Chapter 12

Missing Character

MISSING CHARACTER

In such type of questions, a figure, a set of figures, an arrangement or a matrix is given, each of which bears certain characteristics, be it numbers, letters or a group/ combination of letters/ numbers, following a certain pattern.

The candidate has to find a missing character in the figure out of the given options.

Let us develop the ability to identify missing character with the help of following examples.

ILLUSTRATION 1 :

11	3	49
5	19	?
7	13	100

(1) 96 (2) 120 (3) 144 (4) 100

Sol. **(3)** In a row the third term is the square of the average of the first two numbers.

$\therefore\ ? = \left(\frac{5+19}{2}\right)^2 = 12^2 = 144.$

ILLUSTRATION 2 :

1	4	9	?
1	2	3	4
2	4	6	?

(1) 16, 8 (2) 49, 7 (3) 36, 4 (4) 25, 5

Sol. **(1)** I st row : $1^2, 2^2, 3^2, 4^2,$

Third row : 2, 4, 6, 8

$\therefore$ The missing numbers = 16, 8

ILLUSTRATION 3 :

3C	24D	8E
7I	21 K	3M
4D	?	7J

(1) 11 E (2) 28 G (3) 351 (4) 48 F

Sol. **(2)** In the first row, letters are consecutive CDE.In the 2nd row, letters are one step forward I-K-M

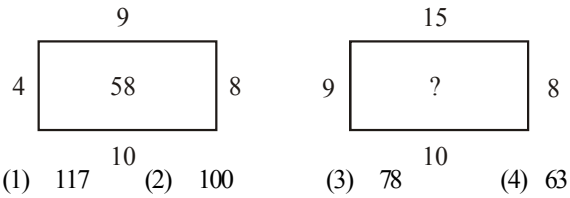
In the third row, the letters are + 2 forward i.e

D – – G – – J.

Number is the product of the two numbers.

Hence, $4 \times 7 = 28$

ILLUSTRATION 4 :

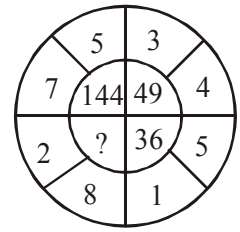


(1) 117 (2) 100 (3) 78 (4) 63

Sol. **(3)** In the first figure $9 \times 10 - 4 \times 8 = 58$

$\therefore$ The missing figure = $15 \times 10 - 9 \times 8 = 78$

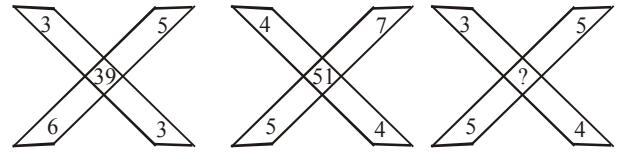
ILLUSTRATION 5 :



(1) 82 (2) 100 (3) 68 (4) 64

Sol. **(2)** Required number = $(2 + 8)^2 = 100$.

ILLUSTRATION 6 :



(1) 47 (2) 45 (3) 37 (4) 35

Sol. **(3)** Fig 1 : $3 \times 3 + 6 \times 5 = 39$

Fig 2 : $4 \times 4 + 5 \times 7 = 37$

$\therefore$ So ? = $3 \times 4 + 5 \times 5 = 37$

ILLUSTRATION 7 :

Find the number in place of question mark (?) in the following matrix

3	5	7	9	11	13
8	26	48	82	?	170

(1) 121 (2) 120 (3) 119 (4) 111

Sol. **(2)** The numbers are according to the rule $n^2 \pm 1$.
i.e, $3^2 - 1$, $5^2 + 1$, $7^2 - 1$, $9^2 + 1$. $11^2 - 1$ and $13^2 + 1$.
$\therefore$ the missing number is 120.

ILLUSTRATION 8 :

Find the missing number

(1) 52 (2) 36 (3) 117 (4) 81

Sol. **(2)** The rule is : In the figure : $5 \times 4 = 20$, $5 + 4 = 9$
In the second figure : $3 \times 8 = 24$ and $3 + 8 = 11$
$\therefore$ In the third figure $9 \times 4 = 36$.

ILLUSTRATION 9 :

Insert the missing letter

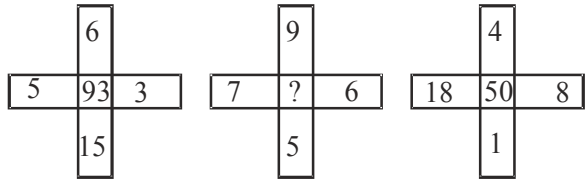
B	G	N
D	J	R
G	N	?

(1) U (2) V (3) W (4) X

Sol. **(3)** In Ist column, the rule is + 1, +2 ; in column two, the rule is + 2, + 3 and so in column three, the rule is +3, + 4.
So the letter is 4 letters from R i.e, W.

ILLUSTRATION 10 :

Find the missing term in the second figure out of the given option given below the figure.



(1) 15 (2) 19 (3) 27 (4) 89

Sol. **(4)** In first figure central number = $5 \times 15 + 6 \times 3$
In the second figure central number = $7 \times 5 + 9 \times 6 = 89$.

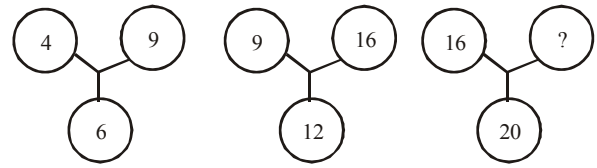
ILLUSTRATION 11 :

1	2	3
11	7	5
120	45	?

(1) 19 (2) 17 (3) 16 (4) 15

Sol. **(3)** In each column, the third number is the difference of the squares of the other two numbers.
$\therefore$? $= 5^2 - 3^2 = 25 - 9 = 16$.

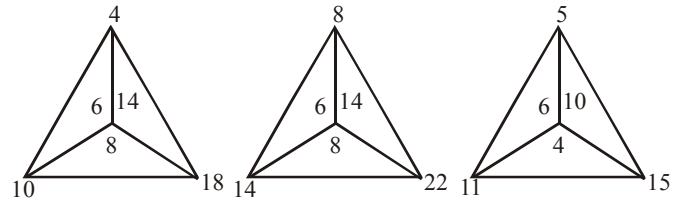
ILLUSTRATION 12 :



(1) 60 (2) 50 (3) 25 (4) 40

Sol. **(3)** 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 $? = 25$

ILLUSTRATION 13 :



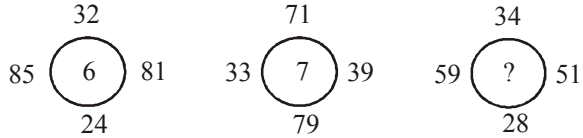
(1) 6 (2) 8 (3) 10 (4) 14

Sol. **(3)** Fig 1 : $10 - 4 = 6$; $18 - 10 = 8$: $18 - 4 = 14$
Fig 2 : $14 - 8 = 6$: $22 - 14 = 8$: $22 - 8 = 14$
Fig 3 : $11 - 5 = 6$: $15 - 11 = 4$: $15 - 5 = 10$

Miscellaneous Solved Examples

DIRECTIONS : Find the missing number in the following sets of numbers around the circle from the choice given below :

EXAMPLE 1:

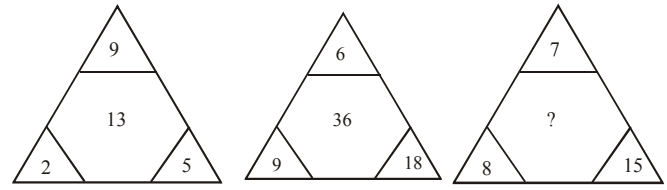


(1) 5 (2) 6 (3) 7 (4) 8

Sol. **(2)** Take the difference of opposite numbers and then take its average, i.e. $\frac{(85 - 81) + (32 - 24)}{2} = 6$ etc.

EXAMPLE 2:

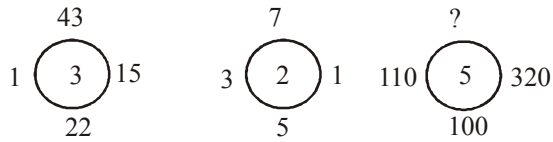
What number should replace the question mark ?



Sol. **41**

$7 \times 8 - 15 = 41$

EXAMPLE 3:



(1) 95 (2) 105 (3) 125 (4) 130

Sol. **(1)** Fourth root of the numbers at the periphery added together, i.e. $1 + 43 + 15 + 22 = 81$, $\sqrt[4]{81} = 3$, etc.

EXAMPLE 4:

1	$\frac{1}{2}$	$\frac{1}{3}$
2	1	?
3	$\frac{3}{2}$	1

(1) 1/3 (2) 1/2 (3) 2/3 (4) 1

Sol. **(3)** Numbers in the 1st and 3rd rows are $\frac{1}{1}, \frac{1}{2}, \frac{1}{3}, \frac{3}{1}, \frac{3}{2}, \frac{3}{3}$ Numbers in the second row should be $\frac{2}{1}, \frac{2}{2}, \frac{2}{3}$

EXAMPLE 5:

What number should replace the question mark ?

8	9	3	69
7	5	6	29
4	7	9	19
9	8	4	?

Sol. **68**

$(8 \times 9) - 3 = 69$; $(7 \times 5) - 6 = 29$

$(4 \times 7) - 9 = 19$; $(9 \times 8) - 4 = 68$

EXAMPLE 6:

What number should replace the question mark ?

1st	2nd	3rd	4th
26	27	29	25
28	29	31	36
30	31	37	49
32	33	?	64
34	35	43	81

Sol. **41**

The first column has even numbers starting at 26.

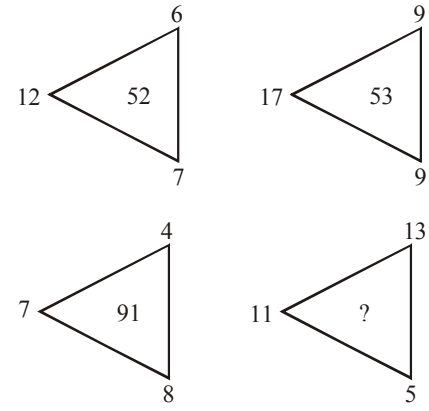
The second column has odd numbers starting at 27.

The third column has prime numbers starting at 29.

The fourth column has square numbers starting at 25.

EXAMPLE 7:

What number should replace the question mark ?



Sol. **92**

$12 + 6 + 7 = 25$. Reverse $= 52$

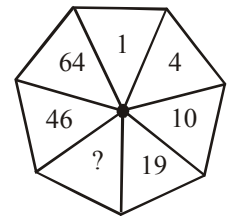
$17 + 9 + 9 = 35$. Reverse $= 53$

$7 + 4 + 8 = 19$. Reverse $= 91$

$11 + 13 + 5 = 29$. Reverse $= 92$

EXAMPLE 8:

What number should replace the question mark ?

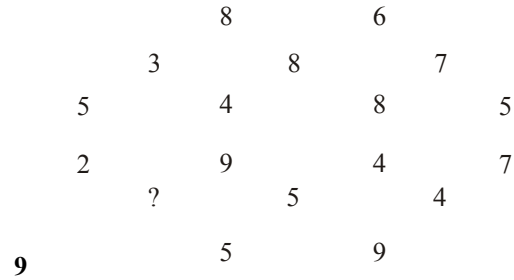


Sol. **31**

Start at 1 and work clockwise to each segment, adding 3, 6, 9, 12, 15, 18.

EXAMPLE 9:

What number should replace the question mark ?

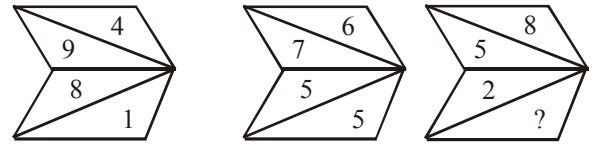


Sol. **9**

Looking across, rows having two numbers total 14, rows having three numbers total 18, and rows having four numbers total 22.

EXAMPLE 10:

What number should replace the question mark ?

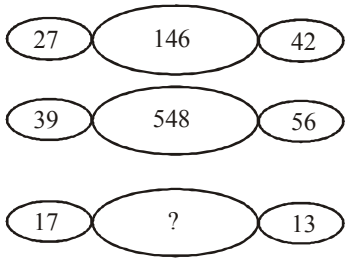


Sol. **9**

Look across to some sections in each of the three figures : 4, 6, 8 (increase by 2) ; 9, 7, 5 (reduce by 2);
8, 5, 2 (reduce by 3) ; 1, 5, 9 (increase by 4).

EXAMPLE 11:

What number should replace the question mark ?

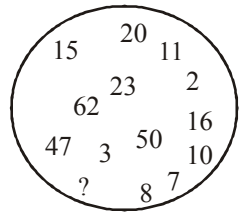


Sol. **212.**

$7 \times 3 = 21,\ 1 + 1 = 2$

EXAMPLE 12:

What number should replace the question mark ?

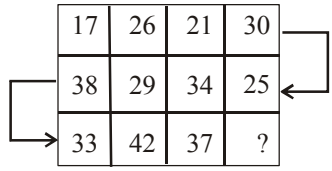


Sol. **32.**

Multiply by 3 and add 2 to obtain the pairings, so,
$10 \times 3 = 30, 30 + 2 = 32$
The other such pairs are :
3/11, 7/23, 20/62, 2/8, 16/50, and 15/47

EXAMPLE 13:

What number should replace the question mark ?

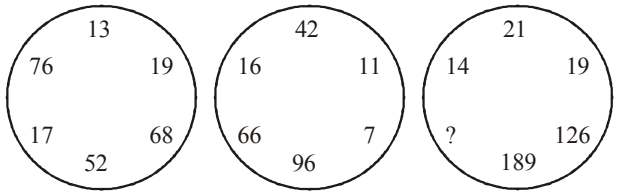


Sol. **46.**

Beginning at 17, go across the row and then follow the direction of the arrows alliterating between +9 and –5.

EXAMPLE 14:

What number should replace the question mark ?



Sol. **171.**

Ist circle

$17 \times 4 = 68$; $13 \times 4 = 52$; $19 \times 4 = 76$

IInd circle

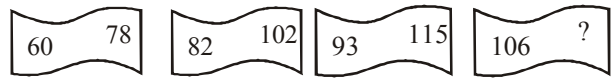
$7 \times 6 = 42$; $11 \times 6 = 66$; $16 \times 6 = 96$

IIIrd circle

$21 \times 9 = 189$; $14 \times 9 = 126$; $19 \times 9 = 171$

EXAMPLE 15:

What number should replace the question mark ?

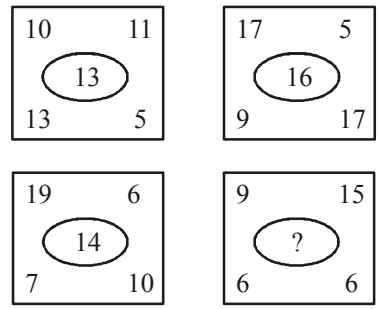


Sol. **130.**

+18, +20, +22, +24

EXAMPLE 16:

What number should replace the question mark ?

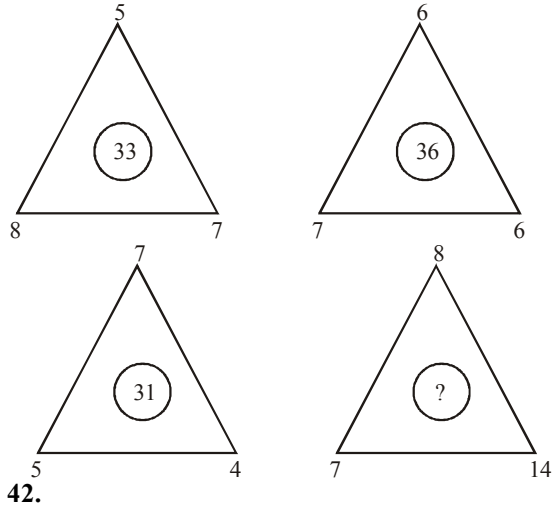


Sol. **12.**

$10 + 11 + 13 + 5 = 39$; $39 \div 3 = 13$
$17 + 5 + 9 + 17 = 48$; $48 \div 3 = 16$
$19 + 6 + 7 + 10 = 42$; $42 \div 3 = 14$
$9 + 15 + 6 + 6 = 36$; $36 \div 3 = 12$

EXAMPLE 17:

What number should replace the question mark ?

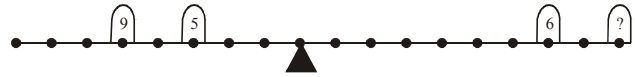


Sol. **42.**

$(5 \times 8) - 7 = 33$
$(6 \times 7) - 6 = 36$
$(7 \times 5) - 4 = 31$
$(8 \times 7) - 14 = 42$

EXAMPLE 18:

Find the weight which should be placed at the question mark for the scales to balance.



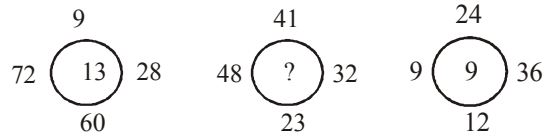
Sol. **3.**

$5 \times 9 = 45$
$3 \times 5 = 15$
60

$6 \times 6 = 36$
$3 \times 8 = 24$
60

Exercise 1

1.



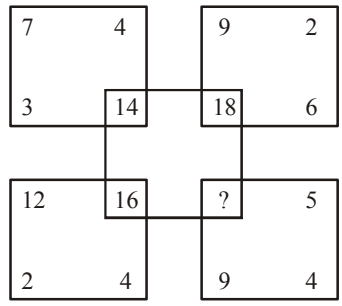
(1) 12 (2) 15 (3) 17 (4) 18

2.

0	–1	– 2
1	0	– 1
2	?	0

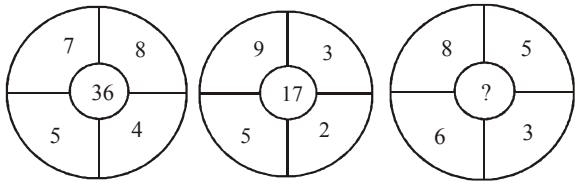
(1) 1 (2) – 1 (3) – 2 (4) 4

3. What number should replace the question mark ?



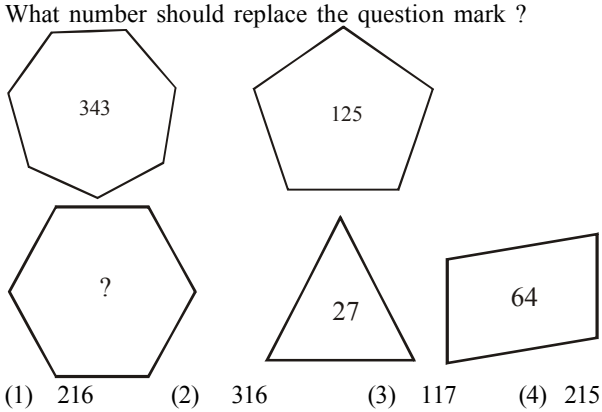
(1) 45 (2) 30 (3) 52 (4) 18

4. What number should replace the question mark ?



(1) 18 (2) 22 (3) 36 (4) 19

5. What number should replace the question mark ?



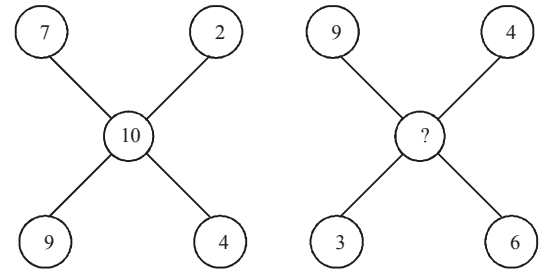
(1) 216 (2) 316 (3) 117 (4) 215

6. What number should replace the question mark ?

4322 : 48
4172 : 56
7615 : ?

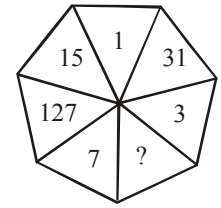
(1) 336 (2) 210 (3) 49 (4) 52

7. What number should replace the question mark ?



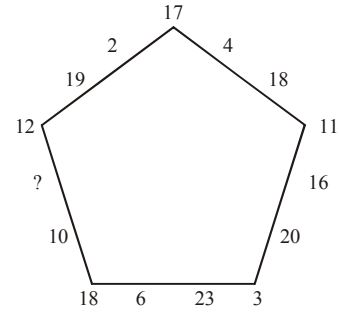
(1) 2 (2) 9 (3) 12 (4) 19

8. What number should replace the question mark ?



(1) 64 (2) 63 (3) 72 (4) 78

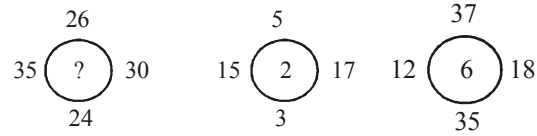
9. Which number should replace the question mark ?



(1) 9 (2) 10 (3) 12 (4) 16

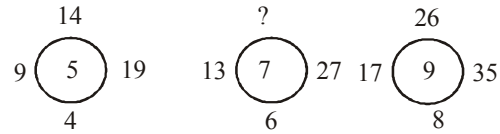
DIRECTIONS (Qs. 10-26) : Find the missing number in the following sets of number around the circle given below :

10.



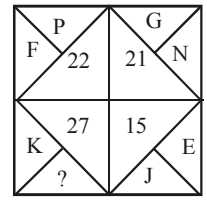
(1) 4 (2) 5 (3) 6 (4) 7

11.



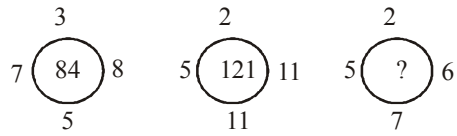
(1) 18 (2) 20 (3) 22 (4) 24

12.



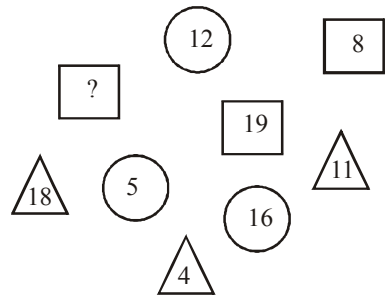
(1) M (2) P
(3) 32 (4) None of these

13.



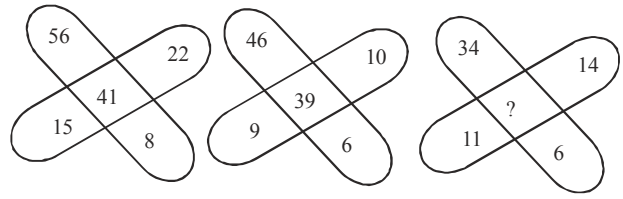
(1) 28 (2) 36 (3) 48 (4) 42

14.



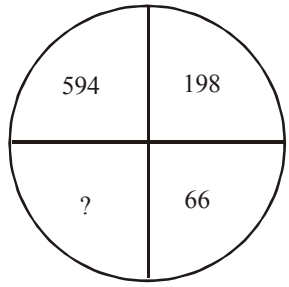
(1) 6 (2) 8 (3) 10 (4) 12

15.



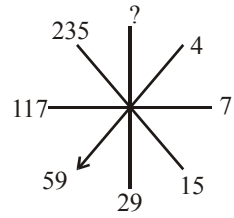
(1) 12 (2) 25 (3) 48 (4) 52

16.



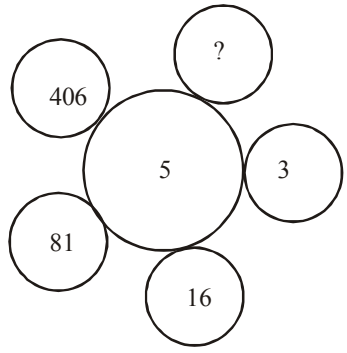
(1) 11 (2) 12 (3) 22 (4) 33

17.



(1) 327 (2) 386 (3) 438 (4) 469

18.



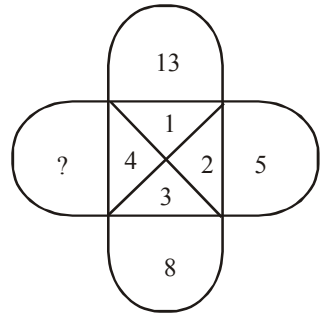
(1) 1 (2) 731 (3) 1625 (4) 2031

19.

3C	2B	4A
27A	?	64B
9C	4A	16B

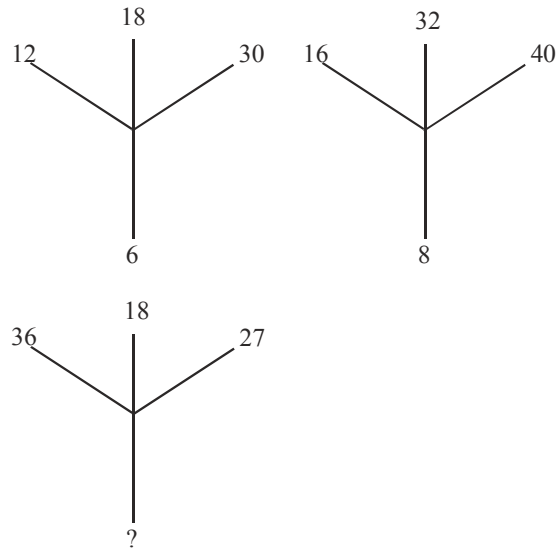
(1) 8C (2) 12 C (3) 16 C (4) 18 C

20.



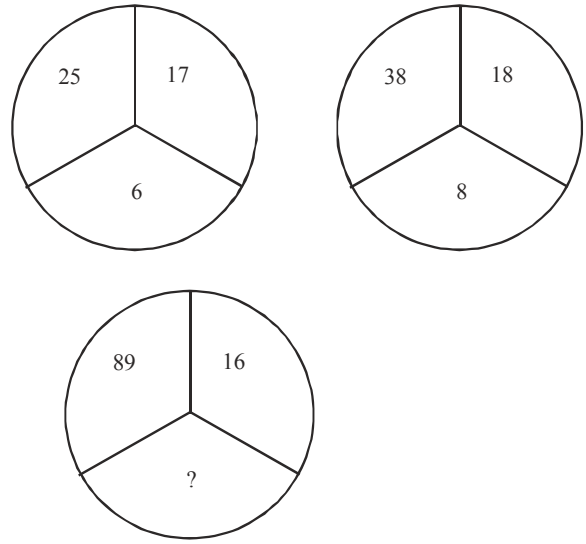
(1) 10 (2) 11 (3) 12 (4) 13

21.



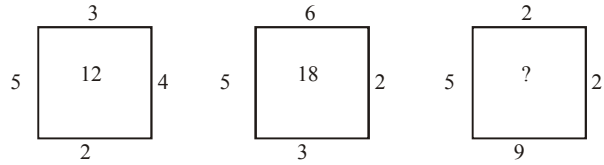
(1) 6 (2) 9 (3) 12 (4) 18

22.



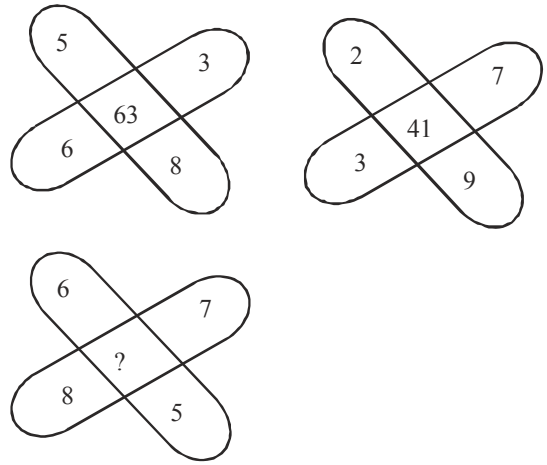
(1) 13 (2) 15 (3) 17 (4) 19

23.



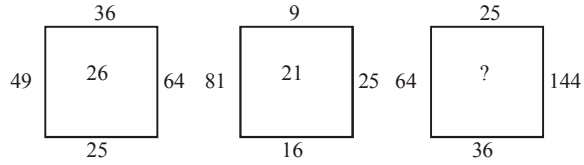
(1) 15 (2) 16 (3) 17 (4) 18

24.



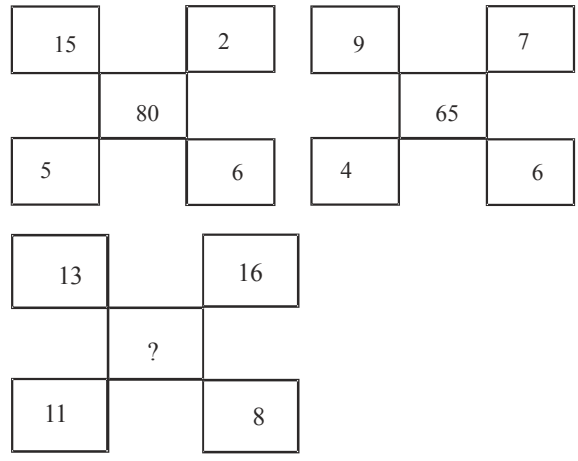
(1) 26 (2) 82 (3) 83 (4) 86

25.



(1) 19 (2) 23 (3) 25 (4) 31

26.



(1) 35 (2) 48 (3) 72 (4) 120

DIRECTIONS (Qs. 27-31) : In each of the following questions, a matrix of certain characters is given. These characters follows a certain trend, row-wise or column-wise. Find out this trend and choose the missing character from the given alternatives.

27.

6	6	8
5	7	5
4	3	?
120	126	320

(1) 4 (2) 8 (3) 12 (4) 16

28.

3	6	8
5	8	4
4	7	?

(1) 6 (2) 7 (3) 8 (4) 9

29.

31	17	58	87
68	19	61	56
91	22	70	50
10	142	11	?

(1) 5 (2) 8 (3) 7 (4) 4

30. In the matrix given below, the value of A, B, and C are

9	A	12
B	10	7
8	C	11

(1) A = 13, B = 11, C = 9 (2) A = 13, B = 9, C = 11
(3) A = 9, B = 11, C = 13 (4) A = 9, B = 13, C = 11

31.

188	300	263
893	?	915

(1) 88 (2) 96 (3) 238 (4) 500

DIRECTIONS (Qs. 32-33) : In each of these question, which character when placed at the sign of interrogation shall complete the matrix ?

32.

F	W	O
A	J	K
E	M	?

(1) N (2) X (3) D (4) P

33.

A	M	B	N
R	C	S	D
E	U	F	?

(1) G (2) R (3) T (4) V

34. The diagram below is a 'magic square' in which all rows and columns and both diagonals add up to 34. Find xy

1	8	13	12
14			
4	x	16	y
15			

(1) 77 (2) 60 (3) 45 (4) 63

35.

13	$4\frac{1}{4}$	
$6\frac{3}{4}$	A	B
8		$5\frac{1}{2}$

Complete above magic square so that the rows, columns, diagonals – all add to the same number and then find A + B

(1) $20\frac{3}{4}$ (2) 20 (3) $20\frac{1}{4}$ (4) None

DIRECTIONS (Qs. 36-58) : Find the missing character in each of the following questions.

36.

1	12	10
15	2	?
8	5	3

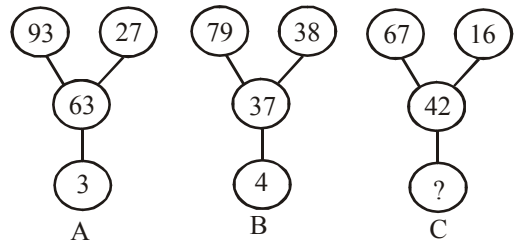
(1) 9 (2) 11 (3) 4 (4) 6

37.

6	9	15
8	12	20
4	6	?

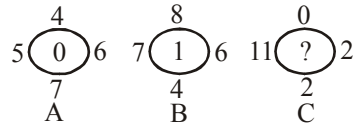
(1) 5 (2) 10 (3) 15 (4) 21

38.



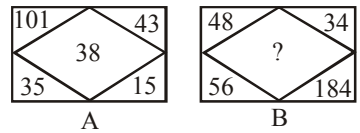
(1) 5 (2) 6 (3) 8 (4) 9

39.



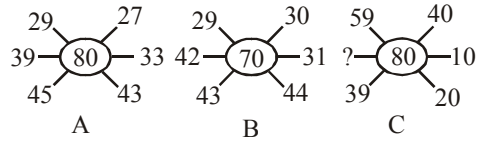
(1) 0 (2) 2 (3) 11 (4) 12

40.



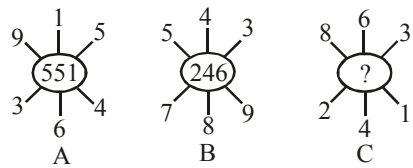
(1) 127 (2) 142 (3) 158 (4) 198

41.



(1) 49 (2) 50 (3) 60 (4) 69

42.



(1) 262 (2) 622 (3) 631 (4) 824

43.

Z	?	S
R	O	?
?	G	C

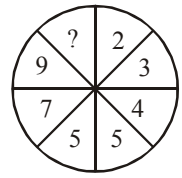
(1) WJK (2) KWT (3) WKJ (4) JKW

44. 49 36 25 **26** 64 81 9 16 **21** 25 64 25 36 **?** 144

A B C

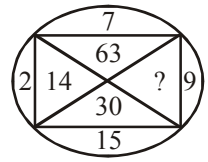
(1) 19 (2) 23 (3) 25 (4) 31

45.



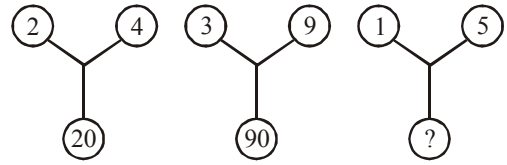
(1) 10 (2) 11 (3) 12 (4) 13

46.



(1) 33 (2) 145 (3) 135 (4) 18

47.



(1) 75 (2) 26 (3) 25 (4) 20

48.

5	3	16
9	5	46
7	8	?

(1) 16 (2) 56 (3) 55 (4) 57

49.

3	6	9
5	8	20
4	7	?

(1) 11 (2) 14 (3) 28 (4) 12

50.

5	26	1
9	84	3
11	?	5

(1) 146 (2) 116 (3) 126 (4) 136

51.

13	54	?
7	45	32
27	144	68

(1) 42 (2) 36 (3) 6 (4) 4

52.

7	9	21	27
4	2	36	18
9	4	54	?

(1) 18 (2) 24 (3) 36 (4) 48

53.

5	9	7
4	5	3
1	6	8
40	100	?

(1) 70 (2) 60 (3) 50 (4) 80

54.

4	5	6
2	3	7
1	8	3
21	98	?

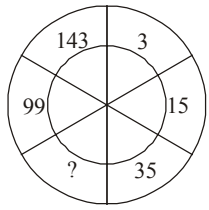
(1) 94 (2) 76 (3) 73 (4) 16

55.

84		81		88	
14	12	18	9	?	11

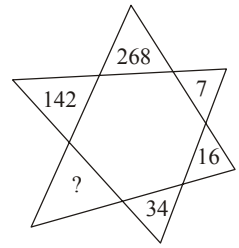
(1) 16 (2) 21 (3) 61 (4) 81

56.



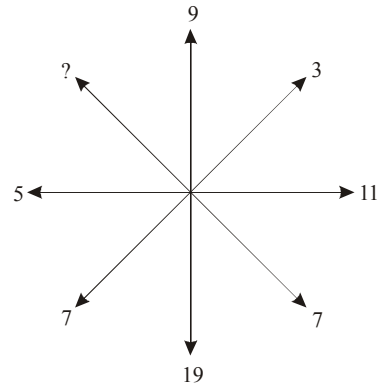
(1) 63 (2) 56 (3) 60 (4) 65

57.



(1) 72 (2) 70 (3) 68 (4) 66

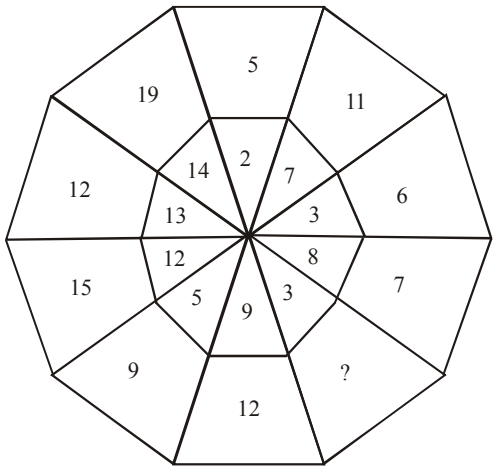
58.



(1) 4 (2) 5 (3) 15 (4) 13

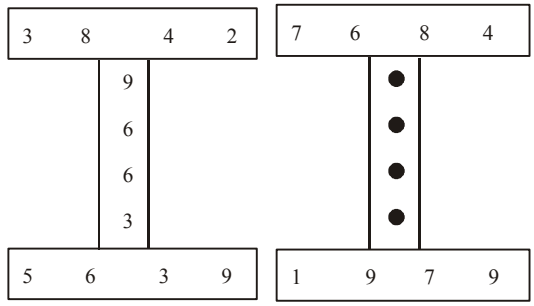
Exercise 2

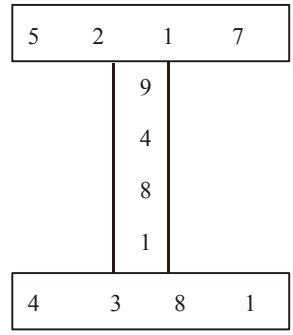
1. What number should replace the question mark ?



(1) 25 (2) 22 (3) 27 (4) 28

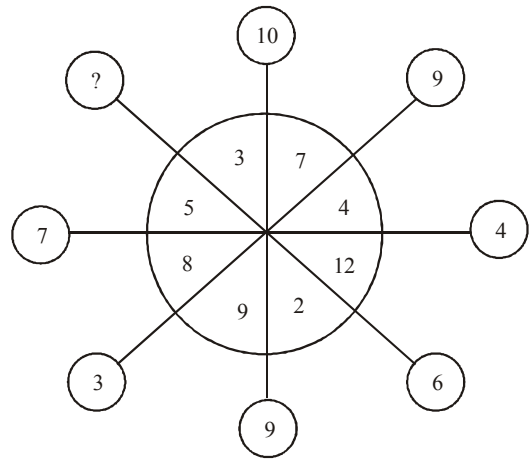
2. What four digits should appear in the middle section





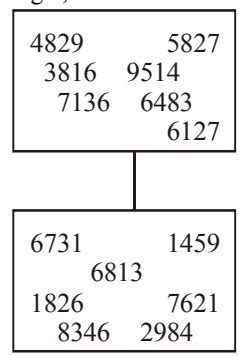
(1) 9598 (2) 5432 (3) 145 (4) 1721

3. What number should replace the question mark ?



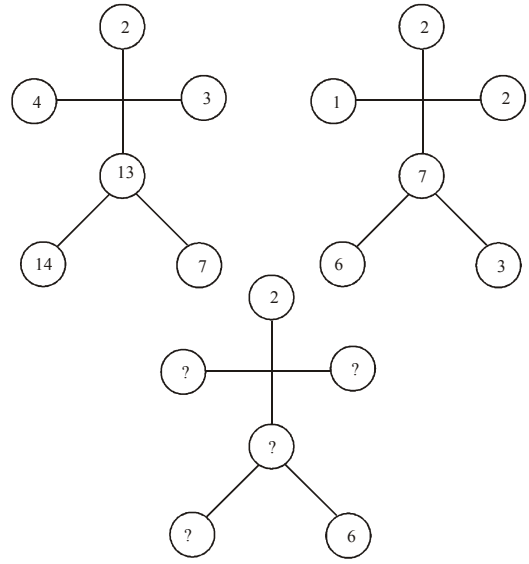
(1) 19 (2) 16 (3) 12 (4) 20

4. Which two numbers, one in the top rectangle and one in the bottom rectangle, are the odd ones out ?



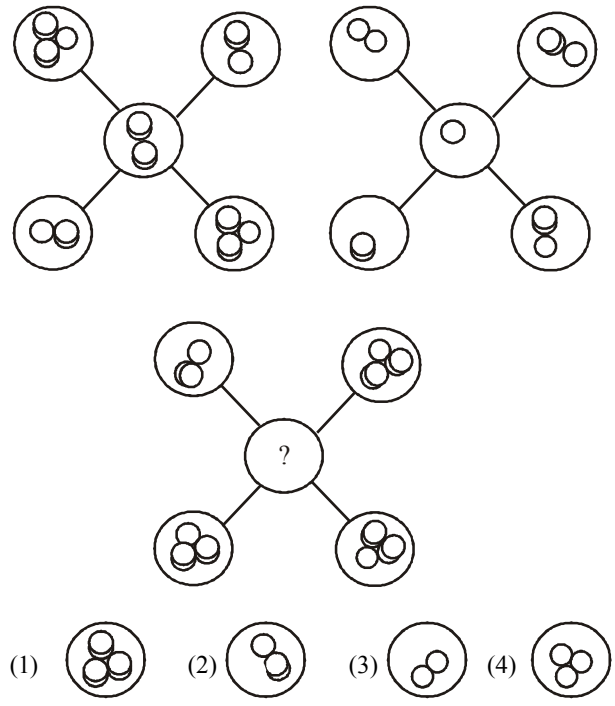
(1) 5827 and 1826 (2) 6483 and 8346
(3) 3816 and 6813 (4) 6127 and 7621

5. What numbers should replace the question mark ?

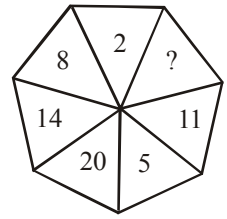


(1) 4, 2 and 12 (2) 5, 11 and 17
(3) 10, 9 and 4 (4) 5, 3 and 2

6.

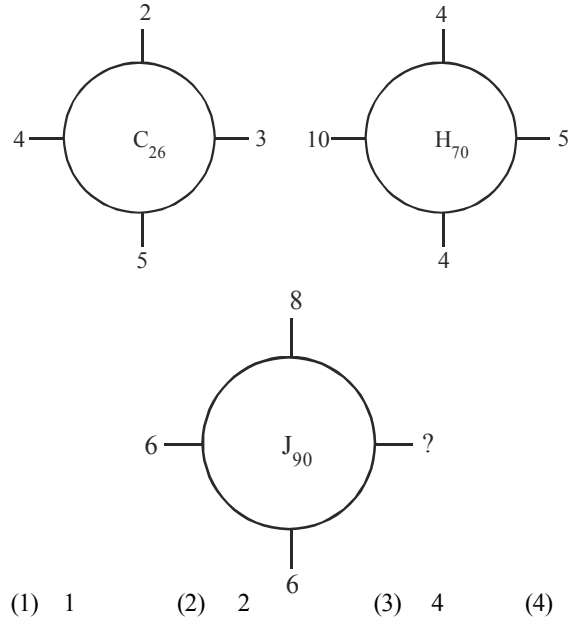


7.



(1) 18 (2) 17 (3) 19 (4) 12

8.



(1) 1 (2) 2 (3) 4 (4) 10

DIRECTIONS (Qs. 9-11) : In each of the following questions, a matrix of certain characters is given. These characters follows a certain trend, row-wise or column-wise. Find out this trend and choose the missing character from the given alternatives.

9.

5	9	8	7
8	6	9	10
7	13	?	19
5	7	8	9

(1) 9 (2) 10 (3) 12 (4) 15

10.

23	529	1024
21	441	144
19	361	?

(1) 1441 (2) 3529 (3) 8281 (4) 9361

11.

72	24	6
96	16	12
108	?	18

(1) 12 (2) 16 (3) 18 (4) 20

DIRECTIONS (Q. 12) : In each of the questions, there is some relationship according to some rule between the letters and numerals given in each row. Find the rule in each case and then choose the correct alternative from among the four alternatives given under it satisfying the same rule to fill in the vacant places in the third row.

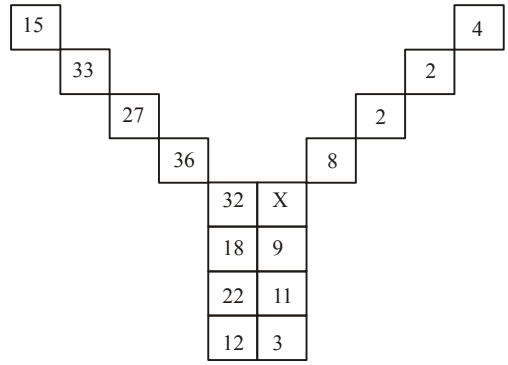
12.

FJ	25	16	NS
LZ	25	196	SX
NQ	?	?	WY

(1) 4, 9 (2) 9, 4 (3) 4, 10 (4) 9, 5

DIRECTIONS (Q. 33) : In the following questions, numbers have been arranged according to the same general pattern. Find the missing number in each.

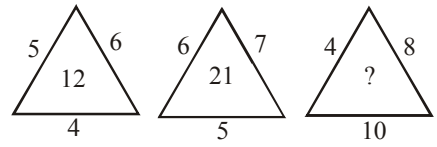
13. Find the value of X in the following figure :



(1) 3 (2) 4 (3) 8 (4) 12

DIRECTIONS (Q. 14) : Find the missing character in each of the following questions.

14.



(1) 14 (2) 22 (3) 32 (4) 320

15.

3C	27D	9E
7I	21K	3M
4D	?	7J

(1) 11E (2) 28G (3) 35L (4) 48F

Hints & SOLUTIONS

Exercise 1

1. **(1)** Add all the four numbers and then take its square root.

2. **(1)** Numbers on opposite sides of the central box are equal in magnitude but opposite in sign.

3. **(2)** $\frac{7\times4\times3}{6}=14$; $\frac{9\times2\times6}{6}=18$

$\frac{12\times2\times4}{6}=16$; $\frac{9\times4\times5}{6}=30$

4. **(2)** $(7\times8)-(5\times4)=36$
$(9\times3)-(5\times2)=36$
$(8\times5)-(6\times3)=22$

5. **(1) 216**
The number in the center of each figure is the cube of the number of sides of the figure

6. **(2) 210**
$7\times6\times1\times5=210$

7. **(1)** Subtract the sum of the even numbers from the sum of the odd numbers.

$7+9=16$ $9+3=12$
$2+4=6$ $4+6=10$
$16-6=10$ $12-10=2$

8. **(2) 63**
Start at 1 and jump clockwise to alternate segments while adding 2, 4, 8, 16, 32, 64 in turn.

9. **(2) 10**
Each side adds up to 50.

10. **(2)** The number inside the circle is the difference of the numbers on its left and right.

11. **(2)** The number at the centre is to be multiplied by 1, 2, 3, and 4, then subtract '1' from each to get the peripheral number.

12. **(2)** Putting A = 1, B = 2, C = 3, D = 4 .....
X = 24, Y = 25, Z = 26,
We have F + P = 6 + 16 = 22 : G + N = 7 + 14 = 21
: J + E = 10 + 5 = 15.
Since K = 11, so value corresponding to missing letter
= (27 – 11) = 16
So, the missing letter is the 16th letter of the English alphabet, which is P.

13. **(4)** Multiply all the numbers around the circle and then divide it by 10 to get the number at the centre, viz.,

$\frac{7\times3\times8\times5}{10}=84$

14. **(1)** This way, the sum of the numbers in the same shape totals 33.

15. **(2)** We have $(56+15)-(22+8)=41$, $(46+9)-(10+6)=39$
So, missing number = $(34+11)-(14+6)=25$.

16. **(3)** Moving clockwise,
We have : 594 ÷ 3 = 198 : 198 ÷ 3 = 66.
So, missing number = 66 ÷ 3 = 22

17. **(4)** We have : 4 × 2 – 1 = 7, 7 × 2 + 1 = 15,
15 × 2 – 1 = 29 × 2 + 1 = 59,
59 × 2 – 1 = 117, 117 × 2 + 1 = 235.
So, missing number = 235 × 2 – 1 = 469.

18. **(4)** We have : 3 × 5 + 1 = 16 ,
16 × 5 + 1 = 81, 81 × 5 + 1 = 406.
So, missing number = 406 = 406 × 5 + 1 = 2031.

19. **(1)** In each row, out of the letters A, B and C, each of these must appear once. Also, in each column. The product of first and third numbers is equal to the second numbers, so the missing number will be (2 × 4) i.e., 8 and the missing letter will be C. Thus, the answer is 8C.

20. **(3)** The arrangement is : 5 + 3 = 8, 8 + 4 = 12, 12 + 1 = 13.
So, the missing number is 12.

21. **(2)** The above three numbers are multiples of the number at the bottom. Clearly 36, 18 and 27 are all multiples of 9. So, the missing number is 9.

22. **(2)** The sum of the two numbers in the upper part is 7 times the number in the lower part.
So, missing number = (89 + 16) ÷ 7 = 15.

23. **(4)** We have : (3 × 4 × 2 × 5) ÷ 10 = 12 ;
(6 × 2 × 3 × 5) ÷ 10 = 18.
So, missing number = (2 × 2 × 9 × 5) ÷ 10 = 18

24. **(2)** We have : (5 × 3) + (6 × 8) = 63, (2 × 7) + (3 × 9) = 41
So, missing number = (6 × 7) + (8 × 5) = (42 + 40) = 82.

25. **(4)** We have : $\sqrt{36} + \sqrt{64} + \sqrt{25} + \sqrt{49} = 26$;

$\sqrt{9} + \sqrt{25} + \sqrt{16} + \sqrt{81} = 21$
So, missing number

$= \sqrt{25} + \sqrt{144} + \sqrt{36} + \sqrt{64} = (5 + 12 + 6 + 8) = 31$

26. **(2)** We have (15 – 5) (2 + 6) = 80, (9 – 4) (7 + 6) = 65
So, missing number = (13 – 11) × (16 + 8) = 48.

27. **(2)** In the first column, 6 × 5 × 4 = 120.
In the second column, 6 × 7 × 3 = 126
Let the missing number be x . Then in the third column, we have :

$8 \times 5 \times x = 320 \Rightarrow x = \dfrac{320}{40} = 8.$

28. **(1)** Clearly, sum of numbers in each row is 17.
So, missing number = 17 – (4 +7) = 6.

29. **(3)** The sum of the numbers in each column is 200.
∴ Missing number = 200 – (87 + 56 + 50) = 7.

30. **(4)** The sum of the numbers in each row and each column is 30.

31. **(1)** In the first row, (263 – 188) × 4 = 300.
∴ In the second row, missing number
= (915 – 893) × 4 = 22 × 4 = 88.

32. **(3)** Putting A = 1, B = 2, C = 3, ..., M = 13, ..., X = 24, Y = 25, Z = 26, we have :
In the first column, F – A = 6 – 1 = 5 = E.
In the second column, W – J = 23 – 10 = 13 = M.
∴ In the third column, missing letter = O – K = 15 – 11 = 4 = D.

33. **(4)** Consecutive letters occupy alternate positions in each row.

34. **(1)**

1	8	13	12
14	11	2	7
4	5	16	9
15	10	3	6

35. **(2)**

13	$4\frac{1}{4}$	$10\frac{1}{2}$
$6\frac{3}{4}$	$9\frac{1}{4}$	$10\frac{3}{4}$
8	$14\frac{1}{4}$	$5\frac{1}{2}$

36. **(3)** This is a multiplication magic square. The product of each set of three numbers in any column or row is the constant 120.

37. **(2)** In the first row, $6 \times \frac{3}{2} = 9$, $6 \times \frac{5}{2} = 15$

In the second row, $8 \times \frac{3}{2} = 12$, $8 \times \frac{5}{2} = 20$.

∴ In the third row, missing number $= 4 \times \frac{5}{2} = 10$

38. **(4)** In fig. (A), 93 – (27 + 63) = 3
In fig, (B), 79 – (38 + 37) = 4
∴ In fig. (C), missing number = 67 – (16 + 42) = 9.

39. **(3)** The number inside the circle is equal to the difference between the sum of the numbers at the extremities of the horizontal diameter and the sum of numbers at the extremities of the vertical diameter.
In fig. (A), (5 + 6) – (7 + 4) = 0
In fig. (B), (7 + 6) – (8 + 4) = 1.
∴ In fig. (C) missing number = (11 + 2) – (0 + 2) = 11

40. **(2)** In fig. (A),
(101 + 15) – (35 + 43) = 116 – 78 = 38.
In fig. (B), Missing number
= (48 + 184) – (56 + 34) = 232 – 90 = 142.

41. **(4)** The sum of numbers at the extremities of the three line segments in each figure is same.
In fig. (A), 39 + 33 = 29 + 43 = 27 + 45 = 72
In fig. (B), 42 + 31 = 29 + 44 = 30 + 43 = 73
Let the missing number in fig. (C) be x.
Then, x + 10 = 59 + 20 = 40 + 39 = 79 or x = 69.

42. **(2)** In fig. (A), (915 – 364) = 551.
In fig. (B), (789 – 543) = 246.
∴ In fig. (C), missing number = (863 – 241) = 622.

43. **(3)** The letter in the second column is three steps behind that in the first column, and the letter in the third column is four steps behind that in the second column. So, the missing letter in the first row will be three steps behind Z, which is W. The missing letter in the second row will be four steps behind O, which is K. The missing letter in the third row will be three steps ahead of G, which is J.

44. **(4)** In fig (A), $6^2 = 36$, $8^2 = 64$, $5^2 = 25$, $7^2 = 49$ and 6 + 8 +5 + 7 = 26
In fig (B), $3^2 = 9$, $5^2 = 25$, $4^2 = 16$, $9^2 = 81$. and 3 + 5 + 4 + 9 = 21
In fig (C), $5^2 = 25$, $12^2 = 144$, $6^2 = 36$, $8^2 = 64$.
So, missing number = 5 + 12 + 6 + 8 = 31.

45. **(2)** The numbers in the right half form the series : 2, 3, 4, 5.
The numbers in the left half form the series : 5, 7, 9, 11.

46. **(3)** Clearly, we have : 15 × 2 = 30, 2 × 7 = 14, 7 × 9 = 63
So, missing number = 9 × 15 = 135.

47. **(2)** The lower number is obtained by adding the square of the upper two numbers. Thus,
In fig. (A), $2^2 + 4^2 = 20$
In fig. (B), $3^2 + 9^2 = 90$
∴ In fig. (C), missing number = $1^2 + 5^2 = 26$

48. **(4)** In each row, the third term is product of first two terms plus 1.
∴ ? = 7 × 8 + 1 = 57

49. **(2)** The third term of each row is half the product of the two numbers. Thus $? = \frac{1}{2}(4 \times 7) = 14$

50. **(3)** In each row, middle term is "square of the first" plus second
∴ the missing number is $11^2 + 5 = 126$

51. **(4)** In each column, the third number = $13 + 2 \times 7 = 27$
$54 + 2 \times 45 = 144$
∴ missing number $\Rightarrow x + 2 \times 32 = 68$ or $x = 4$

52. **(2)** In the first row: $\frac{21}{7} = \frac{27}{9}$

In the second row: $\frac{36}{4} = \frac{18}{2}$

∴ In the third row: $\frac{54}{9} = \frac{x}{4} \Rightarrow x = 24$

53. **(3)** In first column: $5^2 + 4^2 - 1 = 40$;
In second column: $9^2 + 5^2 - 6 = 100$
In third column: $7^2 + 3^2 - 8 = 50$

54. **(1)** 1st column = $4^2 + 2^2 + 1^2 = 21$
2nd column = $5^2 + 3^2 + 8^2 = 98$
3rd column = $6^2 + 7^2 + 3^2 = 94$

55. **(1)** First figure: $(84 \div 14) \times 2 = 12$ etc.

So $? \Rightarrow \frac{88}{?} \times 2 = 11$

So ? = 16.

56. **(1)** Numbers are
$1 \times 3, 3 \times 5, 5 \times 7, 7 \times 9, 9 \times 11, 11 \times 13$
or
use the rule: +12, +20, +28, +36, 44 etc.

57. **(2)** Rule is: Double the number and add 2.
Starting with 70.

58. **(3)** × 2 + 1 is the rule. So the missing number is $2 \times 7 + 1$ i.e. 15.

Exercise 2

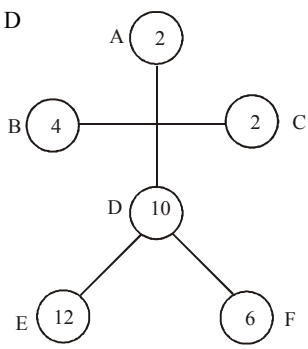
1. **(2)** In opposite segments, alternate pairs of digits total the same.
19 + 3 = 14 + 8.

2. **(1)** Sum of numbers in horizontal column is written in vertical column of previous figure.
5217 + 4381 = 9598

3. **(4)** The outer number added to its two connected numbers always total 20. For example :
3 + 7 + 10 = 20, 7 + 4 + 9 = 20, etc.

4. **(1)** 5827 in the top and 1826 in the bottom. Each of the other numbers has pairings top and bottom: 4829/2984, 7136/6731, 6483/8346, 9514/1459, 6127/7621, 3816/6813.

5. **(1)** F – B = C
B + C + F = E
E/F = A
A × C + F = D



6. **(1)** The inner circle shows the difference in striped vs plain circles in the outer circles. There are three more striped circles than plain circles in the four surrounding figures.

7. **(2)** Start at 2 and, working clockwise, jump three spaces each time adding 3.

8. **(3)** The number inside the circle is obtained by multiplying the sum of the upper number, the lower number and the number corresponding to the position of the letter in the english alphabet, multiplying by the number on the right and then subtracting the number on the left from the product.
Thus we have $(2 + C + 5) \times 3 - 4 = (2 + 3 + 5) \times 3 - 4 = 26$; $(4 + H + 4) \times 5 - 10 = (4 + 8 + 4) \times 5 - 10 = 70$.
Let the missing number be x.
Then $(8 + J + 6) \times X - 6 = 90$
$\Rightarrow (8 + 10 + 6) \times X = 96 \Rightarrow X = 4$.

9. **(4)** In the first column, $(5 + 8 + 7) \div 4 = 5$.
In the second column, $(9 + 6 + 13) \div 4 = 7$.
In the fourth column, $(7 + 10 + 19) \div 4 = 9$.
Let the missing number be x. Then, in the third column, we have :
$(8 + 9 + x) \div 4 = 8 \Rightarrow 17 + x = 32 \Rightarrow x = 15$.

10. **(3)** In each row, the second number is the square of the first number, and the third number is the square of the number obtained by interchanging the digits of the first number.
∴ Missing number = $(91)^2 = 8281$.

11. **(1)** In the first row, $72 \div \left(\frac{24}{2}\right) = 6$.

In the second row, $96 \div \left(\frac{16}{2}\right) = 12$.

Let the missing number in the third row be x.

Then, $108 \div \left(\frac{x}{2}\right) = 18 \Rightarrow \frac{x}{2} = \frac{108}{18} = 6 \Rightarrow x = 12$

12. **(1)** We have : $FJ = (F - J)^2 = (6 - 10)^2 = 16$;
$NS = (N - S)^2 = (14 - 19)^2 = 25$;
$LZ = (L - Z)^2 = (12 - 26)^2 = 196$;
$SX = (S - X)^2 = (19 - 24)^2 = 25$.
So, the missing numbers are :
(i) $WY = (W - Y)^2 = (23 - 25)^2 = (-2)^2 = 4$.
(ii) $NQ = (N - Q)^2 = (14 - 17)^2 = (-3)^2 = 9$.

13. **(2)** The top left hand number is obtained by adding the bottom two numbers. The top right hand number is the result of dividing the bottom two numbers.
Thus, 12 + 3 = 15, 12 ÷ 3 = 4;
22 + 11 = 33, 22 ÷ 11 = 2.
18 + 9 = 27, 18 ÷ 9 = 2.
So, 32 + X = 36 and 32 ÷ X = 8 or X = 4.

14. **(3)** The number inside the triangle is obtained by dividing the product of the numbers outside of the triangle by 10. Thus,
In I triangle, $(5 \times 6 \times 4) \div 10 = 12$
In II triangle, $(6 \times 7 \times 5) \div 10 = 21$
∴ In III triangle, missing number
$= (4 \times 8 \times 10) \div 10 = 32$.

15. **(2)** The letters in the first row form a series C, D, E (a series of consecutive letters). The letters in the second row form a series I, K, M (a series of alternate letters). Similarly, the letters in the third row will form the series D, G, J (a series in which each letter is three steps ahead of the previous one). So, the missing letter is G. Also, the number in the second column is equal to the product of the numbers in the first and third columns.
So, missing number is (4×7) i.e. 28.
Thus, the answer is 28G.