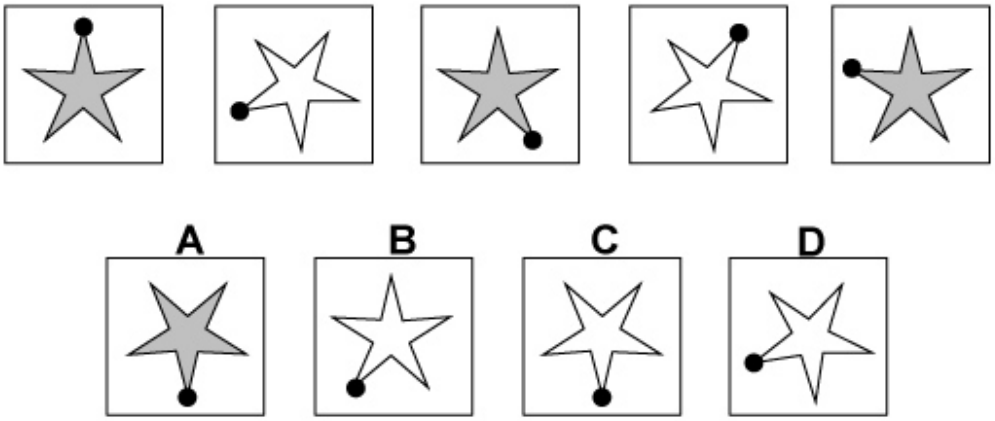
Inductive Reasoning
Practice Test 3

Solution Booklet

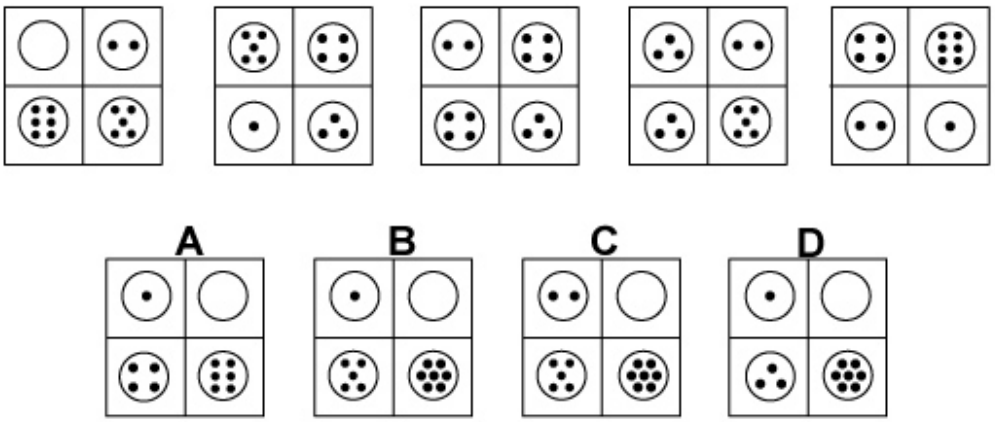
Question 1



Solution: C

Explanation:
In this question there is a five-pointed star with a black dot on one of the points. There are two rules to follow.
The first rule is that the colour of the star alternates between grey and white. Following this rule, the colour of the star in the next diagram of the sequence should be white. The correct answer, therefore, could be B, C or D.
The second rule is that the star and dot rotate about the centre of the star each time by 108° anticlockwise. Following this rule, for the next diagram of the sequence, the dot should be at the bottom point of the star. The correct answer, therefore, is C.

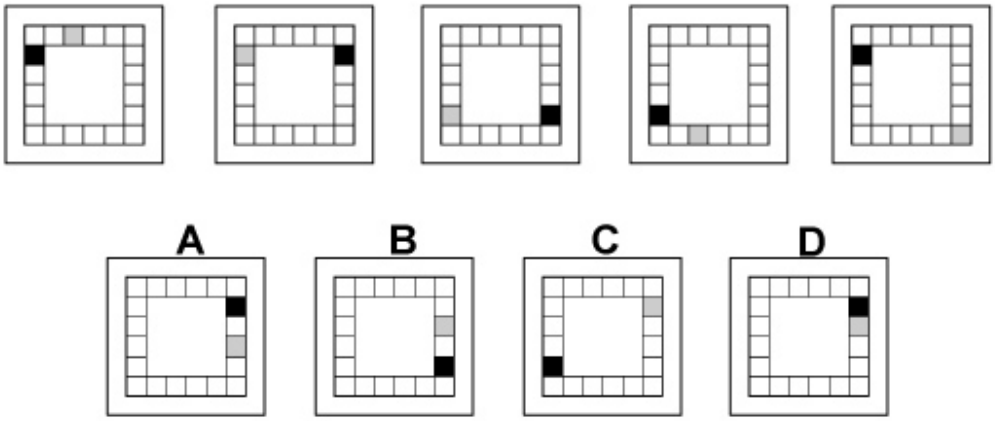
Question 2



Solution: B

Explanation:
In this question there are two rules to follow that are applied simultaneously.
The first rule is that the top and bottom rows interchange each time.
The second rule is that the numbers of dots in the circles that started in the top row of the first diagram increase by one each time, whereas the numbers of dots in the circles that started in the bottom row of the first diagram decrease by one each time.
Following these rules simultaneously, for the next diagram of the sequence, the circles in top row should have one dot and zero dots respectively and the circles in the bottom row should have five dots and seven dots respectively. The correct answer, therefore, is B.

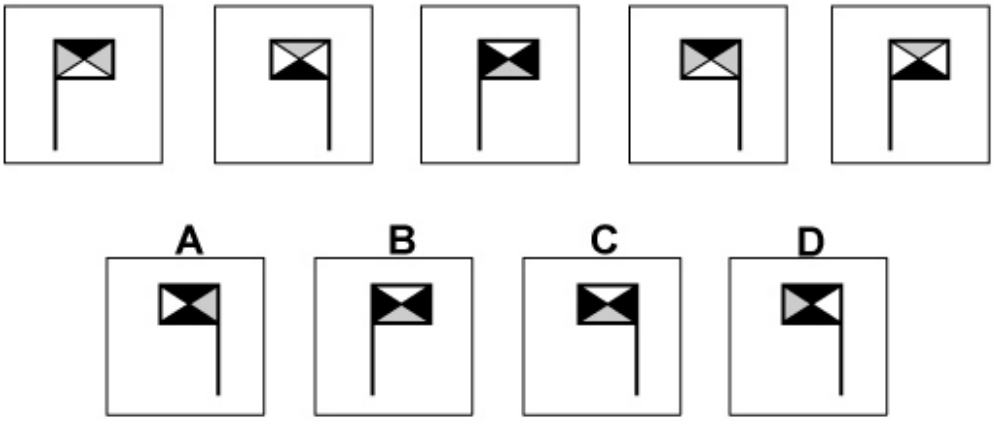
Question 3



Solution: D

Explanation:
In this question, the black square and the grey square each has its own rule to follow.
The black square reflects alternately in the vertical axis of symmetry and in the horizontal axis of symmetry. Following this rule, for the next diagram of the sequence, it should reflect in the vertical axis of symmetry. The correct answer, therefore could be A or D.
The grey square moves around the outside of the grid by three squares anticlockwise each time. Following this rule, the correct answer must be D.

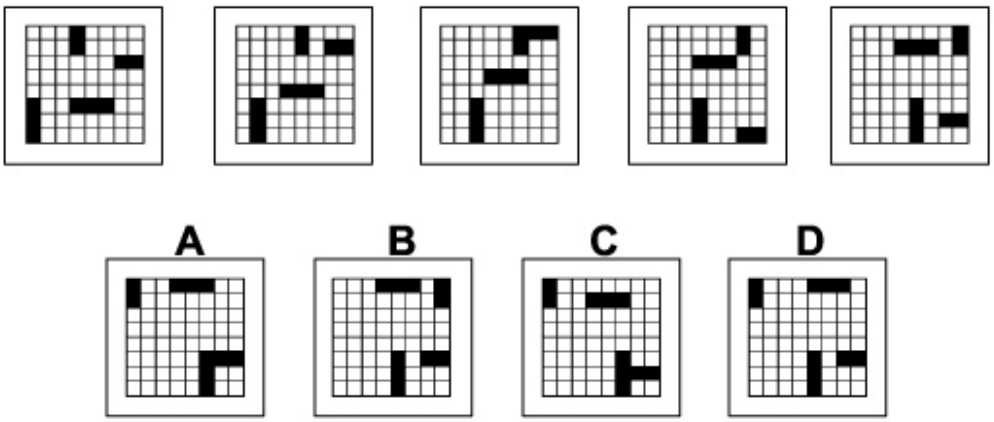
Question 4



Solution: C

Explanation:
In this question there are two rules to follow.
The first rule is that the flag is reflected in the vertical axis each time. Following this rule, for the next diagram of the sequence, the flag should point towards the left. The correct answer, therefore, could be A, C or D.
The other rule is that the colours of the four quarters of the flag change each time - black changes to grey, grey changes to white and white changes to black. Following this rule, the correct answer must be C.

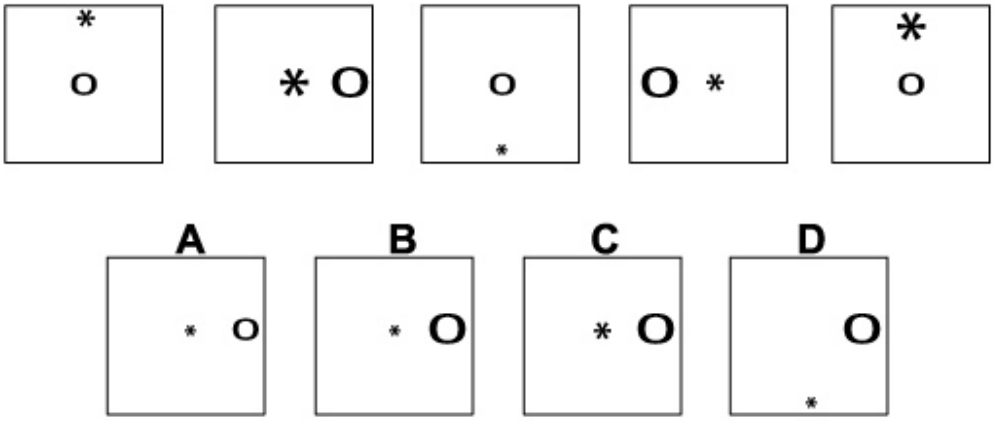
Question 5



Solution: A

Explanation:
In this question there is a grid with two horizontal rectangles and two vertical rectangles.
From one diagram to the next the horizontal rectangles always move one square up the grid. When they reach the top row of the grid, they then move to the bottom row in the next diagram.
From one diagram to the next the vertical rectangles always move one square to the right in the grid. When they reach the right column of the grid, they then move to the left column in the next diagram.
Following these rules, the correct answer is A.

Question 6

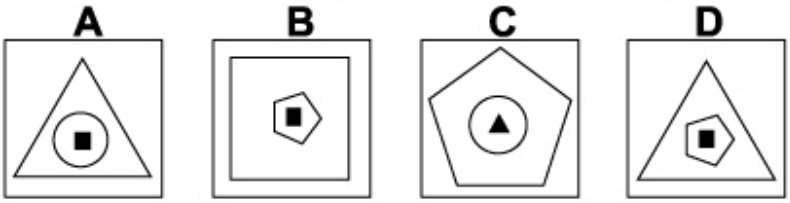


Solution: B

Explanation:
In this question there is an asterisk that has three different sizes (small, medium and large), and a letter O that has two different sizes (small and large).
The asterisk moves up and down the vertical axis of symmetry of the square, changing size from medium, to large, to small, back to medium etc
The letter O moves backwards and forwards across the horizontal axis of symmetry of the square and alternates between a small O and a large O.
Following these rules, for the next diagram of the sequence, there should be a small asterisk in the centre of the square and a large O on the right edge of the square. The correct answer, therefore, is B.

Question 7

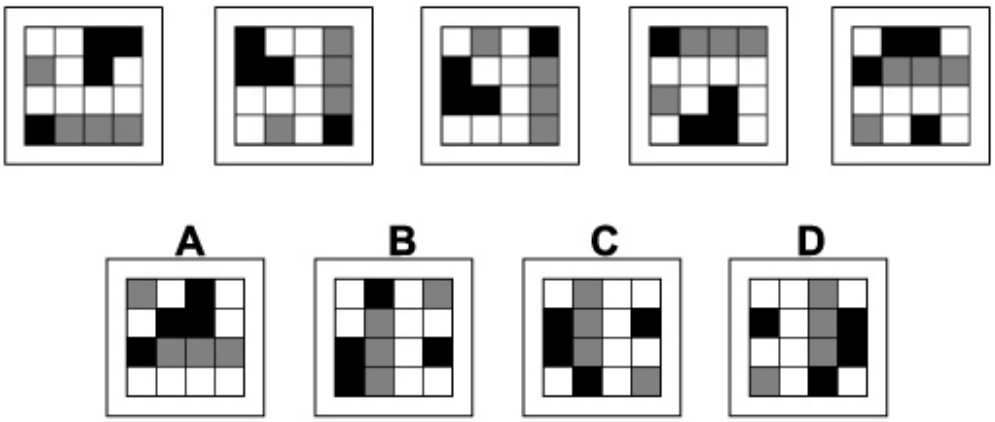
Which of the following replaces the question mark in the sequence?



Solution: D

Explanation:
In this question, each diagram has three shapes, one inside the other, with the inner shape coloured black.
From one diagram to the next, the middle shape of the three becomes the outer shape, the inner shape becomes the middle shape but is no longer shaded black, and a new black shape is placed in the centre.
Following these rules, for the missing diagram of the sequence, the outer shape should be a triangle, the middle shape should be a pentagon and the inner shape should be a black square (the same shape as the middle shape in the fourth diagram). The correct answer, therefore, is D.

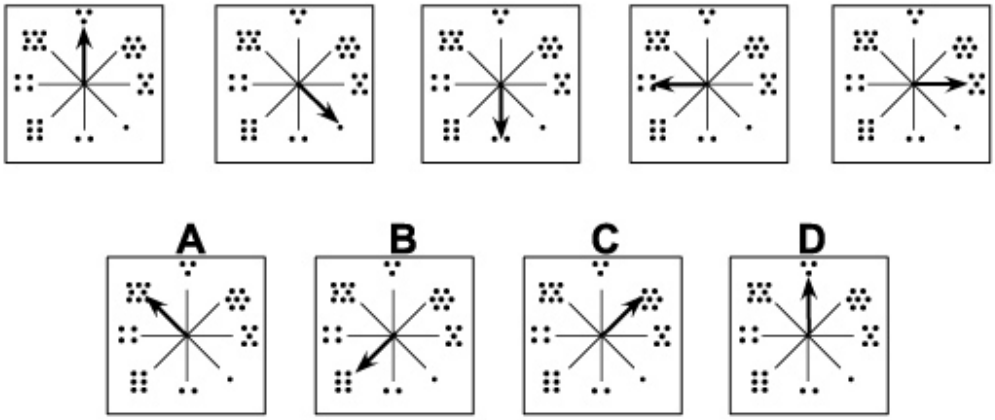
Question 8



Solution: C

Explanation:
In this question there is a grid of black, grey and white squares.
There are two rules to follow that are applied consecutively. The first rule is that the whole diagram is rotated by 90° anticlockwise. The second rule is that the coloured squares all move down the grid one place, with those in the bottom row moving to the top row.
The first rule, therefore, should be applied next, and the correct answer is C.

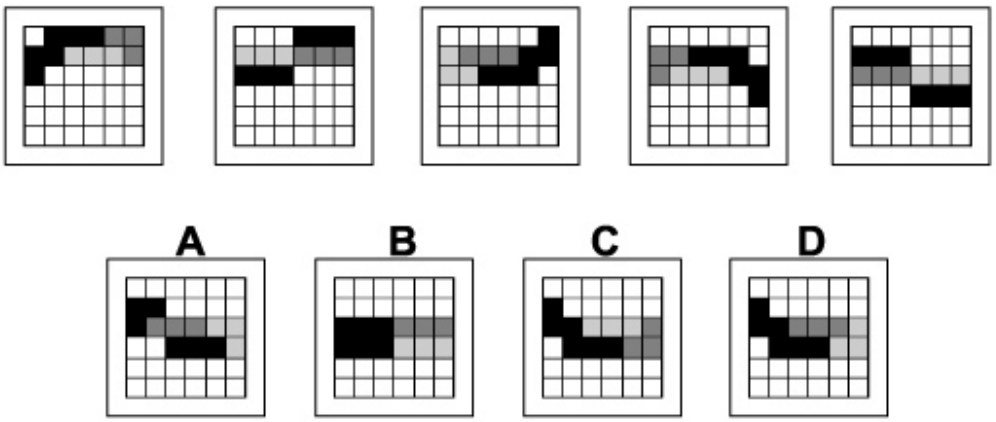
Question 9



Solution: A

Explanation:
In this question, the arrow moves clockwise around the dial, the number of places it moves being determined by the number of dots from the previous diagram.
Following this rule, for the next diagram in the sequence, the arrow should move clockwise by five places, and the correct answer is A.

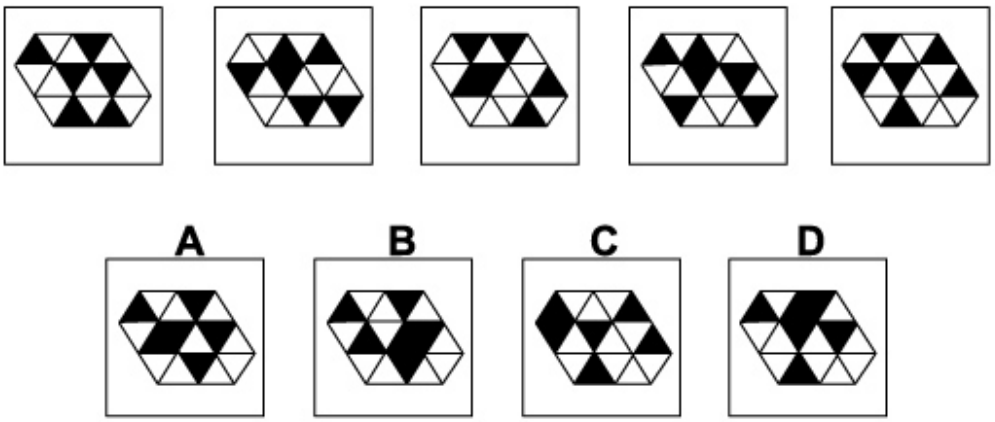
Question 10



Solution: D

Explanation:
In this question there is a 'snake' of squares consisting from head to tail of four segments - the first with 3 black squares, the second with 3 light grey squares, the third with 3 dark grey squares and the fourth with 3 black squares.
The 'snake' starts with its tail in the top row second column and moves around the grid in a zigzag pattern, moving forwards along the zigzag by two places each time.
Following this rule, for the next diagram of the sequence, the tail should move two places to the left to be in the second row, first column. Of the two possible answers, C and D, only D has the four segments of the 'snake' in the correct order.

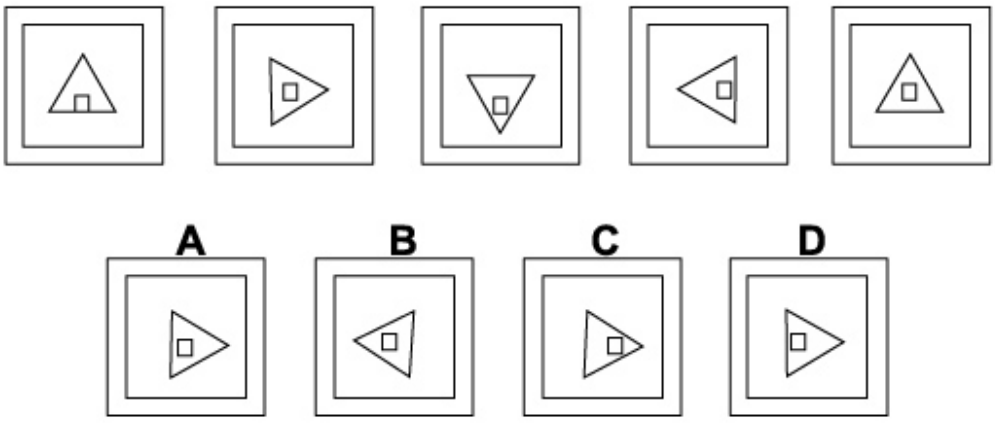
Question 11



Solution: A

Explanation:
In this question there is a grid of sixteen equilateral triangles, some coloured black and some white. Fourteen of the triangles have either an edge or a vertex touching the outside of the grid. The colours of these fourteen triangles move around the edge of the grid, moving one place anticlockwise each time.
The two triangles in the centre of the grid (one black and one white) remain unchanged from one diagram to the next.
Following these rules, the next diagram in the sequence must be A.

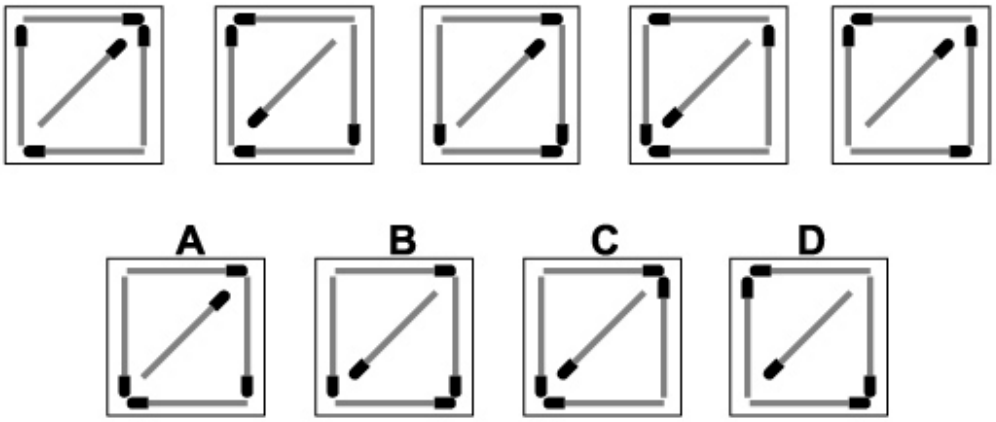
Question 12



Solution: C

Explanation:
In this question there is a small square inside an equilateral triangle, which is itself inside a larger square. There are two rules to follow.
The first rule is that the large square and the equilateral triangle rotate about the centre point by 90° clockwise each time. Following this rule, in the next diagram of the sequence, the equilateral triangle should point towards the right. The correct answer, therefore, could be A, C or D.
The second rule concerns the small square that can occupy three positions in turn lying on one of the three axes of symmetry of the equilateral triangle - on its base, at its centre, or touching two edges of the triangle near to its vertex. Following this rule, for the next diagram of the sequence, the small square should be near to the vertex of the triangle. The correct answer, therefore, is C.

Question 13

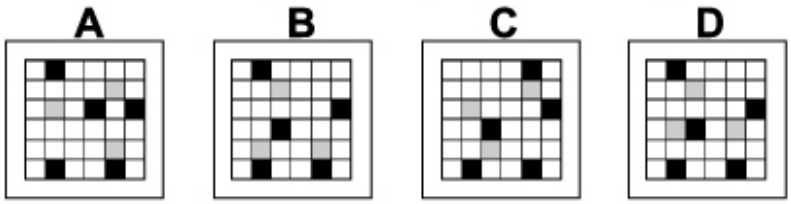


Solution: B

Explanation:
In this question there are five matchsticks. From one diagram to the next, the matchsticks change direction if their heads are touching; otherwise they stay as they are. Following these rules, the next diagram of the sequence is B.

Question 14

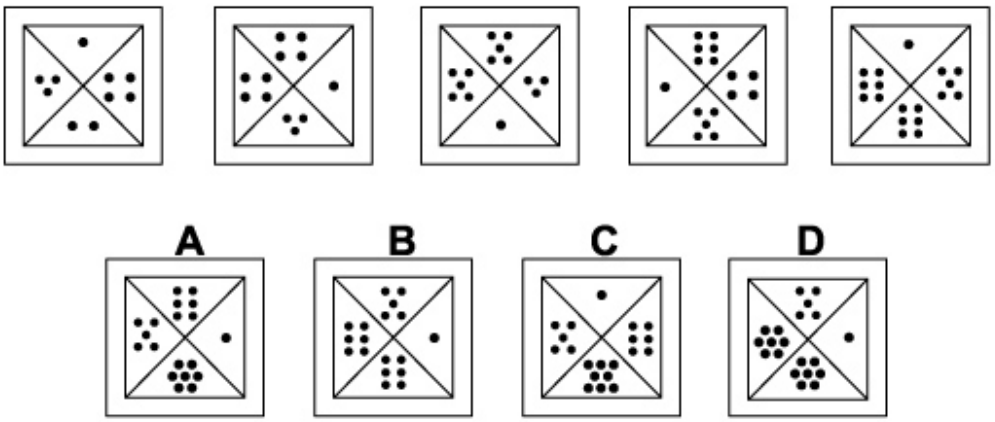
Which of the following replaces the question mark in the sequence?



Solution: B

Explanation:
In this question there are three circuits of small squares within the square grid – an outer circuit of 20 squares around the perimeter, an inner circuit of 4 squares at the centre and a middle circuit of 12 squares in between.
Four black squares occupy the outer circuit and move three places clockwise each time.
Three grey squares occupy the middle circuit and move two places anticlockwise each time.
A single black square occupies the inner circuit and moves one place clockwise each time.
Following these rules, the missing diagram of the sequence must be B.

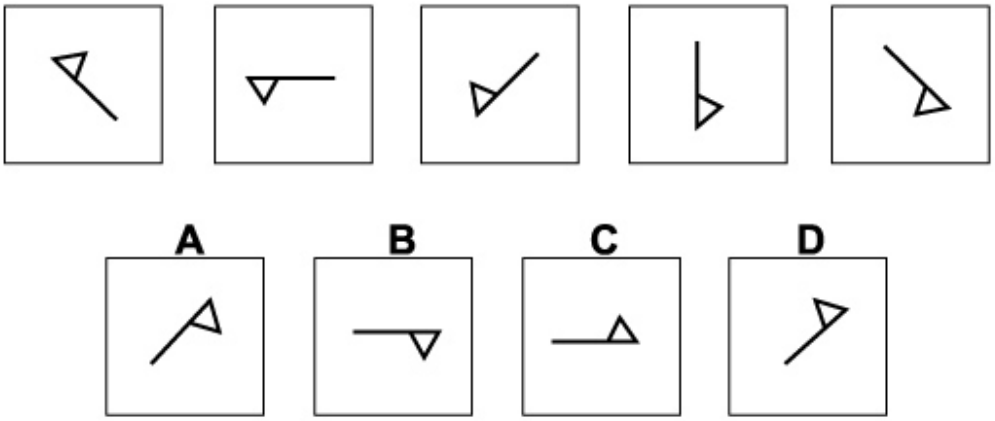
Question 15



Solution: D

Explanation:
In this question there is a square divided into four quarters. There are two rules to follow.
The first rule is that the quarter containing one dot and the next quarter to it in a clockwise sense, interchange. Following this rule, for the next diagram of the sequence, the quarter containing one dot should interchange with the quarter containing five dots. The correct answer, therefore, could be B or D.
The second rule is that the numbers of dots in each of the other two quarters increases by one each time. Following this rule, the two quarters with six dots should each increase to seven dots. The correct answer, therefore, is D.

Question 16

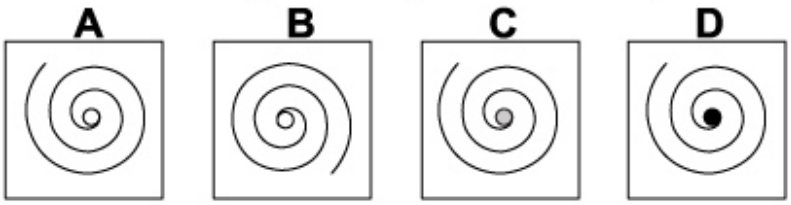


Solution: C

Explanation:
In this question there are two rules to follow.
The first rule is that the flag rotates by 45° anticlockwise each time. Following this rule, the next diagram in the sequence could be B or C.
The second rule is that the flag is reflected in the line of the flagpole each time. Following this rule, the correct answer must be C.

Question 17

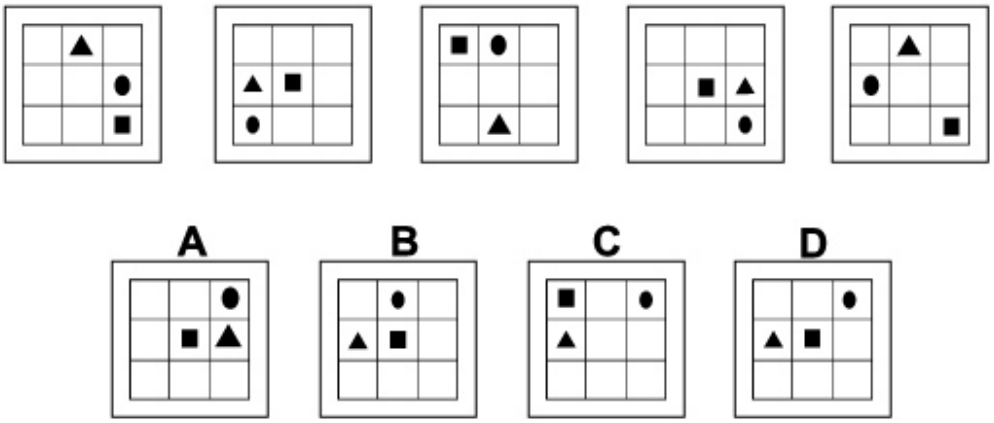
Which of the following replaces the question mark in the sequence?



Solution: A

Explanation:
In this question there are two rules to follow.
The first rule is that the dot at the centre of the spiral changes from white to black to grey, then back to white etc. Following this rule, for the missing diagram of the sequence, there should be a white dot at the centre. The correct answer, therefore, could be A or B.
The second rule is that the spiral rotates by 90° clockwise each time. The correct answer, therefore, must be A.

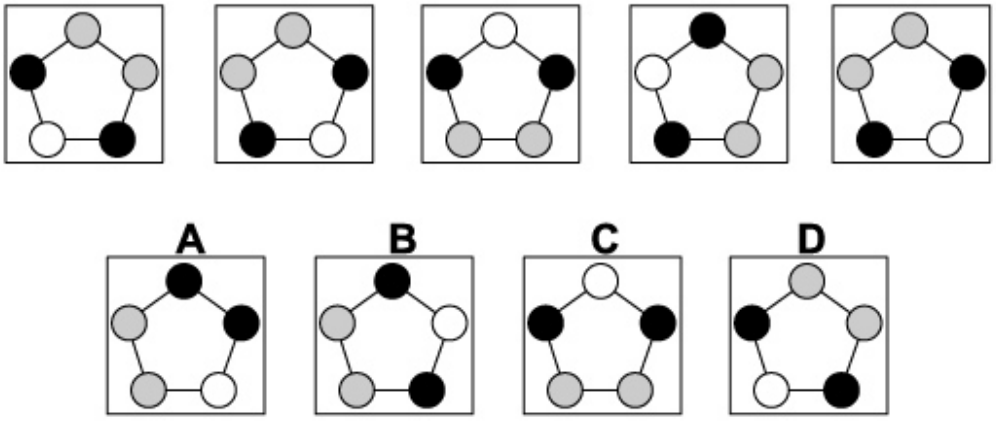
Question 18



Solution: D

Explanation:
In this question each of the three shapes has its own rule to follow.
The triangle moves around the four squares of the grid at the centre of each edge, rotating by 90° anticlockwise each time.
The square moves backwards and forwards along one diagonal of the grid.
The dot moves clockwise around the outer eight squares of the grid, moving forwards by three spaces each time.
Following these rules, the correct answer is D.

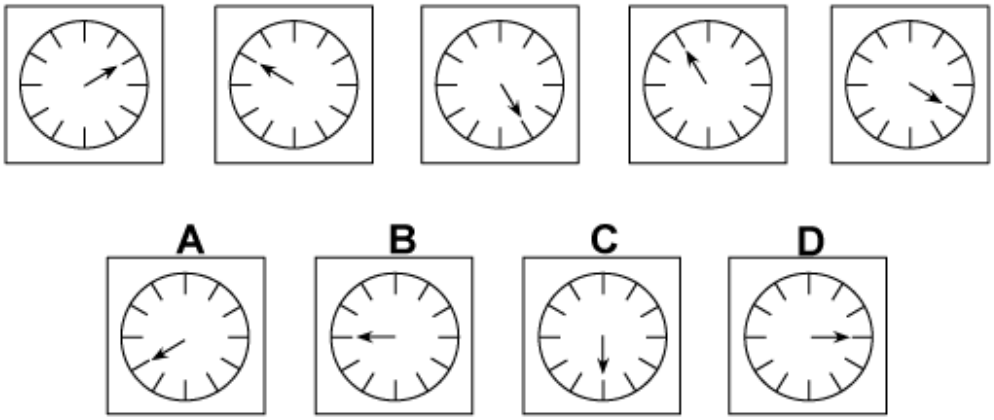
Question 19



Solution: B

Explanation:
This question is about reflection. The shape (not considering the colours) has five lines of symmetry. The shape (with colours) is reflected successively in each line of symmetry - starting with the vertical line of symmetry, then the next line of symmetry clockwise from the vertical line, then the next clockwise, and so on.
Following this rule, to obtain the next diagram of the sequence, we should reflect in the line of symmetry that passes through the circle in the top left of the shape. The correct answer, therefore, is B.

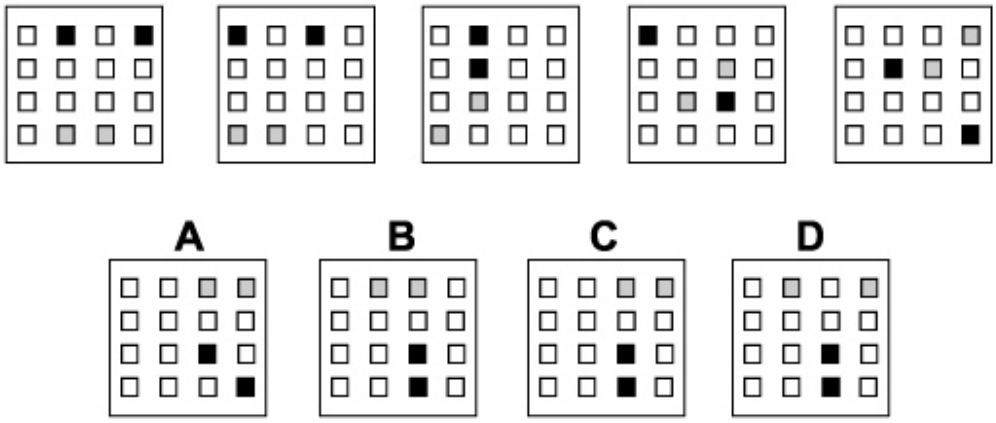
Question 20



Solution: A

Explanation:
In this question the hand rotates anticlockwise around the dial, the first time by 120°, the second time by 150°, etc. The number of degrees by which it rotates increases by 30° each time.
To obtain the next diagram of the sequence, therefore, the hand should rotate by 240° anticlockwise from four o'clock to eight o'clock. The correct answer, therefore, is A.

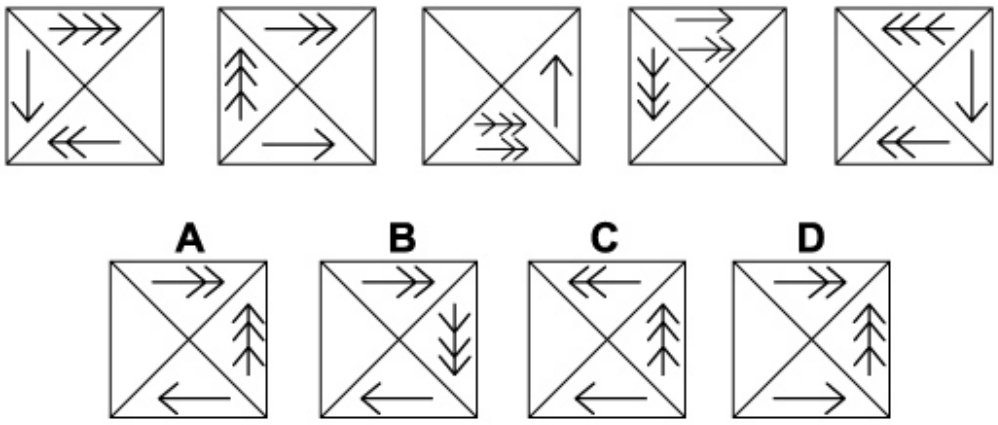
Question 21



Solution: C

Explanation:
In this question there are two grey and two black squares that follow their own paths.
The two grey squares start in the bottom row of the grid and follow a Z-shaped path, moving one place each time - firstly towards the left in the bottom row, then up the diagonal of the Z-shape, then left again across the top row.
The two black squares start in the top row of the grid and follow a backwards Z-shaped path, moving one place each time - firstly towards the left along the top row, then down the diagonal of the backwards Z-shape, then towards the left again in the bottom row.
The correct answer, therefore, is C.

Question 22

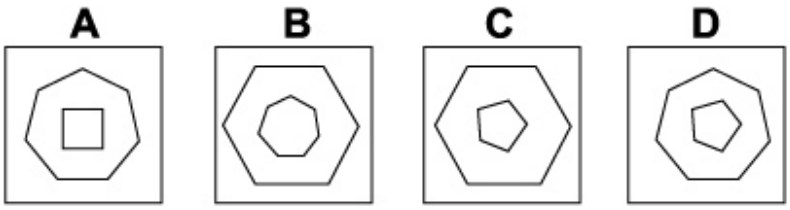


Solution: A

Explanation:
In this question the arrows move around the outside of the grid according to the direction of the arrowheads and a number of places given by the number of arrowheads. However, when two arrows occupy the same quarter of the diagram, the direction of the arrowheads on both arrows reverses.
For the next diagram of the sequence, therefore, the arrow with one arrowhead moves one place clockwise, the arrow with two arrowheads moves two places clockwise and the arrow with three arrowheads moves three places anticlockwise. Since none of them then occupy the same quarter of the diagram, none of the arrowheads are reversed. The correct answer, therefore, is A.

Question 23

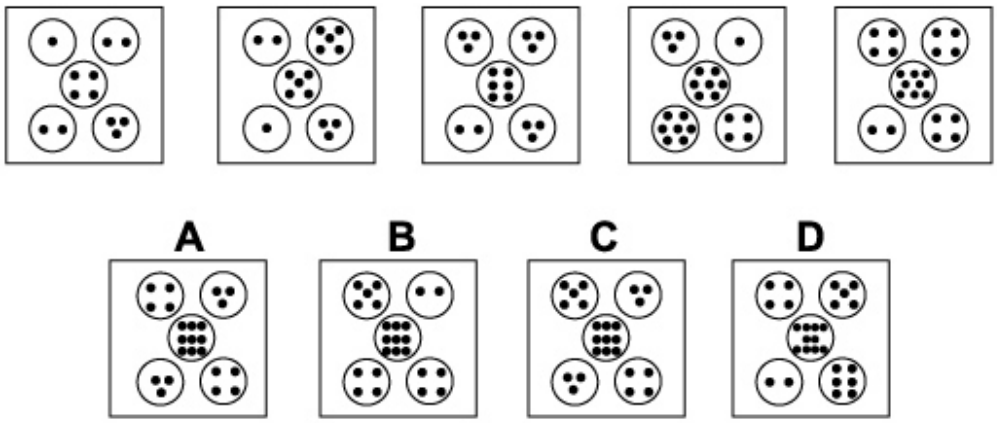
Which of the following replaces the question mark in the sequence?



Solution: D

Explanation:
In this question each diagram shows a regular polygon inside another regular polygon.
The number of sides of the outer polygon decreases by one each time. The number of sides of the inner polygon increases by one each time.
The sum of the sides of the two polygons is always 12.
For the missing diagram of the sequence, therefore, there should be a regular pentagon (five-sided polygon) inside a regular heptagon (seven-sided polygon). The correct answer, therefore, is D.

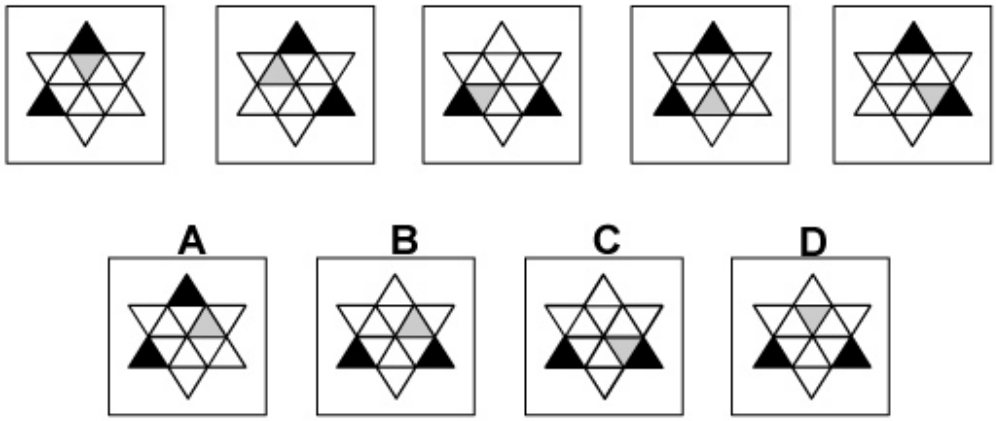
Question 24



Solution: C

Explanation:
In this question there are two rules to follow.
The first rule is that the number of dots in the centre circle increases by one each time. Following this rule, for the next diagram of the sequence, there should be nine dots in the centre circle. The correct answer, therefore, could be A, B or C.
The second rule is that the number of dots in the centre circle is always equal to the sum of the numbers of dots in the top left and bottom right circles, and the product of the numbers of dots in the top right and bottom left circles. Since 5 + 4 = 9 and $3 \times 3 = 9$, the correct answer must be C.

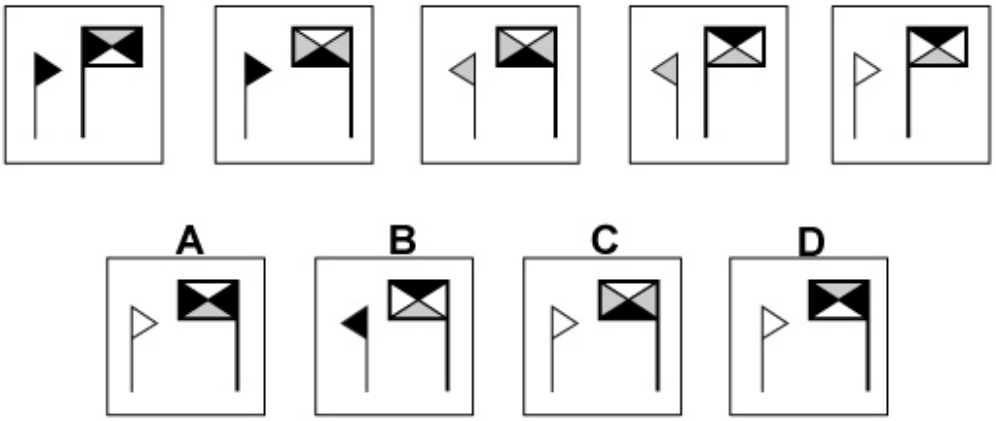
Question 25



Solution: B

Explanation:
In this question the six triangles around the outside of the shape rotate by 120° clockwise each time and the six triangles in the middle of the shape rotate by 60° anticlockwise each time. Following these rules, the next diagram of the sequence must be B.

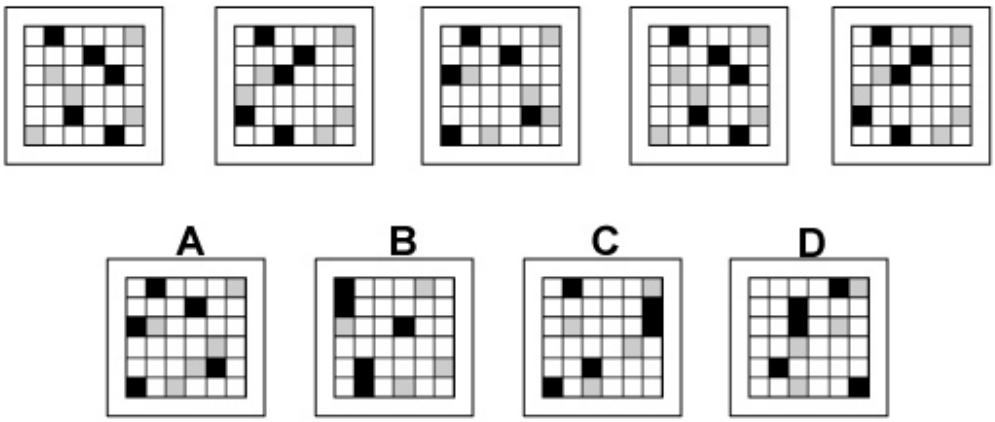
Question 26



Solution: D

Explanation:
In this question there are two rules to follow. The first rule is that the two flags take it in turns to change direction. For the next diagram of the sequence, therefore, the big flag should change direction. The correct answer could be A, C or D.
The second rule concerns the colours of the five triangles. If a flag does not change direction, then the colours stay the same. However, if a flag does change direction then the colours change as follows: black changes to grey, grey changes to white and white changes to black. For the next diagram, since only the big flag changes direction, the colour of the small flag should remain as white, but the colours of the big flag should change according to this rule. The correct answer, therefore, is D.

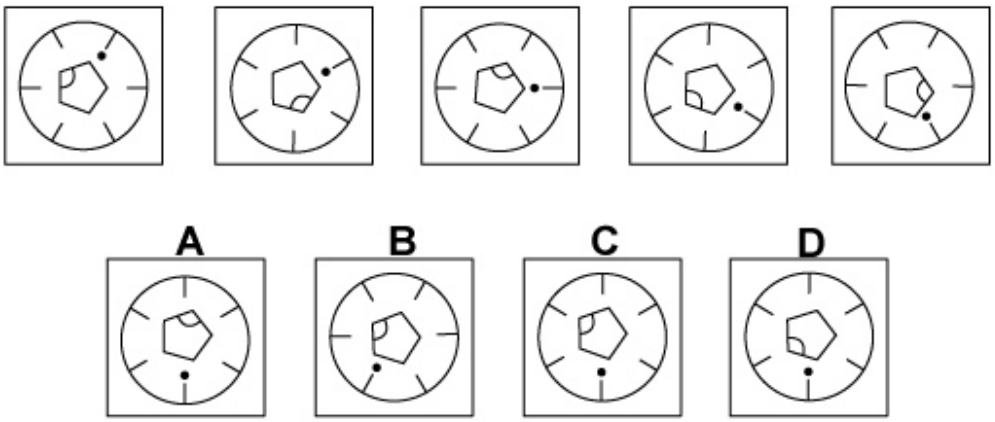
Question 27



Solution: A

Explanation:
In this question some of the shaded squares move along the rows of the grid.
The shaded squares in the first and second rows stay the same throughout.
Most of the shaded squares in the third, fourth, fifth and sixth rows move two places to the left each time, until they get to the far left end when they re-emerge on the right side. This is true for all the shaded squares in rows 3, 4, 5 and 6 except for a rogue light grey square on the third row.
Following these rules, the correct answer is A.

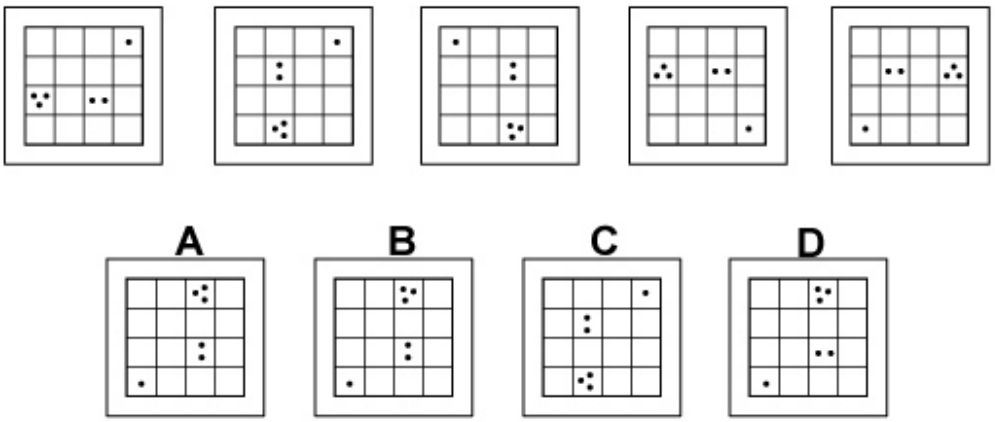
Question 28



Solution: C

Explanation:
In this question there is a circular dial with a pentagon at its centre. Each rotates about the centre according to its own rule.
The dial rotates clockwise by 30° each time. Following this rule, the correct answer could be A, C or D.
The pentagon rotates by 144° anticlockwise each time. Following this rule, the correct answer must be C.

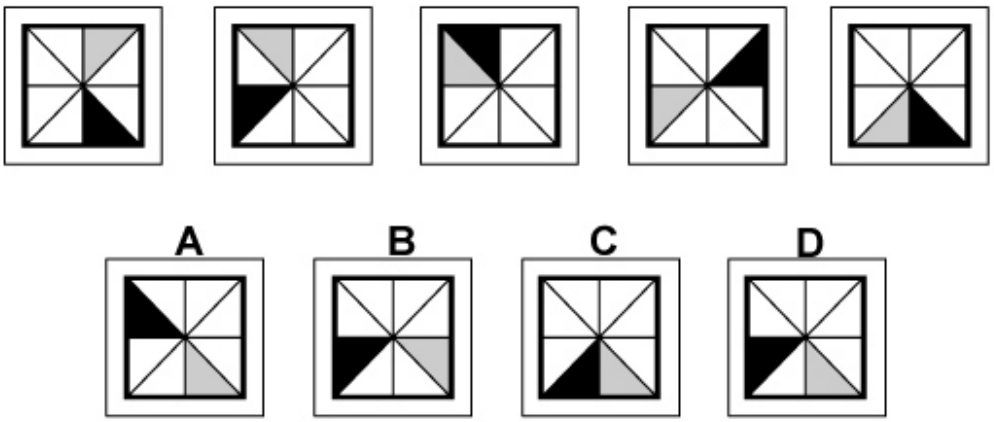
Question 29



Solution: B

Explanation:
In this question, the grid is reflected alternately in two different axes.
The first axis is along the diagonal from the top right corner of the grid to the bottom left corner of the grid.
The second axis is the vertical line through the centre of the grid.
Notice how the orientation of the dots changes when they are reflected.
To obtain the next diagram of the sequence, the first reflection must be applied. The correct answer, therefore, is B.

Question 30



Solution: D

Explanation:
In this question there is a black triangle and a grey triangle that can occupy one of each of eight triangles in the grid.
The black triangle advances by two places clockwise each time - which is equivalent to a 90° clockwise turn.
The grey triangle advances by one place anticlockwise each time.
Following these rules simultaneously, the correct answer is D.

- End of Test 3 -