Spatial Aptitude Quiz Questions For GATE 2025

GATE And Tech
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1 Transformation of Shapes: Translation (10 Questions)

1. Which of the following statements accurately describes the properties of translations of the shapes? (Multiple Select Answers)

   A. Translations preserve the angles of geometric figures.

   B. Translations change the area of the shape.

   C. Translations maintain the distance between any two points in the shape.

   D. Translations can rotate the shape.

   Solution:

   A. True: Translations do not change the internal angles of shapes.

   B. False: Translations do not alter the area of the shape.

   C. True: Distances between points in the shape remain unchanged.

   D. False: Translations only move shapes without rotating them.

   Correct Answers: A; C

2. Which of the following effects occur when a shape undergoes a translation? (Multiple Select Answers)

   A. The shape remains congruent to the original shape.

   B. The orientation of the shape changes.

   C. The shape can be moved to a different location in the coordinate plane.

   D. The relative positions of points within the shape change.

   Solution:

   A. True: The shape remains congruent.

   B. False: The orientation does not change.

   C. True: The shape can be moved to a new location.

   D. False: The relative positions remain the same.

   Correct Answer: A; C

3. Which of the following statements accurately describes the characteristics of translations of geometric figures? (Multiple Select Answers)

   A. A translation can be expressed mathematically using a translation vector, indicating the direction and distance of the movement.

   B. When a shape is translated back to its original position, it can overlap completely with the original shape.

   C. The size and dimensions of a shape remain unchanged after a translation, preserving its congruence with the original.

   D. Translations can alter the internal angles of the geometric figure, resulting in a different shape.

   Solution:

   A. True: A translation vector precisely defines how far and in which direction a geometric figure moves.

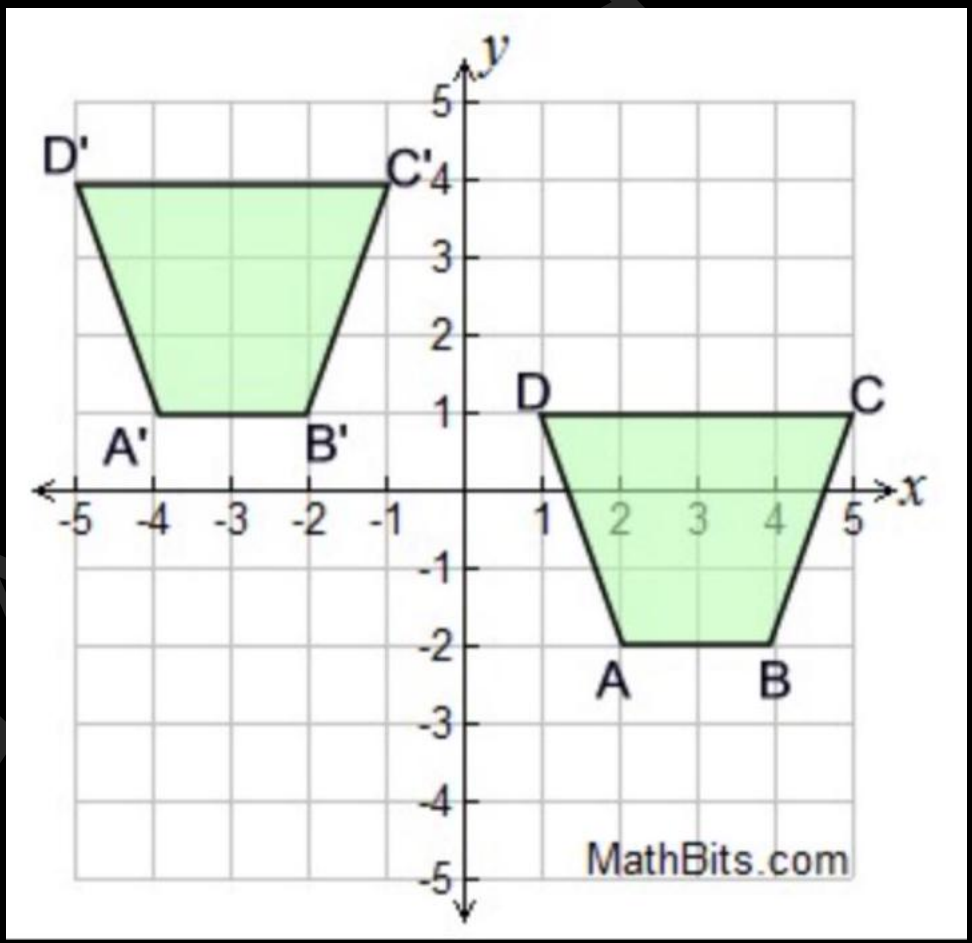
   B. True: If a shape is translated and then moved back to its original coordinates, it will overlap entirely with its original position.

   C. True: Translations preserve all shape properties, including size and dimensions, ensuring the original and translated shapes are congruent.

   D. False: Translations do not affect the internal angles of a shape; the angles remain unchanged.

   Correct Answer: A; C; D

4. Which translation mapping is depicted in the graph at the right?



   A. $(x, y) \rightarrow (x + 6, y - 3)$

   B. $(x, y) \rightarrow (x - 3, y + 6)$

   C. $(x, y) \rightarrow (x - 6, y + 3)$

   D. $(x, y) \rightarrow (x + 3, y - 6)$

Solution:

Correct Answer: C

5. A translation maps the origin to the point $(-2, 4)$. What is the image of point $(-5, 3)$ under this same translation?

   A. $(-7, 7)$

   B. $(-3, -1)$

   C. $(-3, 7)$

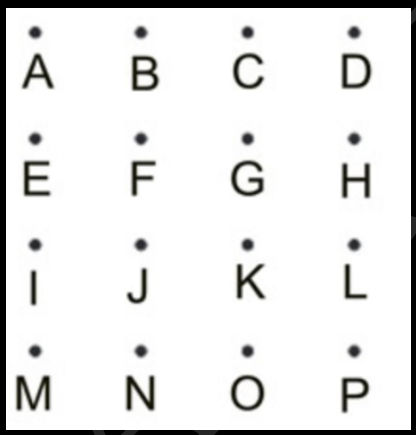
   D. $(-7, 1)$

   Solution:

   Correct Answer: A

6. The diagram at the right shows 16 dots from a sheet of dot paper, where the dots are equally spaced. A translation maps dot B to dot K.

   Under this translation to which dot will dot E be mapped?



   A. C

   B. J

   C. N

   D. O

   Solution:

   Correct Answer: C

7. Given the translation $(x + 7, y - 3)$, find the image of the preimage point $(3, 8)$.

   A. $(5, 10)$

   B. $(10, 5)$

   C. $(8, 5)$

   D. $(8, 3)$

   Solution:

   The given translation is, $(x, y) \rightarrow (x + 7, y - 3)$.

   It is given that $(x, y) = (3, 8)$. So the translated point is, $(x + 7, y - 3) = (3 + 7, 8 - 3) = (10, 5)$.

   Correct Answer: B

8. If a transformation of $X = x + 4$ and $Y = y - 3$ is applied, what is the new position of the origin in the xy coordinate system?

   A. $(4, 3)$

   B. $(4, -3)$

C. $(-4, 3)$

D. $(-4, -3)$

Solution:

In $x - y$ plane origin is $x = 0, y = 0$.

Therefore when $x - y$ is transformed to $X - Y$, origin in $x - y$ plane will shift to $X = 0 + 4 = 4, Y = 0 - 3 = -3$.

The correct answer is $(4, -3)$.

Correct Answer: B

9. Let $\tau_{A,B}$ represent a linear translation in the xy-plane from point A to point B.

   - $A = (21, 42)$
   - $B = (32, 43)$
   - $C = (-12, 6)$
   - $D = (-112, 206)$

   if $\tau_{A,B}\tau_{B,C}\tau_{C,D}\tau_{D,A}(2, 8) = (a, b)$, what is $a + b$?

   A. 20

   B. 4

   C. 10

   D. 12

   Solution:

   This is a cyclic translation.

   $\tau_{A,B}$ takes you from point $A \rightarrow B$

   $\tau_{B,C}$ takes you from point $B \rightarrow C$

   $\tau_{C,D}$ takes you from point $C \rightarrow D$

   $\tau_{D,A}$ takes you from point $D \rightarrow A$

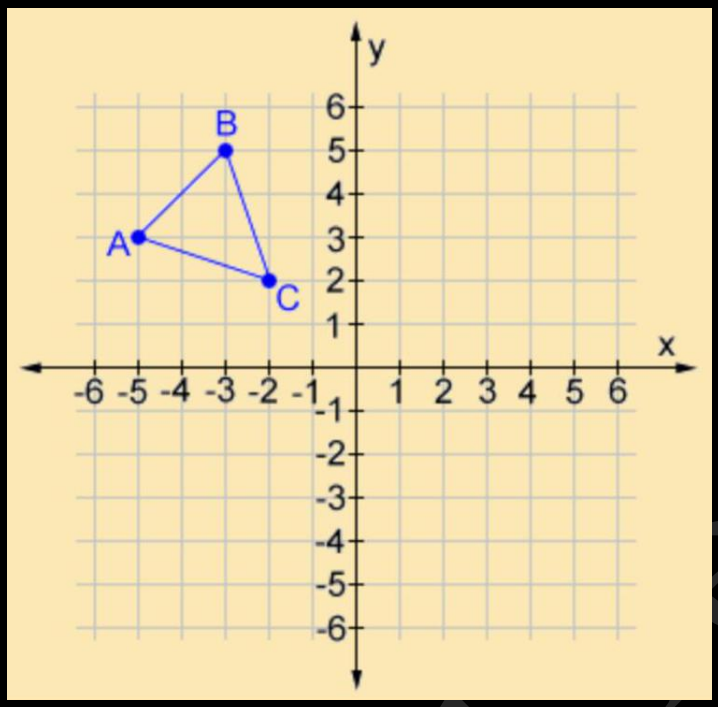
   So, the net result of all these translation is no translation at all.

   So, you will get back to point $(a, b) = (2, 8)$

   $\therefore a + b = 2 + 8 = 10$

   Correct Answer: C

10. If (x, y) is a point on triangle ABC, graph the translated triangle DEF given the coordinates $(x + 7$, y $- 8$).



What is the area of triangle *DEF*?

A. It is the same as triangle *ABC*

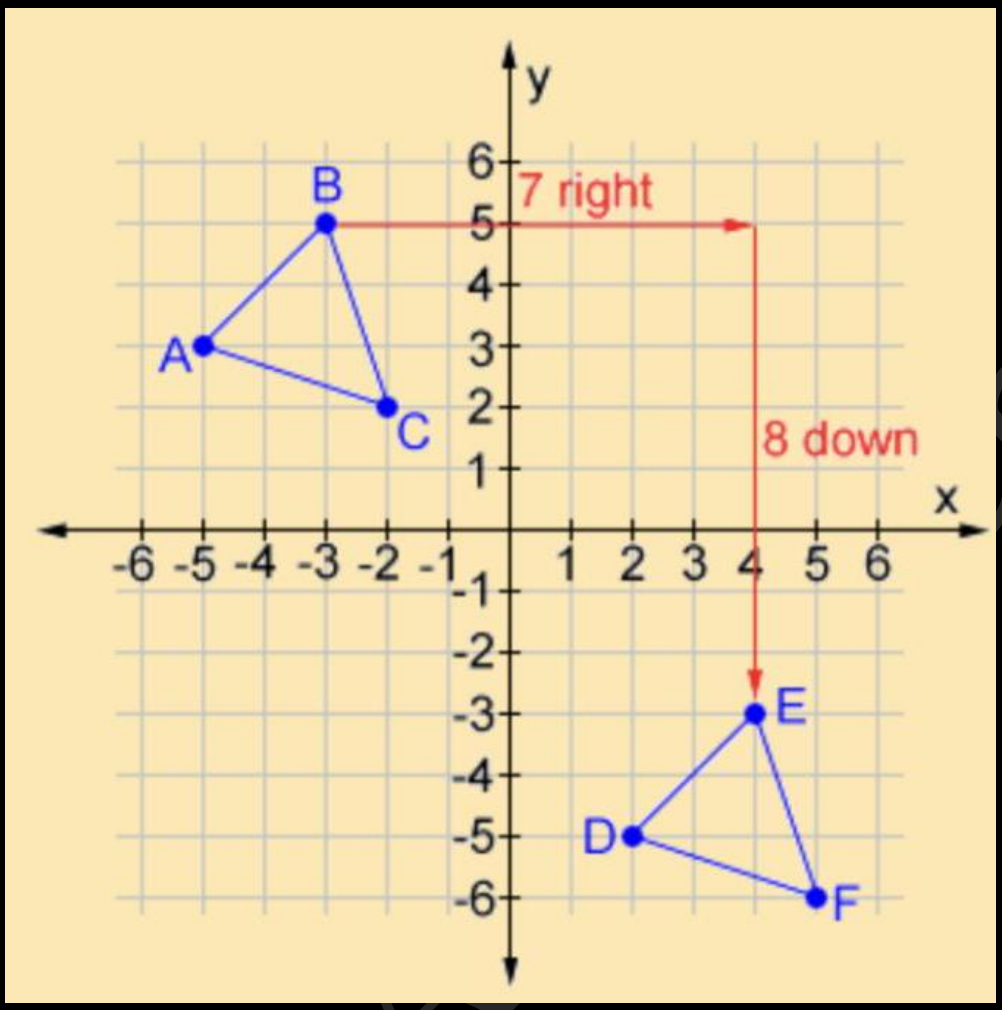
B. It is larger than the triangle *ABC*

C. It is less than the triangle *ABC*

D. None of the above

Solution:

The value for a is 7 and b is -8 so, each vertex in triangle *ABC* is translated 7 units to the right then 8 units down to produce the vertices of triangle *DEF*.



A translation in geometry does not change the area of a shape; it only changes its position, meaning the shape is moved to a different location on the coordinate plane while maintaining its size and form.

Correct Answer: A

2 Transformation of Shapes: Rotation (10 Questions)

11. Which of the following statements are true regarding the properties of rotation in geometric figures? (Multiple Select Answers)

    A. Rotations are performed around a fixed point called the center of rotation.

    B. The distance from the center of rotation to any point on the figure remains the same after rotation.

    C. Rotations can change the size of the geometric figure.

    D. The orientation of the figure can change depending on the angle of rotation.

    Solution:

    A. True. Rotations always occur around a fixed point, called the center of rotation.

    B. True. A key property of rotation is that the distance between any point on the figure and the center of rotation remains the same.

    C. False. Rotations do not change the size of the figure; they only change the orientation or position.

    D. True. The orientation (or direction) of the figure can change depending on the angle of rotation (e.g., a 90° or 180° rotation).

Correct Answer: A;B;D

12. When a geometric figure is rotated, which of the following characteristics are true? (Multiple Select Answers)

    A. The angles of the shape remain unchanged after rotation.

    B. A rotated shape can overlap with its original position if rotated by a full 360°.

    C. The relative positions of points within the figure change after rotation.

    D. Rotated shapes are congruent to their original shapes.

    Solution:

    A. True. Rotations are rigid transformations, meaning that the angles within the shape remain unchanged.

    B. True. If a shape is rotated by a full 360°, it will return to its original position, and thus it can overlap with its original shape.

    C. False. The relative positions of points in the shape remain the same, though their absolute coordinates may change. A rotation maintains the structure of the figure.

    D. True. Rotations preserve congruence, meaning that the rotated figure is always congruent to the original shape (same size and shape).

    Correct Answer: A;B;D

13. If a figure is rotated 90° clockwise and then rotated 90° counterclockwise about the same point, which of the following statements are true? (Multiple Select Answers)

    A. The figure returns to its original position.

    B. The angles of the figure are altered.

    C. The size of the figure remains unchanged.

    D. The orientation of the figure may change based on the order of the rotations.

    Solution:

    A. True. Rotating a figure 90° clockwise, and then 90° counterclockwise effectively cancels out the rotations, returning the figure to its original position.

    B. False. Rotations do not alter angles within the figure. All angles remain the same as in the original figure.

    C. True. Rotations preserve the size of the figure, so the figure remains unchanged in size after rotation.

    D. False. Since the two rotations cancel each other out, the orientation of the figure remains the same as the original.

    Correct Answer: A;C

14. The image of the point $(-4, 3)$ under a rotation of 90° (counterclockwise) centered at the origin is _____.

    A. $(-4, -3)$

    B. $(3, -4)$

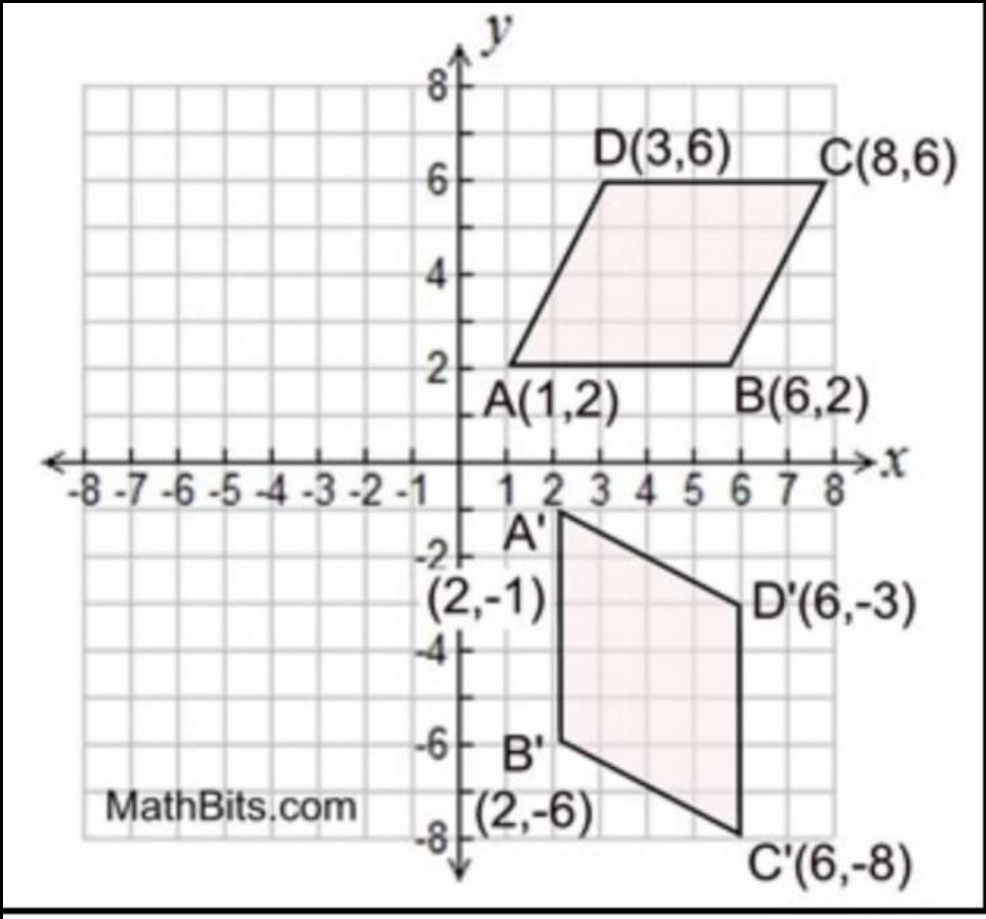
    C. $(-3, 4)$

    D. $(-3, -4)$

    Solution:

    Correct Answer: D

15. For the transformation shown at the right, what is the measure of the angle of rotation of $ABCD$ about the origin?



A. 90°

B. 180°

C. 270°

D. 360°

Solution:

Correct Answer: C

16. After a rotation, point $P = P'$.

Which statement is true about the location of point P if this occurred?

A. Point P and point P' were two distinct points equidistant from the center of the rotation.

B. Point P and point P' were two distinct points located on the same arc of rotation.

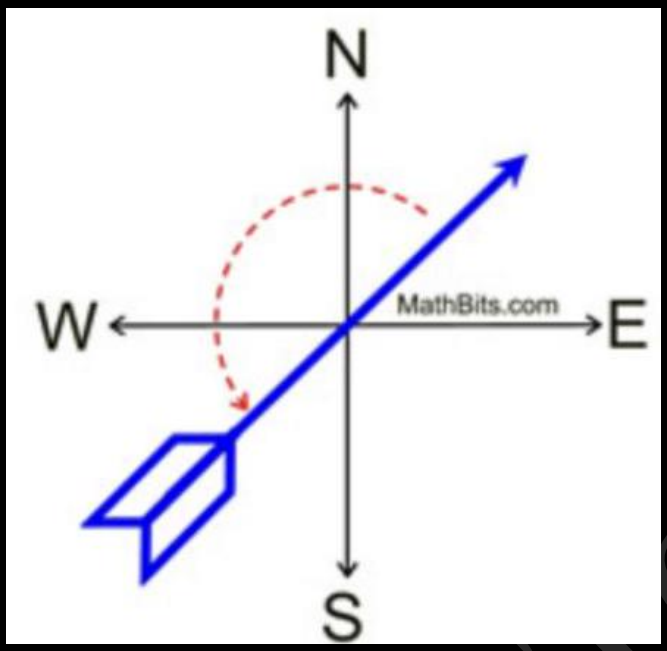
C. Point P was located at the center of the rotation.

D. Point P and point P' were two distinct points located on the same ray from the center of the rotation.

Solution:

Correct Answer: C

17. A wind vane is an instrument for showing the direction of the wind. Prior to a wind gust, the arrow indicating the direction of the wind is pointing NE, as shown. As a wind gust passes, the wind vane rotates 270 degrees. In what direction is the wind vane pointing during the wind gust? The vane always rotates in the same direction as shown.



A. SE

B. SW

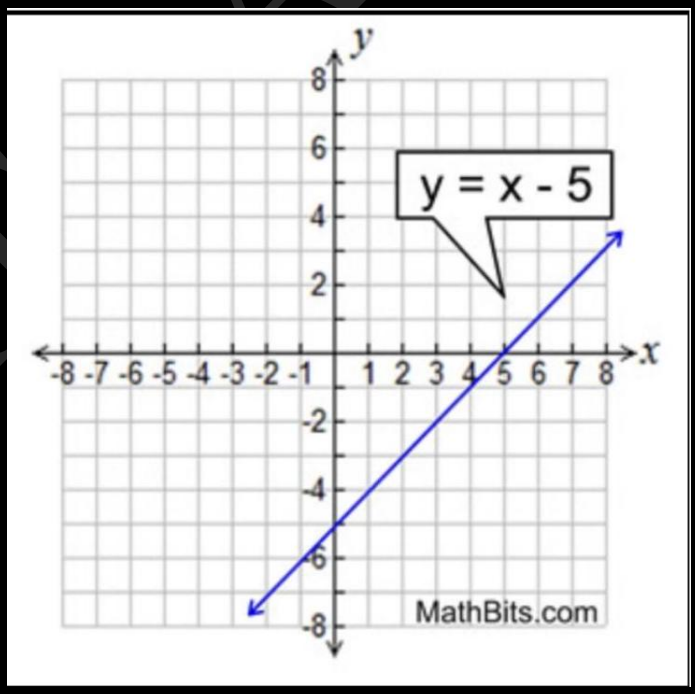
C. NW

D. W

Solution:

Correct Answer: A

18. Rotate the line shown at the right 90° about the origin. Hint: rotate the x and y intercepts. What is the equation of the resulting image?



A. $y = x + 5$

B. $y = -x + 5$

C. $y = -x - 5$

D. $y = x$

Solution:

Correct Answer: B

19. A rotation of 120° counterclockwise is the same as a rotation of _____ clockwise.

A. 60°

B. 120°

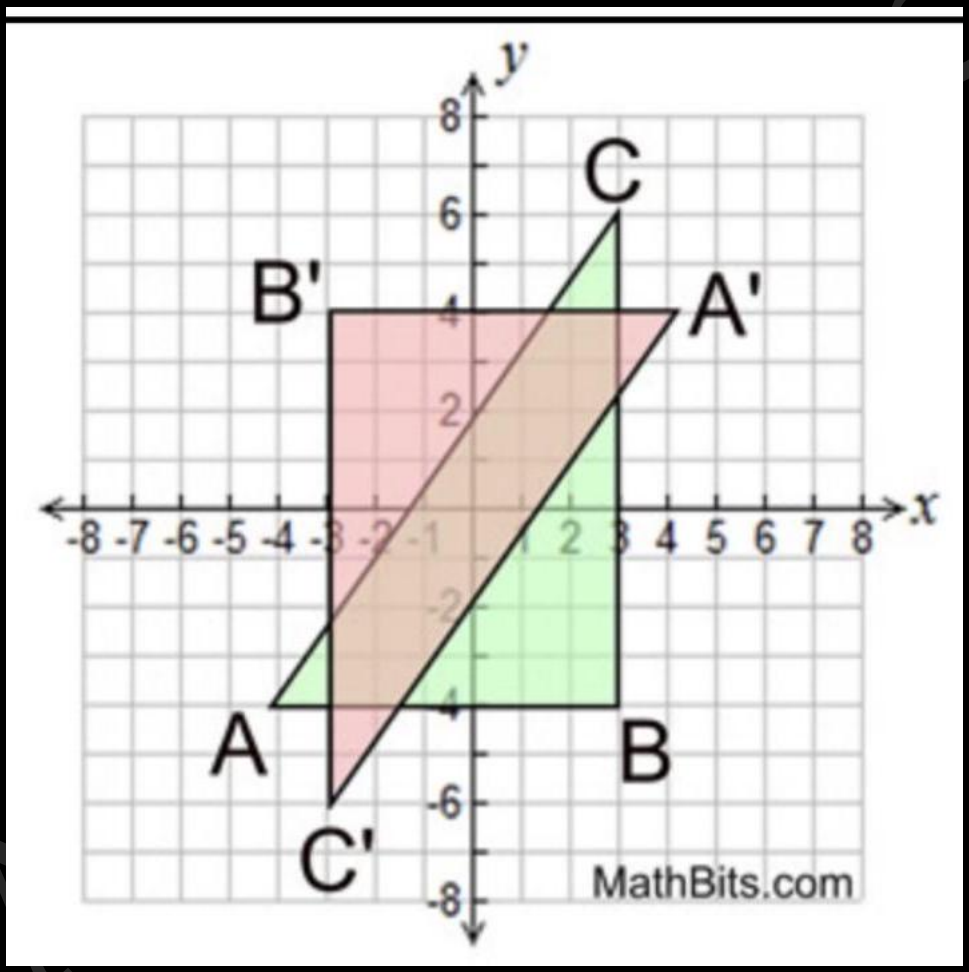
C. 220°

D. 240°

Solution:

Correct Answer: D

20. In the graph at the right, $\triangle ABC$ has been transformed into $\Delta A'B'C'$. Which transformation occurred? (O = origin)



A. $R_{0,90°}(\triangle ABC) = \Delta A'B'C'$

B. $R_{O,-90°}(\triangle ABC) = \triangle A'B'C'$

C. $R_{O,180°}(\triangle ABC) = \Delta A'B'C'$

D. $R_{O,270°}(\triangle ABC) = \Delta A'B'C'$

Solution:

Correct Answer: C

3 Transformation of Shapes: Scaling(10 Questions)

21. Which of the following statements are true regarding the theoretical properties of scaling (dilation)? (Multiple Select Answers)

A. Scaling a figure preserves the shape but changes its size.

B. Scaling by a factor greater than 1 enlarges the figure, while scaling by a factor less than 1 shrinks the figure.

C. Scaling can change the angles of the figure.

D. When a figure is scaled, the ratio of corresponding sides of the original and scaled figure remains constant.

Solution:

A. True. Scaling preserves the shape but changes the size of a figure.

B. True. Scaling by a factor greater than 1 enlarges the figure, and scaling by a factor less than 1 shrinks the figure.

C. False. Scaling does not change angles; it preserves the angles of the shape.

D. True. The ratio of corresponding sides of the original and scaled figures remains constant.

Correct Answer: A;B;D

22. Which of the following characteristics are true for scaling a figure with respect to a fixed center point? (Multiple Select Answers)

A. Every point on the figure moves away from or toward the center of scaling.

B. The distance from the center to any point on the figure is multiplied by the scaling factor.

C. The orientation of the figure can change if the center of scaling is not at the origin.

D. The original shape and the scaled shape are similar.

Solution:

A. True. Every point on the figure moves away from or toward the center depending on the scaling factor.

B. True. The distance from the center to any point on the figure is multiplied by the scaling factor.

C. False. Scaling preserves the orientation of the figure, regardless of where the center is located.

D. True. Scaling results in a similar shape to the original, meaning all corresponding angles are the same, and the sides are proportional.

Correct Answer: A;B;D

23. Which of the following is true about scaling transformations in geometry? (Multiple Select Answers)

A. Scaling transformations are linear transformations that affect both the x and y coordinates by the same factor.

B. A uniform scaling transformation will always result in a congruent figure.

C. A negative scaling factor results in a reflection of the figure.

D. Scaling can alter both the size and the orientation of a geometric figure.

Solution:

A. True. Scaling is a linear transformation that multiplies both the x and y coordinates by the same factor.

B. False. Uniform scaling results in a similar figure, not a congruent one, unless the scaling factor is 1.

C. True. A negative scaling factor reflects the figure across the origin.

D. False. Scaling changes the size but does not affect the orientation of the figure unless combined with a reflection or another transformation.

Correct Answer: A;C

24. The plan of a window seat is drawn using the scale of 2 cm : 1 m. What is the actual length of the window seat if it measures 5.8 cm on the scale drawing?

A. 2.9 m

B. 2.9 cm

C. 11.6 cm

D. 11. m

Solution:

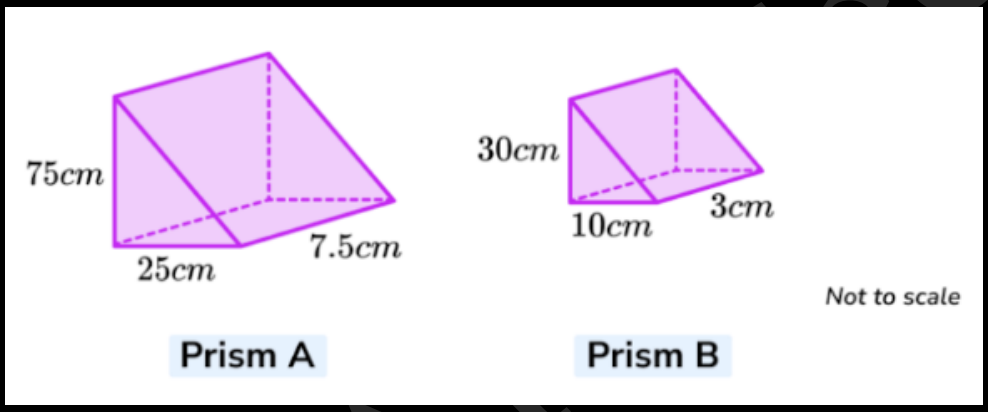
$1m = 100cm$

$2cm : 100cm = 1cm : 50cm$

$50 \times 5.8 = 290cm = 2.9m$

Correct Answer: A

25. Below is a diagram showing two triangular prisms. Prism B is a model of Prism A.



Calculate the ratio of lengths of Prism A to lengths of Prism B in its simplest form.

A. 75 : 30

B. 3 : 7.5

C. 5 : 2

D. 3 : 1

Solution:

Taking one similar length (the height for example) from each prism, 75 : 30 = 5 : 2.

Correct Answer: C

26. The length of a table is $3.9m$; the length of the table is 3 times its width. The width of the table on the diagram is $20cm$.

Calculate the ratio of the length of real table to the length of the diagram table. Give your answer in the form $n : m$ where n and m are integers.

A. 130 : 25

B. 5 : 26

C. 25 : 130

D. 26 : 5

Solution:

$3.9 \div 3 = 1.3$ m width

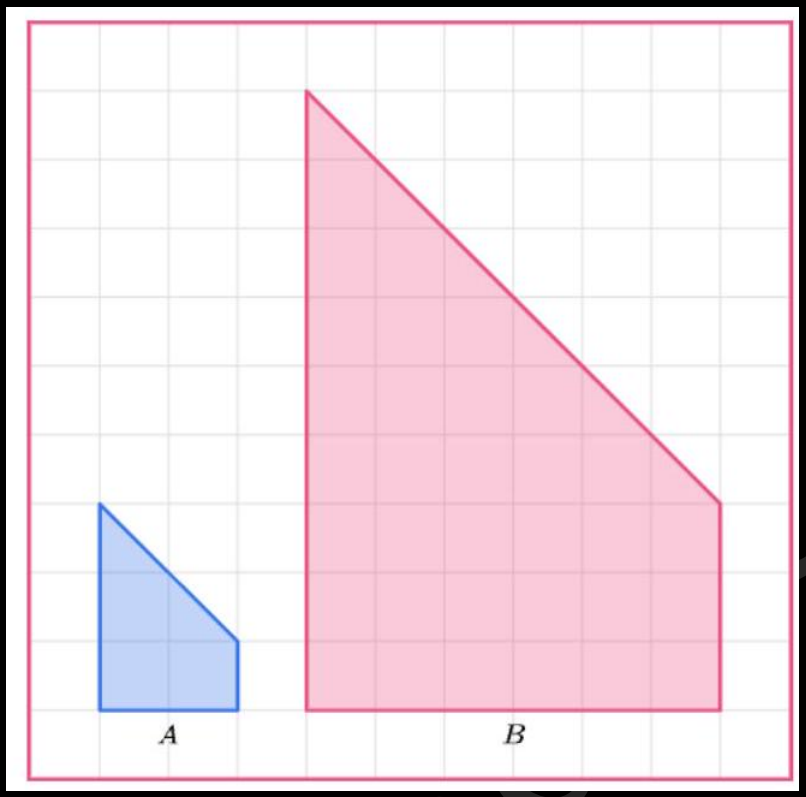
1.3 m : 25 cm

130 cm : 25 cm

130 : 25 = 26 : 5

Correct Answer: D

27. Calculate the scale factor of the enlargement from shape A to shape B.



A. Scale factor $\frac{1}{3}$

B. Scale factor 2

C. Scale factor 3

D. Scale factor $\frac{1}{2}$

Solution:

The original shape has a base of 6.

The base of the enlarged shape is 2.

$$\text{Scale factor} = \frac{\text{enlarged length}}{\text{original length}} = \frac{6}{2} = 3$$

Correct Answer: C

28. A house has a kitchen with length $4.5m$ and width $3m$. Calculate the length and width of this kitchen on a floor plan with scale factor $1 : 150$.

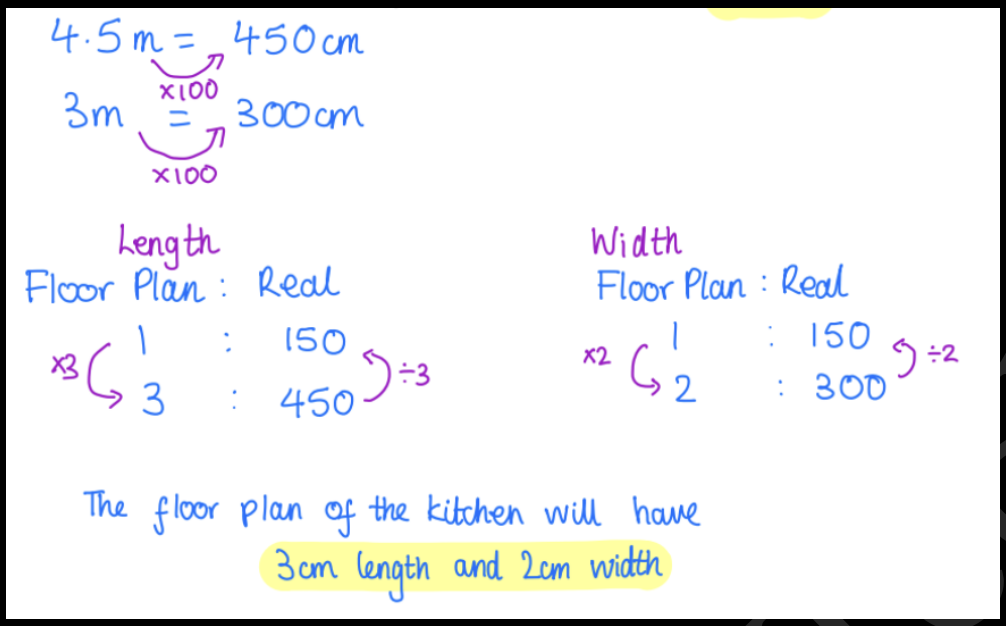
A. 2 cm length and 3 cm width

B. 3 cm length and 5 cm width

C. 3 cm length and 2 cm width

D. 3 cm length and 3 cm width

Solution:



Correct Answer: C

29. The distance between Madrid and Barcelona is approximately 504 km. On a map of Spain, this distance is 4 cm. Calculate the scale factor for this map.

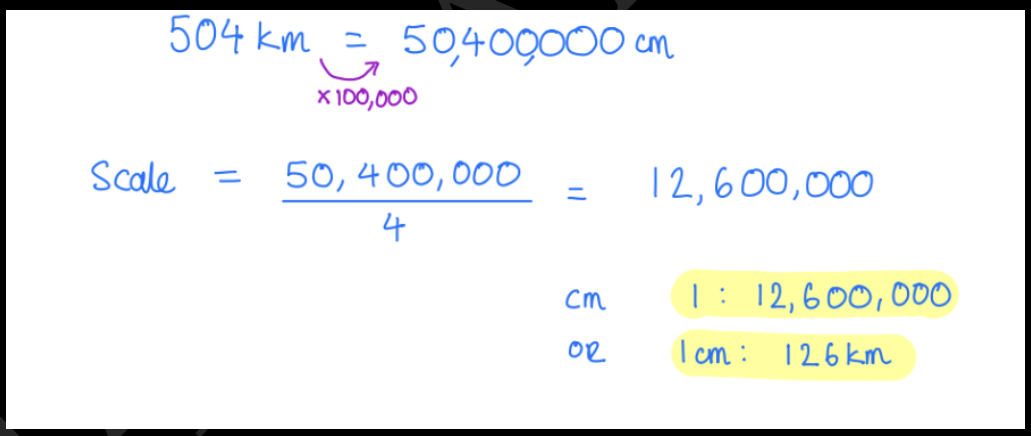
A. 1 cm: 126 km

B. 2 cm: 126 km

C. 1 cm: 4 km

D. 10 cm: 126 km

Solution:



Correct Answer: A

30. A square, *E*, with sides of length 10 cm are enlarged by a scale factor less than 1. The resulting shape, *F*, has sides of length 3 cm. Calculate the scale factor of enlargement.

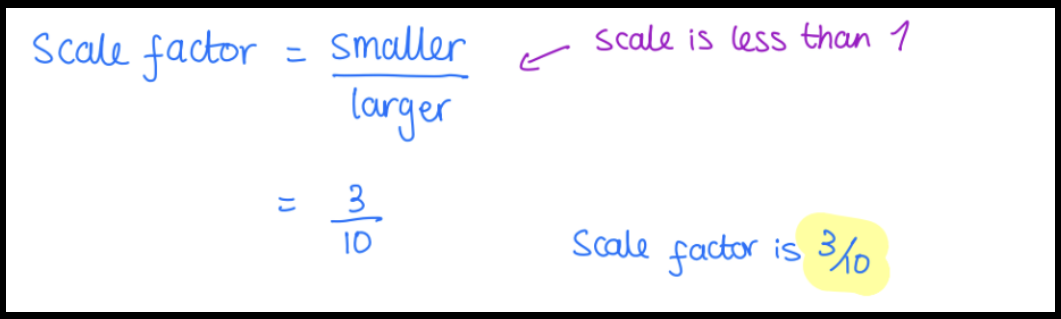
A. 10/3

B. 1/2

C. 3/10

D. 3/5

Solution:



Correct Answer: C

4 Transformation of Shapes: Mirroring (10 Questions)

31. Which of the following statements is/are true about mirroring (reflection) transformations? (Multiple Select Answers)

    A. A reflection flips a figure across a line called the axis of reflection.

    B. After a reflection, the distance between the corresponding points of the original and reflected figure remains unchanged.

    C. The orientation of the figure is reversed after a reflection.

    D. Reflections always preserve the angles of a geometric figure.

    Solution:

    A. True. Reflection flips a figure over a line, known as the axis of reflection.

    B. False. The distance between corresponding points may vary depending on the axis of reflection. However, corresponding points are equidistant from the axis.

    C. True. Reflections reverse the orientation of the figure.

    D. True. Reflections are rigid transformations and always preserve angles.

    Correct Answer: A;C;D

32. If a geometric figure is reflected over the x-axis, which of the following statements are true? (Multiple Select Answers)

    A. The y-coordinates of all points in the figure change signs.

    B. The x-coordinates of all points remain the same.

    C. The reflected shape is congruent to the original shape.

    D. The angles of the shape change after reflection.

    Solution:

    A. True. When a figure is reflected over the x-axis, the y-coordinates change signs while the x-coordinates remain the same.

    B. True. The x-coordinates of the points do not change in reflection over the x-axis.

    C. True. Reflection is a rigid transformation, so the reflected shape is congruent to the original.

    D. False. The angles remain the same after reflection, as reflections preserve angles.

    Correct Answer: A;B;C

33. Which of the following are true about the effects of mirroring a figure over an arbitrary line of reflection? (Multiple Select Answers)

    A. The reflected figure is always congruent to the original.

    B. The distance between a point on the original figure and its corresponding point on the reflected figure is the same for every point.

    C. If a figure is reflected twice over the same line, it returns to its original position.

    D. Reflecting a figure across two parallel lines results in a translation.

Solution:

A. True. A reflection always results in a congruent figure.

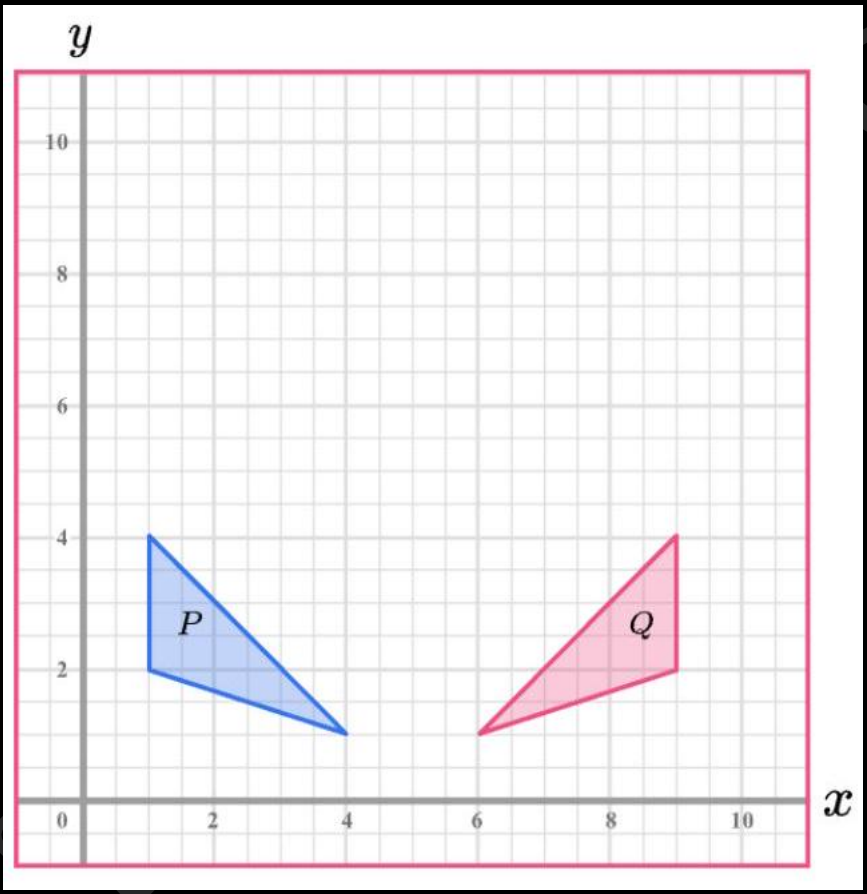
B. True. The distance from a point to its reflected image is equal on both sides of the line of reflection for every point.

C. True. Reflecting a figure twice over the same line brings the figure back to its original position.

D. True. Reflecting a figure across two parallel lines results in a translation, where the figure shifts but maintains its shape and orientation.

Correct Answer: A;B;C;D

34. Describe the transformation of Shape P to Shape Q



A. reflection in $x = 6$

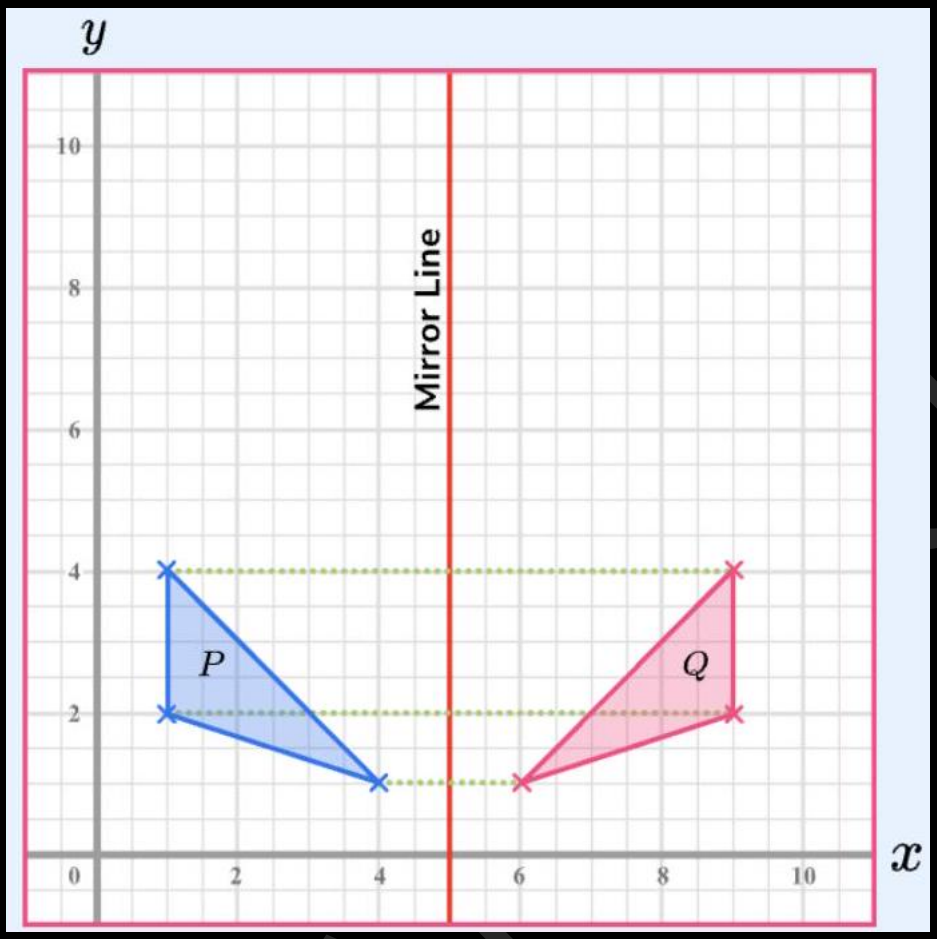
B. reflection in $x = 5$

C. reflection in $y = 5$

D. transformation in $x = 5$

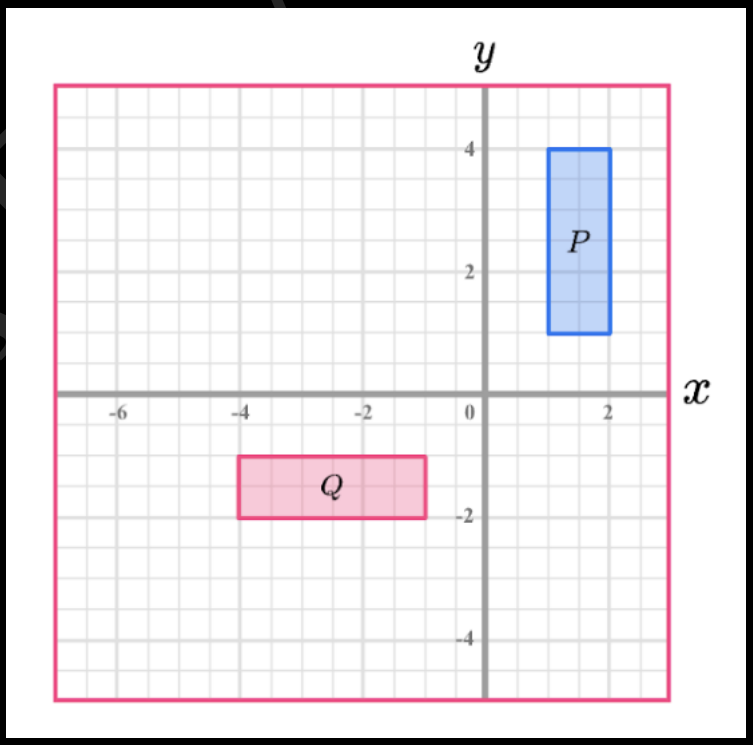
Solution:

You must state that the transformation is a reflection. The line of reflection is a vertical line, so the equation is $x = a$, where a is a number. The corresponding points on the object and the image must be equidistant (the same distance) from the mirror line.



Correct Answer: B

35. Describe the reflection of Shape *P* to Shape *Q*



A. reflection in x-axis

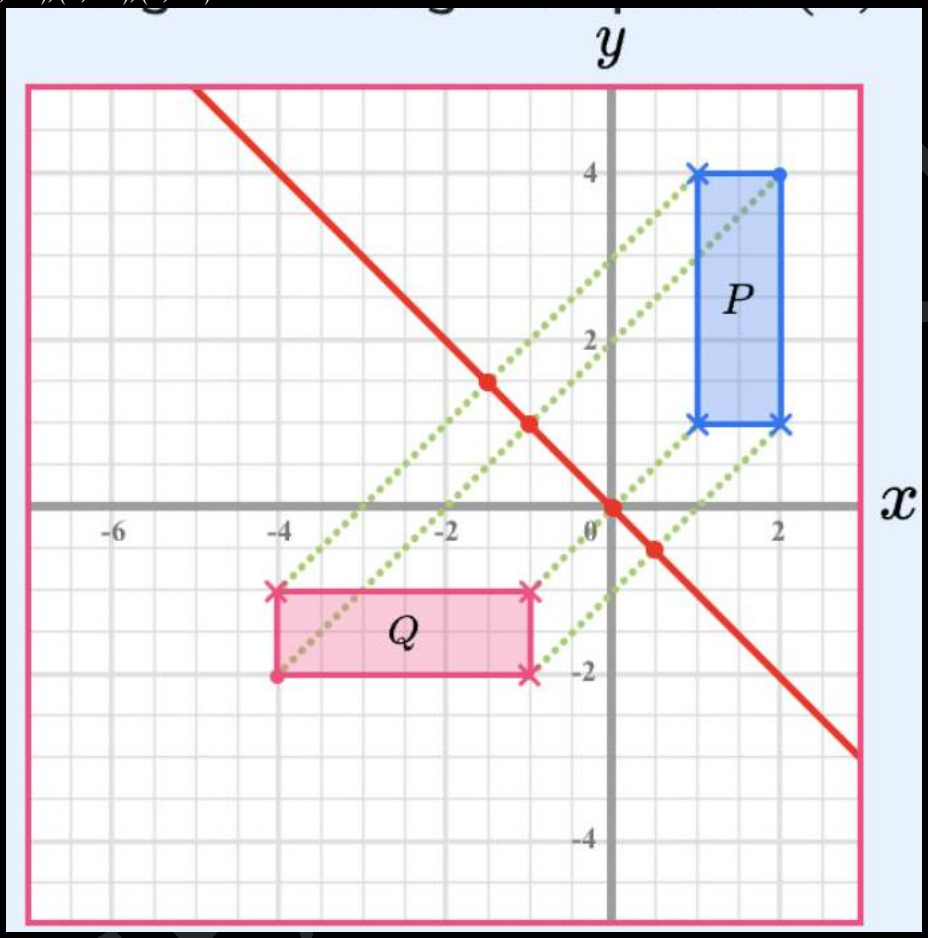
B. reflection in y-axis

C. reflection in $y = -x$

D. reflection in $y = x$

Solution:

The line of reflection is a diagonal line. The corresponding points on the object and the image must be equidistant (the same distance) from the mirror line. The mirror line goes through the points $(1,-1),(2,-2),(3,-3)$ and so on.



Correct Answer: C

36. About the y-axis, for which of the following reflection of $f(x)$ is $f(x)$?

A. $f(x) = x^3$

B. $f(x) = \cos x$

C. $f(x) = \tan x$

D. None of the above

Solution:

The function should be even.

$\cos x$ is symmetrical about the y-axis.

Correct Answer: B

37. For some constant $a > 1$, the two functions $f(x) = a^x$ and $g(x) = \log_a x$ intersect exactly once. What is a?

A. e^1

B. e^{-1}

C. e^{-e}

D. $e^{\frac{1}{e}}$

Solution:

We know that these functions are inverse of each other and inverse functions are mirror images about $y = x$.

So, wherever they intersect, their slopes will be equal to 1.

$a^x = \frac{\ln x}{\ln a} \rightarrow (1)$(b y base changing theorem).

$a^x \ln a = 1 \rightarrow (2)$

$\frac{1}{x \ln a} = 1 \rightarrow (3)$

Using these 3 equations,

from 3, $x \ln a = 1$,

$\ln a = \frac{1}{x}$,

$e^{\ln a} = e^{\frac{1}{x}}$,

$a = e^{\frac{1}{x}}$

Using (1), $\left(a^x = \frac{\ln x}{\ln a}\right)$;

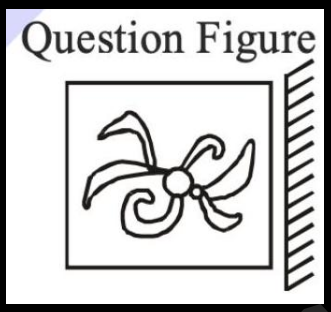
from (2), $a^x \ln a = 1, \ln a = \frac{1}{a^x}$.

Substituting this value in the equation (1), $\ln x = 1, \quad x = e$.

Putting $x = e$ in the obtained equation,we get $a = e^{\frac{1}{e}}$

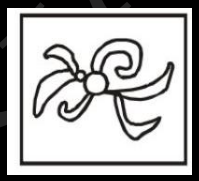
Correct Answer: D

38. Choose the correct mirror image of the following question figure.



A. 

B. 

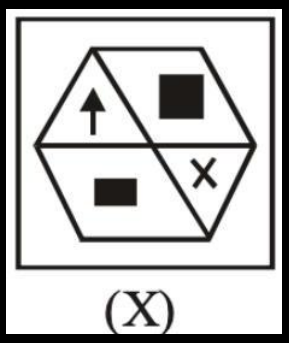
C. 

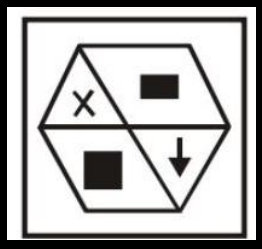
D. 

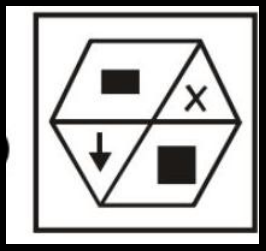
Solution:

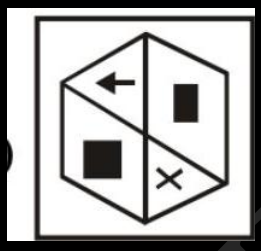
Correct Answer: A

39. Find the water image of the given figure (X).



A. 

B. 

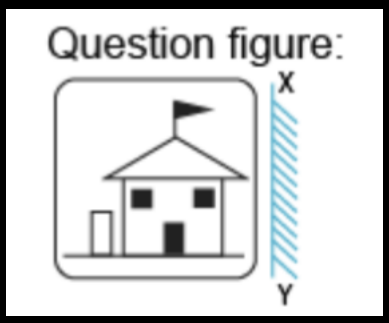
C. 

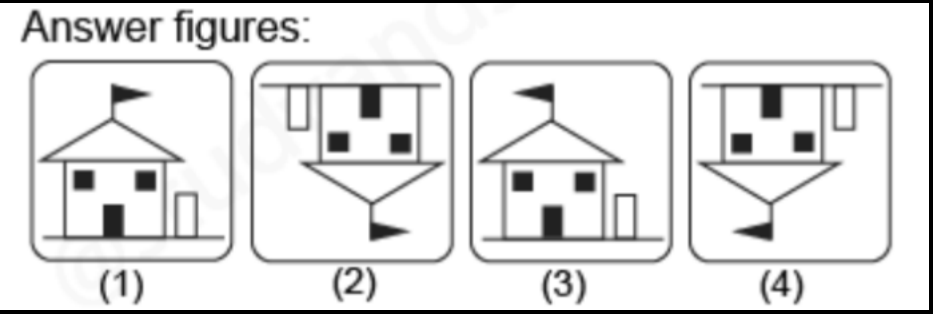
D. 

Solution:

Correct Answer: B

40. Which of the answer figures is exactly the mirror image of the given question figure when the mirror is held at XY?





A. 2

B. 4

C. 3

D. 1

Solution:

Correct Answer: C

5 Transformation of Shapes: Assembling (10 Questions)

41. Which of the following shapes can be assembled to form a cube?

A. Six squares

B. Four triangles

C. Two rectangles

D. Three circles

Solution:

A cube has six faces, all of which are squares. Therefore, you need six square shapes to assemble a cube.

Correct Answer: A

42. If you combine two identical equilateral triangles, what shape will they form when placed edge to edge?

A. Parallelogram

B. Square

C. Rhombus

D. Rectangle

Solution:

When two identical equilateral triangles are joined along one edge, they form a rhombus. The angles at the meeting vertex are equal, resulting in a rhombus shape.

Correct Answer: C

43. If you have four identical right-angled triangles, which of the following shapes can you create by assembling these triangles?

A. A square

B. A parallelogram

C. A Circle

D. Both A and B

Solution:

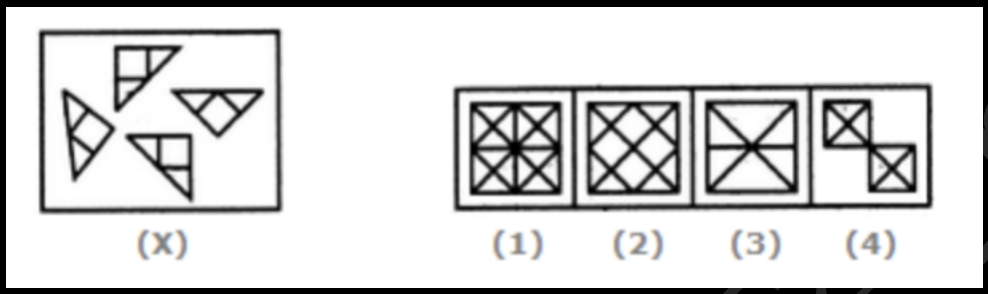
A. Square: You can arrange the four right-angled triangles with their hypotenuses touching to form a square.

B. Parallelogram: You can join two triangles along a side and place the other two in a similar way to create a parallelogram.

C. Circle: Not possible with triangles.

Correct Answer: D

44. Find out which of the figures (1), (2), (3), and (4) can be formed from the pieces given in figure (X).



A. 1

B. 2

C. 3

D. 4

Solution:

Correct Answer: B

45. I construct a quadrilateral by combining triangles together. A minimum of how many triangles do I need?

A. 1

B. 2

C. 3

D. 4

Solution:

The triangles of a quadrilateral are the triangles created by drawing line segments from one vertex of a quadrilateral to all the others.

2 triangles are needed to construct a quadrilateral.

The triangles are connected at the diagonal.

Correct Answer: B

46. If I have a quadrilateral PQRS, how many triangles are there in the quadrilateral in which I must have one of the diagonals as a side.

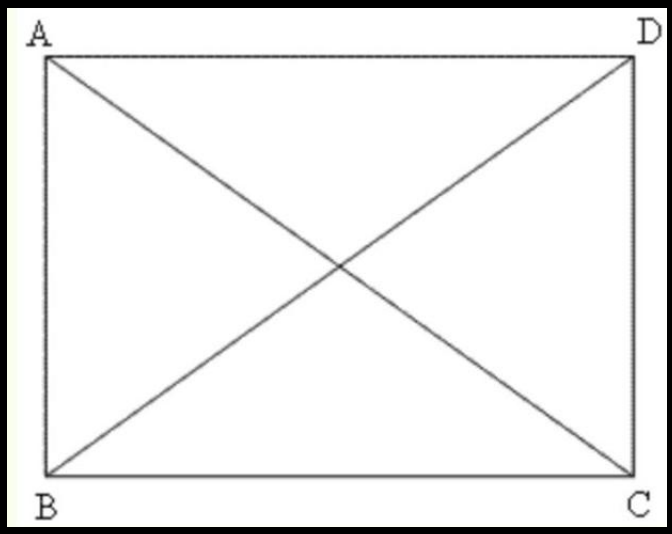
A. 1

B. 2

C. 3

D. 4

Solution:

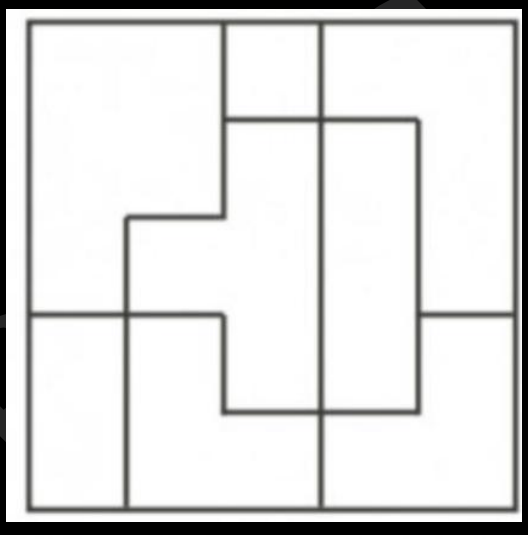


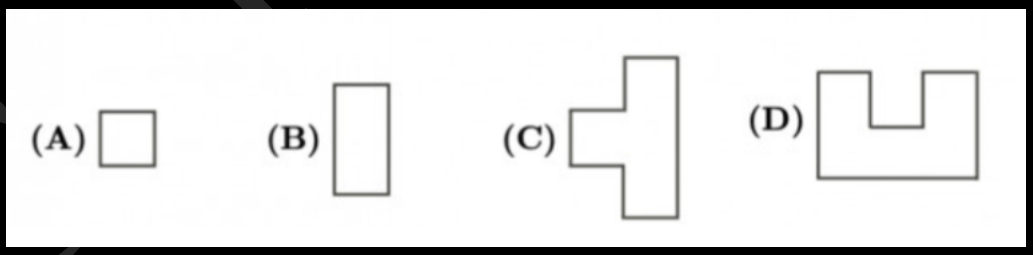
Consider quadrilateral *ABCD* above. The triangles that can be constructed with diagonals are the following- ABC, DBC, BAD, CAD.

Hence, 4 triangles are possible.

Correct Answer: D

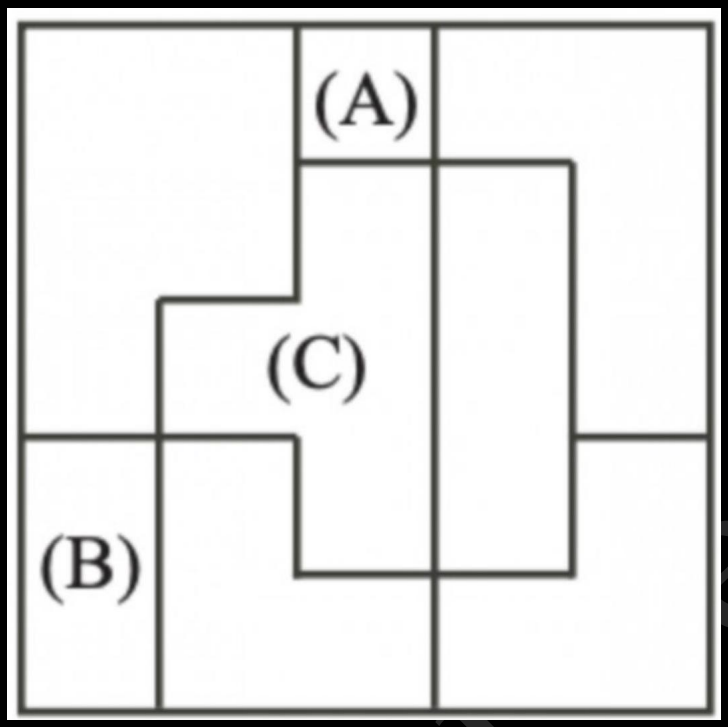
47. The diagram shows a square divided into eight pieces. Which shape is not one of those pieces?





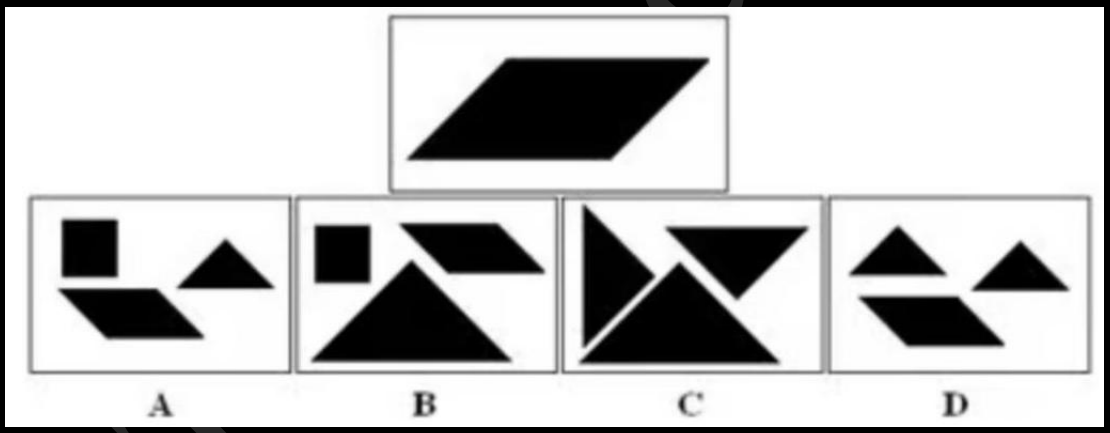
Solution:

Piece (D) does not occur in the diagram:



Correct Answer: D

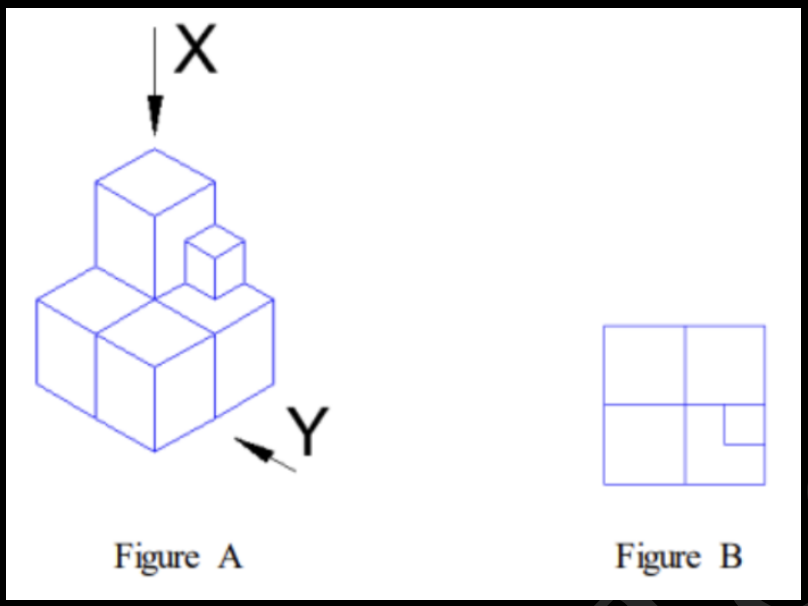
48. Which group of shapes can be assembled to make the shape shown below?



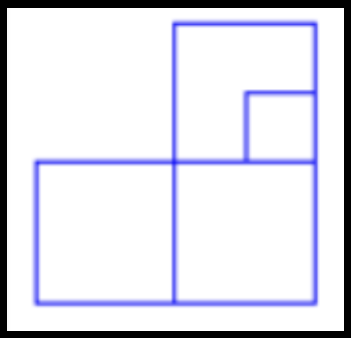
Correct Answer: C

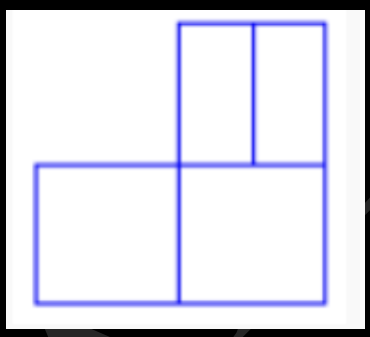
Solution:

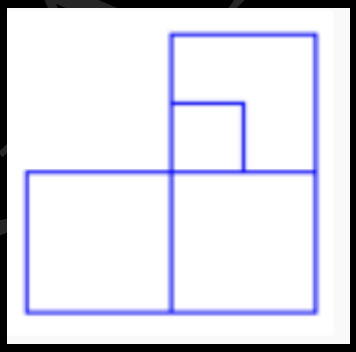
49. Five cubes of identical size and another smaller cube are assembled as shown in Figure A. If viewed from direction X, the planar image of the assembly appears as Figure B.

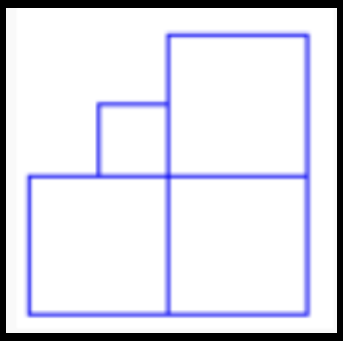


If viewed from direction *Y*, the planar image of the assembly (Figure A) will appear as

A. 

B. 

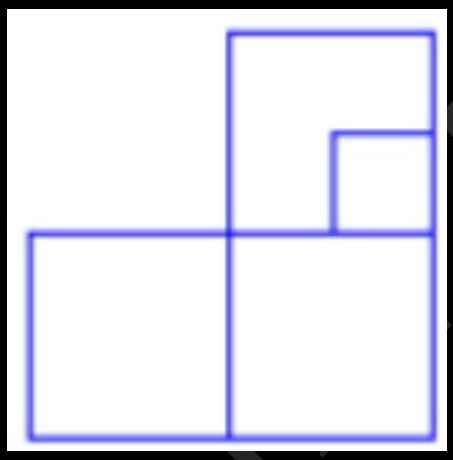
C. 

D. 

Solution:

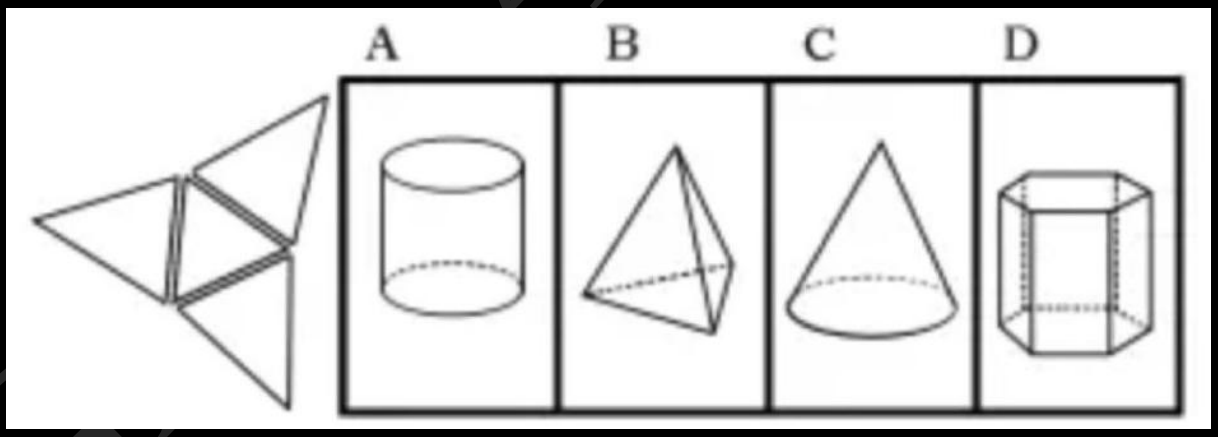
As we Viewed from the Direction of Y.

We Find out the Answer, The First Option is Correct.



Correct Answer: A

50. When put together, what 3-dimensional shape will you get?

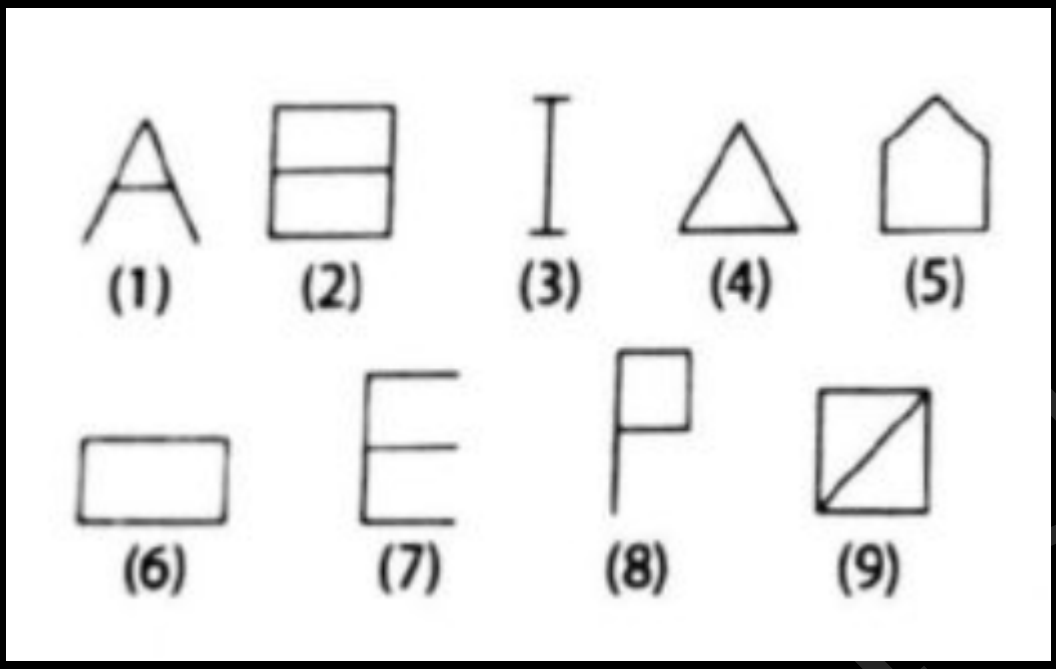


Solution:

Correct Answer: B

6 Transformation of Shapes: Grouping (10 Questions)

51. In the following question, group the given figures into three classes using each figure only once.
Problem Figure:



A. (1, 3, 4)(2, 5, 9)(6, 7, 8)

B. (1, 2, 3)(4, 5, 6)(7, 8, 9)

C. (1, 5, 9)(2, 4, 7)(3, 6, 8)

D. (3, 7, 8)(1, 6, 5)(4, 2, 9)

Solution:

If we start grouping the figures on the basis of sides, we have:

The figures that are made by three lines are (1, 3, 4)

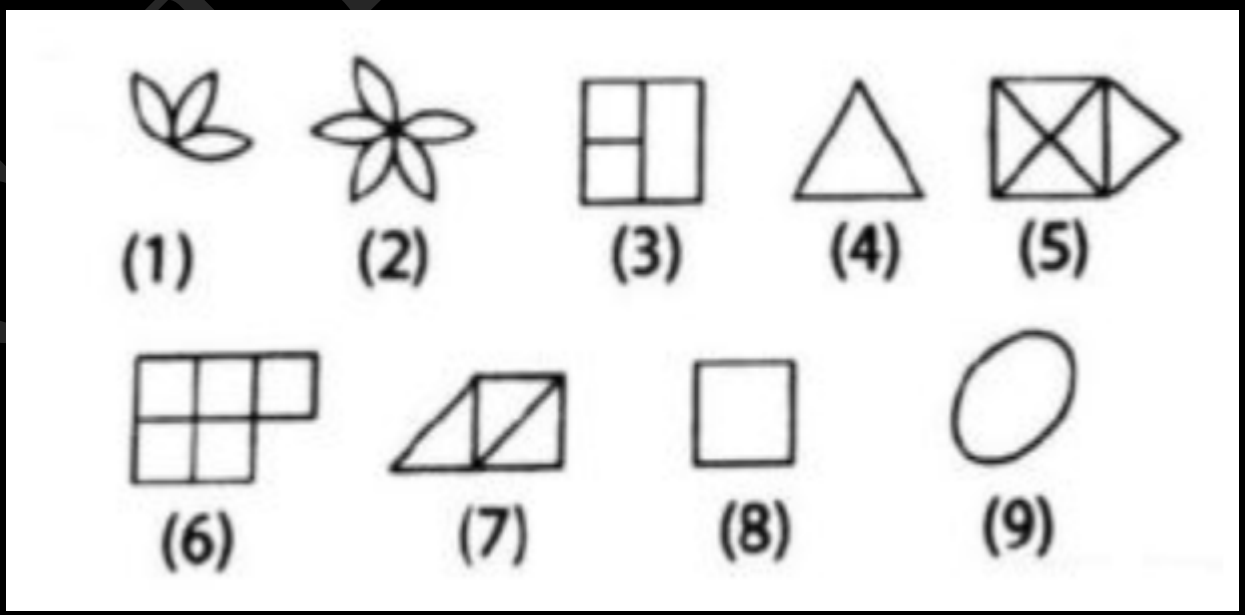
Also, the figures which are made by four lines are (6, 7, 8)

Similarly, the figures made by the five lines are (2, 5, 9). These three groups are present in the option A. Thus the answer is A.

Correct Answer: A

52. In the following question, group the given figures into three classes using each figure only once.

Problem Figure:



A. (1, 2, 3)(4, 8, 9)(5, 7, 6)

B. $(4,5,7)(3,1,2)(7,8,9)$

C. $(1,2,7)(8,9,4)(2,3,6)$

D. None of the above

Solution:

The figures 1, 3 and 7 have three petals, three rectangles and three triangles respectively.

So, they should be grouped in one group figures 4,8 and 9 have one triangle, one rectangle and one circle respectively.

So, they should be grouped into one group.

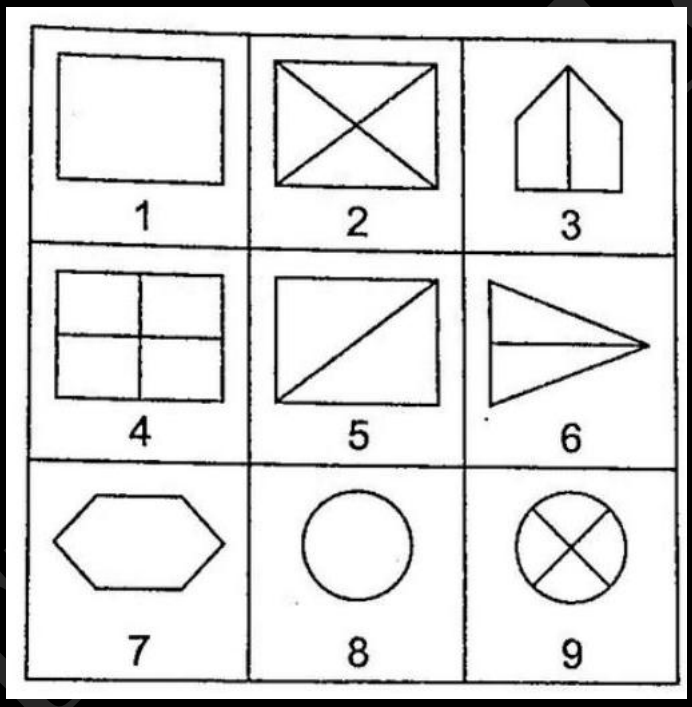
On the other hand, the figures between 2,5 and 6 have five petals, five triangles and five squares, respectively.

So, they should be grouped into one group.

Therefore the correct answer is C. $(1,2,7)(8,9,4)$ $(2,3,6)$.

Correct Answer: C

53. Group the figures into different classes on the basis of their orientation, shape, etc.



A. $(1,2,4),(3,5,6),(7,8,9)$

B. $(1,7,8),(3,5,6),(2,4,9)$

C. $(1,3,4),(2,8,9),(5,6,7)$

D. $(1,7,8),(2,3,6),(4,5,9)$

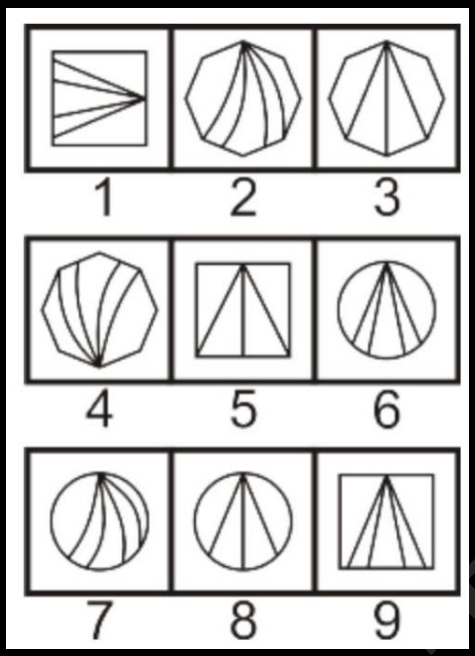
Solution:

Clearly, 1,7, and 8 contain a simple geometrical shape. 2, 4, and 9 contain two straight lines dividing the main figure into four parts. 3,5 and 6 contain one geometrical shape divided into two equal parts by a straight line.

Thus, the given nine figures may be divided into three groups as $(1,7,8),(3,5,6)$ and $(2,4,9)$.

Correct Answer: B

54. Choose the correct sequence which are the group of identical images.



A. 1, 7, 2; 3, 9, 6; 4, 5, 8

B. 1, 9, 7; 2, 8, 5; 3, 4, 6

C. 3, 5, 8; 1, 6, 9; 2, 4, 7

D. 5, 6, 9; 3, 4, 1; 2, 7, 8

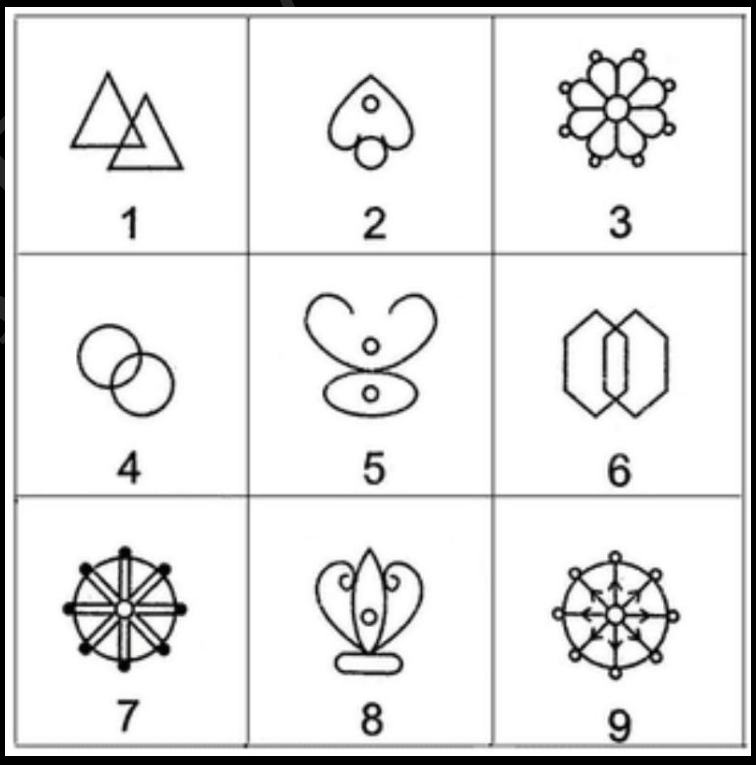
Solution:

The actual image sequence is

Option (C) 3, 5, 8; 1, 6, 9; 2, 4, 7.

Correct Answer: C

55. Group the given figures into different classes on the basis of their orientation, shape etc.



A. (1, 4, 8), (2, 5, 7), (3, 9, 6)

B. $(1,4,6),(2,5,8),(3,7,9)$

C. $(1,4,6),(2,5,7),(3,8,9)$

D. $(1,2,3),(4,5,6),(7,8,9)$

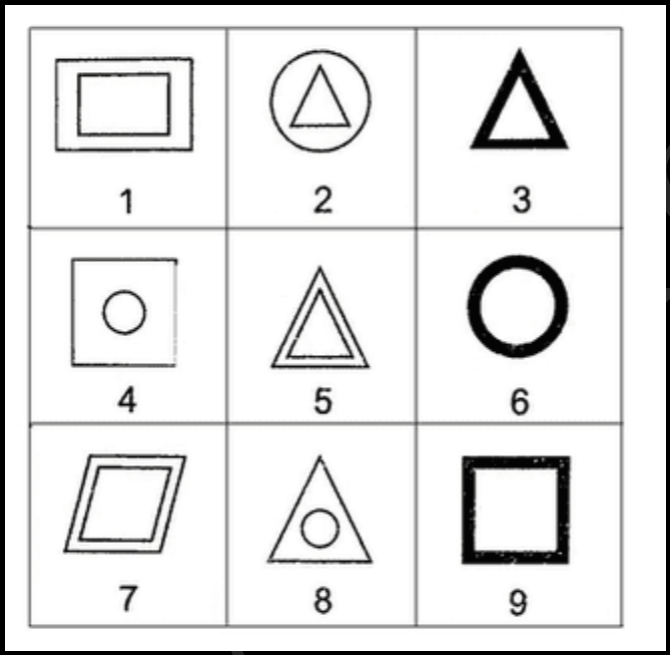
Solution:

1,4 , and 6 contain two identical figures which intersect each other.

2, 5 and 8 contain figures in which curves are present 3, 7 and 9 contain figures which represent circular design patterns.

Correct Answer: B

56. Group the given figures into different classes on the basis of their orientation, shape etc.



A. $(1,5,7),(2,4,6),(3,9,8)$

B. $(1,5,7),(2,4,8),(3,6,9)$

C. $(1,5,7),(4,8,9),(2,3,6)$

D. $(1,5,7),(3,8,9),(2,4,6)$

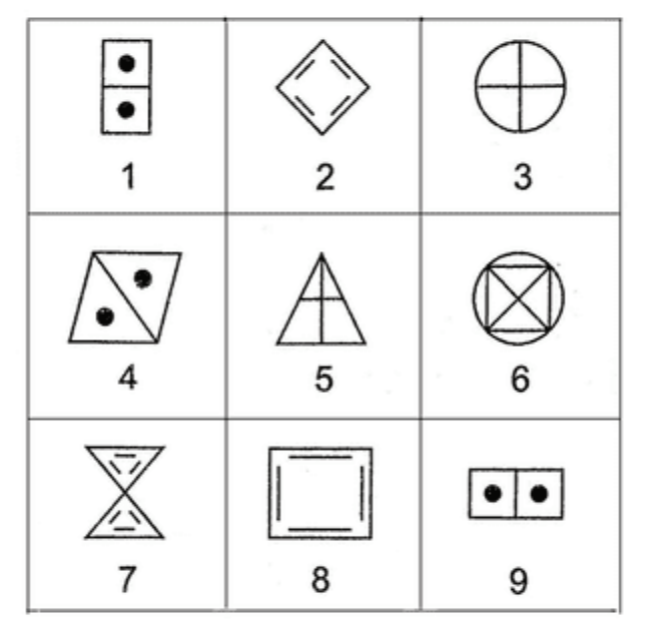
Solution:

1,5 and 7 are composed of two similar figures, one inside the other.

2,4 and 8 contain a figure placed inside a different figure 3, 6 and 9 are figures with thick boundaries.

Correct Answer: B

57. Group the given figures into different classes on the basis of their orientation, shape etc.



A. $(1,4,9),(2,6,8),(3,5,7)$

B. $(1,2,8),(3,5,7),(4,6,9)$

C. $(2,5,8),(4,6,9),(1,3,7)$

D. $(1,4,9),(2,7,8),(3,5,6)$

Solution:

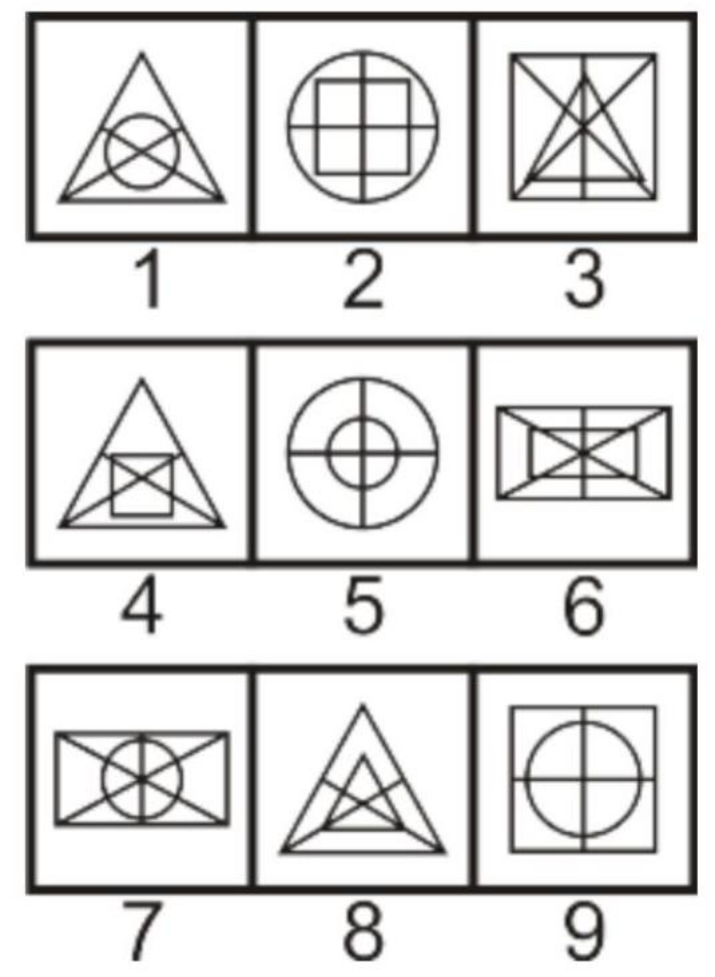
1, 4 and 9 form a group of figures which are divided into two equal parts and each part contains one small dark circle.

2, 7 and 8 form a group of figures in which lines equal to the number of lines present in the main figure are present inside the figure (one line parallel to each line).

3, 5 and 6 form a group of figures in which two straight lines mutually perpendicular to each other are present.

Correct Answer: D

58. Choose the correct sequence which are the group of identical images.



A. 1, 3, 5; 2, 4, 6; 7, 8, 9

B. 1, 4, 8; 2, 5, 9; 3, 6, 7

C. 1, 2, 3; 4, 6, 7; 8, 9, 5

D. 1, 6, 7; 2, 3, 4; 5, 8, 9

Solution:

The actual image sequence is Option (B) 1,4,8; 2,5,9; 3,6,7.

Correct Answer: B

59. Group the given figures into three classes using each figure only once.

A. 2, 4, 7; 1, 6, 9; 3, 5, 8

B. 1, 3, 5; 2, 6, 7; 4, 8, 9

C. 1, 5, 7; 2, 3, 6; 4, 8, 9

D. 1, 3, 5; 2, 4, 7; 6, 8, 9

Solution:

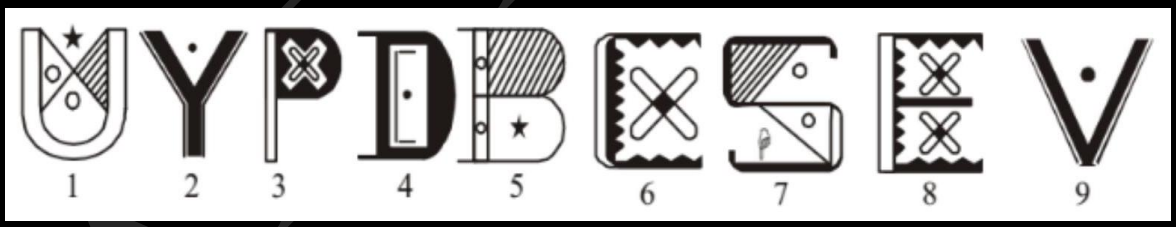
1, 6, 9 are figures which are half shaded by slanting lines.

2, 4, 7 are all divided into equal parts (either three or four parts) by straight lines and also have a black circle at the centre.

3, 5, 8 have similar designs and have their four corners shaded black.

Correct Answer: A

60. A series of figures are given which can be grouped into classes. Select the group into which the figures can be classified from the given responses.



A. 1, 5, 7; 2, 4, 9; 3, 6, 8

B. 1, 5, 7; 2, 8, 9; 3, 4, 6

C. 1, 7, 8; 2, 4, 9; 3, 5, 6

D. 1, 4, 6; 5, 8, 9; 2, 3, 7

Solution:

As we can see that,

Figures 1, 5 and 7 contain an English letter, two circles, one star and oblique lines.

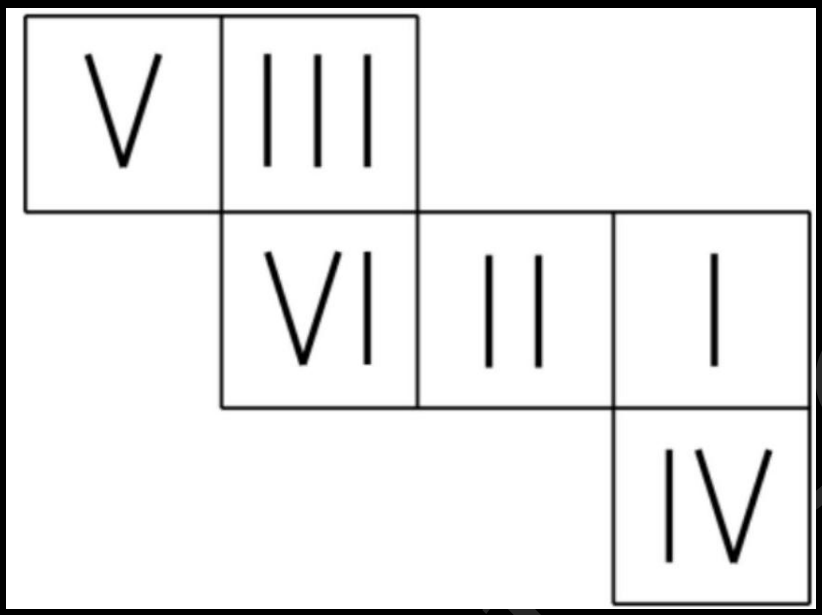
Figures 2, 4 and 9 contain an English letter and one dot.

Figures 3, 6 and 8 contain an English letter and one or two cross sign (s).

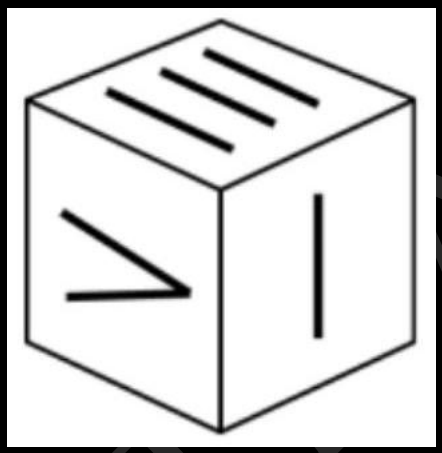
Correct Answer: A

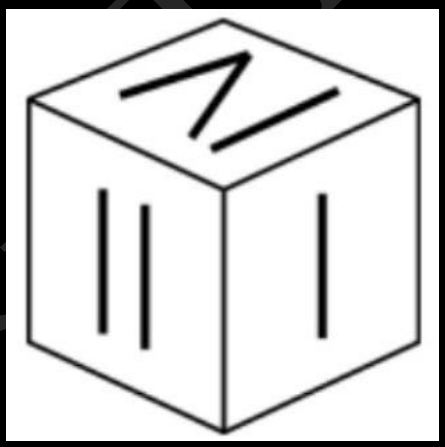
7 Transformation of Shapes: Paper Folding (10 Questions)

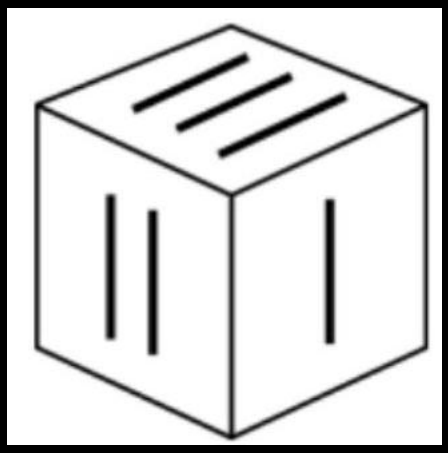
61. The net below can be folded to make a Roman numerical dice.

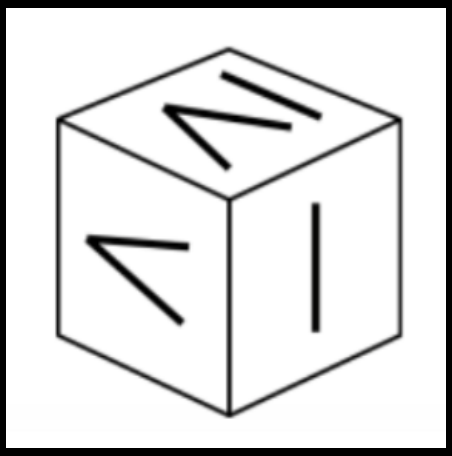


Which one of the following dice could have been made as a result of folding the net?

A. 

B. 

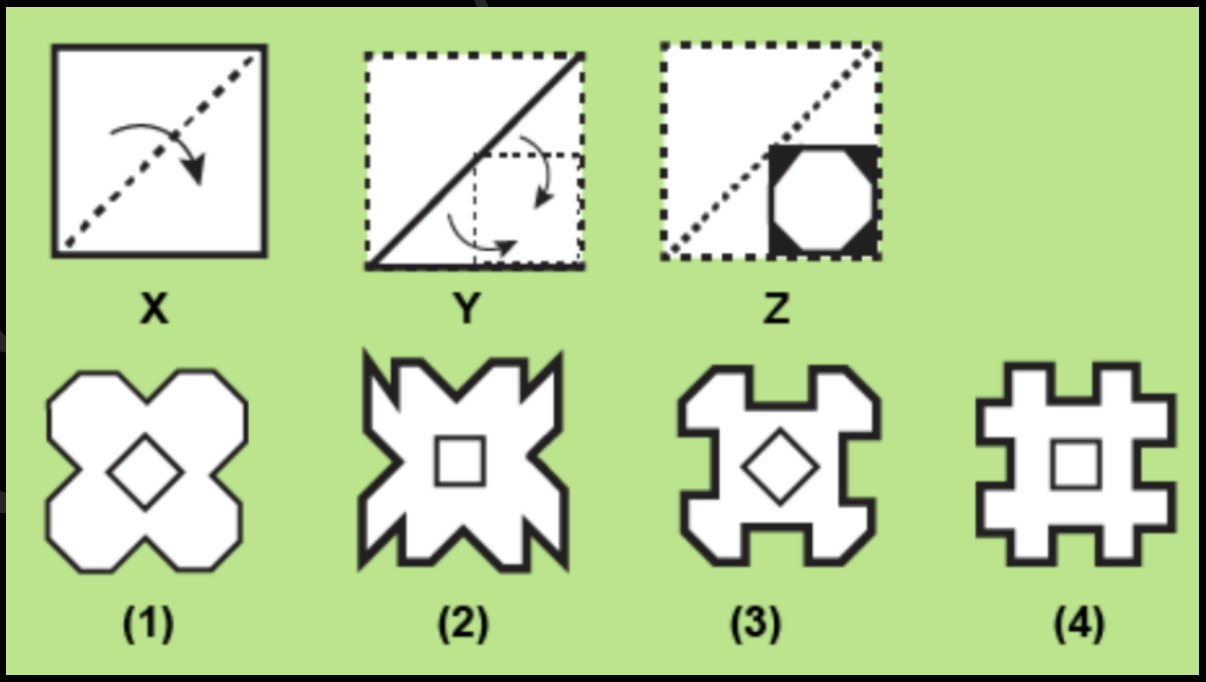
C. 

D. 

Solution:

Correct Answer: D

62. Choose the figure from 1,2,3 or 4 which closely resembles figure Z.



A. (1)

B. (2)

C. (3)

D. (4)

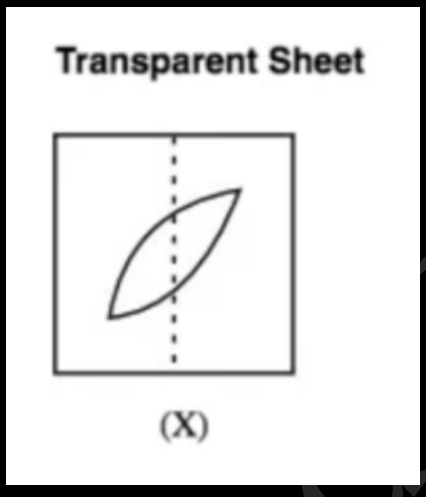
Solution:

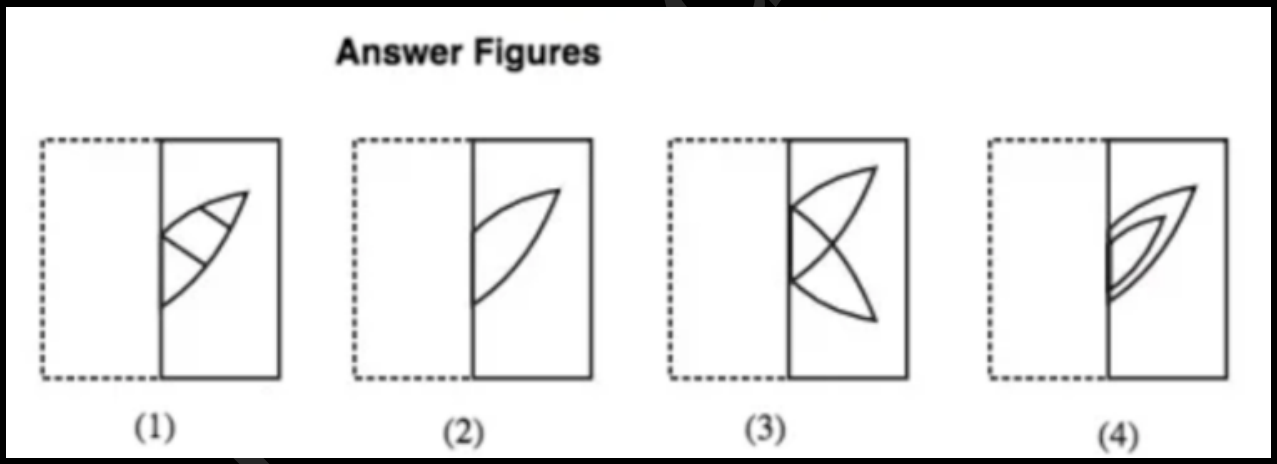
Try following the corners and the middle of the sides. You will observe, the missing corners of the final square.

Option A is the correct.

Correct Answer: A

63. Find the pattern which will appear on the transparent sheet after it is folded along the dotted line.





A. (1)

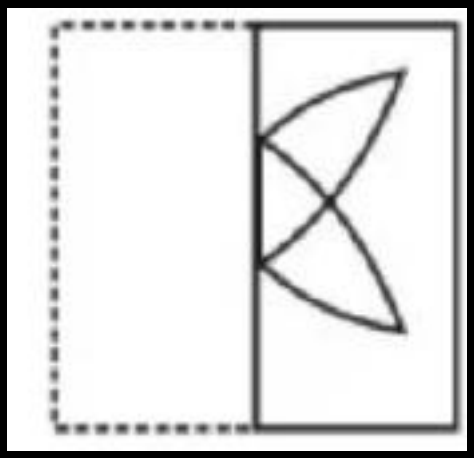
B. (2)

C. (3)

D. (4)

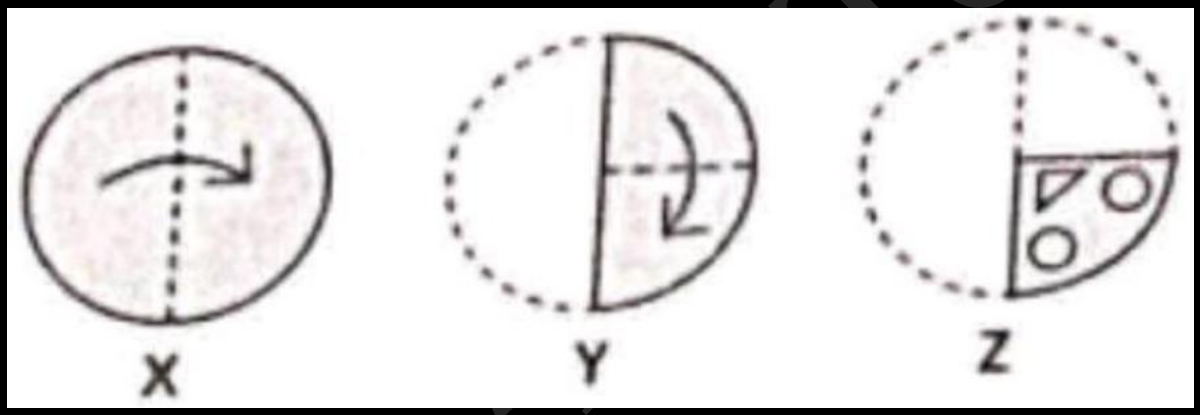
Solution:

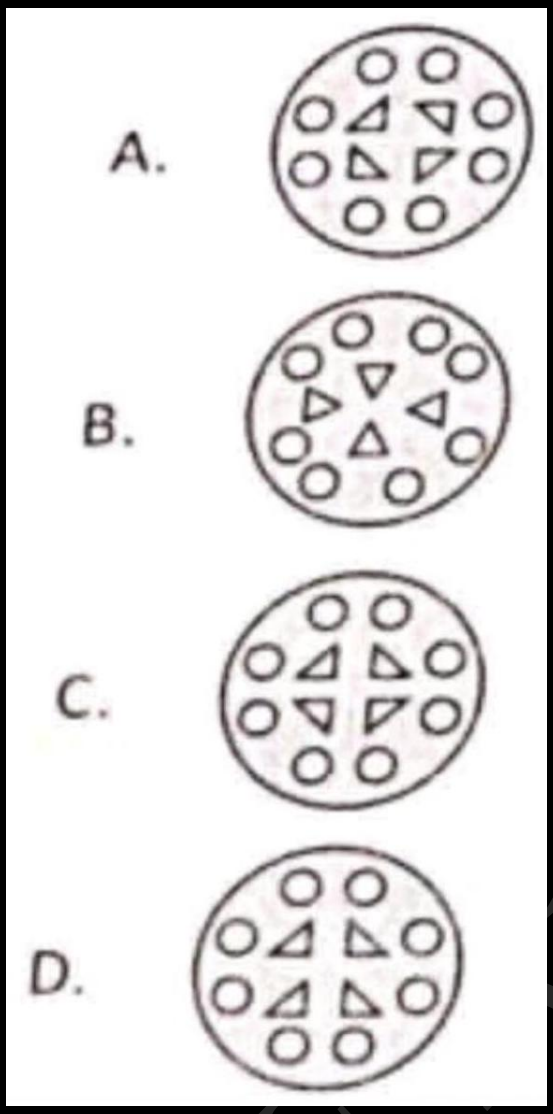
If you fold the paper from left to right from dotted line, the left part figure will go in opposite direction. Please take a transparent paper and draw a similar figure and fold it.Thus, figure (3) is the correct figure, and the answer is (C).



Correct Answer: C

64. The given question consists of a set of three figures *X*, *Y* and *Z* which shows the sequence of folding of a piece of paper. Fig. *Z* shows the manner in which the folded paper has been cut. Select a figure from the options which shows the unfolded form of Fig. *Z*.



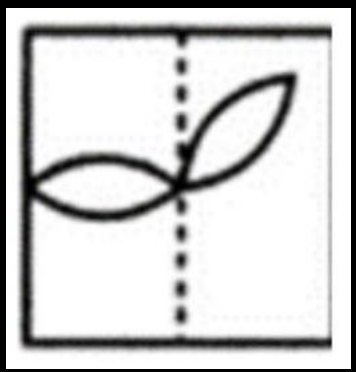


Solution:

The correct answer is A because it accurately reflects the pattern of cuts made on the folded paper as shown in Figure Z. By mentally unfolding the paper from Figure Z, following the folds shown in X and Y, you will arrive at the pattern of holes in option A.

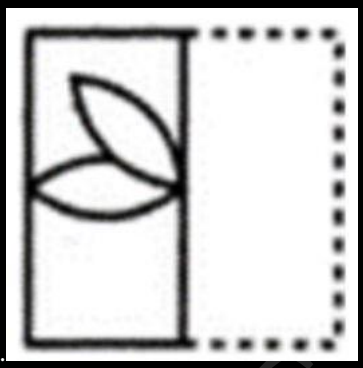
Correct Answer: A

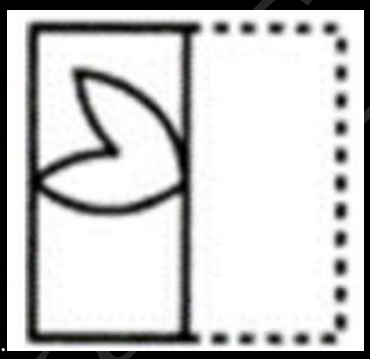
65. In a figure a transparent sheet is given. Find out the pattern formed when the transparent sheet is folded. (Dotted line represent the folding of paper)



A. 

B. 

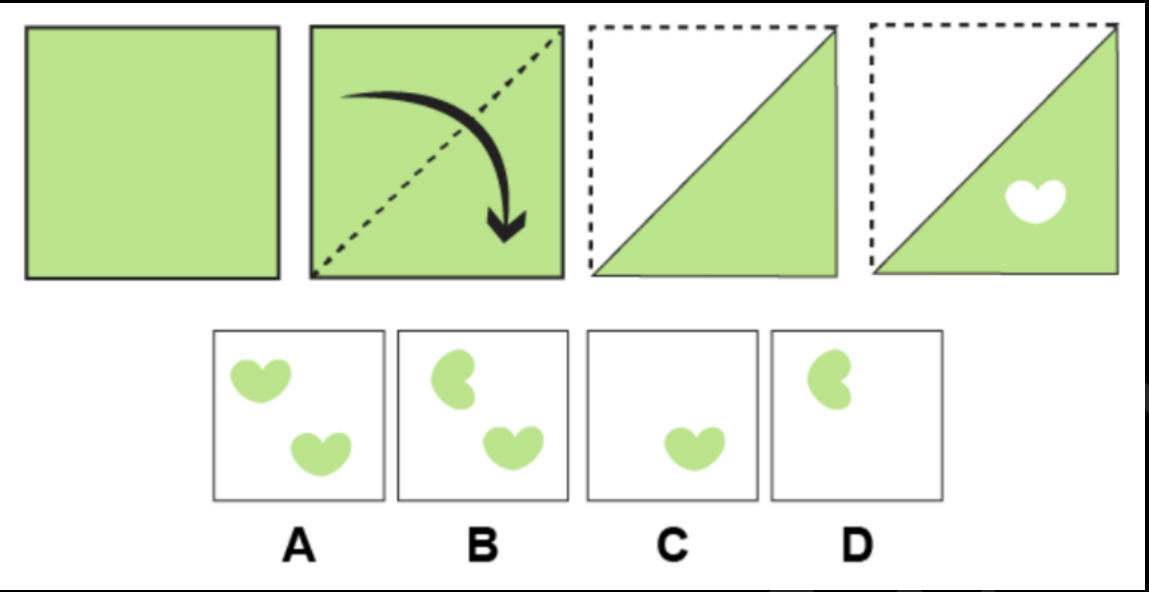
C. 

D. 

Solution:

Correct Answer: B

66. Choose the figure from A, B, C, and D that closely resembles the last figure Z after being cut.



Solution:

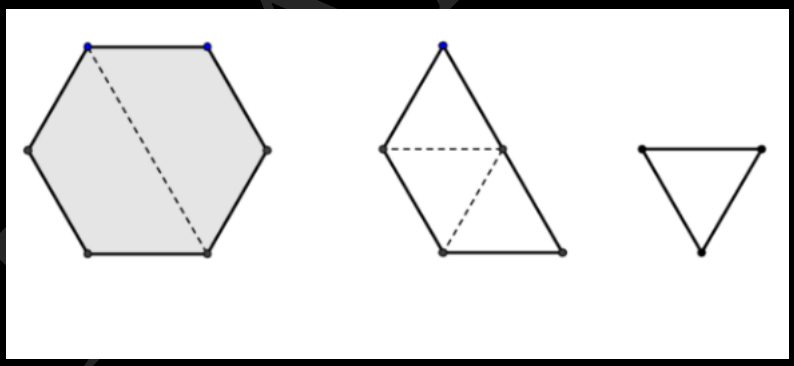
When the paper is unfolded, we will witness 2 hearts. This rules out options *C* and *D* for the answer.

Since the paper was folded diagonally, the second heart must also be flipped vertically and rotated 90 degrees clockwise.

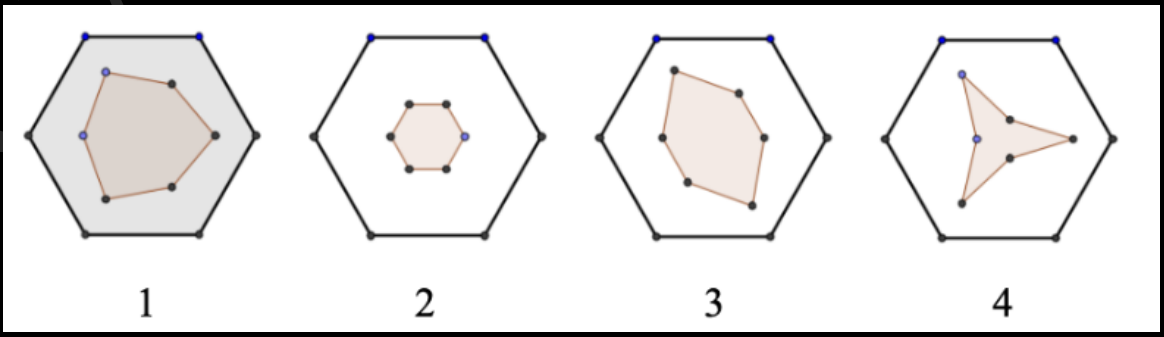
This further disqualifies option A for an answer. Option B is the correct answer.

Correct Answer: B

67. A piece of paper in the shape of a regular hexagon is folded over once and then into thirds as shown.



One straight cut is made, removing a section of the folded paper, and the remaining piece is unfolded again. Which of these shapes can be the result?



A. All except number 2 are possible.

B. All except number 1 are possible.

C. All except number 4 are possible.

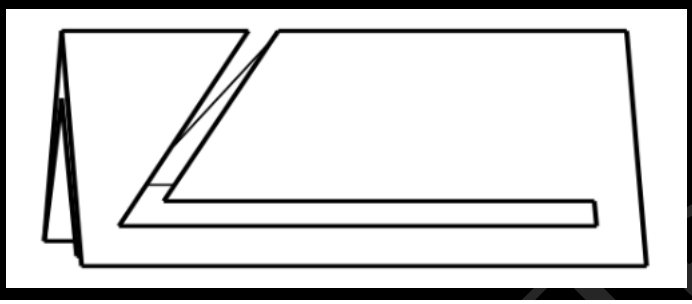
D. All except number 3 are possible.

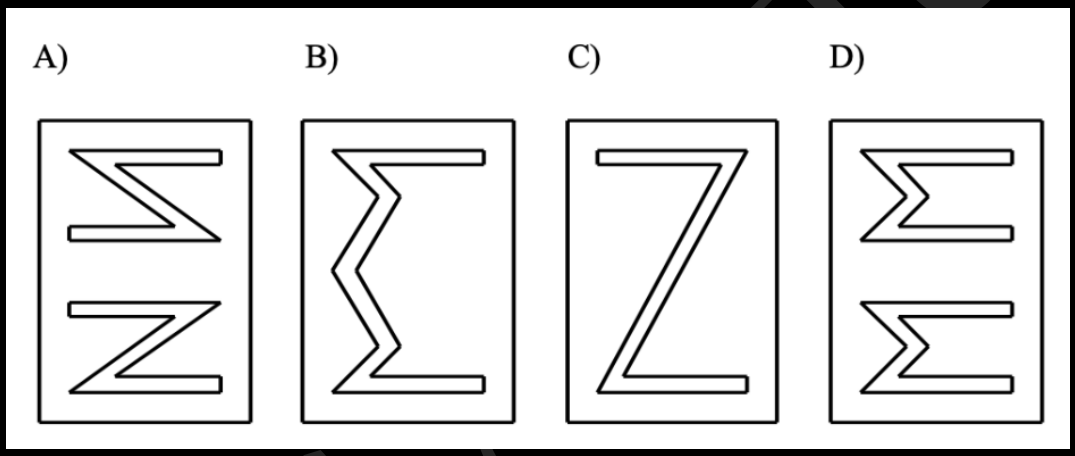
Solution:

Because of the symmetry resulting from the folds, all but number 3 are possible. The correct answer is therefore D.

Correct Answer: D

68. A rectangular sheet of paper is folded in half and then folded in half again. A piece is cut out of the paper, while folded, as shown. The sheet is then smoothed out to its original size again. Given that the pattern which appears is one of the following, which is it?



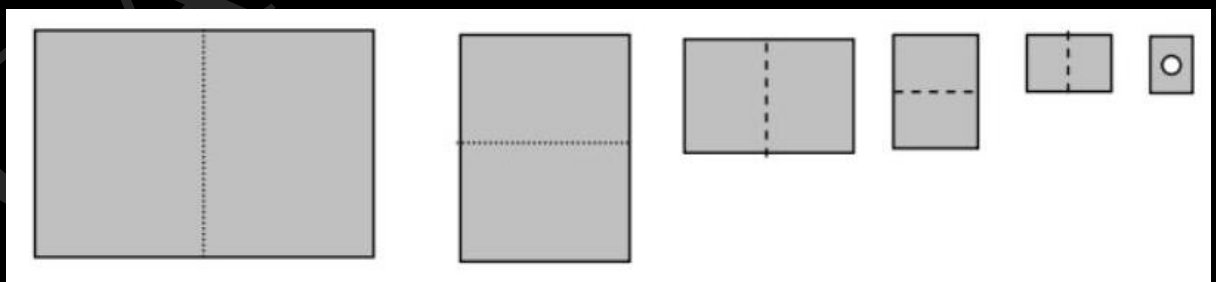


Solution:

Since the paper was folded twice, the pattern formed on the paper must be symmetric with respect to a fold, and each half must again be symmetric with respect to a fold. Only D satisfies this requirement. The correct answer is therefore D.

Correct Answer: D

69. Harold folds piece of paper five times as shown and pokes a hole through the folded paper. How many holes are there in the unfolded paper?



A. 6

B. 10

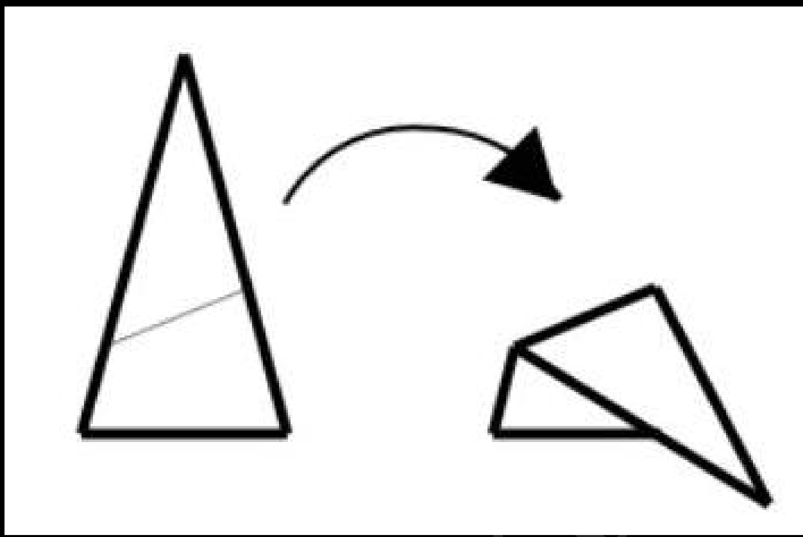
C. 16

D. 32

Solution:

Each fold doubles the number of layers of paper. The final small rectangle is therefore made up of 32 layers. Since one hole is poked in each layer, the unfolded paper has 32 holes, and the correct answer is therefore D.

70. The diagram shows a triangular piece of paper that has been folded over to produce a shape with the outline of a pentagon. If a rectangular piece of paper is folded once, what is the smallest value of n (greater than 4) for which it is not possible to create an n-sided polygon in the same way?



A. 6

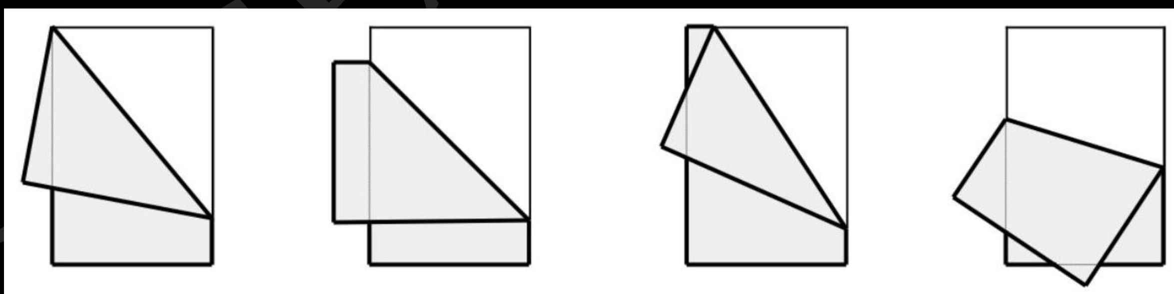
B. 7

C. 8

D. 10

Solution:

When the piece of paper is folded, the crease makes up one side of the resulting polygon. In addition, each of the four corners of the rectangle can contribute at most two sides to the resulting polygon. More than 9 sides are therefore certainly not possible. As we see in the figure, the other given values are possible.

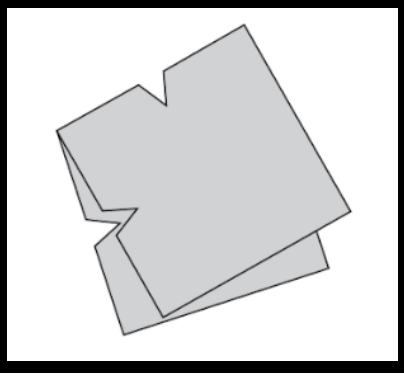


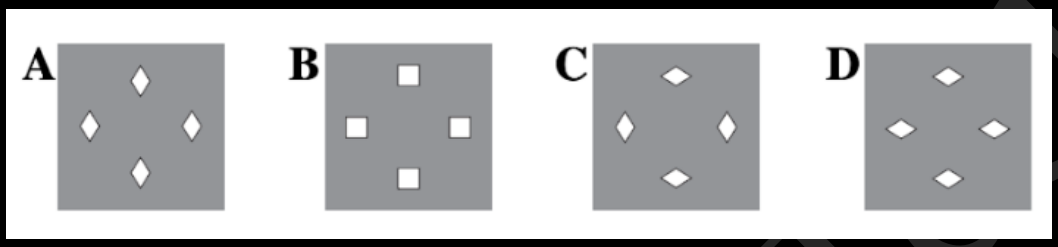
The correct answer is therefore D.

Correct Answer: D

8 Transformation of Shapes: Paper Cutting (10 Questions)

71. A folded napkin was cut through (see picture). What does it look like when unfolded?

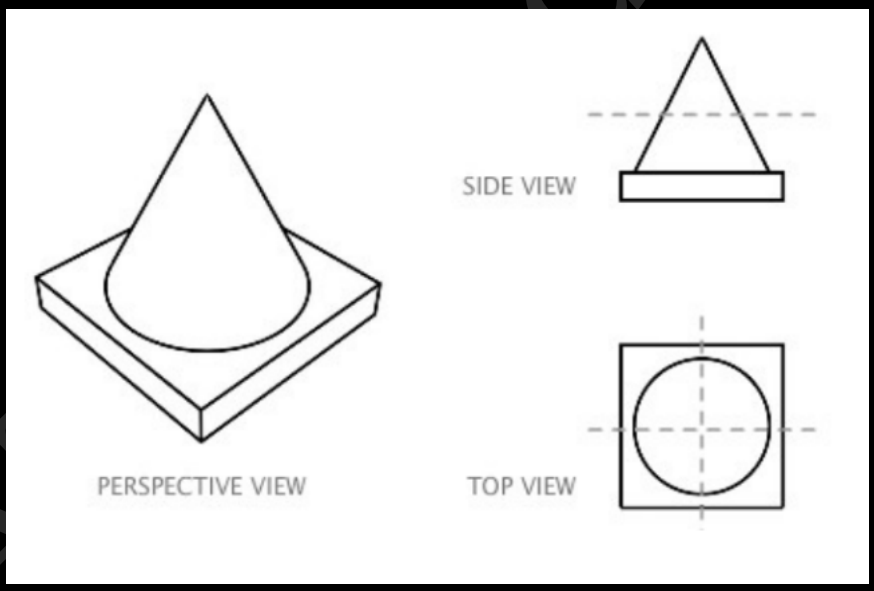




Solution:

Correct Answer: C

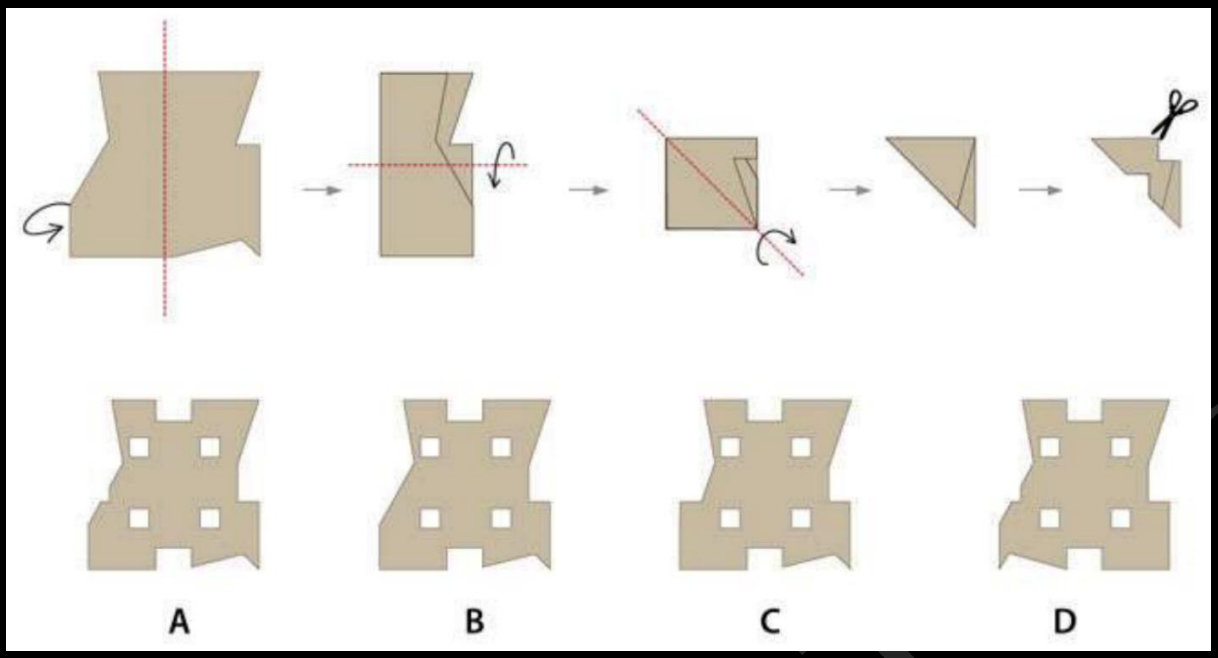
72. A perspective view of a solid object is shown on the left. The object is cut simultaneously along THREE perpendicular planes as shown on the right. How many surfaces will the resulting pieces have in total (i.e. sum of the surfaces of all pieces)? (Numerical Answer Type)



Solution:

Correct Answer: 48

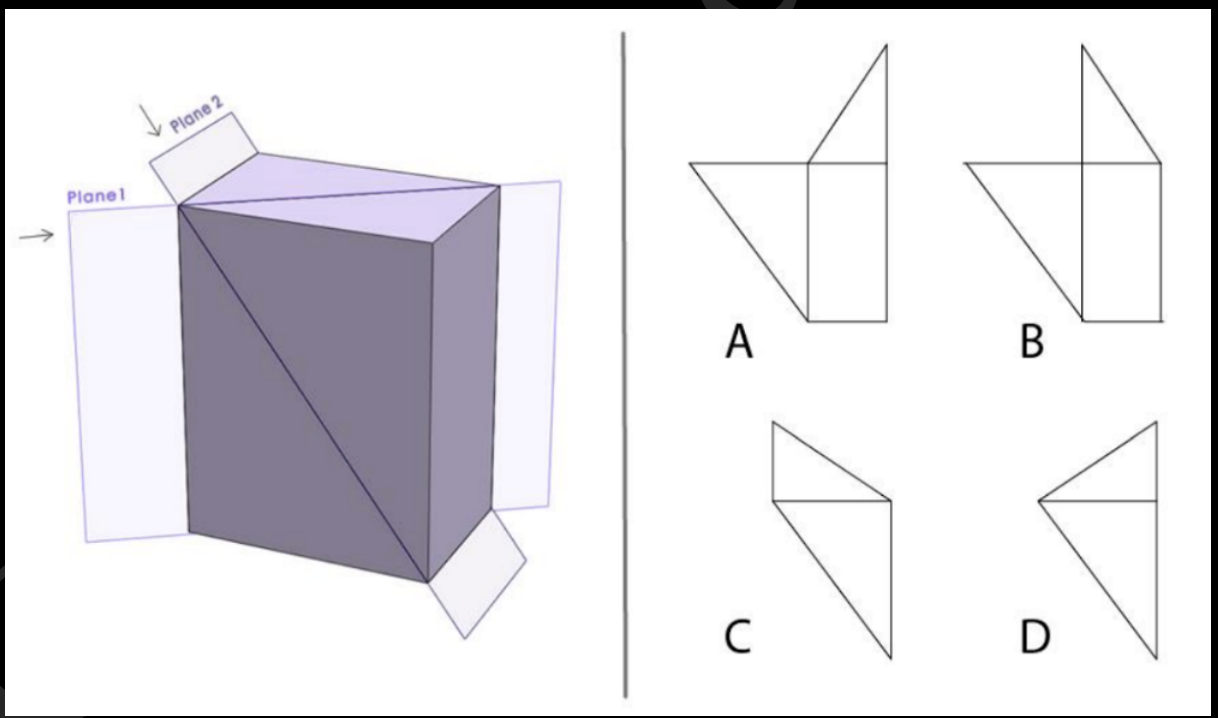
73. An irregular piece of paper is folded and cut as shown below. Which option shows the correct cuts when the paper is unfolded?



Solution:

Correct Answer: A

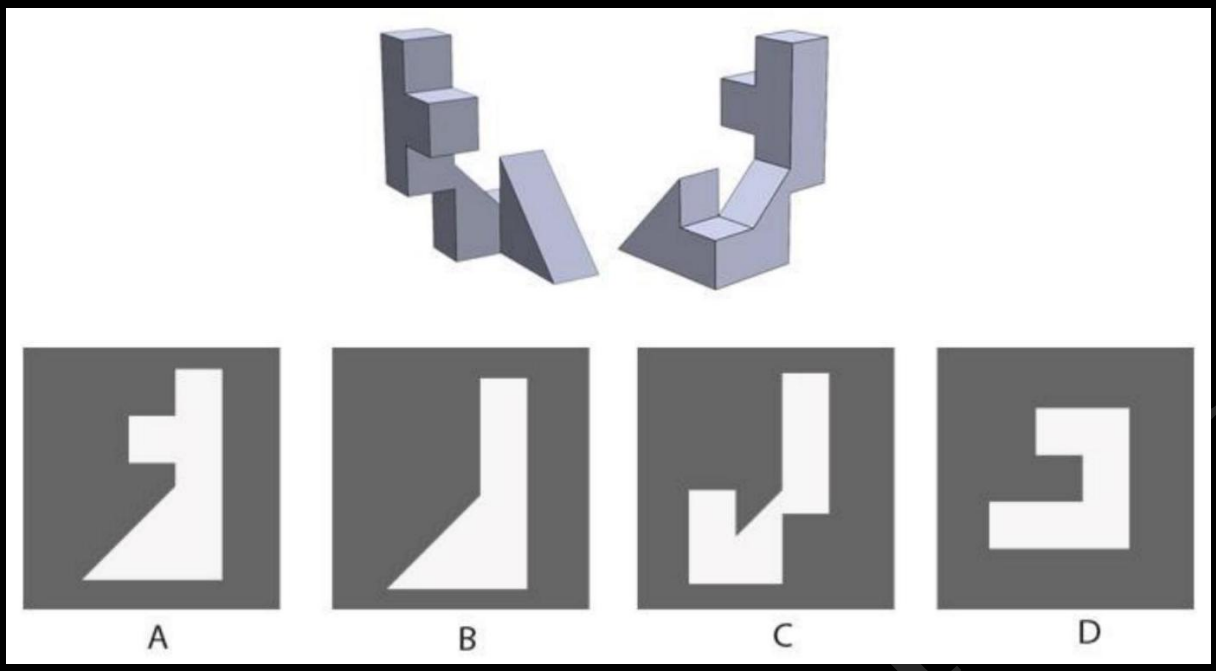
74. The rectilinear hollow box shown on the left is cut along plane 1 and plane 2. Which of the option(s) show(s) correct unfolded pieces? (Multiple Select Answers)



Solution:

Correct Answer: B;C

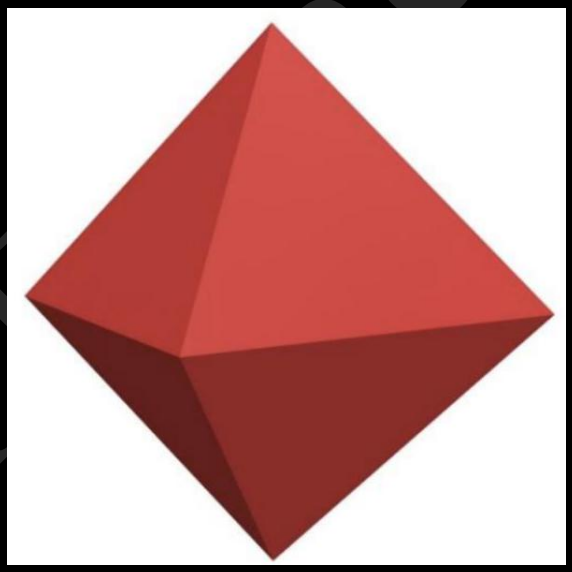
75. Shown below are 2 views of the same solid. Through which of the cutouts shown in the options, will the solid pass? (Multiple Select Answers)



Solution:

Correct Answer: A;C;D

76. 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? (Multiple Select Answers)



A. Triangle

B. Square

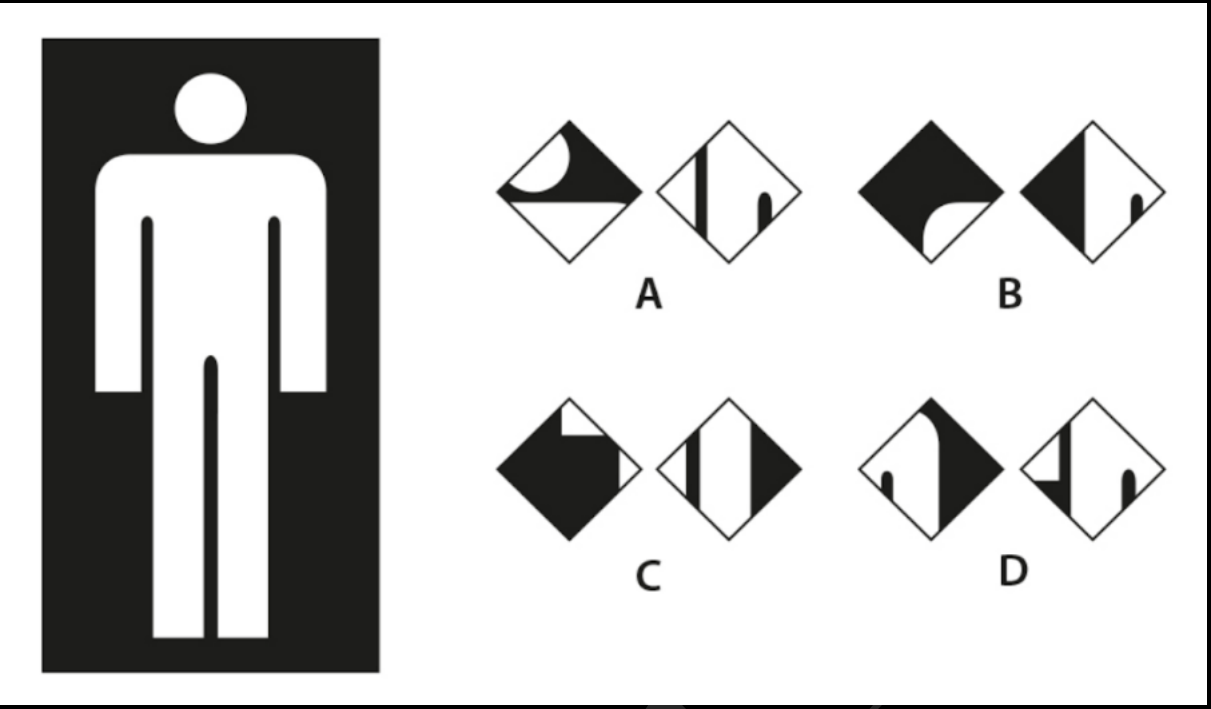
C. Pentagon

D. Hexagon

Solution:

Correct Answer: B;C;D

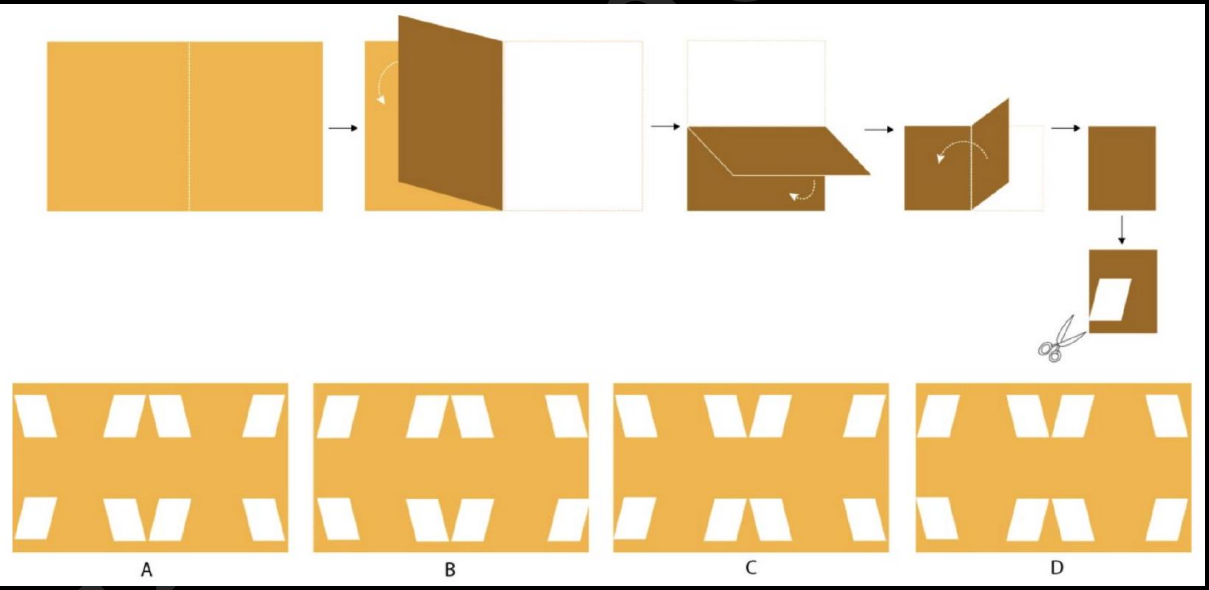
77. Each of the options shows a pair of two different pieces. Which of the options CAN NOT be cut out of the given figure? (Multiple Select Answers)



Solution:

Correct Answer: B;D

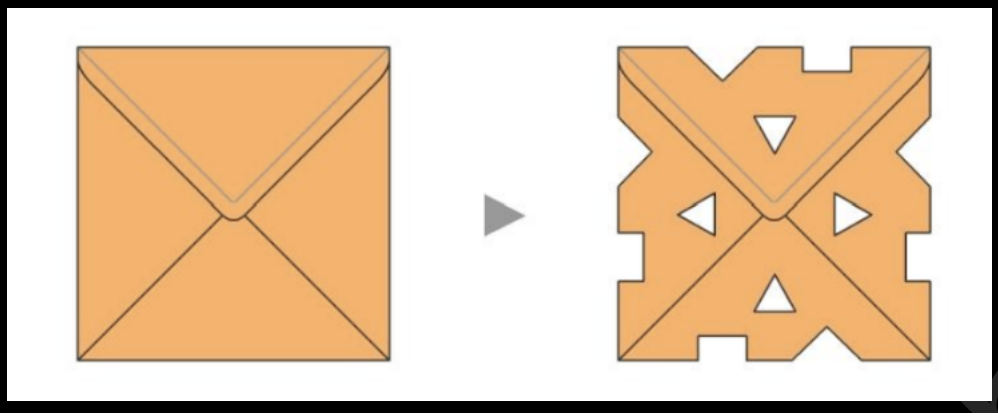
78. Select the correct option.

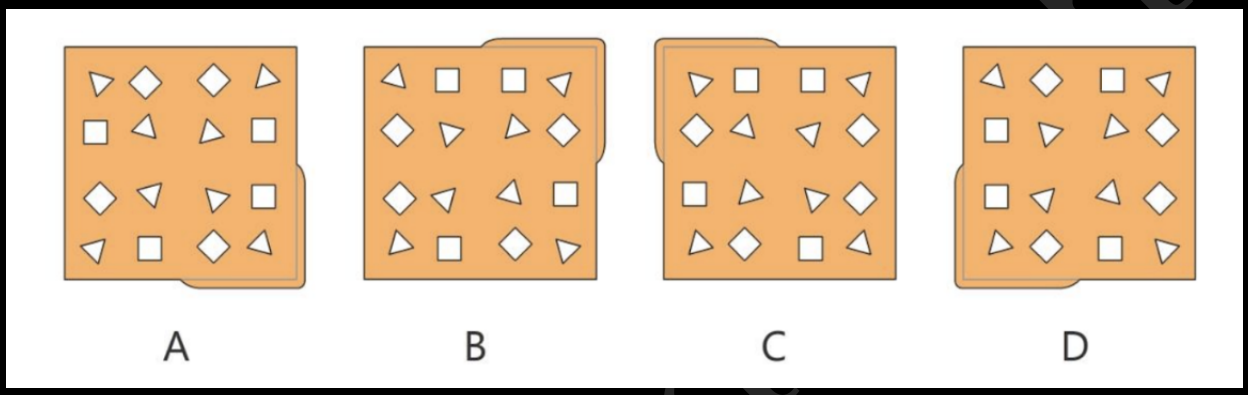


Solution:

Correct Answer: A

79. 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?

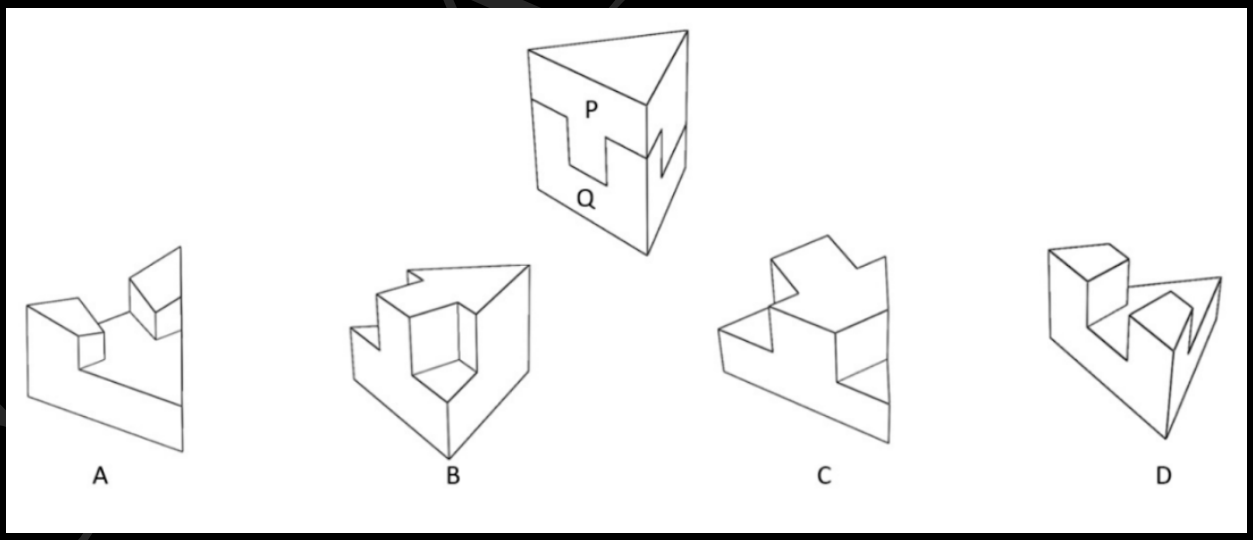




Solution:

Correct Answer: B

80. Shown below is a triangular prism cut into two parts, *P* and *Q*. Identify which option represents part *P*.

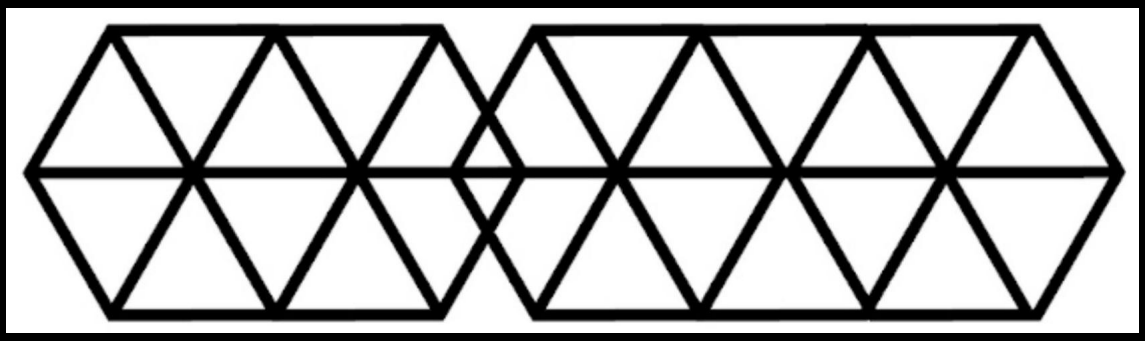


Solution:

Correct Answer: B

9 Patterns in Two Dimensions (10 Questions)

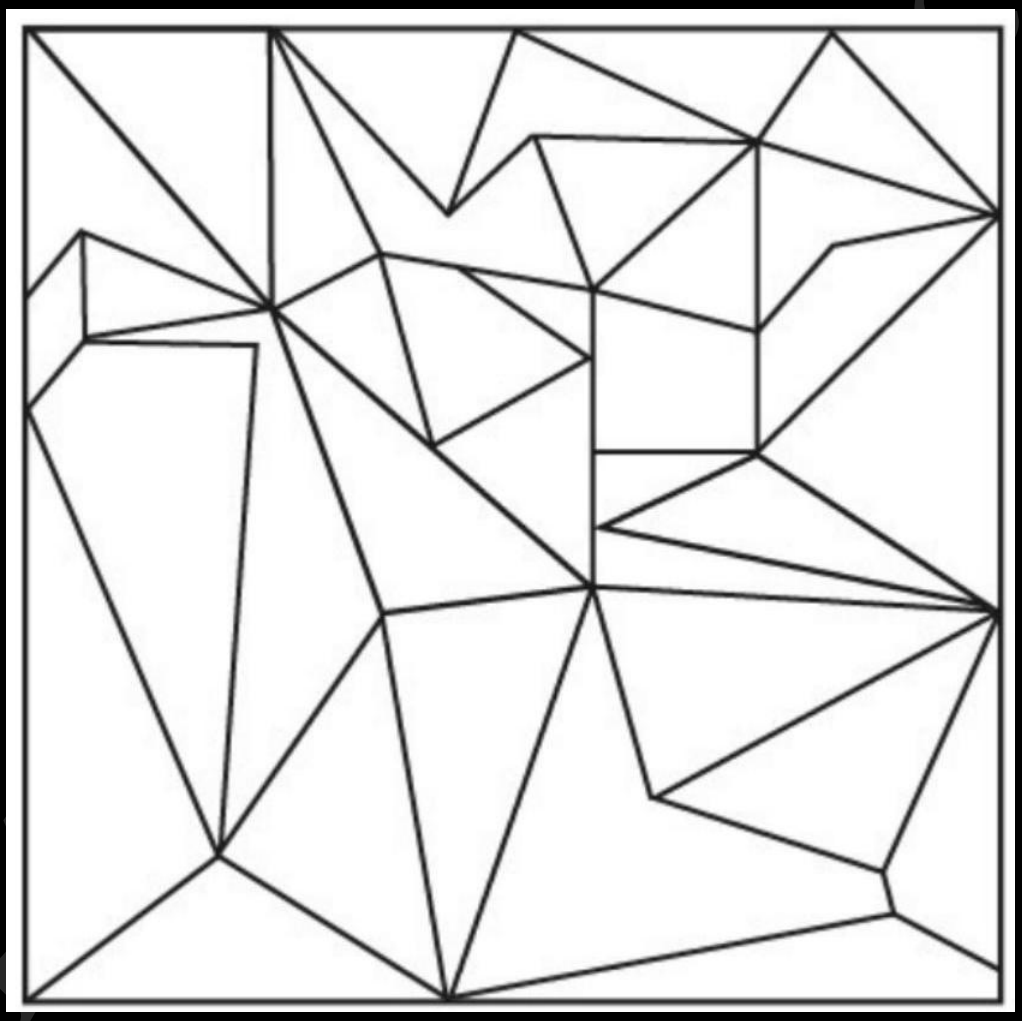
81. Count the total number of triangles. (Numerical Answer Type)



Solution:

Correct Answer: 28

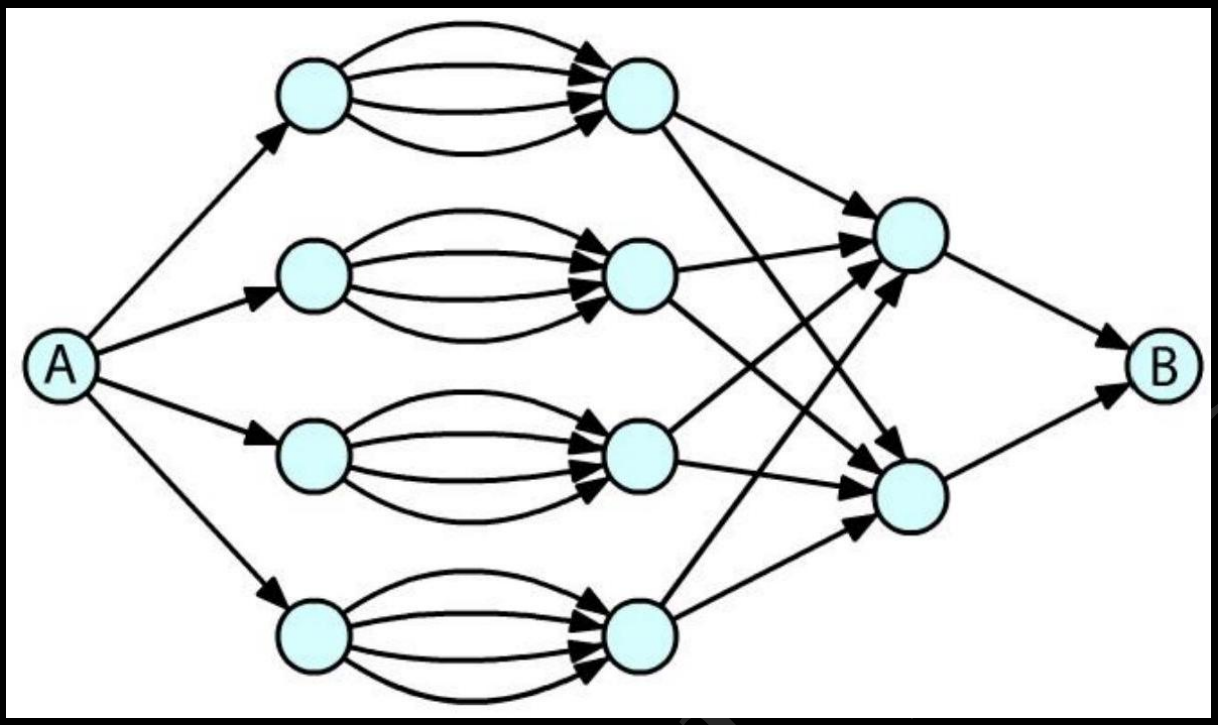
82. What is the total number of triangles in the figure given below? (Numerical Answer Type)



Solution:

Correct Answer: 24

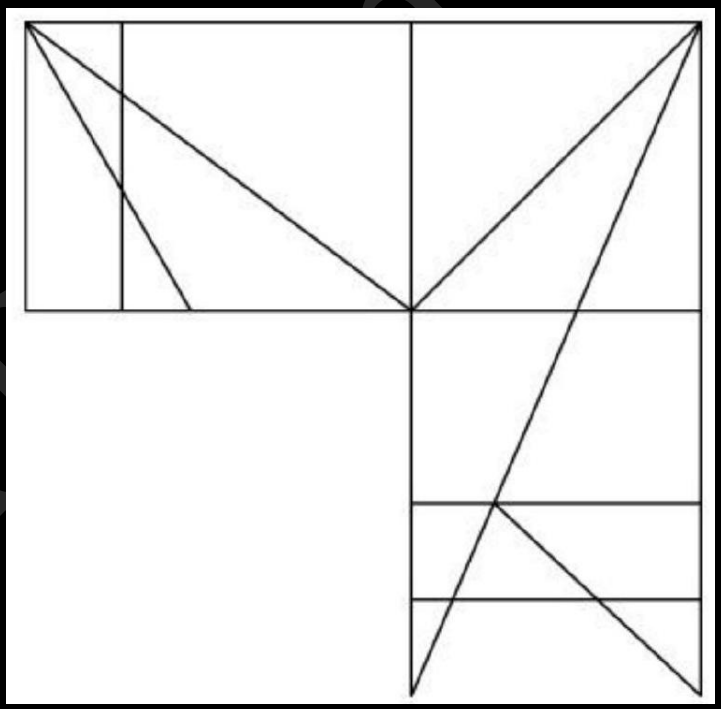
83. The figure shows different paths for going from *A* to *B*. The directions of the paths are indicated by arrows. No node can be visited twice. What is the total number of different paths to go from *A* to *B*? (Numerical Answer Type)



Solution:

Correct Answer: 32

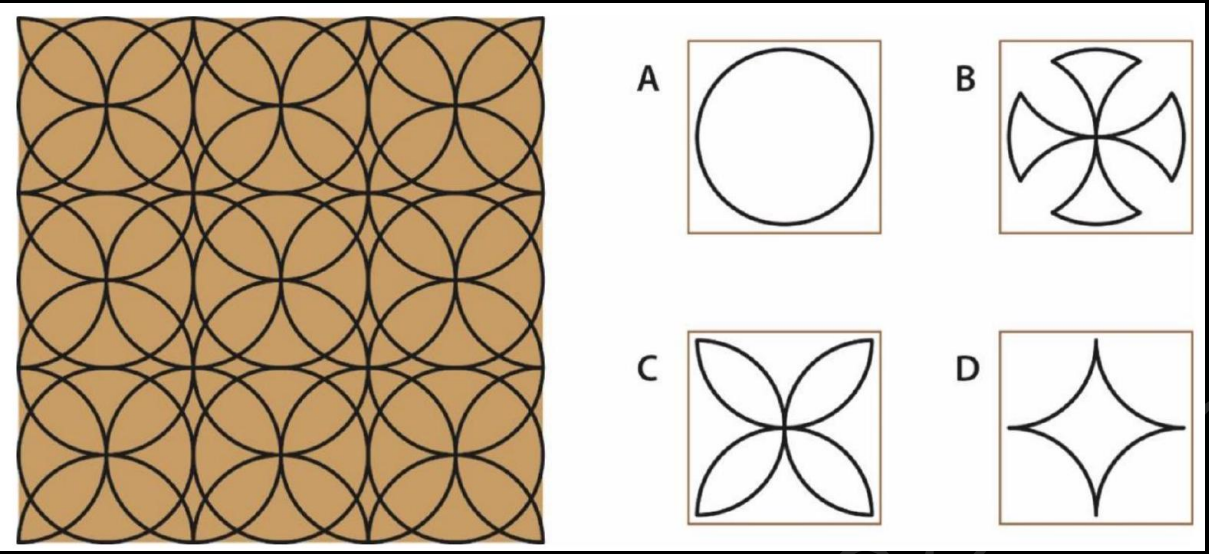
84. How many right-angled triangles are there in the image? (Numerical Answer Type)



Solution:

Correct Answer: 18

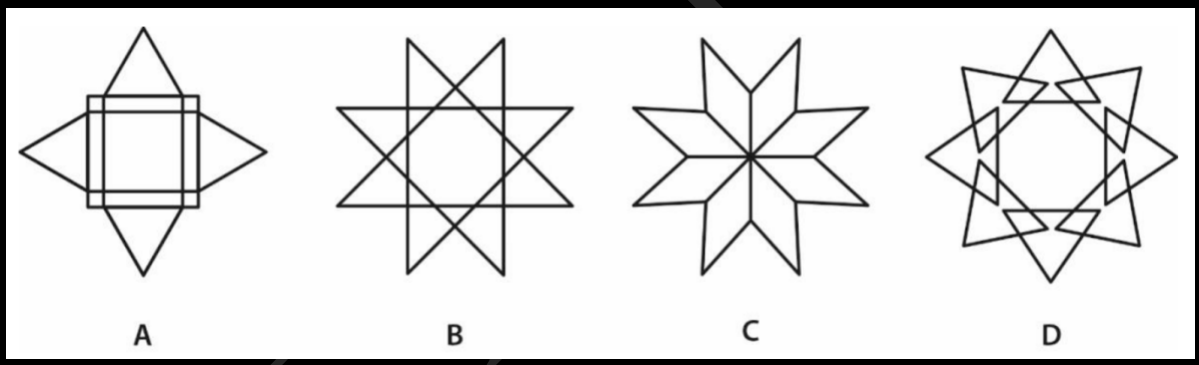
85. Shown on the left is a pattern printed by repeated use of a single printing block. Which of the printing blocks shown on the right can be used to print the pattern? (Multiple Select Answers)



Solution:

Correct Answer: A;D

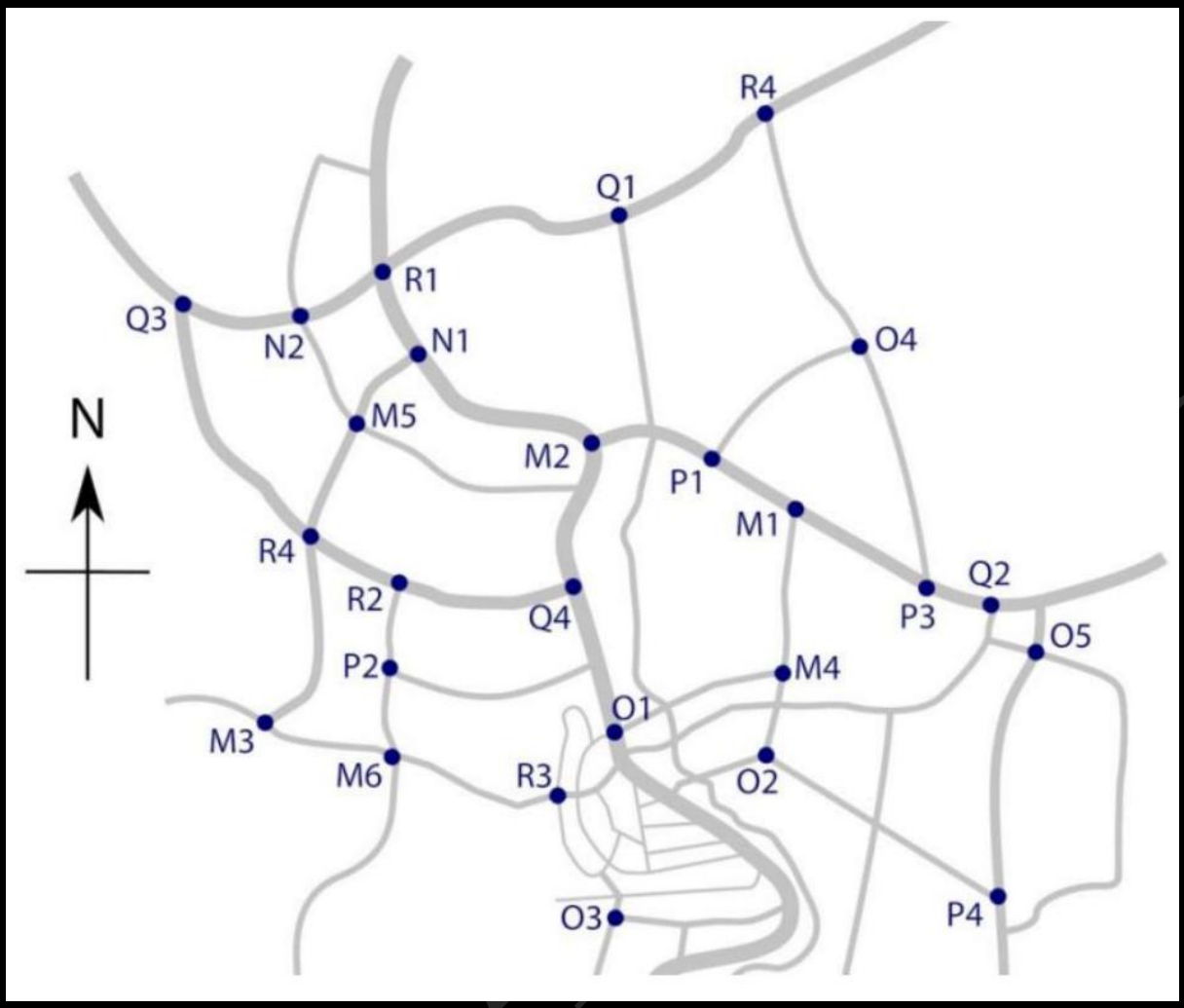
86. Which of the given figures can be drawn without lifting the pen? The lines can cross each other but cannot overlap on top of one another. (Multiple Select Answers)



Solution:

Correct Answer: A;B;D

87. 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? (Multiple Select Answers)



A. The policewoman visits the signal **M6** twice

B. She passes signals **M6**, **P2** and **R2** in that sequence

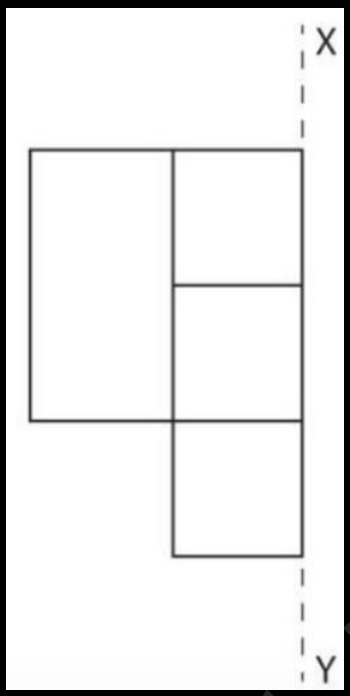
C. She visits **R4** before **R2**

D. She ends her beat walk at **R3**

Solution:

Correct Answer: C;D

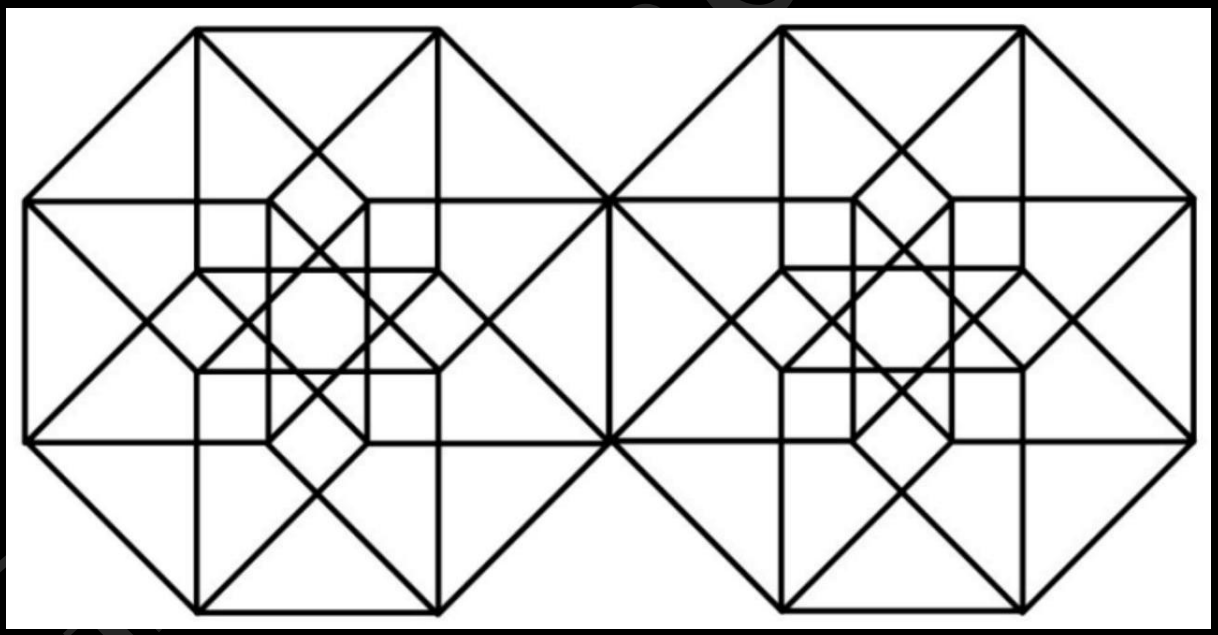
88. The following figure is cloned and the cloned figure is reflected along the XY axis. How many rectangles are present in the resultant figure? (Numerical Answer Type)



Solution:

Correct Answer: 25

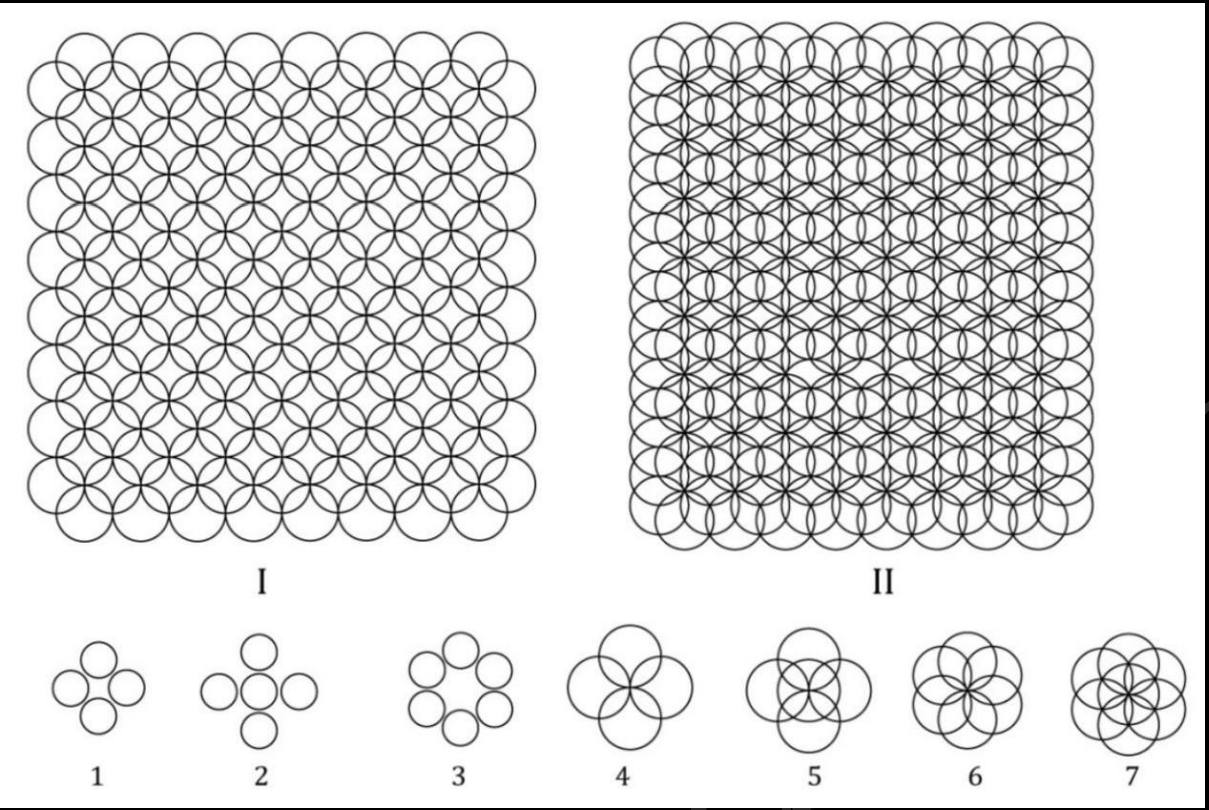
89. Count the number of squares in the given figure. (Numerical Answer Type)



Solution:

Correct Answer: 37

90. Below are two patterns created by a repetition of circles. For each of the patterns, identify the configuration of circles from which it has been created, from the set of options given below and then answer the question that follows.



Which of the following statements is/are TRUE?

A. I can be created from 3 and 4; and II can be created from 5 and 6

B. I can be created from 1 and 2; and II can be created from 5, 6 and 7

C. I can be created from 4; and II can be created from 6

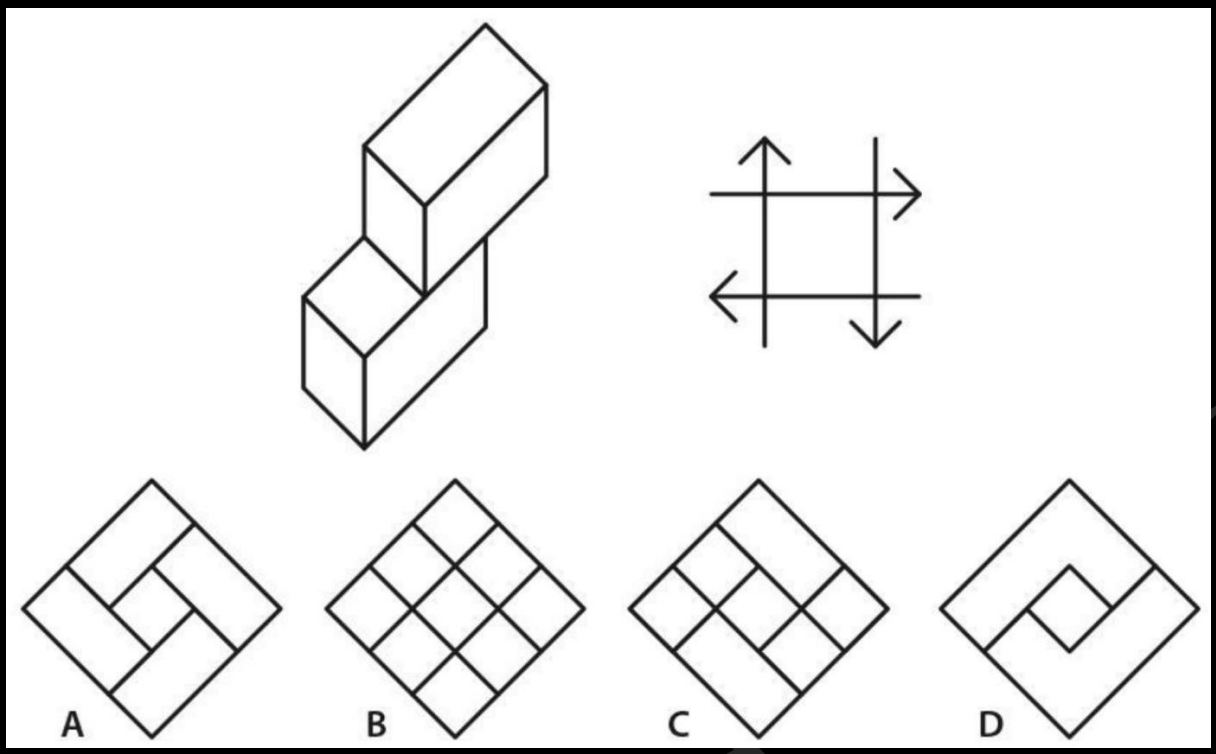
D. I can be created from 4 and 5; and II can be created from 6 and 7

Solution:

Correct Answer: C

10 Patterns in Three Dimensions (10 Questions)

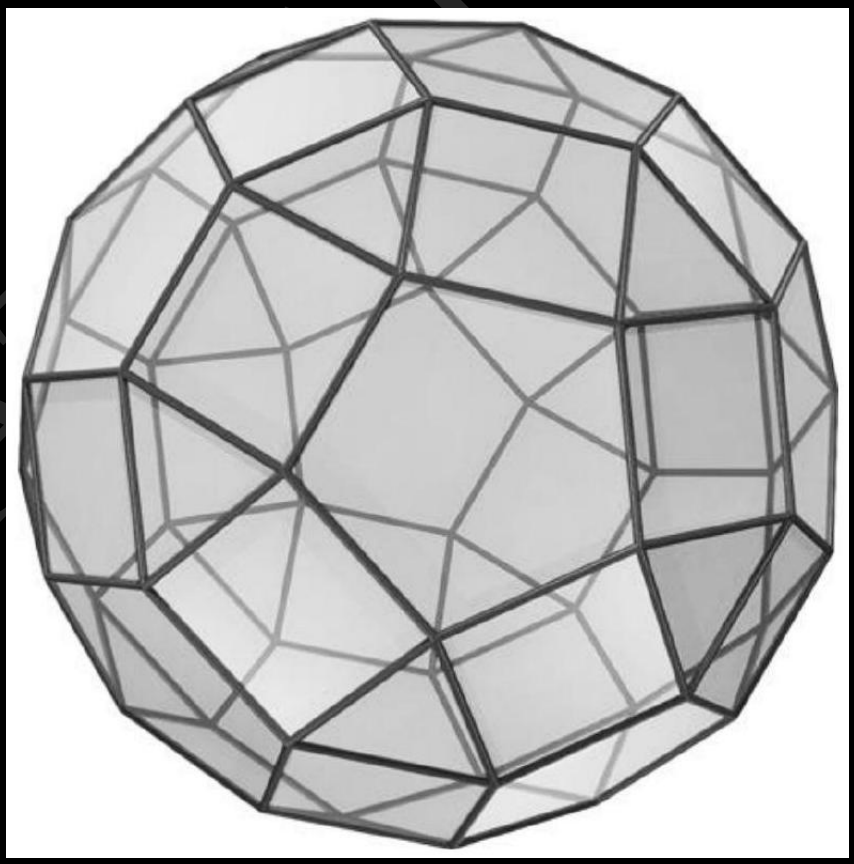
91. Shown below is a 3D block. Four such blocks are interlocked in a square form. What will be the top view of the blocks after interlocking?



Solution:

Correct Answer: A

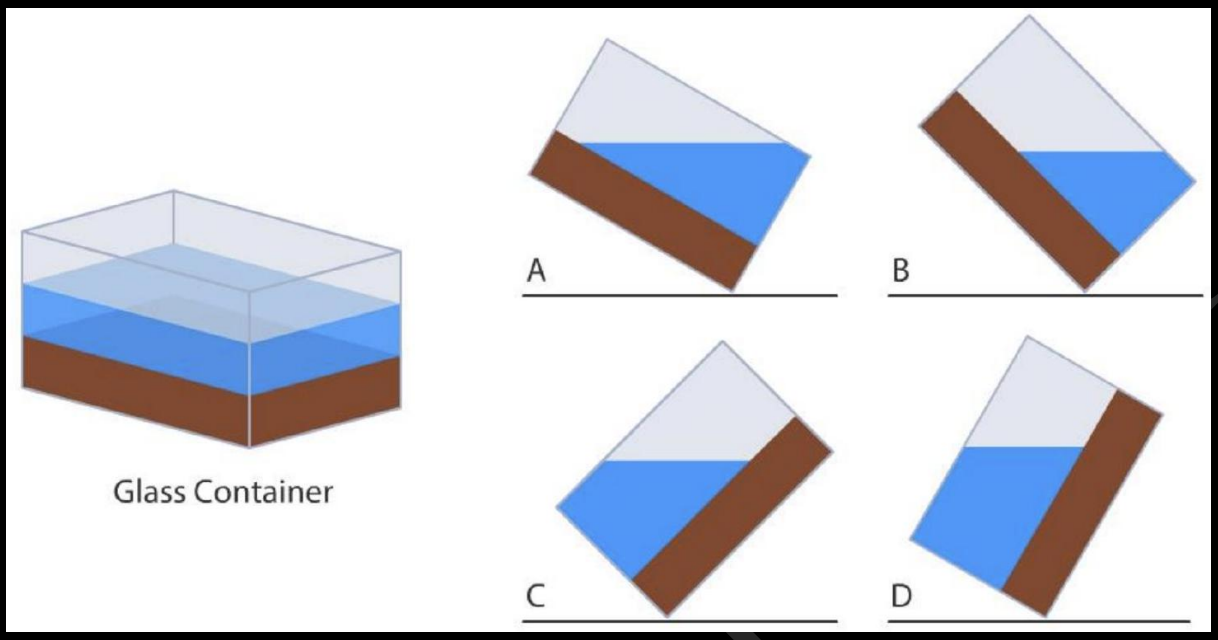
92. The given 3D object is made by combining three shapes - pentagons, squares and triangles. What is the total number of squares? (Numerical Answer Type)



Solution:

Correct Answer: 30

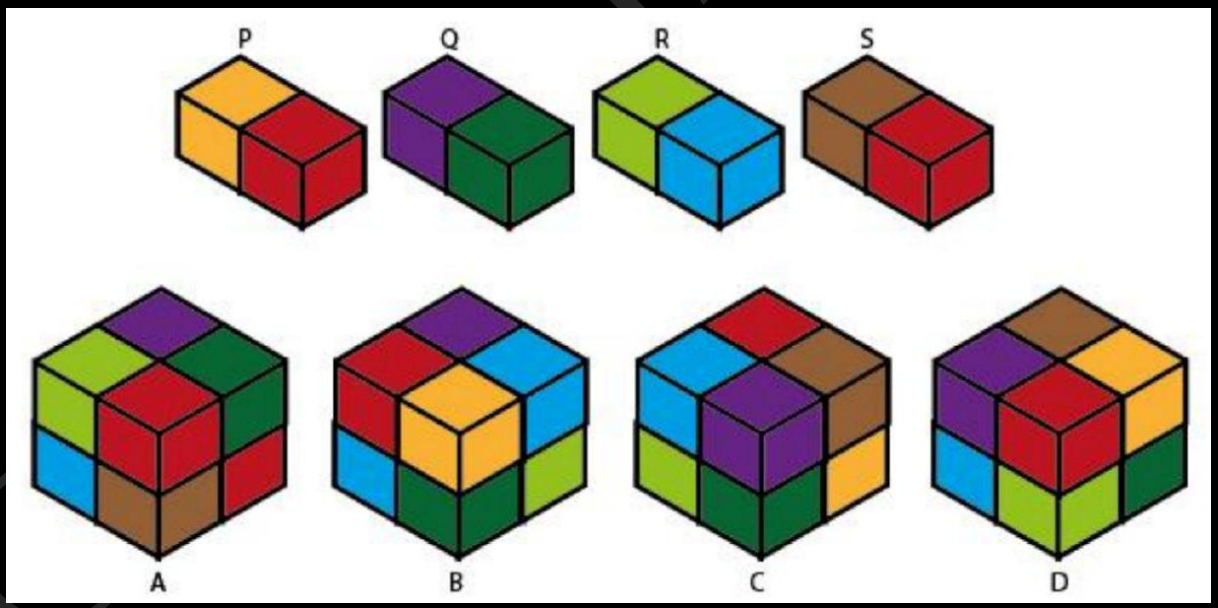
93. Shown below is an isometric view of a cuboidal glass container of size $2 \times 2 \times 3$ units. It contains a solid wooden block and some water. When tilted, which of the options will be the side view(s) of the glass container? (Multiple Select Answers)



Solution:

Correct Answer: A;C

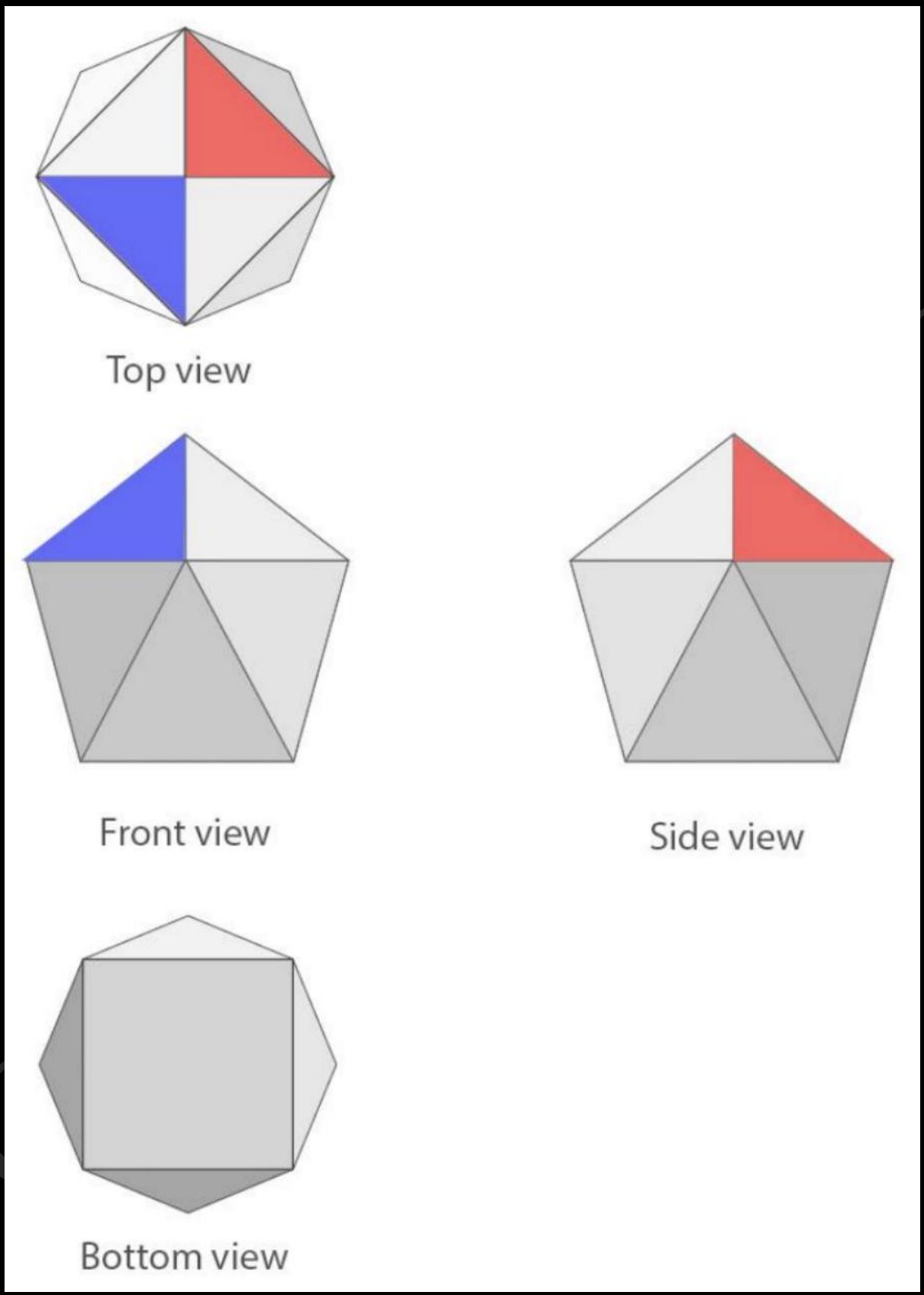
94. Four solid pieces P, Q, R and S are arranged to form a cube. Which of the cubes shown in the options is/are NOT possible? (Multiple Select Answers)



Solution:

Correct Answer: B;D

95. Four views of a convex solid are shown. How many surfaces does the solid have? (Numerical Answer Type)

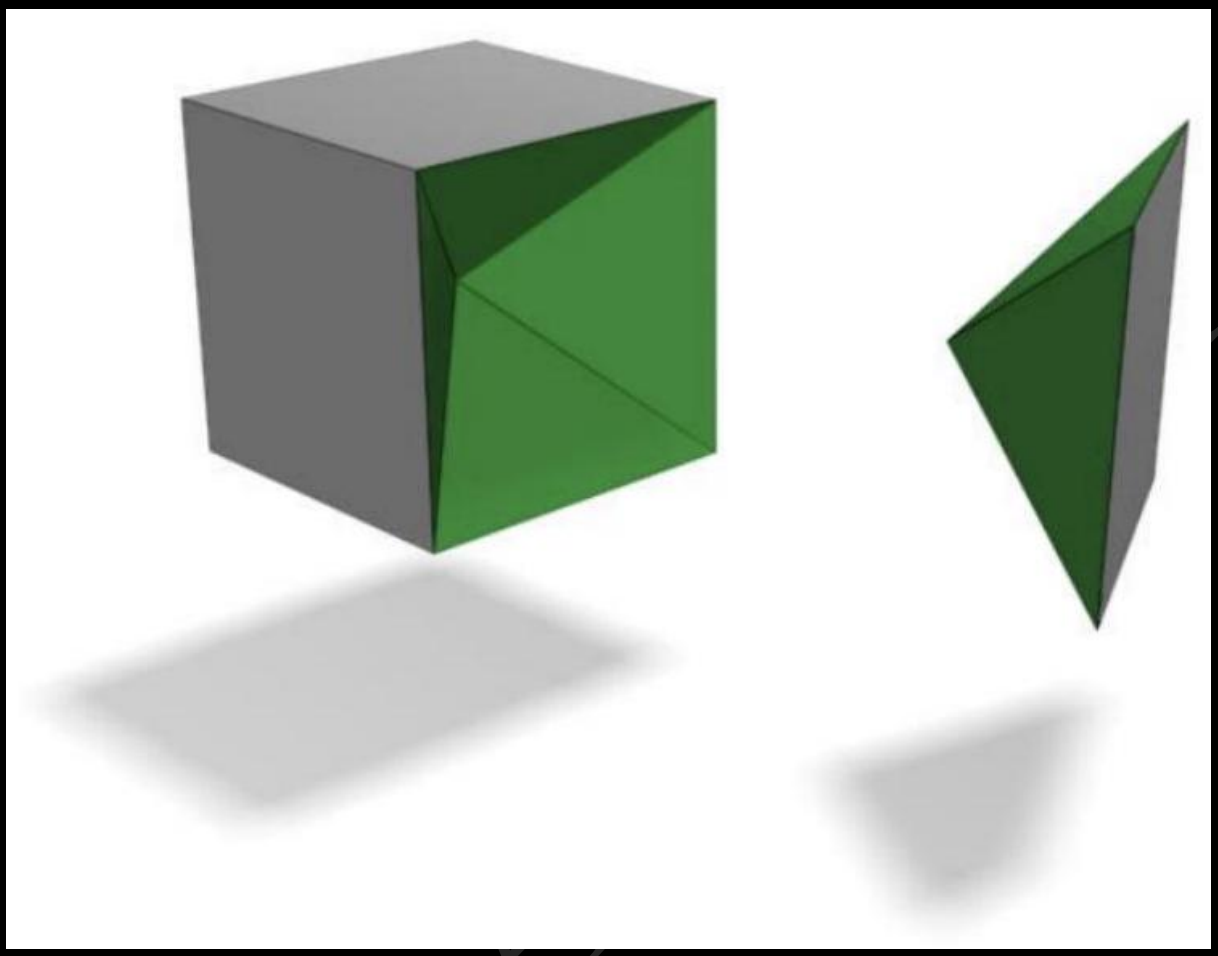


Solution:

Correct Answer: 13

96. 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 di-

mensions is removed from another side of the resultant solid, how many surfaces can the new resultant solid have? (Multiple Select Answers)



A. 10

B. 11

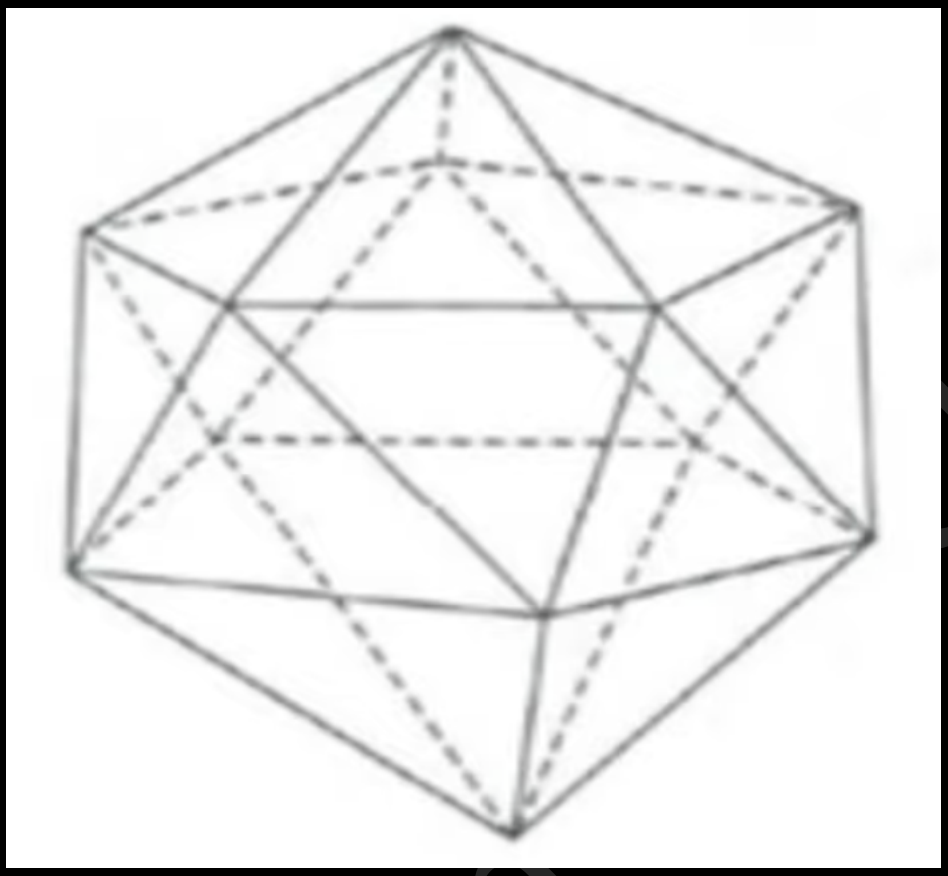
C. 12

D. 13

Solution:

Correct Answer: A;C

97. Consider the following three-dimensional figure:



How many triangles does the above figure have?

A. 18

B. 20

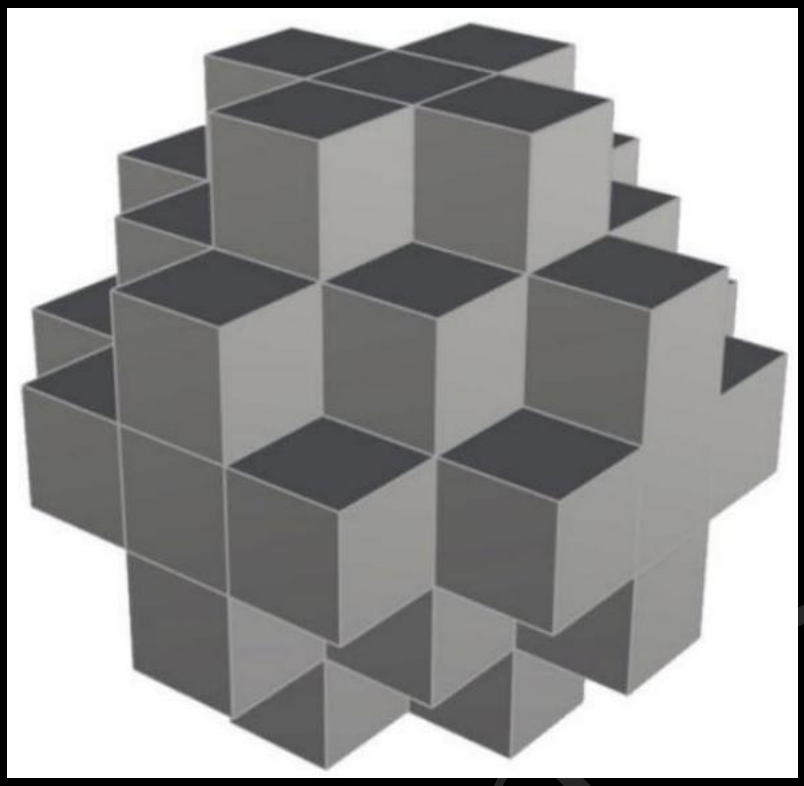
C. 22

D. 24

Solution:

Correct Answer: B

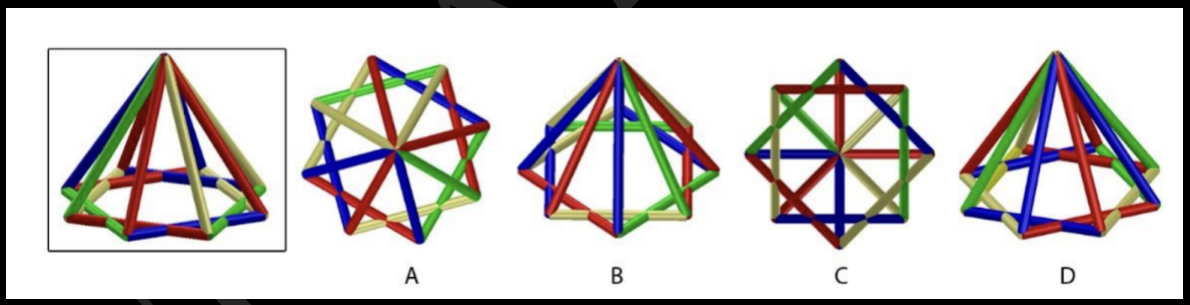
98. A solid object made of cubes is shown below. This object is symmetric about all three axes, and does not contain cavities (no hollow spaces). How many cubes does the solid contain? (Numerical Answer Type)



Solution:

Correct Answer: 57

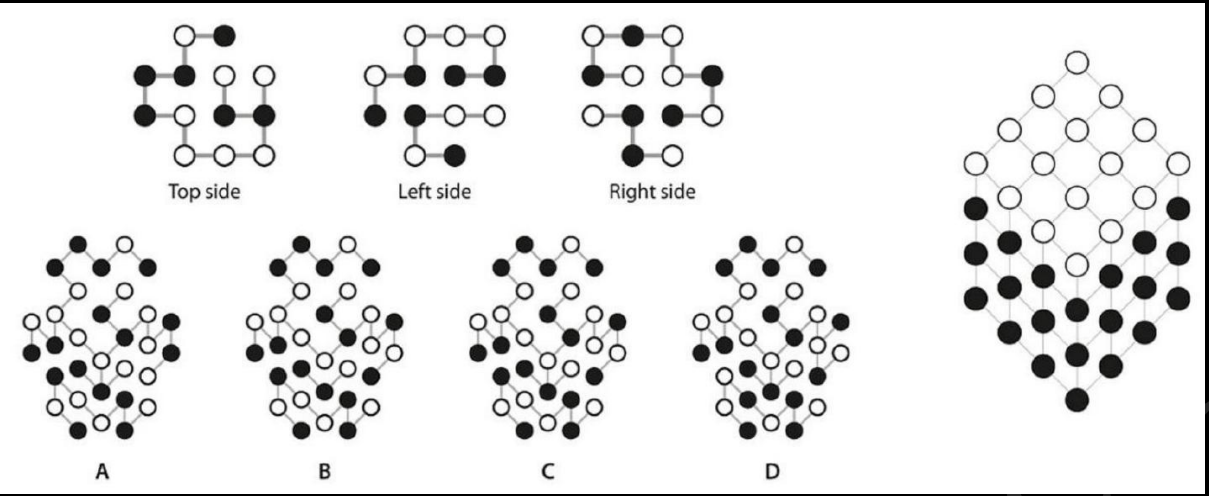
99. Given below is a structure made of coloured straws. Which of the views shown in the options belong(s) to the object in the box? (Multiple Select Answers)



Solution:

Correct Answer: A;B;C

100. Three sides, each with circles and connecting lines, show three faces of a three-dimensional cube. (An example of such a cube is shown on the right.) Choose the correct option that corresponds to a cube with the three sides shown below.



Solution:

Correct Answer: C

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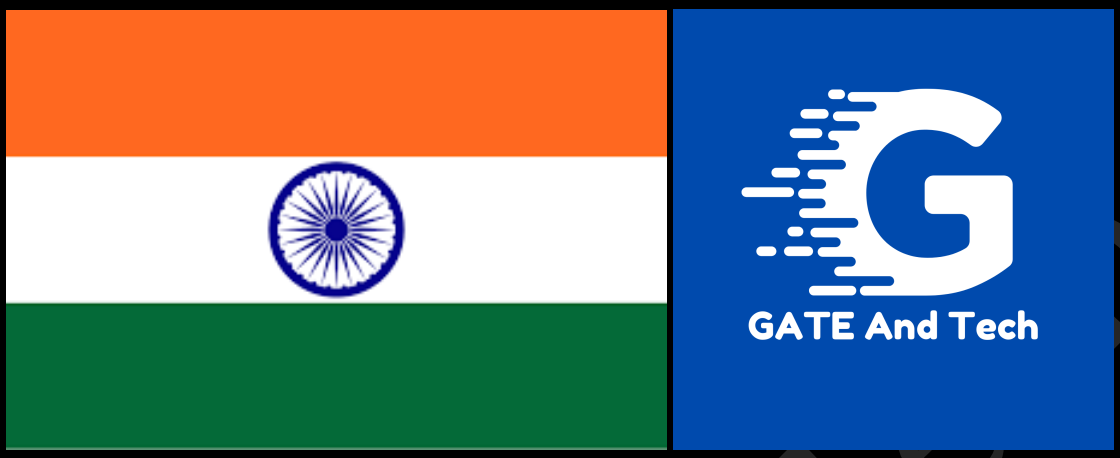

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Total 100 Questions