

BMA's

REASONING

Trainer

Class 9

SOLUTIONS

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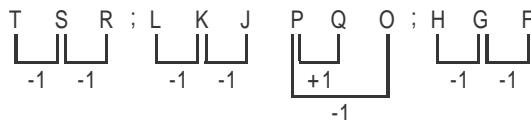
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1

Chapter

WHICH ONE IS DIFFERENT ?

- (D) In other groups, the last two letters are consecutive in reverse order and for the first letter there is a gap of 2 letters.
- (C) The sequence of alphabet in each group is in reverse order (-1). Only option (C) has sequence in distributed order, i.e.,

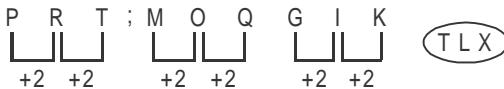


- (D) L N J K ; D F B C ; X Z V W ; R U P Q

L	N	J	K	;	D	F	B	C	;	X	Z	V	W	;	R	U	P	Q
+2	+1				+2	+1	+1			+2	+1	+1			+3	+1		
- (B) A F L ; D I N E J P ; M R X

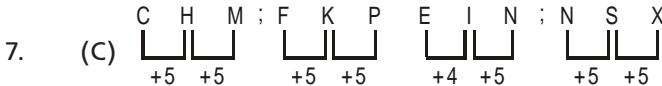
A	F	L	;	D	I	N	E	J	P	;	M	R	X
+5	+6			+5	+5		+5	+6			+5	+6	

- (D) In all other options, there is a gap of one letter in between.

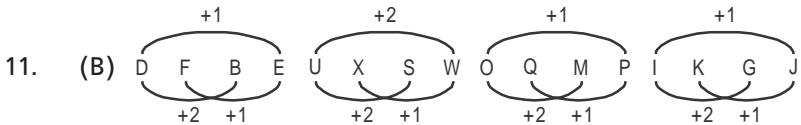


(T L X)

- (A) In all other options, there is a gap of one letter between first and second letter and gap of two letters between second and third letters.



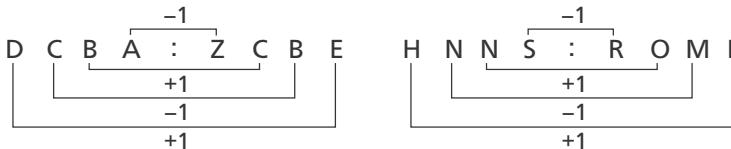
- (C) All other groups contain last and first letters consecutive.
- (B) The pattern used for classification is placement of alphabets in the order (+3, -1, -1). Since option (B) does not follow the pattern, it is odd in the group.
- (A) All the other groups are meaningful.



11. (B) In other groups, third, first, fourth and second letters are consecutive.
12. (D) In all the numbers, the third digit is the product of first two digits.
13. (D) In others, the middle digit is half the sum of other two.
14. (A) All other numbers are perfect cubes.
15. (D) In all other numbers, first and third digits are same.
16. (D) Option (A), (B), (C) are odd numbers and option (D) is an even number.
17. (A) Others are multiples of 120.
18. (A) Others are multiples of 11.
19. (C) Others can be expressed as powers of 2.
20. (C) In all other numbers, 4 digits are consecutive (though in different orders).
21. (B) In all others, triangle and arrow are on the same side.
22. (D) In all other figures, the outer and inner projection are similar.
23. (B) Number of dots inside and outside the polygons are consecutive.
24. (C) Except (C), all the remaining figures are in the same direction when rotated.
25. (C) In each problem figure, the lower figure is formed by attaching either a straight line or a curved line to the upper portion of the upper figure.
26. (A) In all other figures, the wheel has even number of gears.
27. (A) In all the figures except (A) the direction of the outer line is anticlockwise.

29. (B) All other figures are mirror images of the English alphabet.
30. (D) The shaded square is on the right of the upright arrow.
31. (A) In all other figures, one dot is outside the figure and one inside.
32. (C) All other figures can be rotated to get one another.
33. (B) In all the other figures except (B) the direction is anti clockwise

1. (A)



2. (C) I E R : O K S

O U M : U A N $\begin{array}{c} +1 \\ \hline +6 \\ +6 \end{array}$

3. (D) As L $\xrightarrow{+4}$ p Similarly D $\xrightarrow{+4}$ h

$$\begin{array}{ll} K \xrightarrow{+4} o & C \xrightarrow{+4} g \\ J \xrightarrow{+4} n & B \xrightarrow{+4} f \end{array}$$

4. (A) C F D G : L O M P

$\begin{array}{c} +9 \\ \hline +9 \\ +9 \\ +9 \end{array}$

Similarly H K I L : Q T R U

$\begin{array}{c} +9 \\ \hline +9 \\ +9 \\ +9 \end{array}$

5. (A) A B C D \rightarrow W X Y Z Similarly, E F G H \rightarrow S T U V

6. (D) P S Q R C F E D

$\begin{array}{c} -1 \\ \hline +1 \\ +1 \end{array}$ $\begin{array}{c} -1 \\ \hline +1 \end{array}$

Similarly,

$$\begin{array}{c} \text{J} \quad \text{M} \quad \text{K} \quad \text{L} \\ \boxed{} \quad \boxed{-1} \quad \boxed{} \quad \boxed{} \\ +1 \quad +1 \end{array} : \begin{array}{c} \text{W} \quad \text{Z} \quad \text{Y} \quad \text{X} \\ \boxed{-1} \quad \boxed{-1} \quad \boxed{} \quad \boxed{} \\ +1 \end{array}$$

7. (C) As $B \xrightarrow{+6} H$ Similarly $N \xrightarrow{+6} T$
 $C \xrightarrow{+6} I$ $O \xrightarrow{+6} U$
 $F \xrightarrow{+6} L$ $R \xrightarrow{+6} X$
 $G \xrightarrow{+6} M$ $Q \xrightarrow{+6} W$
8. (A) Difference of +3 alphabets in each letter.
9. (C) $123 : 13^2$

Similarly $235 \rightarrow 25^3$ middle digit of first term becomes power of the next term.

10. (A) $x : \left(\frac{x}{2}\right)^2$ is the relationship or second $= \left(\frac{\text{first}}{2}\right)^2$.
 $\therefore \left(\frac{30}{2}\right)^2 = 15 = 225$
11. (B) Analogy of prime numbers.
12. (C) As $68 = (4)^3 + 4$
 $130 = (5)^3 + 5$
and $350 = (7)^3 + 7$
Hence the number is $= (6)^3 + 6 = 222$
13. (C) The relationship is $x^2 : (x + 1)$. i.e., $11^2 : 11 + 1$
 $5^2 : 5 + 1 = 6$

14. (C) The relationship is $x : \frac{x^2}{2}$. i.e., $6 : \frac{6^2}{2}$ Similarly $4 : \frac{4^2}{2} = 8$
15. (C) $3 \xrightarrow{3^2 + 3} 12$

Similarly, $5 \xrightarrow{5^2 + 5} 30$

16. (A) The relation is $x : (x + 1)^{1/2}$ i.e., $35 : (35 + 1)^{1/2} = 6$

similarly $120 : (120 + 1)^{1/2} = 11$

17. (B) $\frac{144 : 10}{\sqrt{144}-2}$ Similarly $\frac{169 : 11}{\sqrt{169}-2}$

18. (D) $14 = (2 \times 9 - 4)$
 similarly, $26 = (2 \times 15 - 4)$
 $\therefore ? = 15$
 Hence, the number is 15.

19. (D) From the first pair, the 2nd figure is obtained when the 1st figure gets laterally inverted. Hence, figure (D) is the correct answer figure for the second pair.
20. (B) From the first pair the second figure is obtained when the first figure gets inverted. Hence, figure (B) is the correct answer figure for the second pair.
21. (A) First figure, from bottom, moves to the fourth position and is reversed. Its head is also reversed. Fourth figure comes at the third position and its head is also reversed. The third figure comes at the second position and is reversed. Its head is also reversed. Second figure comes at the first position and its head and position get reversed.
22. (D) From the first pair, the 2nd figure is got when the 1st figure gets reversed. Hence the figure in option (D) is the correct answer for the second pair.
23. (C) One bent line is shifted to the top of the main figure.
24. (A) The figure rotates 135° clockwise, triangle moves one side anti-clockwise on the figure and gets inverted, the line segment rotates through 225° clockwise.
25. (D) The figure rotates through 90° anti-clockwise in such a way that the shaded portion becomes white and the white portion becomes shaded.
26. (B) The line attached to the shaded circle rotates through 90° anti-clockwise. The remaining portion of the figure rotates through 90° clockwise and is reversed.
27. (C) All the lines are inverted at the same positions.

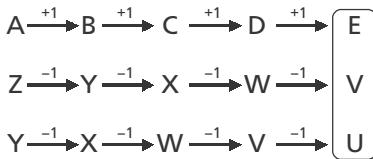
28. (C) From section (i) to (ii) of the problem figures, the right half of the figure is removed.
29. (A) From section (i) to section (ii) of the problem figure, one segment (lower) of the existing figure is retained. Answer figure (A) correctly replaces section (iv) of the problem figure.
30. (D) The figures rotate 90° clockwise and heads of the arrow are reversed.
31. (B) The upper and lower halves of the figure get inverted at their positions.
32. (A) The block with lines rotates 90° clockwise, whereas rest of the portion of the figure rotates 180°
33. (C) From section (i) to section (ii) of the problem figure, the existing figure gets inverted and parallel lines appear inside it. Answer figure (C) correctly replaces section (iv) of the problem figure.
34. (C) The upper half of the figure is inverted.
35. (A) The figure rotates through 90° clockwise in such a way that an identical figure appears on upper side of the original figure.
36. (B) The lines outside the figure occupy inside positions and lines inside the figure occupy outer positions.
37. (D) From section (i) to (ii) of the problem figure, the existing figure gets inverted and is placed over a new figure having more sides. Similarly section (iv) of the problem figure is obtained by making same changes in section (iii). Hence, answer figure (D) correctly replaces section (i) and section (iv) of the problem figure.
38. (B) White portion gets inverted laterally and an identical portion gets attached with that of the existing one.
39. (C) Both the figures interchange positions and are reversed at the new positions. The arrow comes on the arm of U-shaped figure in inverted position.

3

Chapter

WHAT COMES NEXT ?

1. (D)



2. (B) 1st letter: B $\xrightarrow{+2}$ D $\xrightarrow{+2}$ F $\xrightarrow{+2}$ (H) $\xrightarrow{+2}$ J

2nd letter: Z $\xrightarrow{-1}$ Y $\xrightarrow{-1}$ X $\xrightarrow{-1}$ (W) $\xrightarrow{-1}$ V

3rd letter : A $\xrightarrow{+2}$ C $\xrightarrow{+2}$ E $\xrightarrow{+2}$ (G) $\xrightarrow{+2}$ I

3. (B) 1st letter: a $\xrightarrow{+6}$ g $\xrightarrow{+6}$ (m) $\xrightarrow{+6}$ s $\xrightarrow{+6}$ y

2nd letter: j $\xrightarrow{+6}$ p $\xrightarrow{+6}$ (v) $\xrightarrow{+6}$ b $\xrightarrow{+6}$ h

3rd letter: s $\xrightarrow{+6}$ y $\xrightarrow{+6}$ (e) $\xrightarrow{+6}$ k $\xrightarrow{+6}$ q

4. (D) Number: 2 $\xrightarrow{+2}$ 4 $\xrightarrow{+4}$ 8 $\xrightarrow{+6}$ 14 $\xrightarrow{+8}$ (22)

Letters: B $\xrightarrow{+1}$ C $\xrightarrow{+2}$ E $\xrightarrow{+3}$ H $\xrightarrow{+4}$ (L)

5. (A) Letters: W $\xrightarrow{-2}$ (U) $\xrightarrow{-2}$ S $\xrightarrow{-2}$ Q $\xrightarrow{-2}$ O

Numbers: 144 (12^2) \rightarrow (121) (11^2) \rightarrow 100 (10^2) \rightarrow 81 (9^2) \rightarrow 64 (8^2)

6. (C) 1st number: 2 $\xrightarrow{+5}$ 7 $\xrightarrow{+7}$ 14 $\xrightarrow{+9}$ 23 $\xrightarrow{+11}$ 34 $\xrightarrow{+13}$ (47)

Middle letter: Z $\xrightarrow{-1}$ Y $\xrightarrow{-1}$ X $\xrightarrow{-1}$ W $\xrightarrow{-1}$ V $\xrightarrow{-1}$ (U)

3rd number: 5 $\xrightarrow{+2}$ 7 $\xrightarrow{+2}$ 9 $\xrightarrow{+2}$ 11 $\xrightarrow{+2}$ 13 $\xrightarrow{+2}$ (15)

7. (C) 1st letter: N $\xrightarrow{-3}$ K $\xrightarrow{-3}$ H $\xrightarrow{-3}$ E $\xrightarrow{-3}$ (B)

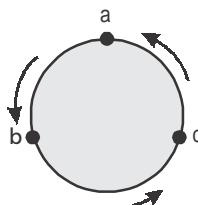
Middle number: 5 $\xrightarrow{+2}$ 7 $\xrightarrow{+3}$ 10 $\xrightarrow{+4}$ 14 $\xrightarrow{+5}$ (19)

3rd number: V $\xrightarrow{-2}$ T $\xrightarrow{-2}$ R $\xrightarrow{-2}$ P $\xrightarrow{-2}$ (N)

8. (A) Normally when there are only two letters in a series, these letters are repeated in a group. The answer is obviously (a). When these letters are placed in a series in place of blanks, we get a series of the type. l m l l m l l m l l m l.
9. (D) Here the first cycle is a b c, the second cycle is the reverse of the first i.e., c b a. Next cycle is b c a and then its reverse. So the series this way becomes

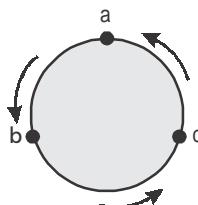
a b c c b a b c a a c b

Hence the choice is (D).



10. (C) Here the suitable choice is (C). The series so obtained is

a b c c b c a a c a b b a b c c



The group of letters os formed are
a b c c / b c a a / c a b b / a b c c.

Here the last letter in the cycle is repeated. Next the first letter 'a' is dropped and the last letter is again repeated. Thus the groups so formed are a b c c : b c a a, c a b b , a b c c etc.

11. (D) The letters including the blanks are twelve in number. These can be divided into groups of two, three, four or six. The groups of two or three are not producing any rhythm because the pattern shall in this case be

a – | bb | ab | b – | ab | – b | and a – b | bab | b – a | b – b | : There is no symmetry in these groups. But when divided into groups of four, we may have a b b | a b b | a b – b | .

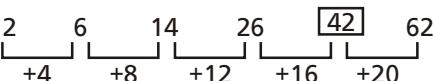
4 can be easily seen that a group a b b b is repeated. Hence the series is

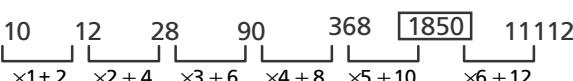
a b b b a b b b a b b b

which produces some kind of rhythm.

12. (B) Dividing into groups of four, we have
a a b a a a b b a a b b

Comparing the pattern of the groups, we can easily see that the order of each group is a a b b. Hence the choice is (B).

13. (D) 
The difference of each successive number is increased by 4.
Hence, number 42 will fillup the blank space.

14. (A) 
Hence, number 1850 should replace the question mark.

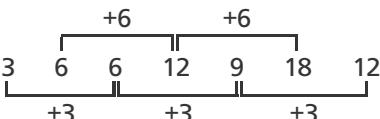
15. (A) $4_{\times 2+1} 9_{\times 2+2} 20_{\times 2+3} 43_{\times 2+4} \boxed{90}$

16. (B) The series consists of squares and cubes of consecutive natural numbers i.e. $1^2, 1^3, 2^2, 2^3, 3^2, 3^3, 4^2, \dots$

17. (A) Series proceeds with a difference of 4, 4, 12, 12, 36, 36. Hence, the missing number will be 108.

18. (C) The pattern is $\times 2 + 1, \times 2 - 1, \times 2 + 1, \times 2 - 1, \dots$

So, missing term = $101 \times 2 + 1 = 203$.

19. (B) 

20. (D) Series has been written in reverse order with a difference of $(1)^2, (1)^3, (2)^2, (3)^2, (3)^3$ i.e., 1, 1, 4, 8, 9, 27.

21. (C) Clearly, the given sequence is a combination of two series:
I. 1, 3, 7, 13, ? and II. 3, 6, 9, 12

The pattern followed in I is +2, +4, and the pattern

followed in II is +3.

Hence, the answer is (C).

22. (D) The pattern is $\times 1 + 1, \times 2 + 2, \times 3 + 3, \times 4 + 4, \dots$
 So, missing term = $112 \times 5 + 5 = 565$.
23. (C) The outer design of problem figure (1) is identical to that of problem figure (5) and the inner design gets inverted and shaded. Similarly, answer figure can be obtained from figure (2) by inverting the inner design and shading it. Hence, the correct answer figure is (C).
24. (A) Every time one circled is added anti-clockwise in each successive figure and the square rotates through 45° . Position of ? is the same in figure (2) and (4), hence it will be same in the answer figure.
25. (B) Shaded triangle moves 45° anti-clockwise and circle moves 45° clockwise. Symbols inside the main figure are repeated in pair from problem figure (4) onwards.
26. (A) From problem figure (1) to (2), symbol X moves anti-clockwise $\frac{1}{2}$ side from figure (2) to (3), the symbol O moves $1\frac{1}{2}$ side, from figure (3) to (4), the symbol = moves $2\frac{1}{2}$ sides and from figure (4) to (5), again the symbol = moves $\frac{1}{2}$ side. Hence, in figure (5) to (6), the symbol O will move $1\frac{1}{2}$ side.
27. (D) The main figure rotates 45° clockwise in each figure, the black semi-circle gets outside and inside the square, alternatively.
28. (A) Right side figure is shifted to left side and gets inverted, left side figure is shifted to right side and is converted into a new figure.
29. (A) Changes in the symbols take place alternatively as shown in the two diagrams and symbol in place of • is replaced by a new symbol.

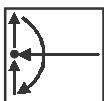


Fig. 1 to 2

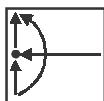
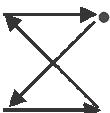


Fig. 2 to 3

30. (A) From figure (1) to (2), the shaded portion of the upper left square rotates 90° clockwise. Upper right square shifts to just opposite side and the shaded portion of the lower square also rotates 90° clockwise. Similar changes occur from problem figure (3) to (4) and from problem figure(5) to the answer figure.
31. (A) Changes in the symbols take place as shown in the diagram and a new symbol replaces the old one in place of sign*.



32. (B) From problem figure (1) to (2) and figure (3) to (4), the main design rotates 90° clockwise and all the dots, except the central one, move vertically opposite. The similar changes occur from problem figure (5) to the answer figure.
33. (A) The dots move anti-clockwise and their number is increased by one in every subsequent figure and the sign at the centre changes from T to ^ and ^ to Z. The same changes take place in the subsequent figures change for every 3 steps.
34. (A) The figure rotates 45° clockwise in each step. In one step, the symbols at the extreme positions get inverted and the middle arrow moves to the outer side of the line. In the alternate step, the arrow gets inverted and the lines at the extreme position move to the other side of the line.
35. (D) The U-shaped figure repeats after every 3 figures, hence it will be same in answer figure as in figure(2). The shaped arrow rotates 180° from problem figure (1) to (5). The same process will be repeated from problem figure (2) to answer figure.
36. (B) From figure (1) to (2), first symbol, counting from left hand

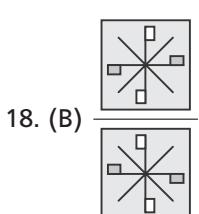
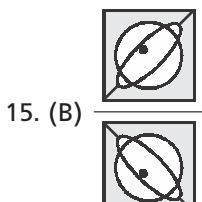
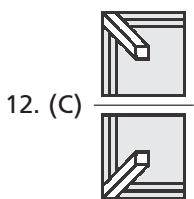
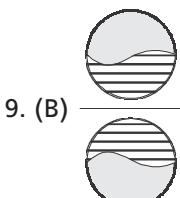
side occupies the position of second symbol and is inverted, second symbol comes at fourth position, fourth symbol comes at third position and is inverted and third symbol comes at first position and is replaced by a new one. The same changes in figure (5) will result into the answer figure.

37. (A) One line from the upper figure is deleted and one line in the lower figure is added in a set order in each successive figure.

1. (B) 

4. (A) 

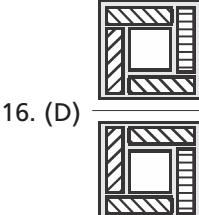
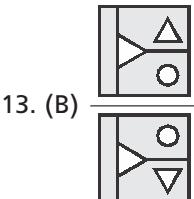
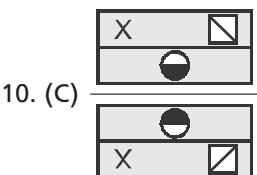
7. (B) 



2. (B) 

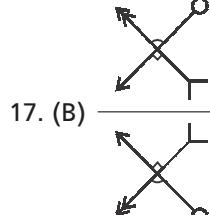
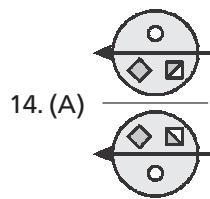
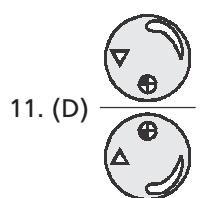
5. (D) 

8. (B) 



3. (D) 

6. (D) 



19. (D) SUPERVISOR 20. (B) 247593 247593

21. (D) 19651NDOPAK 19651NDOPAK

22. (B) RADIANT RADIANT

23. (B) latest latest

24. (A) + + = = +

25. (B) 1 3
5 K 3 1
K P

26. (C) s ? s ?

27. (A) o o
↑ ↑ o o
↑ ↑

28. (C) → → → ← ← ←

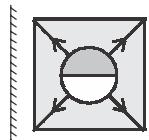
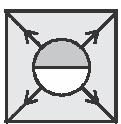
29. (C) o o
→ → o o
→ →

30. (D) o o
o o o o
o o

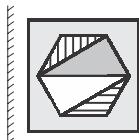
31. (D) o o
△ △ o o
△ △

32. (C) △ ?
x = □ ?
= x

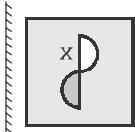
33. (B)



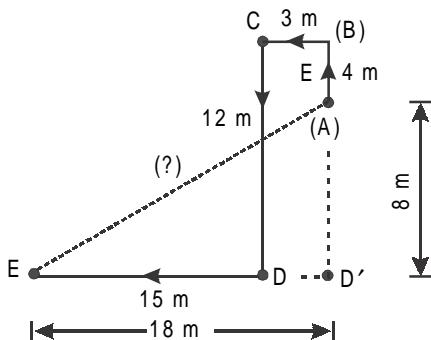
34. (D)



35. (A)



1. (A)



From the diagram,

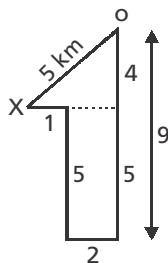
$$\begin{aligned} AE^2 &= (AD')^2 + (ED')^2 \\ &= (8)^2 + (18)^2 = (64 + 324) \end{aligned}$$

$$AE^2 = 388$$

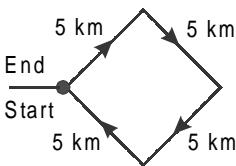
$$\Rightarrow AE = \sqrt{388} \approx 20 \text{ m.}$$

2. (D) $OX = \sqrt{4^2 + 3^2}$

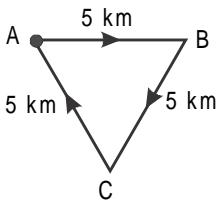
$$= \sqrt{25} = 5 \text{ km}$$



3. (B) His office and House are same (at 0 km distance)



4. (A) Following the instructions as given in the question, it is seen that starting and end points are the same.



5. (D)
-
- A complex path diagram showing a rectangle with a diagonal dashed line from S to E. Point S' is on the bottom edge of the rectangle. Distances are labeled: 3 km (horizontal distance from S to E), 4 km (vertical distance from E to the top edge), 2 km (vertical distance from the top edge to S'), 7 km (vertical distance from S' to the top edge), 5 km (horizontal distance from S' to the right edge), and 12 km (total horizontal distance from S to the right edge).

From the diagram,

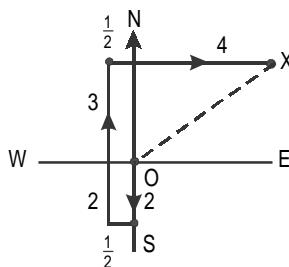
$$ES^2 = (ES')^2 + (S'S)^2 = (5)^2 + (12)^2 = 25 + 144 = 169$$

$$\therefore ES = 13 \text{ km}$$

6. (C)
-
- A horizontal path from point A to point B. Point A is at the start with a vertical distance of 5 m. Point B is at the end with a vertical distance of 5 m. The total horizontal distance between A and B is 10 m.

Ashraf is at a distance of 10 m and towards East from his starting point.

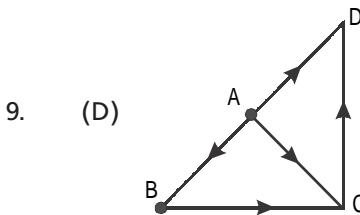
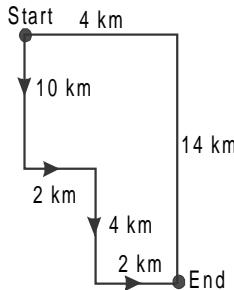
7. (C) $OX = \sqrt{3^2 + 4^2} = 5\text{ km}$



8. (A) From the diagram,

Horizontal distance = 4 km towards east

Vertical distance = 14 km towards south.



9. (D) D, which is to the North of C, is located to the North-East of A.

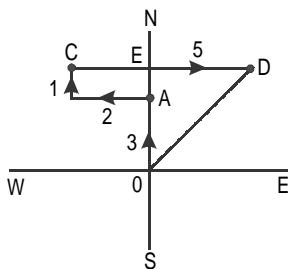
10. (B) 13 km in North-West direction
Distance covered by him

$$\Rightarrow CS^2 = (CS')^2 + (S'S)^2$$

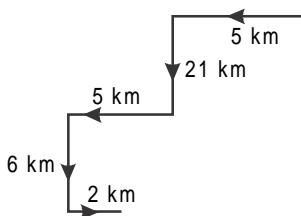
$$= (5)^2 + (12)^2 = 25 + 144 = 169$$

$$\Rightarrow CS = 13 \text{ km in NW direction.}$$

11. (D) $OD = \sqrt{4^2 + 3^2} = 5 \text{ m.}$



12. (D) Distance in vertical direction = $(21 + 6) \text{ km} = 27 \text{ cm.}$

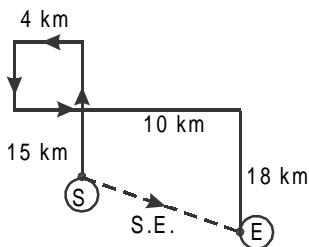


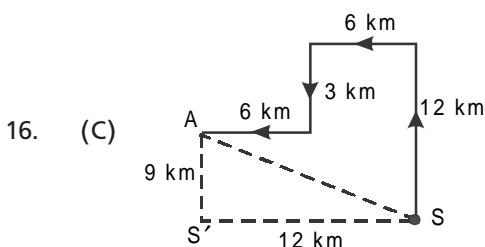
13. (A)
-

Reconstruction back the whole sequence of movements starting with the final direction of East, we find that Sana person originally started in the West direction.

14. (D)
-

15. (A) South east.

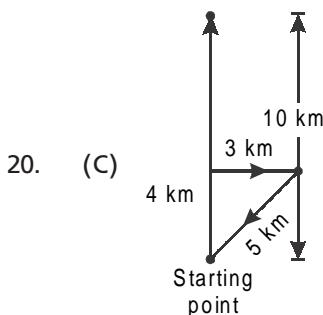
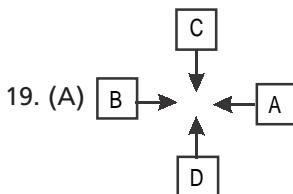
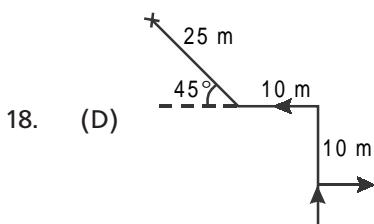
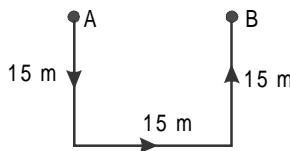


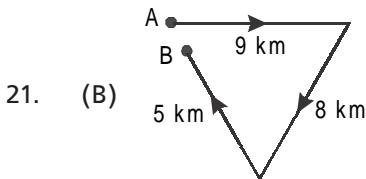


$$AS^2 = (AS')^2 + (S'S)^2 = (9)^2 + (12)^2 = 81 + 144 = 225$$

$\Rightarrow AS = 15 \text{ km}$

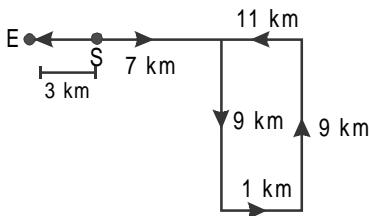
17. (C) Harish finally reaches a point which is 15 m from the starting point and he is in East direction.



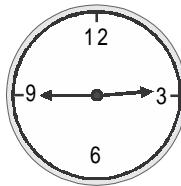


A and B represent the starting and finishing position respectively of Pearl. B is to the South-East of A.

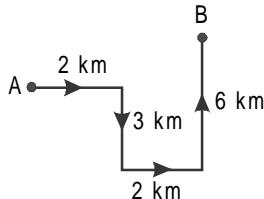
22. (C) Distance from S to E is (3 km) in west direction.



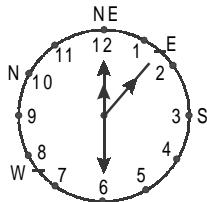
23. (A) When the time is quarter to three, the hands of the watch are approximately diametrically opposite. Hence if the minute hand points to North-East, the hour hand will point South-West.



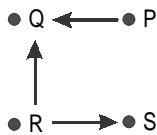
24. (C) Final position B is at a distance of 6 km towards North from her last turn.



25. (C) Diagram is shown as per the conditions in the question. Clearly at 1 : 30 p.m. the hour hand shall point East.

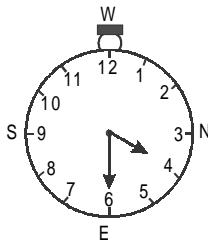


26. (B) According to $P \div Q + R - S$



\therefore S is in the South-East of Q.

27. (A) North-East.



28. (B)
-

The person is at a distance of 15 m towards East from the starting point.

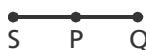
29. (B)
-

- 30-33
-

30. (C)

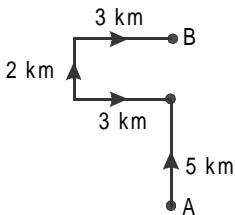
31. (A)

32. (C) T R U



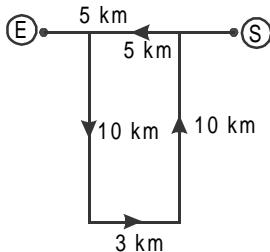
33. (A)

34. (A)

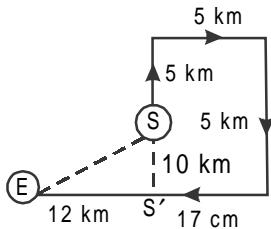


B is the finishing point and is at a distance of 7 km from the starting point A.

35. (A) From the diagram, distance from 'S' to 'E' is $(5 + 2) \text{ km} = 7 \text{ km}$



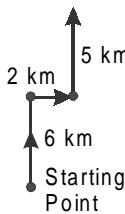
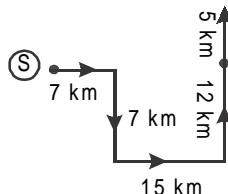
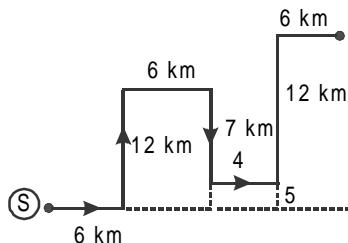
36. (B)



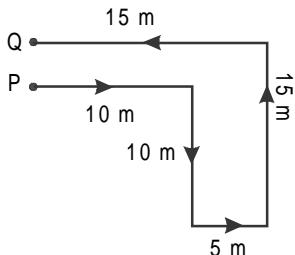
$$\begin{aligned} ES^2 &= (ES')^2 + (SS')^2 \\ &= (12)^2 + (10)^2 \\ &= 144 + 100 = 244 \end{aligned}$$

$$\Rightarrow ES = \sqrt{244} \approx 15.61 \text{ cm}$$

37. (A)

38. (D) Total horizontal distance = $(15 + 7)$ km = 22 m.39. (A) From the figure, vertical distance = $(12 - 7 + 12)$ km = 17 km

40. (A)



$$15 - 10 = 5 \text{ m}$$

1. (B) $(5 - 1) \times (6 - 3) = 12$
 $(7 - 3) \times (8 - 3) = 20$
Similarly, $(?) = (7 - 2) \times (6 - 3) = 15$
2. (A) Numbers are, $1 \times 3 = 3$; $3 \times 5 = 15$; $5 \times 7 = 35$; $\boxed{7 \times 9 = 63}$;
 $9 \times 11 = 99$; $11 \times 13 = 143$
3. (B) The pattern used is:
 $13 \times 4 = 52$; $8 + 5 = 13$; $13 \times (8 - 5) = 39$
4. (D) $20 \times 4 = 80$; $11 + 9 = 20$; $20 \times (11 - 9) = 40$
5. (C) The numbers in the triangle are the differences of the numbers at the vertices.
6. (C) $3^2 = 9$; $4^2 = 16$; $(?)^2 = 25 \Rightarrow (?) = 5$
7. (D) $(2)^2 = 4$; $(6)^2 = 36 \Rightarrow 9^2 = 81$
8. (C) First figure $\Rightarrow \sqrt{4 \times 9} = 6$; second figure
 $\Rightarrow \sqrt{9 \times 16} = 12$
 $\therefore \sqrt{16 \times ?} = 20$ i.e. $16 \times ? = 400$ or $? = 25$
9. (C) Numbers placed along the sides of the triangle are the squares of the digits of the number at the centre of the triangle.
 $(4)^2 = 16$; $(3)^2 = 9$, $(9)^2 = 81$

Therefore, the number at the centre would be ($64 = 8^2$, $100 = 10^2$, $49 = 7^2$) 8107. Hence, the correct answer is (C).

10. (A) $(10-8) \times (15-8) = 14$
 $(8-6) \times (9-5) = 8$
So missing number = $(6-4) \times (11-8) = (2 \times 3) = 6$

11. (D) $93 - (27 + 63) = 3$
 $79 - (38 + 37) = 4$
 $67 - (16 + 42) = 9$

12. (B) $2, 3 \rightarrow 23 + 5 = 28$
 $4, 5 \rightarrow 45 + 5 = 50$
and $3, 5 \rightarrow 35 + 5 = 40$
Hence the missing number is 40.

13. (D) $35 + 20 + 28 - 43 = 40$
 $28 + 11 + 16 - 45 = 10$
Similarly $15 + 15 + 40 - 32 = 38$
Hence the missing number is 38.

14. (D) $\sqrt[3]{64} + \sqrt[3]{27} + \sqrt[3]{8} + \sqrt[3]{1} = 10$
 $\sqrt[3]{125} + \sqrt[3]{64} + \sqrt[3]{27} + \sqrt[3]{8} = 14$
So missing term

$$= \sqrt[3]{216} + \sqrt[3]{125} + \sqrt[3]{64} + \sqrt[3]{27} = (6 + 5 + 4 + 3) = 18$$

15. (C) In first figure, $(9 \times 10) - (4 \times 8) = 58$
 \therefore The missing figure = $(15 \times 10) - (9 \times 8) = 78$

16. (D) $(8 + 2)^2 = 10^2 = 100$

17. (B) $39 = 3 \times 3 + 6 \times 5$
 $51 = 4 \times 4 + 5 \times 7$
 $37 = 4 \times 3 + 5 \times 5$

18. (C) $(3)^2 + (4)^2 = (5)^2$
 $(5)^2 + (12)^2 = (13)^2$

$$(\text{?})^2 + (15)^2 = (17)^2 \Rightarrow (\text{?})^2 = (17)^2 - (15)^2 = 289 - 225 \\ = 64$$

Hence the missing number is 8.

19. (D) $(15 \times 2) + 1 = 31; (31 \times 2) + 1 = 63;$
 $(63 \times 2) + 1 = 127$

Similarly $(127 \times 2) + 1 = 255$.

20. (B) $(5 \times 3) + (6 \times 8) = 63, (2 \times 7) + (3 + 9) = 41$

Similarly $(6 \times 7) + (8 \times 5) = 42 + 40 = 82$

21. (C) In first column: $5^2 + 4^2 - 1 = 40$;

In Second column: $9^2 + 5^2 - 6 = 100$

Similarly, $7^2 + 3^2 - 8 = 50$.

22. (D) In the first row: $(11 + 7)^2 = 18^2 = 324$,

In the second row $(15 + 6)^2 = 21 = 441$

Similarly, $(9 + 5)^2 = 14^2 = 196$.

23. (A) Take the average of two numbers and then square the result.

Thus the required number $= \left(\frac{6+8}{2} \right)^2 = (7)^2 = 49$.

24. (B) $\sqrt{225} + \sqrt{64} = 15 + 8 = 23; \sqrt{16} + \sqrt{1} = 4 + 1 = 5$

Similarly $\sqrt{49} + \sqrt{81} = 7 + 9 = 16$.

25. (A) $12^2 - 8^2 = 80,$

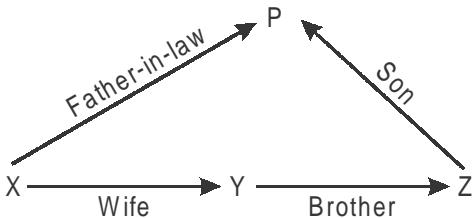
$$16^2 - 7^2 = 207$$

Similarly $25^2 - 21^2 = 184$.



26. (A) There are 11 elements between 3 and 1. So, the middle letter will be the sixth one, which is B.
27. (C) R E 5 D A P \$ 3 T I **Q 7 9** B # 2 K % U 1 M **W 4** * J * N
28. (B) R E 5 D A P \$ 3 T I Q 7 9 B # 2 K **% U 1** M W 4 * J 8 N
29. (C) The 16th element from the left is 2, and the element 7 steps to the left of 2 is 4.
30. (C) In the all other groups, the first element moves 3 steps forward to give the second element, which in turn moves 5 steps backward to give the third element.
31. (C) R*T J **L 2 \$** D = M # 8 C % B < **K 1 &** A W ? P E + Q @ ? F 6
32. (B) The 18th element from the left is 1. The 6th element to the left of 1 is E.
33. (A) The new arrangement is :
 6 F 7 @ Q + E P ? W A & 1 K < B % C 8 # M = D \$ 2 L J T * R
 The 16th element from the right end of this arrangement is <. The 6th element to the right of < is M.
34. (A) The new arrangement is :
 B % C 8 # M = D \$ 2 L J T * R < K 1 & A W ? P E + Q @ 7 F 6
 The 21st element from the right end of this arrangement is 2.
35. (B) In each of the analogue pairs, the corresponding elements of both the terms occupy the same position from the beginning and end of the given sequence.

1. (A) D is the brother of E and E is the daughter of B. This means that D is the son of B. Also, A is the mother of B. So, A is the grandmother of D.
2. (D)
3. (D) A's son is brother of C and D.
 \Rightarrow B is the uncle to C.
4. (A) Aunt's husband is uncle to the boy.
5. (D) The only daughter of Govinda's mother-in-law is the wife of Govinda. Therefore, the statement, in other words implies that "Her mother is my wife." Hence, it is clear that Govinda is the Husband to that girl.
6. (C)
7. (D) The relationship chart, based on the given problem can be worked out as given below.

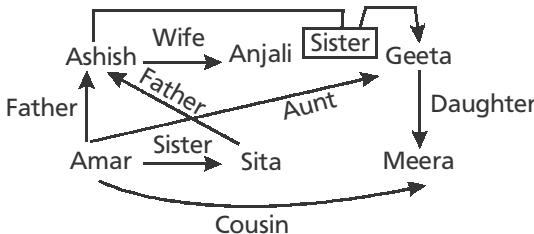


'Y' is the brother of 'Z' who is son of "P" So. Y is also the son of 'P'. When 'P' is the father of 'Y' and 'X' is the wife of 'Y' then 'P' is the father-in-law of 'X'.

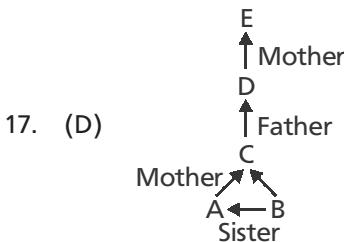
8. (D) His own wife.
9. (B) Clearly, the man is the cousin of that woman.
10. (D) As the given information in the question, X's mother is the only daughter of Y's mother. In other words X is the son of Y's sister. So X is the nephew of Y.

11 to 14

32

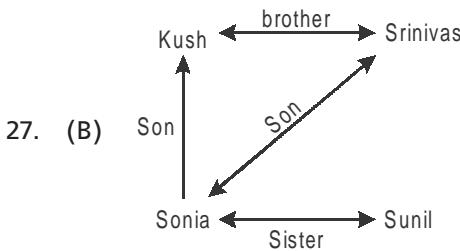


11. (D) 12. (B) 13. (B) 14. (A)
15. (B) P is the daughter of V, who is spouse of T. T is the daughter of S. So, T is the mother and V is the father of P. Therefore, S is the grandfather of P.
16. (A) R and S are brothers and Q is the child of R and T is the child of S. So, cousin of Q is T.



18. (B) Only daughter of Neha's father is Neha herself. Therefore, statement, in other words implies that Neha is the mother of that person.
19. (C) Clearly, the lady is the grandmother of man's sister's son i.e, the mother of the mother of man's sister's son i.e, the mother of man's sister.
20. (C) From the information given in the question, we cannot determine if M is a male or a female. Hence, none of the options is a definite answer.
21. (C) Only son-in-law of mother of Sweta's mother is the father of Sweta and his son is the brother of Sweta. Therefore, Sweta attended the birthday party of her brother.
22. (A) The father of his brother means "his father". Is the only son of my mother means "my brother". That means the statement delivered by lady can be read as his father is my brother or in other words lady is the father's sister of that man's father.

23. (C) B is the daughter of C and C is the daughter in law of P. So P is the grandfather of B. Also, A is uncle of B i.e. A is the brother of B's father. Thus, A is the son of P.
24. (B) The information given in the question can be used as "The only sister of your brother (you) is my mother". Hence, man is related as son to that woman.
25. (D) Son-in-law.
26. (D) C is B's daughter and D is B's son. So, D is the brother of C. E is a male married to C so, E is the husband of C, whose brother is D. Thus, D is the brother in-law of E.



From the figure above it is clear that Kush is Sonia's son.

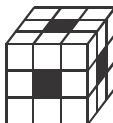
28. (A) Sister's husband.
29. (C) Grand father.
30. (C) Only son of Priya grandfather means Archana father & his son is Priya brother.
31. (C) The daughter of Akash's father's wife is the sister of Akash and brother of the daughter is the brother of Akash. Hence, the boy in blue shirt is the brother of Akash. Therefore, the correct answer is (C).
32. (D) A's daughter is the sister of R and S.
B is the sister of A. Thus B, is the aunt of S.
33. (A) Girl in the photograph is niece to Hari.
34. (D) Mahesh and Ritu is the married couple.
35. (B) Dipesh is Ravi's grandson.
36. (D)
37. (C) Ravi is the paternal grandfather of Renu.
38. (A) 39. (D) 40. (B)



8
Chapter

CUBES AND DICE

1. (B) $(3 \times 1) + (2 \times 4) + (1 \times 4) = 3 + 8 + 4 = 15$
2. (A) In the figure, there are 11 columns containing 4 cubes each, 6 columns containing 3 cubes each and 3 columns containing 2 cubes each.
 \therefore Total number of cubes
 $= (11 \times 4) + (6 \times 3) + (2 \times 3) = 44 + 18 + 6 = 68.$
3. (B) $(3 \times 1) + (2 \times 7) + (1 \times 13) = 3 + 14 + 13 = 30$
4. (C) In the figure, there are 21 columns containing 3 cubes each, 12 columns containing 2 cubes each and 8 columns containing 1 cube each.
 \therefore Total number of cubes $= (21 \times 3) + (12 \times 2) + (8 \times 1) = 63 + 24 + 8 = 95.$
5. (C) Number of smaller cubes with no surface painted
 $= (n - 2)^3 = (2)^3 = 8.$
6. (A) Number of cubes having more than one faces painted.
 \Rightarrow cubes painted from 2 faces $= (n - 2) \times 12 = (4 - 2) \times 12 = 24$ and cubes painted from 3 faces $= 8$ i.e., $24 + 8 = 32.$
7. (C) The four cubes at the center of the two middle rows i.e., $2 \times 4 = 8$ cubes have no face coloured.
8. (B) Number of smaller cubes with three surfaces painted $= 8.$



One cube on each surface is painted only one

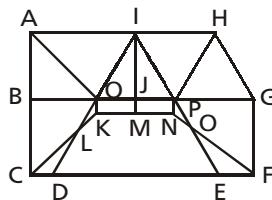
side i.e., 6.

9. (B)
10. (C) There are 25 cubes having only one face coloured.
11. (A) There will be zero cubes coloured on four faces.
12. (C) The six corners have three faces coloured.
 Note: The base corners are not to be considered as the base is not coloured.

13. (D) There can be no cube which has two of its faces both painted with the same colour.
- 14 to 15 (1, 5), (2, 4) and (3, 6) are the opposite faces.
14. (C) 15. (A)
16. (D) Since there are 27 small cubes, only one cube at the centre is without any paint.
17. (B) There will be 64 cubes in all and number of smaller cubes with one surface painted = $(n - 2)^2 \times 6$
 $= (4 - 2)^2 \times 6 = 24$
18. (A)
19. (C) Number of smaller cubes with no surface painted
 $= (n - 2)^3 = (4 - 2)^3 = 8$
20. (C) Number of smaller cubes with no surface painted.
 $(n - 2)^3 = (4 - 2)^3 = 8$
21. (C) From the question figure (dice 2, 3, 4), number opposite to 3 is 4.
22. (C) From the question figure (dice 1, 2, 3), number of dots opposite to 3 is 5.
23. (A) From the question figure (dice 1, 2), colour opposite to yellow is violet.
24. (D) From the question figure (dice 1, 2) number is place of '?' is 3.
25. (D) From the question figure (dice 2 and 3) E is adjacent to B and C. Hence E is opposite to A.
26. (C) From 1st and 2nd dice, 6 is adjacent to 5 and 4.
Hence, 5 is opposite to 2.
27. (A) 1 is opposite to 2.
28. (B) Adjacent faces of 2 are 1, 4, 5, 6.
Hence, 3 is opposite to 2.
29. (C) 4 is opposite 2 and 1 is opposite 6.
Hence, 5 is opposite 3.
30. (C) When 3 dots are at the bottom, the top surface will have four dots.



1. (A) We shall label the figure as shown below.



The simplest triangles are AOB, AOI, IOJ, IJP, IPH, HPG, OLK, CLD, PNO, OEF - 10

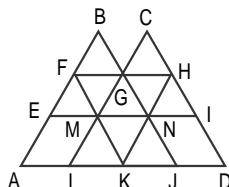
IOP, IDE - 2

12

2. (C) There are 28 triangles.
3. (B) We may label the figures as shown.

The simplest triangles are BFG, CGH, EFM, FMG, GMN, GHN, HNI, LMK, MNK and KNJ i.e., 10 in number.

The triangles composed of three components each are FAK and HKD i.e., 2 in number.

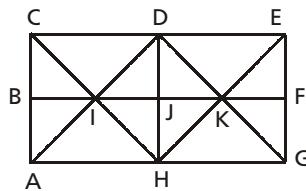


The triangles composed of four components each are BEN, CMI, GLJ and FHK i.e., 4 in number.

The triangles composed of eight components each are BAJ and CLD i.e., 2 in number.

Thus, there are $10 + 2 + 4 + 2 = 18$ triangles in the given figure.

4. (B) The simplest triangles are:



BIC, CID, DIJ, DJK, DKE, KEF, BIA, AIH, IHJ, HJK, HKG, GKF

→ 12

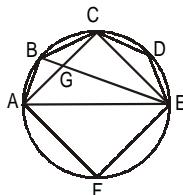
AIC, HID, HKD, GKE, DIK, IHK → 6

$\left. \begin{matrix} CAH, ACD, CDH, DHA, \\ DHG, HGE, GED, EDH \end{matrix} \right\}$ → 8

ADG, CHE → 2

28

5. (B) We may label the given figure as shown.

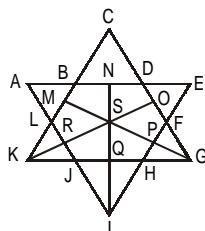


The simplest triangles are ABG, BCG, CGE, CDE, AGE and AEF i.e., 6 in number.

The triangles composed of two components each are ABE, ABC, BCE and ACE i.e., 4 in number.

∴ There are $6 + 4 = 10$ triangles in the figure.

6. (D) The figure may be labelled as shown.



The simplest triangles are ABL, BCD, DEF, FGP, PGH, QHI, JQI, KRJ and LRK i.e., 9 in number.

The triangles composed of two components each are OSG, SGQ, SPI, SRI, KSQ, KMS, FGH, JHI and JKL i.e., 9 in number.

There is only one triangle i.e., KSG which is composed of four components.

The triangles composed of five components each are NEI, ANI, MCG and KCO i.e. 4 in number.

The triangles composed of five components each are NEI, ANI, MCG and KCO i.e., 4 in number.

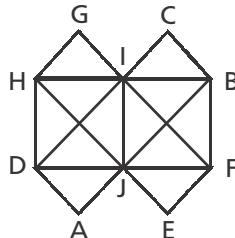
The triangles composed of six components each are GMK and KOG i.e., 2 in number.

There is only one triangle i.e., AEI composed of ten components.

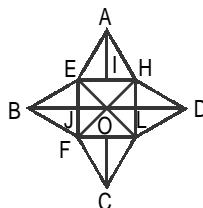
There is only one triangle i.e., KCG composed of eleven components.

\therefore Total number of triangles in the given figure = $9 + 9 + 1 + 4 + 2 + 1 + 1 = 27$.

7. (B) The lines are AB, BC, CD, DA, EF, FG, GH, HE, IJ, HD, DF, FB, BH $\Rightarrow 13$



8. (D) 13 single square, 8 double squares, 5 triple squares, 1 outer square.
9. (C) The figure may be labelled as shown below:



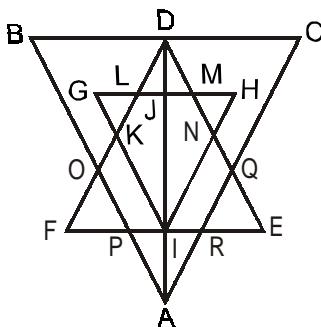
The simplest triangles are AEI, AIH, BEJ, BJF, CFK, CKG, DGL, DLH, EOJ, FOJ, FOG, LOG, HOL and HOE i.e., 14 in number.

The triangles composed of two components each are EAH, FBE, BEO, EOF, BFO, FCG, GDH, HOD, HOG and GOD i.e., 10 in number.

The triangles composed of three components each are EFH, EHG, FGH and EFG i.e., 4 in number.

Thus, there are $14 + 10 + 4 = 28$ triangles.

10. (C) There are 36 triangles in the given figure.
11. (A) The figure may be labelled as shown.



The simplest triangles are GLK, DLJ, DJM, HMN, QRE, IRA, IPA and FPO i.e., 8 in number.

The triangles having two components each are BDO, CDQ, DLM, PRA, KFI, NEI, HJI, GJI, DKI and DNI i.e., 10 in number.

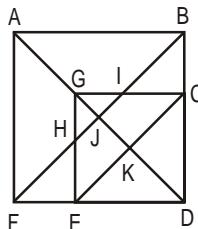
The triangles having four components each are DIE, DFI, DOA, DQA and GHI i.e., 5 in number.

The triangles having six components each are CDA and DBA i.e., 2 in number. DEF is the only triangle having eight components.

ABC is the only triangle having twelve components.

Thus, there are $8 + 10 + 5 + 2 + 1 + 1 = 27$ triangles in the figure.

12. (B) Only three colours will do the needful.
13. (D) The figure may be labelled as shown.



The simplest triangles are EFH, BIC, GHJ, GIJ, EKD and CKD i.e., 6 in number.

The triangles composed of two components each are ABJ, AFJ, GCK, GEK, CED and GHI i.e., 6 in number.

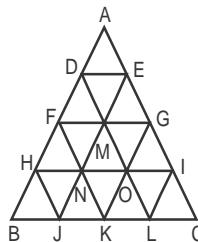
The triangles composed of three components each are GCD, GED, DJB and DJF i.e., 4 in number.

The triangles composed of four components each are ABF and GCE i.e., 2 in number.

The triangles composed of five components each are ABD and AFD i.e., 2 in number. There is only one triangle i.e., FBD composed of six components.

\therefore Total number of triangles in the figure = $6 + 6 + 4 + 2 + 2 + 1 = 21$.

14. (B) The figure may be labelled as shown.



The figures composed of two components each are ADME, DFNM, EMOG, FHJN, MNKO, GOLI, HBJN, NJKO, OKLI, FHNM, MNOG, DFME, HJKN, NKLO, OLCI, FNOM, MOIG and DMGE i.e., 18 in number.

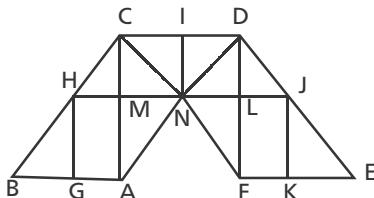
The figures composed of four components each are HOKB, NILJ, FGOH, HOLJ, NICK, FGIN, FMJB, DENH, MGKJ, MGCL, DEIO, FMLK, AENF, AGOD, DMJH, DOKF, EILM and EGKN i.e., 18 in number.

The \square gms composed of six components each are AEJH, DAIL, DECL, DEJB, HILB and HICJ i.e., 6 in number.

The \square gms composed of eight components each are FGKB, FGCK and AGKF i.e., 3 in number.

\therefore Total number of parallelograms in the figure = $18 + 18 + 6 + 3 = 45$.

15. (C) The figure may be labelled as shown.



Number of triangles, HMC, CMN, CNI, NID, DLN, DLJ

BHG, AMN, NFL, JKE $\rightarrow 10$

HCN, CND, NDJ, ACN, FDN $\rightarrow 5$

CAB, DFE $\rightarrow 2$

CDF, ACD $\rightarrow 2$

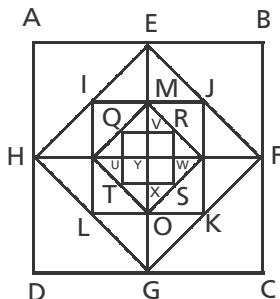
19

16. (D) The figure may be labelled as shown.

The simplest squares are QVYU, VRWY, YWSX and UYXT i.e., 4 in number.

The squares composed of four components each are IMYP, MJNY, YNKO, PYOL and QRST i.e., 5 in number.

The squares composed of seven components each are AEYH, EBFY, YFCG and HYGD i.e., 4 in number.



The only square composed of twelve components is MNOP.

There is only one square i.e., IJKL composed of sixteen components.

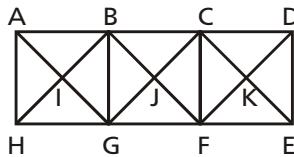
There is only one square i.e., EFGH composed of twenty-four components.

There is only one square i.e., ABCD which is composed of twenty-eight components.

Thus, there are $4 + 5 + 4 + 1 + 1 + 1 + 1 = 17$ squares in the given figure.

17. (C) The figure may be labelled as shown.

Triangles: The simplest triangles are ABI, BGI, GHI, HAI, BCJ, CFJ, FGJ, GBJ, CDK, DEK, EFK and FCK i.e., 12 in number.



The triangles composed of two components each are ABG, BGH, GHA, HAB, BCF, CFG, FGB, GBC, CDE, DEF, EFC and FCD i.e., 12 in number.

The triangles composed of four components each are AGC, BFD, HBF and GCE i.e., 4 in number.

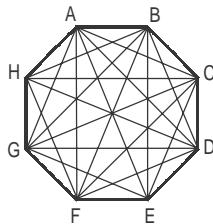
Thus, there are $12 + 12 + 4 = 28$ triangles in the given figure.

Squares: The squares composed of two components each are BJGI and CKFJ i.e., 2 in number.

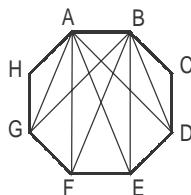
The squares composed of four components each are ABGH, BCFG and CDEF i.e., 3 in number.

\therefore Total number of squares in the figure = $2 + 3 = 5$.

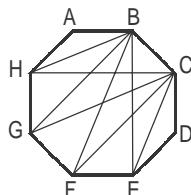
18. (B) When the triangles are drawn in an octagon with vertices same as those of the octagon and having one side common to that of the octagon, the figure will appear as shown in the figure.



Now, we shall first consider the triangles having only one side AB common with octagon ABCDEFGH and having vertices common with the octagon (See Fig. 2). Such triangles are ABD, ABE, ABF and ABG i.e., 4 in number.



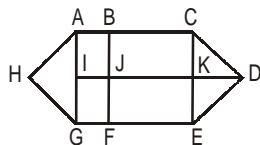
Similarly, the triangles having only one side BC common with the octagon and also having vertices common with the octagon are BCE, BCF, BCG and BCH (as shown in the figure). i.e., There are 4 such triangles.



This way, we have 4 triangles for each side of the octagon. In this, there are $8 \times 4 = 32$ such triangles.

19. (B) We shall label the figure as shown.

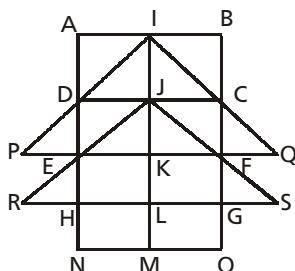
The simplest rectangles are ABJI, BCKJ, IJFG and JKEF i.e., 4 in number.



The rectangles composed of two components each are CKI, BCEF, IKEG and ABFG i.e., 4 in number. The only rectangle composed of four components is ACEG.

Thus, there are $4 + 4 + 1 = 9$ rectangles in the given figure.

20. (C)



Number of squares:

AIJD, IBCJ, DJKE, JCFK, EKLH, KFGL, HLMN, LGOM,
ABFE, DCGH, EFON → 11

Hence, there are 11 squares.

21. (D) The number of triangles:

ADI, IDJ, IBC, IJC, DJE, JEK, JKF, JCF,

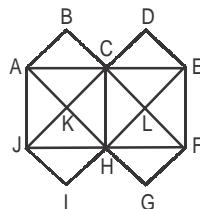
DEP, CQF, EMR, FGS → 12

IDC, JEF, IPQ, JRS → 4

IKP, IKQ, JLR, JLS → 4

Hence, there are 20 triangles.

22 to 23: The figure must be labelled as shown below.



22. (C) Number of squares:

ABCK, CDEL, CLHK, LFGH, KHIJ, ACHJ, CEFH → 7

23. (C) Simplest triangles → 12

Composed of 2: AJH, JAC, ACH, CHJ,

CHF, HFE, FEC, ECH → 8

Composed of 4: AHE, JCF → 2