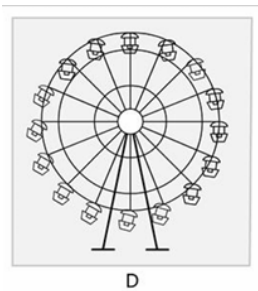
**Option B:**



**Option C:**

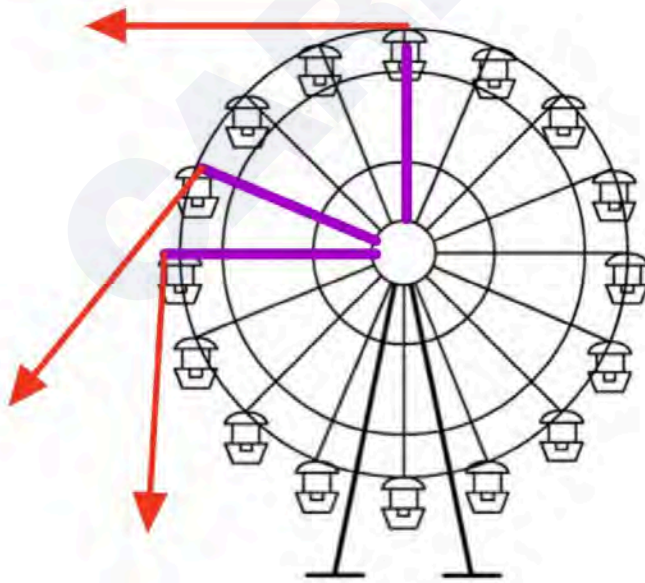


**Option D :**

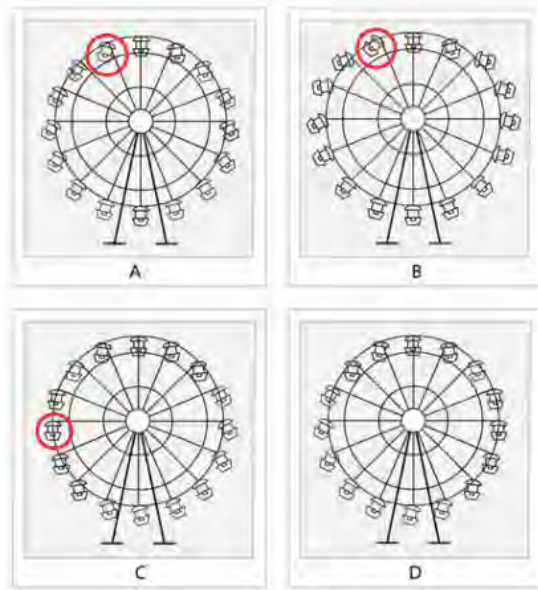


**Solution:**

**Centrifugal force:**– The apparent force that is felt by an object moving in a curved path that acts outwardly away from the centre or rotation. Examples:– When the engine spins fast enough, centrifugal force overwhelms the springs and pushes them into the drum, pulling it and the chain along.



Here the concept of centrifugal force is applied.



The highlighted part option A is wrong because when the wheel picks up speed this position seat will not move this much angle.

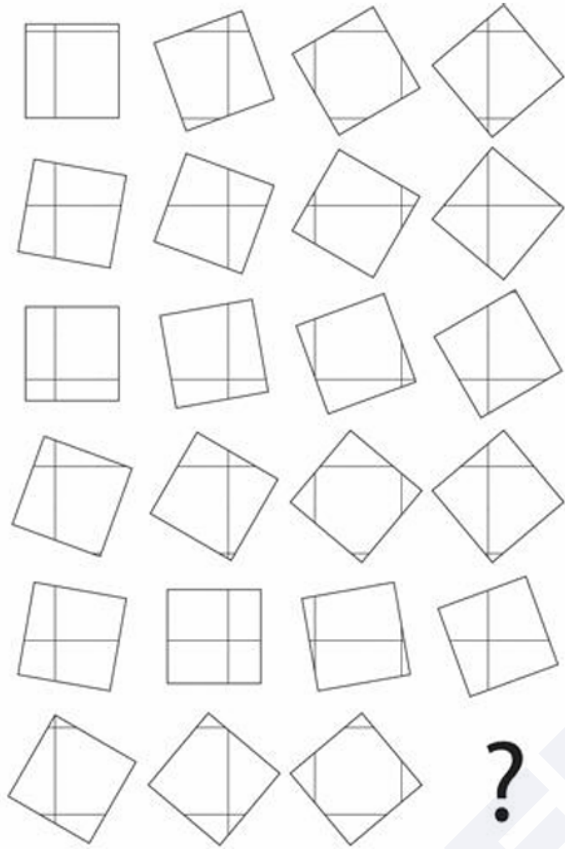
Option B:

Same reason as option A.

Option C: The seat can't remain straight when wheel is moving.

Hence, option D is correct.

**Q.71 Which option will replace the question mark?**



**Option A:**



**Option B:**



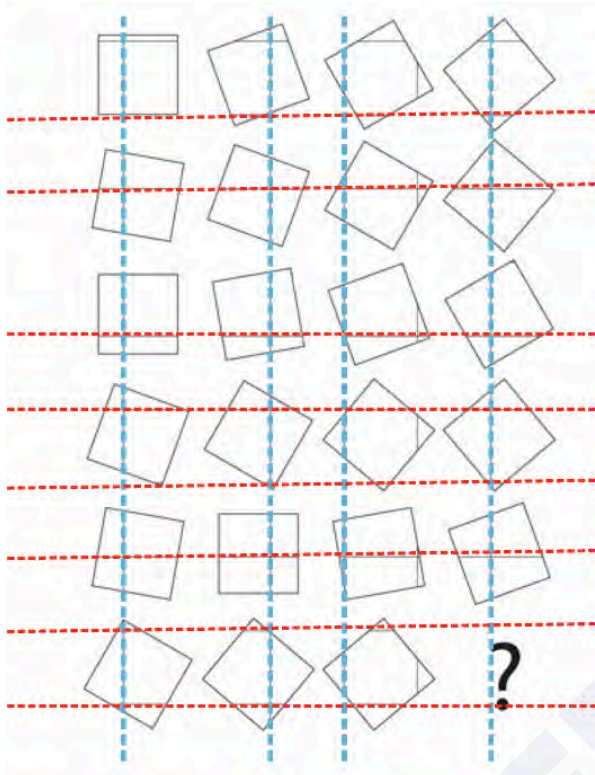
**Option C:**



**Option D:**

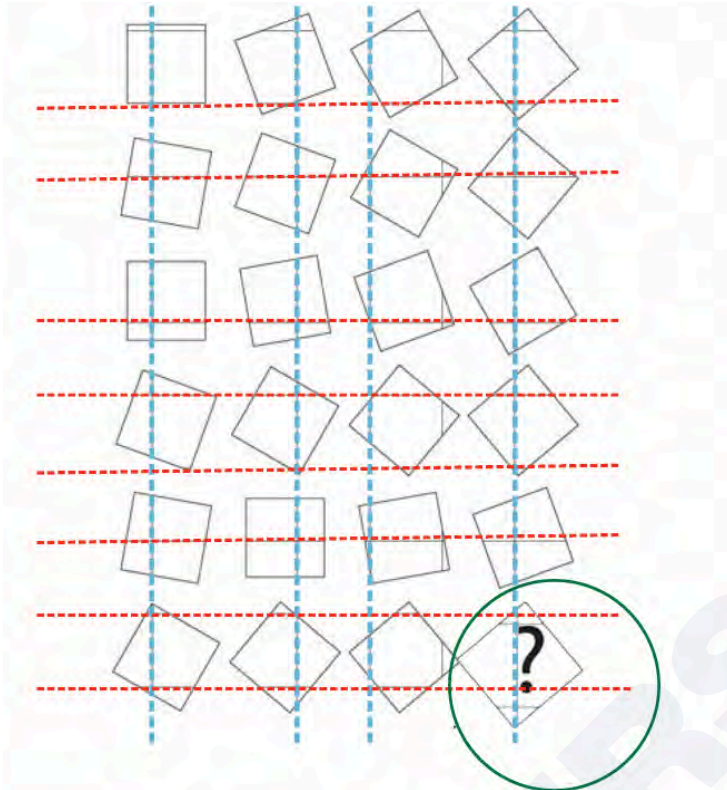


**Solution:**



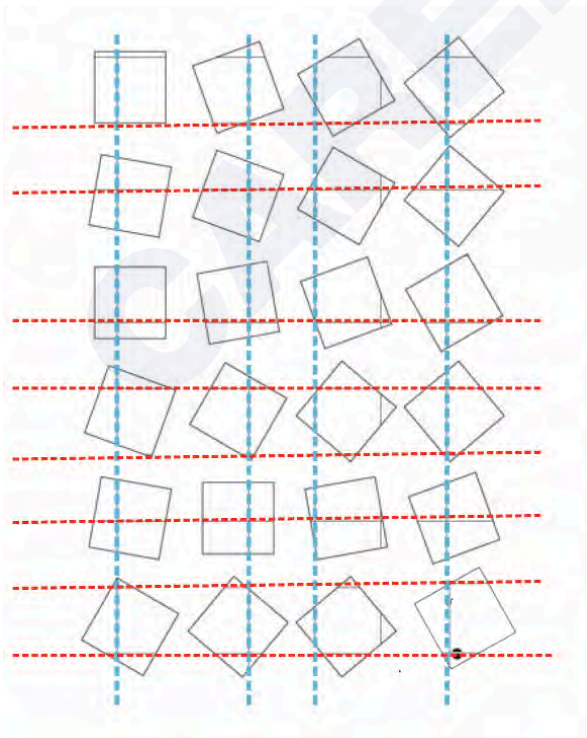
Now, to fill this question mark, we need to check each option one by one.

Option D:



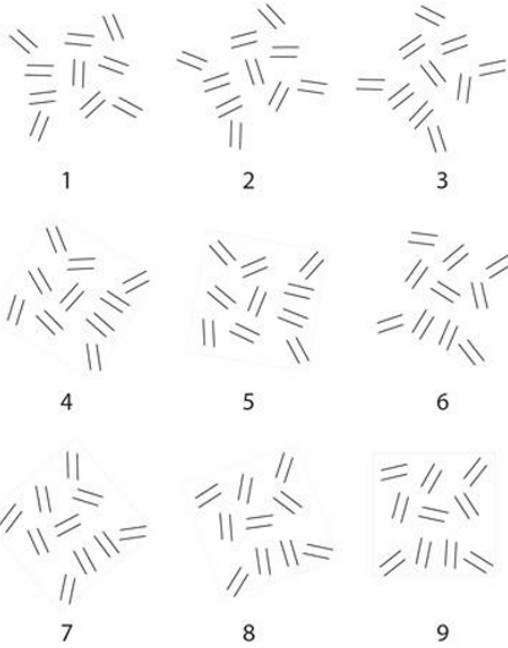
It doesn't fit here. Hence, option B is wrong.

Option D:

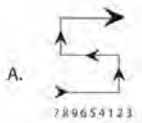


This perfectly fits in the figure. Hence, option D is correct.

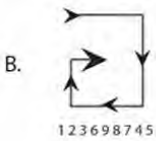
**Q.72 Identify the correct order of rotation.**



**Option A:**



**Option B:**



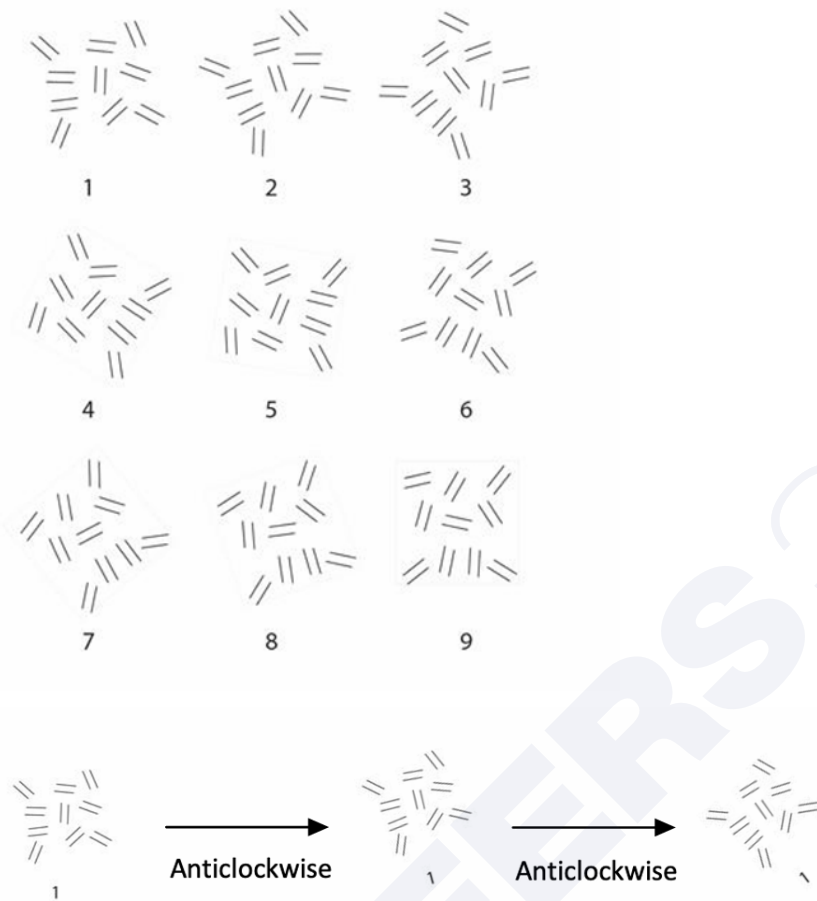
**Option C:**



**Option D:**



**Solution:**



Hence, option A is correct.

**Q.73** The following images are iconic art forms/products of certain countries. Identify the correct set of countries they all can be predominantly attributed to. The individual countries in each set are in a random sequence.



**A. India, Turkey, Mongolia, Russia**

- B. Mongolia, Burma, Afghanistan, India
- C. India, Russia, Japan, Turkey
- D. Pakistan, Japan, India, Mongolia

**Solution:**



This is Pakistani art form



This is Japanese art form



This is an Indian art form.  
Hence, option D is correct.

**Q.74 Refer to the following images of a metal artefact made using traditional manual tools, skills and processes. Identify the correct set of operations required to make it.**



- A. Forging, Bending, Punching, Twisting
- B. Casting, Bending, Punching, Twisting
- C. Twisting, Drilling, Punching, Bending
- D. Bending, Casting, Forging, Punching

**Solution:**

Forging is a manufacturing process involving the shaping of metal using localized compressive forces. Bending is a manufacturing process that produces a V-shape, U-shape, or channel shape along a straight axis in ductile materials, most commonly sheet metal. Commonly used equipment include box and pan brakes, brake presses, and other specialized machine presses. Punching is a forming process that uses a punch press to force a tool, called a punch, through the workpiece to create a hole via shearing. Drilling is a cutting process where a drill bit is spun to cut a hole of circular cross-section in solid materials. Casting is a manufacturing process in which molten material, like metal, is poured into a mould and allowed to harden. Once solidified, the mould is.

So the figure is first forged as we can see new image has shorter legs. So option B and C is eliminated.

In casting, metal is moulded, but here this is not the case. Therefore, option D is also eliminated.

Hence, option A is correct.

**Q.75 Refer to the chairs shown below. Which of the following options is TRUE?**



**A. P is most stable in terms of centre of gravity and R is made of the least number of visible parts**  
**B. S is made of the least number of visible parts and Q is most stable in terms of centre of gravity**  
**C. P is most stable in terms of centre of gravity and S is made of the least number of visible parts**  
**D. R is ergonomically comfortable and Q is most stable in terms of centre of gravity**

**Solution:**

When we observe the chairs given in figure P, Q, R and S we can see that P has symmetrical 4 legs and this is the most stable form of chair among all. We can see S has the least No. of visible parts shown in the figure.

Therefore, option C is correct.

**Q.76 Refer to the following image of a wooden product and read the statements below.**

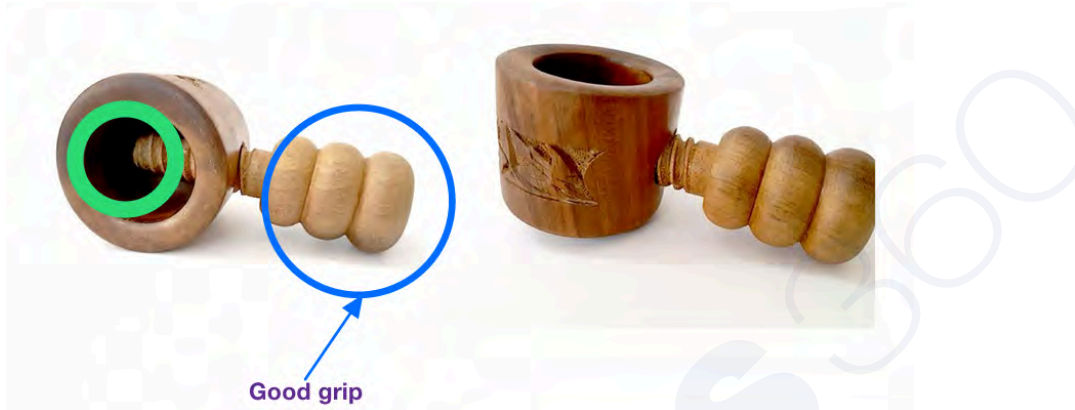
- 1. It has provision for cracking nuts, and it has a good grip**
- 2. It has a good grip, and it has provision for opening cans as well as cracking nuts**
- 3. It has provision for a grinding of nuts, and its making involves drilling, twisting, and casting**
- 4. Its making involves drilling, turning, and twisting**

**Which of the following options is correct?**



- A. 1 is true, 2 and 3 are false
- B. 2 is true, 3 and 4 are false
- C. 3 is true, rest are false
- D. 4 is true, 1 and 3 are false

**Solution:**



When the nut is placed here and the screw is twisted, the nut will be cracked.

Therefore, statement 1 is True.

Statement 2 is false because for opening a can, some sharpness is required.

Statement 3 is false because this can't grind the nuts, for that grinder is required.

Statement 4 need not be examined, as only option A satisfies the above condition.

Hence, option A is correct.

**Q.77** Shown is a quadrant that is mirrored first on x-axis and then on y-axis. Identify the correct complete figure from the given options.



**Option A:**



**Option B:**



Option C:



Option D:



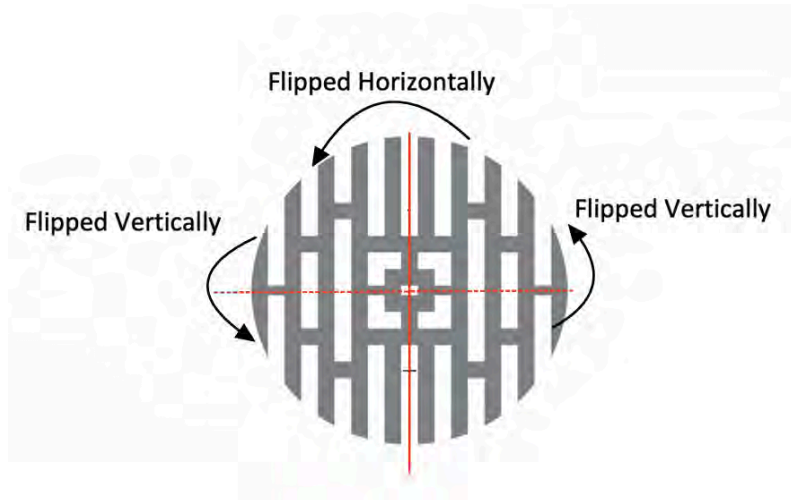
Solution:



Fig 1

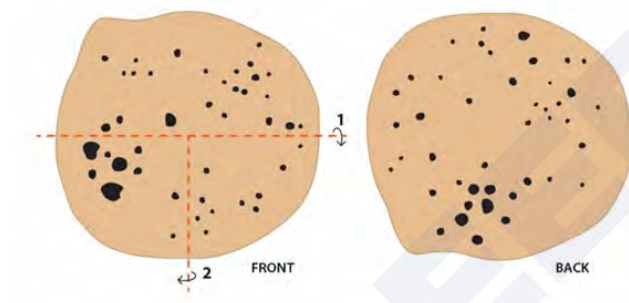
Fig 2

Take out a part fig 2 from the image fig 1 and do the required operation to get result.



Hence, option D is correct.

**Q.78** Thamarai's father has made a roti for her lunch. She folds the roti in the following sequence and packs it into her lunch box. Identify the folded roti.



**Option A:**



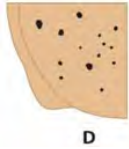
**Option B:**



**Option C:**

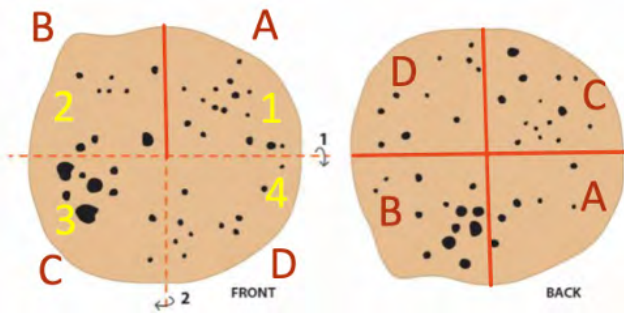


**Option D:**



**Solution:**

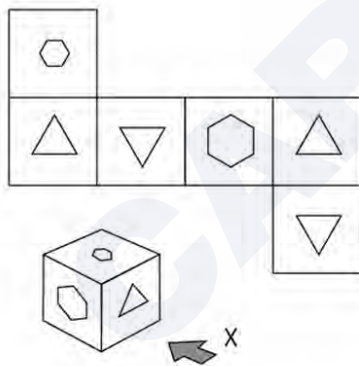
Divide the rotis front and back into 4 quadrants and mark them.



When we fold around 1, then A and B will be on top of 4 and 3 respectively. Now when again folded the portion behind 4 i.e. D will come on top. So from back view we can see D's reversed form.

Hence, option B is correct.

**Q.79** An unwrapped cube is shown below. This cube has cuts of specific shapes on all sides. When the cube is folded, what would be the view as seen from direction X?



**Option A:**



A

**Option B:**



B

**Option C:**

C

**Option D:**

D

**Solution:**

When we fold such a cube, then the front cut of the triangle (shown in the direction of X) will be visible. Now we have to imagine what will appear inside the triangular hole.

The following shapes get overlaid on top of one another.

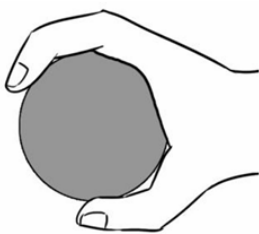
- 1) Inverted (upside down) triangle
- 2) Triangle (coincides with the front triangle)
- 3) Hexagon

The image will look like (as shown below)



Hence, option D is correct.

**Q.80** The four figures below show a hand gripping a cylinder. In which of these figures, will the grip exert the maximum force?

**Option A:**

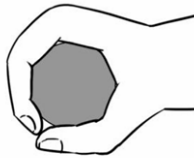
A

**Option B:**

B

**Option C:**

C

**Option D:**

D

**Solution:**

Pressure is defined as the force acting on a unit area. This means that pressure is directly proportional to the force applied and inversely proportional to the area. As force increases, pressure increases.

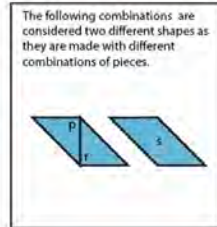
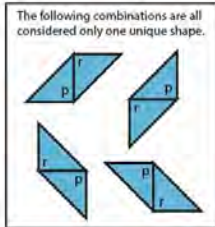
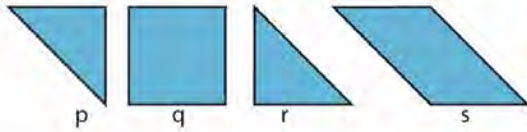
So we can say larger the force means smaller the area.

We can see option B is the worst when force is applied because on two fingers has been used, so force applied is very less.

The perfect choice is option as area is smaller as compared to A, C and D, so the force applied will be maximum.

Hence, option D is correct.

**Q.81** Four cut-outs of shapes (labelled p, q, r, s) are shown below. Using one or more of the cut-out pieces, how many unique combinations can be made that will create a square/rectangle?



- A. 4
- B. 5
- C. 6
- D. 3

**Solution:**

- i) We know that q is square, so this is 1 combination.
- ii) If r is placed on the left side of P we get **pr** combination as shown below.



- iii) Another combination is prq



- iv) Look at S, if r joined on the left and P on the right we get a rectangle rsp



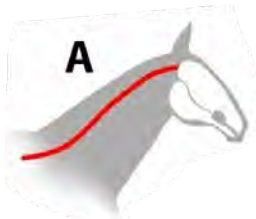
- v) Combine rsp with Q, we get



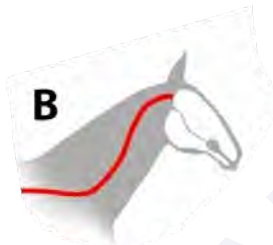
Hence, 5 unique combination. Hence, option B is correct.

**Q.82** The figures show simplified shapes of the neck portion of the vertebral column of a horse. Which of the options is most correct?

**Option A:**



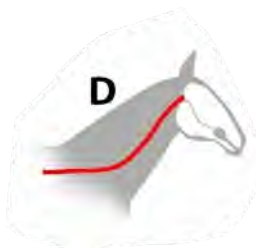
**Option B:**



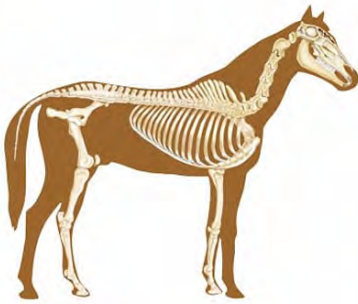
**Option C:**



**Option D:**

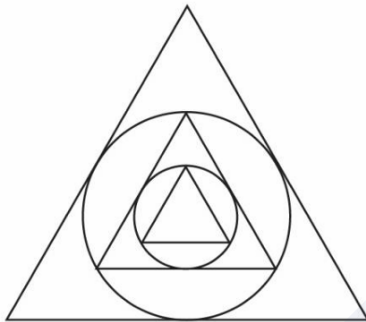


**Solution:**



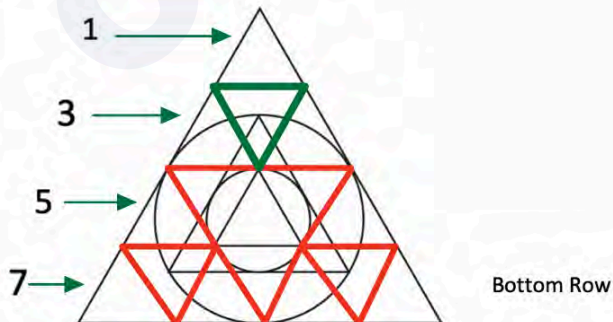
We can see that option B is correct because the vertebral column of a horse have a deep curve in the mid as shown in the image given above.

**Q.83 How many times is the area of the outermost triangle compared to the area of the innermost triangle?**



- A.16
- B.9
- C.9.42
- D. 12

**Solution:**



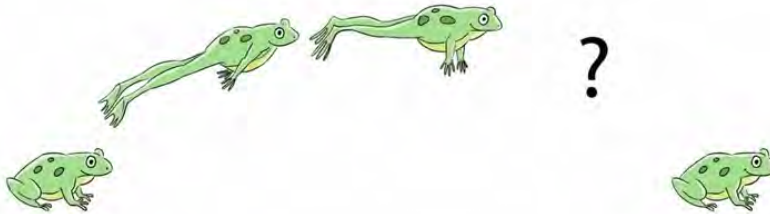
We can see we have 7 triangles in the bottom row, and 5 above the bottom row. We can see from above that the outermost triangle consist of 16 small triangles.

Let the area of small (innermost) triangle = 1 unit

So, the area of outermost triangle = 16 unit

Hence, the area of the outermost triangle is sixteen times the innermost triangle.

**Q.84** Which option will replace the question mark as the frog jumps in an animation sequence?



**Option A:**



A

**Option B:**



B

**Option C:**



C

**Option D:**



D

**Solution:**

The frog will move in a descending pattern with legs open.

Hence, option C is correct.

**Q.85** Which option will replace the question mark?



Option A:



A

Option B:



B

Option C:



C

Option D:



D

**Solution:**

When we combine the above two figures, we get the image as shown below.



Hence, option A is correct.

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