

20. 2; Let us find total number of odd days till 19th October, 2000.

<u>Odd days</u>	
I. 1900	: 1
II. 1901 to 1999	: 4 (99 + 24 = 123)
III. 1 st Jan, 2000 to 19 th Oct, 2000	: <u>6</u> <u>11</u> (1 week + 4 days)

(Jan - 3, Feb - 1, March - 3, April - 2, May - 3, June - 2, July - 3, Aug - 3, Sept - 2, Oct - 5)

Total number of odd days till 19th October, 2000 is 4. Also 4 is the day code for Thursday.

Other Method: Total number of odd days till 1st Jan, 2001 is 1. Therefore, 1st Jan, 2001 was Monday. 19th October, 2000 is $(13 + 30 + 31) = 74$ days before 1st Jan, 2001. Now, when 74 is divided by 7 we get 4 as remainder. Hence, 19th October, 2000 must fall on 4 days before Monday i.e. on Thursday.

21. 2; First of all let us find which day falls on 1st July, 2007.

<u>Odd days</u>	
I. 2000	: 0
II. 2001-2006	: 0
III. 1 st Jan, 2007 to 1 st July, 2007	: <u>0</u> <u>11</u> (3 + 0 + 3 + 2 + 3 + 2 + 1)

Thus, we come to know that total number of odd days till 1st July, 2007 is zero. Therefore, the day was Sunday (because zero is the day code for Sunday).

Now, it's clear that the first Monday of July, 2007 falls on 2nd July, 2007.

22. 1; Once again find the total number of odd days till 28th May, 2003.

<u>Odd days</u>	
I. 2000	: 0
II. 2001-2002	: 2
III. 1 st Jan, 2003 to 28 th May, 2003	: <u>1</u> <u>3</u> (3 + 0 + 3 + 2 + 0)

Note, that 3 is the day code for Wednesday. Hence, we can conclude that 28th May, 2003 was Wednesday.

23. 2; Let us calculate total number of odd days till 29th July, 1969.

<u>Odd days</u>	
I. Till 1900	: 1
II. 1901 - 1968	: 1 (68 + 17 = 85)
III. 1 st Jan, 1969 to 29 th July, 1969	: <u>0</u> 2 (3 + 0 + 3 + 2 + 3 + 2 + 1)

Note, that 2 is the day code for Tuesday. Hence, we can conclude that 29th July, 1969 was Tuesday.

24. 2; Look at Meeta's father's and brother's statement carefully. According to their statement it is clear that Meeta's father birthday is after 10th July but before 12th July. Thus, we can conclude that the birthday was on 11th July.

25. 3; According to the given statement it is clear that Abha's mother's birthday was after Wednesday but before Friday. Hence, we conclude that birthday was on Thursday.

26. 3; 9th day of the Month : Wednesday
18th day of the Month : Friday ($7 \times 1 + 2$)



Hence, the day was Thursday.



29. 4; Today → Friday

Day after tomorrow → Sunday

Deepawali → Sunday

4 day after Deepawali → Thursday.

Shekhar was born on : 3rd March, 1960

Ramesh was born on : 27th Feb, 1960

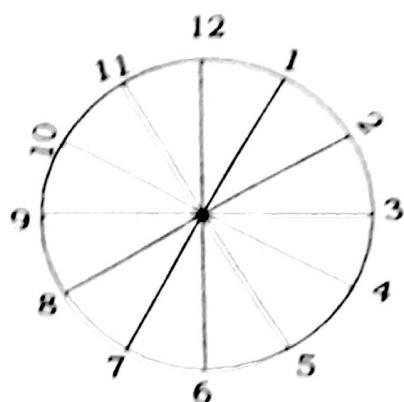
26th Jan, 1960 : Sunday

Total number of days between 27th Jan to 27th Feb : 32 days

When 32 is divided by 7 we get 4 as remainder. Hence, 27th Feb, 1960 must fall on 4 days after Sunday i.e. Thursday.

31. 2; Suman reached Agra on Sunday
Schedule time: Thursday
Rakesh reached Agra on Tuesday
 * * * *
32. 3; Saturday Schedule Thursday
 day
33. 4; On the basis of given information we can conclude that Sapna is $(70 + 314) = 384$ days elder to Suman.
 Now, divide 384 by 7, we get 6 as remainder. Since, Sapna was born on Thursday, therefore, Suman was born 6 days after Thursday i.e. on Wednesday.
34. 3; 1st day of the month : Wednesday 5th day of the month : Sunday Similarly, 12th, 19th and 26th of the month was Sunday.
 Since, National day was celebration on 4th Sunday, therefore we can conclude that it was 26th day of the month.
35. 4; We have no information regarding total number of days in the month.
36. 5; If 15th June is Friday, then $(15+7) = 22^{\text{nd}}$ and $(22+7) = 29^{\text{th}}$ June are Friday also. Thus last day of the month, i.e. 30th June will be Saturday.
37. 1; $27-4 = 23$. Divide 23 by 7 we get 2 as remainder. Therefore, 27th day of the month will fall on two days after Saturday i.e. on Monday.
38. 2; Kishore: Wednesday
 Kapil: 420 days after Wednesday
 Krishna: $(420+314) = 734$ days after Wednesday.
 Now, divide 734 by 7, we get 6 as remainder. Hence, we can conclude that Krishna was born 6 days after Wednesday i.e. on Tuesday.
39. 4; If 14th April falls on Monday then $(14+7) = 21^{\text{st}}$ and $(21+7) = 28^{\text{th}}$ of April will fall on Monday. Thus, the last day of the month i.e. 30th April will fall on two days after Monday i.e. on Wednesday.
40. 3; Note that calendar for the years 1 to 400 is same as the calendar for years 401 to 800. The calendar for the years 401 to 800 are same as the calendar for years 801 to 1200. The same is true for 1201 to 1600, 1601 to 2000, 2001 to 2400..... and so on.
 Look at the last day of four century years.
 31st Dec., 1700 : Friday
 31st Dec., 1800 : Wednesday
 31st Dec., 1900 : Monday
 31st Dec., 2000 : Sunday
 The above result is true for all century years.
 Thus, we can conclude that Tuesday, Thursday and Saturday can't be the last day of any century year.

We all are familiar with the clocks. Let us understand it in relation to second, minute and hour hand.



In a clock if any hand completes one revolution, then it completes 360° , and in one revolution the second hand, minute hand, hour hand covers 60 seconds, 60 minutes, 12 hours respectively.

For second hand: - 60 seconds $\rightarrow 360^\circ$

$$1 \text{ sec} \rightarrow 6^\circ$$

$$5 \text{ sec} \rightarrow 30^\circ$$

For minute hand: - 60 minutes $\rightarrow 360^\circ$

$$1 \text{ minute} \rightarrow 6^\circ$$

5 minutes 30°

Also for

Hour hand :- 12 hours $\rightarrow 360^\circ$

$$1 \text{ hour} \rightarrow 30^\circ$$

Now we will study the relation between the hands of a clock.

When second hand has moved by 5 seconds then how much will the minute hand move?

In 1 min., the minute hand moves by 6°

Hence in 5 seconds i.e. in $\frac{5}{60}$ min it moves by

$$\frac{5}{60} \times 6^\circ = 0.5^\circ$$

In 5 second $= 0.5^\circ$ is moved by minute hand

For every 1 sec., minute hand will move by 0.1°

$$1 \text{ sec} = 0.1^\circ \text{ of minute hand}$$

In 60 minutes, the minute hand gains 55 minutes on the hour hand.

The dial of a clock is a circle whose circumference is divided into 12 parts, called **hour spaces**. Each **hour space** is further divided into 5 parts, called **minute spaces**. This way, the whole circumference is divided into $12 \times 5 = 60$ minute spaces.

The time taken by the hour hand (smaller hand) to cover a distance of an hour space is equal to the time taken by the minute hand (longer hand) to cover a distance of the whole circumference. Thus, we may conclude that **in 60 minutes, the minute hand gains 55 minutes on the hour hand.**

"In an hour, the hour-hand moves a distance of 5 minute spaces whereas the minute-hand moves a distance of 60 minute spaces. Thus the minute-hand remains $60 - 5 = 55$ minute spaces ahead of the hour-hand."

The above conclusion is very much useful in solving the problems related with Clock. Therefore do remember it.

Besides it you need to know some other important facts also

Both hands	Required Angle	Number of times it happens in 12 hours
to be coincident	0°	11
to be at right angle	90°	22
to be in opposite direction	180°	11
to be in straight line	0° or 180°	22

- The clock is divided into 60 equal minute divisions.

- 1 minute division $= \frac{360^\circ}{60} = 6^\circ$ apart.

rated by five minute divisions ($= 5 \times 6^\circ = 30^\circ$ apart).

In one minute, the minute hand moves one minute division or 6° .

In one minute, the hour hand moves $\frac{1}{2}^\circ$.

In one minute the minute hand gains $5\frac{1}{2}^\circ$ more than hour hand.

When the hands are together, they are 0° apart.

In every hour, both the hands coincide once but during 11 O'clock to 1 O'clock it happens only once at 12 O'clock.

When the two hands are at right angle, they are 15 minute spaces apart. This happens twice in every hour but during 8 O'clock to 10 O'clock it happens three times only.

When the hands are in opposite directions, they are 30 minute spaces apart. This happens once in every hour but from 5 O'clock to 7 O'clock it happens only once.

The hands are in the same straight line when they are coincident or opposite to each other.

The hour hand moves around the whole circumference of clock once in 12 hours. So the minute hand is twelve times faster than hour hand.

1. What angle is covered by hour hand in 1 second?

Sol. In 12 hours the hour hand covers 360° .

In 1 hour (60 min.) the hour hand covers

$$\frac{360^\circ}{12} = 30^\circ$$

In 1 hour i.e. (60×60 sec.) the hour hand covers 30° .

In 1 second the hour hand covers

(1 Sec. = $\frac{1}{120}$ is covered by hour hand)

2. What angle is covered by minute hand in 1 second?

Sol. In 1 hour i.e. (60 min.) angle covered by min. hand = 360°

In 1 min. angle covered by min. hand

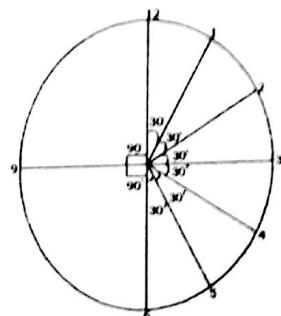
$$\frac{360^\circ}{60} = 6^\circ$$

i.e. in 60 sec. angle covered by min. hand 6°

$$\text{In 1 sec. } \frac{6^\circ}{60} = \frac{1^\circ}{10} = 0.1^\circ$$

(1 Sec. = 0.1° is covered by min. hand)

For better understanding of the angles see the diagram given below



Clock

Ex. 1. At what time between 3 and 4 O'clock are the hands of a clock together?

Sol. At 3 O'clock, the hour hand is at 3 and the minute hand is at 12. i.e., they are 15 min. spaces apart. To be together, the minute hand must gain 15 min. over the hour hand.

We know 55 min. are gained in 60 min.

\therefore 15 min. will be gained in

$$\left[\frac{60}{55} \times 15 \right] \text{min.} = 16\frac{1}{4} \text{ min.}$$

So, the hands will coincide at $16\frac{4}{11}$ min. past 3.

Ex. 2. At what time between 4 and 5 O'clock will the hand of clock be at right angle?

Sol. At 4 O'clock, the minute hand will be 20 min. spaces behind the hour hand.

Now, when the two hands are at right angle, they are 15 min. spaces apart.

So, there are two possible cases:

Case (I): When the min. hand is 15 min. spaces behind the hour hand.

To be in this position, the min. hand will have to gain $(20 - 15) = 5$ min. spaces.

We know,

55 min. spaces are gained in 60 min.

$\therefore 5$ min. spaces are gained in

$$\left[\frac{60}{55} \times 5 \right] \text{ min.} = 5 \frac{5}{11} \text{ min. past 4.}$$

Case (II): When the min. hand is 15 min. spaces ahead of the hour hand.

To be in this position, the min. hand will have to gain $(20 + 15) = 35$ min. spaces.

Now, 55 min. spaces are gained in 60 min.

$\therefore 35$ min. spaces will be gained in $\left[\frac{60}{55} \times 35 \right]$

$$\text{min.} = 38 \frac{2}{11} \text{ min.}$$

So, they are at right angle at $38 \frac{2}{11}$ min. past 4.

Ex. 3. Find at what time between 8 and 9 O'clock will the hands of a clock be in the same straight line but not together.

Sol. At 8 O'clock, the hour hand is at 8 and the min. hand is at 12 i.e., the two hands are 20 min. spaces apart.

To be in the same straight line but not together, they will be 30 min. spaces apart.

So, the min. hand will have to gain

$(30 - 20) = 10$ min. spaces over the hour hand.

Now, 55 min. are gained in 60 min.

10 min. will be gained in $\left[\frac{60}{55} \times 10 \right]$ min.

$$= 10 \frac{10}{11} \text{ min.}$$

The hands will be in straight line at

$$10 \frac{10}{11} \text{ min. past 8.}$$

Ex. 4. At what time between 5 and 6 are the hands of a clock will be 3 minutes apart?

Sol. At 5 O'clock, both the hands are 25 minute spaces apart.

Case I: Minute hand is 25 minute spaces apart. In this case, the minute hand has to gain $(25 - 3)$ i.e. 22 minute spaces.

Now, 55 min. are gained in 60 min.

22 min. are gained in

$$\left[\frac{60}{55} \times 22 \right] \text{ min.} = 24 \text{ min.}$$

\therefore The hand will be 3 minutes spaces apart at 24 min. past 5.

Case II: Minute hand is 3 minute spaces ahead of the hour hand.

In this case, the minute hand has to gain $(25 + 3)$ i.e., 28 minute spaces.

Now, 55 min. are gained in 60 min.

28 min. are gained in

$$\left[\frac{60}{55} \times 28 \right] = 30 \frac{6}{11} \text{ min.}$$

The hands will be 3 minutes spaces apart

$$\text{at } 30 \frac{6}{11} \text{ min. past 5.}$$

Ex. 5. The minute hand of a clock overtakes the hour hand at intervals of 65 minutes of correct time. How much does the clock gain or lose in a day?

Sol. In a correct clock, the minute hand gains 55 minute spaces over the hour hand in 60 minutes. To be together again, the minute hand must gain 60 minutes over the hour hand.

Now, 55 min. are gained in 60 min.

60 min. are gained in $\left[\frac{60}{55} \times 60 \right]$ min.

$$= 65 \frac{5}{11} \text{ min.}$$

But, they are together after 65 minutes.

$$\therefore \text{Gain in 65 minutes} \left[65 \frac{5}{11} - 65 \right] = \frac{5}{11} \text{ min.}$$

$$\text{Gain in 24 hrs.} = \left[\frac{5}{11} \times \frac{60 \times 24}{65} \right] \text{ min.}$$

$$= 10 \frac{10}{143} \text{ min.}$$

Ex. 6. A watch which gains uniformly, is 5 min. slow at 8 O'clock in the morning on Sunday, and is 5 minutes 48 seconds fast at 8 pm on following Sunday. When was it correct?

Sol. Time from 8 am on Sunday to 8 pm on following Sunday = 7 days 12 hours = 180 hours.

$$\text{Thus, the watch gains } \left[5 + 5 \frac{4}{5} \right] \text{ min.}$$

$$\text{or } \frac{54}{5} \text{ min. in 180 hours}$$

$$\text{Now, } \frac{54}{5} \text{ min. are gained in 180 hours.}$$

$$5 \text{ min. are gained in } \left[\frac{180 \times 5 \times 5}{54} \right] \text{ hours.}$$

$$83 \frac{1}{3} \text{ hrs}$$

= 83 hrs. 20 min. after 8 am on Sunday

Thus, the watch is correct after 3 days 11 hrs. 20 min. after 8 am on Sunday i.e., it will be correct at 20 min. past 7 pm on Wednesday.

Ex. 7. A clock is set right at 8 am. The clock gains 10 minutes in 24 hours. What will be the true time when the clock indicates 1 pm on the following day?

Sol. Time from 8 am on a day to 1 pm on the following day is 29 hrs.

Now, 24 hrs. 10 min. of this clock = 24 hrs. of the correct clock

Or,

$$(24 \text{ hrs.} + 10 \text{ min.}) = 24 + \frac{10}{60} = \frac{145}{6} \text{ hrs.}$$

= 24 hrs. of the correct clock.

Here $\frac{145}{6}$ hrs. of this clock = 24 hrs. of the correct clock.

$$\therefore 1 \text{ hr.} = \frac{24 \times 6}{145}$$

So, 29 hrs. of the clock = $\left[\frac{24 \times 6}{145} \times 29 \right]$ hrs. of correct clock = 28 hrs. 48 min. of the correct clock

So, the correct time is 8 am + 28 hrs. 48 min.

$$= 12 : 48 \text{ pm. Ans.}$$

Ex. 8. A clock is set right at 5 am. The clock loses 16 minutes in 24 hours. What will be the true time when the clock indicates 10 pm on the 4th day?

Sol. Time from 5 am on a day to 10 pm on 4th day is 89 hours.

Now, 23 hrs. 44 min. $\left[\frac{356}{15} \text{ hrs.} \right]$ of this clock are the same as 24 hours of the correct clock.

i.e. $\frac{356}{15}$ hrs of this clock = 24 hrs. of correct clock.

$89 \text{ hrs. of this clock} = \left[\frac{24 \times 15}{356} \times 89 \right] \text{ hrs. of correct clock.}$

$$= 90 \text{ hrs. of correct clock.}$$

So, the correct time is 11 pm Ans.

Ex. 9. What smaller angle will the hour hand and minute hand make at 5 : 15 am?

Sol. Speed of hour hand = 30° per hour

$$= \frac{30^\circ}{60} \text{ per minute}$$

$$= \left[\frac{1}{2} \right]^\circ \text{ per minute}$$

$$\therefore \text{The angle of hour hand from 12 at } 5 : 15 \\ = 5 \times 30^\circ + 15 \times 1/2^\circ = 150^\circ + 7.5^\circ = 157.5^\circ$$

The angle of minute hand from

$$12 \text{ at } 15 \text{ minutes} = 3 \times 30^\circ = 90^\circ$$

Angle between hour hand and minute hand will be = $157.5^\circ - 90^\circ = 67.5^\circ$ Ans.

Ex. 10. What will be the smaller angle between hour hand and minute hand at 8 : 30 pm?

Sol. Angle between hands

$$\begin{aligned} &= 30^\circ \times 8 - 30 \times 6^\circ + 30 \times \frac{1}{2}^\circ \\ &= 240^\circ - 180^\circ + 15^\circ = 240^\circ - 165^\circ \\ &= 75^\circ \text{ Ans.} \end{aligned}$$

UNIQUE RULE:

To find the angle between the hour hand and the minute hand

- I.** Multiply 30° to the given hour digit and $11/2^\circ$ to the minute and subtracts the smaller result to the bigger one.

Ex. What will be the angle between hour hand and minute hand at 8 : 30 pm?

$$\begin{aligned} &= 8 \times 30^\circ = 240^\circ, = 165^\circ \\ &= 240^\circ - 165^\circ = 75^\circ \text{ Ans.} \end{aligned}$$

- II.** If the result of this subtraction is more than 180° than we should subtract the result from 360° .

Ex. Find the angle between hour hand and minute hand when the time is 1 : 52 (am/pm).

Sol. $01 \times 30^\circ = 30^\circ$,

$$52 \times 11/2^\circ = 286^\circ$$

According to the rule, $286^\circ - 30^\circ = 256^\circ$

(But, the finding result is more than 180° so, we should subtract it from 360°) thus, $360^\circ - 256^\circ = 104^\circ$

Exercise:

1. At what time between 3 and 4 O'clock are the hands of a clock together?

(1) $16\frac{5}{11}$ min. past 3

(2) $16\frac{7}{11}$ min. past 3

(3) $16\frac{1}{11}$ min. past 3

(4) None of these

2. At what time between 5 and 6 are the hands of a clock coinciding each other?

(1) 22 minutes past 5

(2) 30 minutes past 5

(3) $22\frac{8}{11}$ minutes past 5

(4) $27\frac{3}{11}$ minutes past 5

3. At what time between 9 and 10 will the hands of a clock be together?

(1) 45 minutes past 9

(2) 50 minutes past 9

(3) $49\frac{1}{11}$ minutes past 9

(4) $48\frac{2}{11}$ minutes past 9

- At what time are the hands of a clock together between 2 and 3?

(1) $10\frac{9}{11}$ min. past 2

(2) $10\frac{10}{11}$ min. past 2

(3) $10\frac{8}{11}$ min. past 2

(4) None of these

- At what time between 5 and 5:30 O'clock will the hands of a clock be at right angle?

(1) $10\frac{10}{11}$ min. past 5

(2) $10\frac{9}{10}$ min. past 5

(3) $11\frac{10}{11}$ min. past 5

(4) None of these

6. At what times are the hands of a clock at right angles between 7 am and 8 am?

(1) $54\frac{6}{11}$ min. past 7, $21\frac{9}{11}$ min. past 7

(2) $52\frac{5}{11}$ min. past 7, $21\frac{8}{11}$ min. past 7

(3) $56\frac{6}{11}$ min. past 7, $21\frac{8}{11}$ min. past 7

(4) None of these

7. At what time between 5:30 and 6 will the hands of a clock be at right angles?
- $43\frac{5}{11}$ minutes past 5
 - $43\frac{7}{11}$ minutes past 5
 - 40 minutes past 5
 - 45 minutes past 5
8. At which of the following times between 10 and 11 O'clock will the hand of clock be at right angle?
- $38\frac{2}{11}$ min. past 10
 - $6\frac{5}{11}$ min. past 10
 - $38\frac{3}{11}$ min. past 10
 - $8\frac{2}{11}$ min. past 10
9. Find at what time between 8 and 9 O'clock will the hands of a clock be in the same straight line but not together.
- $10\frac{10}{11}$ min. past 8
 - $10\frac{9}{11}$ min. past 8
 - $11\frac{10}{11}$ min. past 8
 - None of these
10. Find at what time between 2 and 3 O'clock will the hands of a clock be in the same straight line but not together.
- $4\frac{4}{11}$ min. past 2
 - $43\frac{7}{11}$ min. past 2
 - $43\frac{3}{11}$ min. past 2
 - None of these
11. Find at what time between 9 and 10 O'clock will the hands of a clock be in the same straight line but not together.
- $16\frac{4}{11}$ min. past 9
 - $16\frac{5}{11}$ min. past 9
 - $16\frac{3}{11}$ min. past 9
 - None of these
12. At which of the following times between 5 and 6 are the hands of a clock 3 minutes apart?
- 24 min. past 5
 - 26 min. past 5
 - $30\frac{5}{11}$ min. past 5
 - 22 min. past 5
13. At which of the following times between 4 and 5 are the hands of a clock 3 minutes apart?
- $18\frac{6}{11}$ min. past 4
 - $26\frac{5}{11}$ min. past 4
 - $25\frac{5}{11}$ min. past 4
 - $25\frac{3}{11}$ min. past 4
14. At what time between 3 and 4 is the minute-hand 7 minutes ahead of the hour-hand?
- $8\frac{8}{11}$ min. past 3
 - 24 min. past 3
 - 25 min. past 3
 - 22 min. past 3
15. At what time between 3 and 4 is the minute-hand 4 minutes behind the hour-hand?
- 12 minutes past 3
 - 11 minutes past 3
 - 19 minutes past 3
 - None of these

16. The minute hand of a clock overtakes the hour hand at intervals of 63 minutes of correct time. How much a day does the clock gain or lose?
- (1) $56\frac{8}{77}$ min. gain
 (2) $56\frac{8}{77}$ min. lose
 (3) $57\frac{8}{77}$ min. gain
 (4) $57\frac{8}{77}$ min. lose
17. How much does a watch gain or lose per day, if its hands coincide every 64 minutes of correct time?
- (1) $32\frac{8}{11}$ min. gain
 (2) $31\frac{8}{11}$ min. gain
 (3) $32\frac{3}{11}$ min. gain
 (4) $32\frac{8}{11}$ min. lose
18. At which of the following times between 3 and 4 O'clock when the angle between the hands of a watch is one-third of a right angle.
- (1) $10\frac{10}{11}$ min. past 3
 (2) $10\frac{9}{11}$ min. past 3
 (3) $11\frac{9}{11}$ min. past 3
 (4) $21\frac{8}{11}$ min. past 3
19. Find the smaller angle between the two hands of a clock of 15 minutes past 4 O'clock.
- (1) 38.5° (2) 36.5°
 (3) 37.5° (4) None of these
20. Find the smaller angle between the two hands of a clock at 4.30 pm.
- (1) 45° (2) 30°
 (3) 60° (4) None of these
21. At what angle (smaller) are the two hands of a clock inclined at 20 minutes past 5?
- (1) 30° (2) 45° (3) 50° (4) 40°
22. At what angle (smaller) are the two hands of a clock inclined at 32 minutes past 9?
- (1) 94° (2) 95° (3) 93° (4) 92°
23. At what angle (smaller) are the two hands of a clock inclined at 17 minutes past 9?
- (1) $167\frac{1}{2}^{\circ}$ (2) $172\frac{1}{2}^{\circ}$ (3) $166\frac{1}{2}^{\circ}$ (4) $176\frac{1}{2}^{\circ}$
24. At what angle are the two hands of a clock inclined at 38 minutes past 7?
- (1) 01° (2) 02° (3) 03° (4) $1\frac{1}{2}^{\circ}$
25. At what angle (larger) are the two hands of a clock inclined at 48 minutes past 12?
- (1) 264° (2) 263° (3) 265° (4) 266°
26. At what angle are the two hands of a clock inclined at 4 minutes to 12?
- (1) 22° (2) 20° (3) 21° (4) 23°
27. How many times do the hands of a clock point opposite to each other in 12 hours?
- (1) 6 times (2) 10 times
 (3) 11 times (4) 12 times
28. How many times are the hands of a clock at right angles in a day?
- (1) 24 times (2) 48 times
 (3) 22 times (4) 44 times
29. How many times in a day are the hands of a clock straight?
- (1) 48 times (2) 24 times
 (3) 44 times (4) 22 times
30. A watch which gains uniformly, is 5 min. slow at 8 O'clock in the morning on Sunday, and is 5 min. 48 sec. fast at 8 pm on following Sunday. When was it correct?
- (1) 20 min. past 7 pm on Tuesday
 (2) 20 min. past 7 pm on Wednesday
 (3) 10 min. past 7 pm on Tuesday
 (4) 10 min. past 7 pm on Wednesday
31. A clock is set right at 8 am. The clock gains 10 minutes in 24 hours. What will be the true time when the clock indicates 1 pm on the following day?
- (1) 28 hrs. (2) 28 hrs. 48 min.
 (3) 28 hrs. 42 min.
 (4) None of these

32. A clock is set right at 4 am. The clock loses 20 min. in 24 hours. What will be the true time when the clock indicates 3 am on 4th day?
- (1) 4 am (2) 5 am (3) 3 am (4) 4 pm
33. A watch, which gains uniformly is 2 min. slow at noon on Monday, and is 4 min. 48 seconds fast at 2 pm on the following Monday. When was it correct?
- (1) 2 pm on Tuesday
(2) 2 pm on Wednesday
(3) 3 pm on Thursday
(4) 1 pm on Friday
34. A watch which gains 5 seconds in 3 minutes was set right at 7 am. In the afternoon of the same day when the watch indicated quarter past 4 O'clock, the true time is-
- (1) $59\frac{7}{12}$ minutes past 3
(2) 4 pm
(3) $58\frac{7}{11}$ minutes past 3
(4) $2\frac{3}{11}$ minutes past 4
35. How many times do the hands of a clock coincide in a day?
- (1) 24 (2) 20 (3) 21 (4) 22
36. At what time between 4 and 5 will the hands of a watch be equidistant from the figure 5.
- (1) $27\frac{9}{11}$ min. past 4
(2) $27\frac{8}{13}$ min. past 4
(3) $27\frac{9}{13}$ min. past 4
(4) None of these
37. If the hands of a clock coincide every 65 minutes of correct time. How much does the clock gain or lose in 24 hours?
- (1) $11\frac{10}{143}$ min. gain
(2) $10\frac{10}{143}$ min. lose
(3) $10\frac{9}{143}$ min. gain
(4) None of these
- Directions (38 - 42):** The questions given below are based on a vertical mirror and a clock. The clock has dots on its dial and not numbers written on it. Read the questions carefully and find out the real/reflected time.
38. If the real time is 12 : 30, then what is the time shown by the reflection?
- (1) 12 : 30 (2) 11 : 30
(3) 6 : 30 (4) 1 : 30
39. If the time by any clock is 6 O'clock, what is the reflected time?
- (1) 12 : 30 (2) 6 : 00
(3) 6 : 30 (4) 12 : 00
40. If the time shown by the reflection is 1 : 40, then what is the real time?
- (1) 11 : 40 (2) 5 : 45
(3) 10 : 20 (4) 11 : 20
41. If the time shown by the reflection is 12 : 25, then what is the real time?
- (1) 12 : 25 (2) 12 : 35
(3) 11 : 35 (4) 10 : 35
42. If on the dial of a clock, we substitute the numbers with the reversed order of alphabets K to V so that 'V' substitutes '5' and 'U' substitutes '6' and the process is continued, then which alphabet will come in place of 11?
- (1) Q (2) O (3) M (4) P

Answer with explanations:

1. 3; At 3 O'clock, the hour hand is at 3 and the minute hand is at 12. It means that they are 15 min. spaces apart. To be together, the minute hand must gain 15 minutes over the hour hand. Now, we know that 55 min. are gained in 60 min.
 \therefore 15 min. are gained in

$$\frac{60}{55} \times 15 = \frac{180}{11} = 16\frac{4}{11}$$
 min.
Therefore, the hands will be together at $16\frac{4}{11}$ min. past 3.
2. 4; At 5 O'clock, the hour hand is at 5 and the minute hand is at 12. It means that they are 25 min. spaces apart. To be coincide, the minute hand must gain 25 minutes over the hour hand. Now, we know that 55 min. are gained in 60 min.

\therefore 25 min. are gained in

$$\frac{60}{55} \times 25 = \frac{300}{11} = 27 \frac{3}{11} \text{ min.}$$

Therefore, the hands will be together at

$$27 \frac{3}{11} \text{ min. past 5.}$$

3. 3; At 9 O'clock, the hour hand is at 9 and the minute hand is at 12. It means that they are 45 min. spaces apart. To be together, the minute hand must gain 45 minutes over the hour hand. Now, we know that 55 min. are gained in 60 min.

\therefore 45 min. are gained in

$$\frac{60}{55} \times 45 = \frac{540}{11} = 49 \frac{1}{11} \text{ min.}$$

Therefore, the hands will be together at

$$49 \frac{1}{11} \text{ min. past 9.}$$

4. 2; At 2 O'clock, the hour hand is at 2 and the minute hand is at 12. It means that they are 10 min. spaces apart. To be together, the minute hand must gain 10 minutes over the hour hand. Now, we know that 55 min. are gained in 60 min.

\therefore 10 min. are gained in

$$\frac{60}{55} \times 10 = \frac{120}{11} = 10 \frac{10}{11} \text{ min.}$$

Therefore, the hands will be together at

$$10 \frac{10}{11} \text{ min. past 2.}$$

5. 1; At 5 O'clock, there are 25 min. spaces between hour and minute hands. To be at right angle, they should be 15 min. spaces apart. To be in this position, the min. hand should have to gain $25 - 15 = 10$ min. spaces.

Now, we know that 55 min. spaces are gained in 60 min.

\therefore 10 min. spaces are gained in

$$\frac{60}{55} \times 10 = \frac{120}{11} = 10 \frac{10}{11} \text{ min.}$$

\therefore they are at right angle at $10 \frac{10}{11}$ min. past 5.

6. 1; At 7 O'clock, there are 35 min. spaces between hour and minute hands. To be at right angle, they should be 15 min. spaces apart. So, there are two cases:

Case I:

When the minute hand is 15 min. spaces behind the hour hand.

To be in this position, the min. hand should have to gain $35 - 15 = 20$ min. spaces. Now, we know that 55 min. spaces are gained in 60 min.

\therefore 20 min. spaces are gained in

$$\frac{60}{55} \times 20 = \frac{240}{11} = 21 \frac{9}{11} \text{ min.}$$

\therefore they are at right angle at $21 \frac{9}{11}$ min. past 7.

Case II:

When the minute hand is 15 min. spaces ahead of the hour hand.

To be in this position, the min. hand should have to gain $35 + 15 = 50$ min. spaces.

Now, we know that 55 min. spaces are gained in 60 min.

\therefore 50 min. spaces will be gained in

$$\frac{60}{55} \times 50 = \frac{600}{11} = 54 \frac{6}{11} \text{ min.}$$

\therefore they are at right angle at $54 \frac{6}{11}$ min. past 7.

7. 2; At 5 O'clock, there are 25 min. spaces between hour and minute hands. To be at right angle, they should be 15 min. spaces apart. So, there are two cases:

Case I:

When the minute hand is 15 min. spaces behind the hour hand.

Reject the case I, because this incidence will happen before 5 : 30.

Case II:

When the minute hand is 15 min. spaces ahead of the hour hand.

To be in this position, the min. hand should have to gain $25 + 15 = 40$ min. spaces.

Now, we know that 55 min. spaces are gained in 60 min.

\therefore 40 min. spaces will be gained in

$$\frac{60}{55} \times 40 = \frac{480}{11} = 43 \frac{7}{11} \text{ min.}$$

\therefore they are at right angle at $43 \frac{7}{11}$ min. past 5.

8. 1. At 10 O'clock, there are 20 min. spaces between hour and minute hands. To be at right angle, they should be 15 min. spaces apart. So, there are two cases.

Case I:

When the minute hand is 15 min. spaces behind the hour hand.

To be in this position, the min. hand should have to gain $20 - 15 = 5$ min. spaces.

Now, we know that 55 min. spaces are gained in 60 min.

5 min. spaces are gained in

$$\frac{60}{55} \times 5 = \frac{60}{11} = 5\frac{5}{11} \text{ min.}$$

they are at right angle at $5\frac{5}{11}$ min past 10

Case II:

When the minute hand is 15 min. spaces ahead of the hour hand.

To be in this position, the min. hand should have to gain $15 - 10 = 5$ min. spaces.

Now, we know that 55 min. spaces are gained in 60 min.

5 min. spaces will be gained in

$$\frac{60}{55} \times 5 = \frac{60}{11} = 5\frac{5}{11} \text{ min.}$$

they are at right angle at $5\frac{5}{11}$ min past 10

9. 1. To be in same straight line (but not together) the angle between the hour and minute hands must be 180° , ie, 30 min. spaces apart.

At 8 O'clock, they are 40 min. spaces apart.

Therefore, to be in opposite directions the minute hand will have to gain $40 - 30 = 10$ min. spaces.

Now, 10 min. spaces will be gained in

$$\frac{60}{55} \times 10 = \frac{120}{11} = 10\frac{10}{11} \text{ min.}$$

∴ the hand will in opposite directions at $10\frac{10}{11}$ min. past 8.

10. 2. To be in same straight line (but not together) the angle between the hour and minute hands must be 180° , ie, 30 min.

spaces apart.

At 2 O'clock they are 10 min. spaces apart.

Therefore, to be in opposite directions the minute hand will have to gain $30 - 10 = 20$ min. spaces.

Now, 40 min. spaces will be gained in

$$\frac{60}{55} \times 40 = \frac{400}{11} = 36\frac{4}{11} \text{ min.}$$

∴ the hand will in opposite directions

$$\text{at } 36\frac{4}{11} \text{ min. past 2.}$$

11. 1. To be in same straight line (but not together) the angle between the hour and minute hands must be 180° , ie, 30 min. spaces apart.

At 9 O'clock, they are 15 min. spaces apart.

Therefore, to be in opposite directions the minute hand will have to gain $30 - 15 = 15$ min. spaces.

Now, 15 min. spaces will be gained in

$$\frac{60}{55} \times 15 = \frac{180}{11} = 16\frac{4}{11} \text{ min.}$$

Hence the hand will in opposite direc-

tions at $16\frac{4}{11}$ min. past 9.

12. 1. At 5 O'clock, the two hands are 25 min. spaces apart.

Case I:

When the minute hand is 3 minute spaces behind the hour hand.

In this case, the minute hand will have to gain $(25 - 3)$, ie, 22 minute spaces.

Now, we know that 22 min. spaces will be gained in

$$\frac{60}{55} \times 22 = 24 \text{ min.}$$

Hence they will be 3 min. apart at 24 min. past 5.

Case II:

When the minute hand is 3 min. spaces ahead of the hour hand.

In this case, the minute hand will have to gain $(25 + 3)$, ie, 28 minute spaces.

Now, we know that 28 minute spaces will be gained in

$$\frac{60}{55} \times 28 = \frac{336}{11} = 30\frac{6}{11} \text{ min.}$$

Hence, the hands will be 3 min. apart at

$$30 \frac{6}{11} \text{ min. past 5.}$$

13. 1; At 4 O'clock, the two hands are 20 min. spaces apart.

Case I:

When the minute hand is 3 minute spaces behind the hour hand.

In this case, the minute hand will have to gain (20 - 3), ie, 17 minute spaces. Now, we know that 17 min. spaces will be gained in

$$\frac{60}{55} \times 17 = \frac{204}{11} = 18 \frac{6}{11} \text{ min.}$$

Hence, they will be 3 min. apart at $18 \frac{6}{11}$ min. past 4.

Case II:

When the minute hand is 3 min. spaces ahead of the hour hand.

In this case, the min-hand will have to gain (20 + 3), ie, 23 minute spaces.

Now, we know that 23 minute spaces will be gained in

$$\frac{60}{55} \times 23 = \frac{276}{11} = 25 \frac{1}{11} \text{ min.}$$

Hence the hands will be 3 min. apart at $25 \frac{1}{11}$ min. past 4.

14. 2; At 3 O'clock, the two hands are 15 min. spaces apart.

When the minute hand is 7 min. spaces ahead of the hour hand. In this case, the min-hand will have to gain (15 + 7), i.e, 22 minute spaces.

Now, we know that 22 minute spaces will be gained in $\frac{60}{55} \times 22 = 24$ min.

Hence, the minute hand will be 7 min. spaces ahead of the hour hand at 24 min. past 3.

15. 1; At 3 O'clock, the two hands are 15 min. spaces apart.

When the minute hand is 4 minute spaces behind the hour hand. In this case, the minute hand will have to gain (15 - 4), i.e. 11 minute spaces. Now, we know that 11 min. spaces will be gained in $\frac{60}{55} \times 11 = 12$ min.

Hence, they will be 4 min. apart at 12 min.

past 3.

16. 1; In a correct clock, the minute hand gains 55 min. spaces over the hour-hand in 60 minutes. To be together again, the minute-hand must gain 60 min. over the hour-hand.

We know that 60 min. are gained in

$$\frac{60}{55} \times 60 = 65 \frac{5}{11} \text{ min.}$$

But they are together after 63 minutes. Hence, gain in 63 minutes

$$= 65 \frac{5}{11} - 63 = 2 \frac{5}{11} = \frac{27}{11} \text{ min.}$$

Therefore gain in 24 hrs.

$$= \frac{27 \times 60 \times 24}{11 \times 63} = \frac{56}{77} \text{ min.}$$

17. 1; In a correct clock, the minute hand gains 55 min. spaces over the hour-hand in 60 minutes. To be together again, the minute-hand must gain 60 min. over the hour hand.

We know that 60 min. are gained in

$$\frac{60}{55} \times 60 = 65 \frac{5}{11} \text{ min.}$$

But they are together after 64 minutes. Hence gain in 64 minutes

$$= 65 \frac{5}{11} - 64 = 1 \frac{5}{11} = \frac{16}{11} \text{ min.}$$

Therefore gain in 24 hrs.

$$= \frac{16 \times 60 \times 24}{11 \times 64} = 32 \frac{8}{11} \text{ min.}$$

18. 1; At 3 O'clock the two hands of the clock are 15 minute spaces apart. Here we have to look for the time when the angle between the two hands are 30° . Note that 30° means 5 minute spaces apart. There will be two such cases.

Case I :

When the minute hand is 5 minute spaces behind the hour hand.

In this case, the minute hand will have to gain (15 - 5), i.e. 10 minute spaces. Now, we know that 10 min. spaces will be gained in

\therefore 10 min. are gained in

$$\frac{60}{55} \times 10 = \frac{120}{11} = 10 \frac{10}{11} \text{ min.}$$

Therefore, the hands will be together at

$$10\frac{10}{11} \text{ min. past 3.}$$

Hence they will be 5 min. spaces apart at
 $10\frac{10}{11} \text{ min. past 3.}$

Case II:

When the minute hand is 5 min. spaces ahead of the hour hand.

In this case, the minute hand will have to gain $(15 + 5)$, i.e. 20 minute spaces. Now, we know that 20 minute spaces will be gained in

\therefore 20 min. spaces are gained in

$$\frac{60}{55} \times 20 = \frac{240}{11} = 21\frac{9}{11} \text{ min.}$$

Hence, they will be 5 min. spaces apart at $21\frac{9}{11}$ min. past 3.

19. 3; At 4 O'clock the two hands of the clock are 20 minute spaces apart. We know that 5 minute spaces is equal to 30° . Therefore 20 minute spaces implies 120° . Also, we know that in 1 minute minute hand rotates by 6° whereas hour hand rotates by 0.5° . Therefore after 15 minutes minute hand rotates 90° whereas hour hand rotates 7.5° . Hence the required angle is $(120 - 90 + 7.5) = 37.5^\circ$.

20. 1; At 4 O'clock the two hands of the clock are 20 minute spaces apart. We know that 5 minute spaces is equal to 30° . Therefore 20 minute spaces implies 120° . Also, we know that in 1 minute, minute hand rotates by 6° whereas hour hand rotates by 0.5° . Therefore after 30 minutes, minute hand rotates 180° whereas hour hand rotates 15° .

Hence, the required angle is
 $(180 - 20 - 15) = 45^\circ$.

21. 4; At 5 O'clock the two hands of the clock are 25 minute spaces apart. We know that 5 minute spaces is equal to 30° . Therefore 25 minute spaces implies 150° . Also, we know that in 1 minute minute hand rotates by 6° whereas hour hand rotates by 0.5° . Therefore after 20 minutes minute hand rotates 120° whereas hour hand rotates 10° . Hence the required angle is
 $(150 - 120 + 10) = 40^\circ$.

22. 1; At 9 O'clock the two hands of the clock

are 45 minute spaces apart. We know that 5 minute spaces is equal to 30° . Therefore 45 minute spaces implies 270° . Also, we know that in 1 minute minute hand rotates by 6° whereas hour hand rotates by 0.5° . Therefore after 32 minutes minute hand rotates $(32 \times 6) = 192^\circ$ whereas hour hand rotates 16° . Hence the required angle is $(270^\circ - 192^\circ + 16^\circ) = 94^\circ$.

23. 4; At 9 O'clock the two hands of the clock are 45 minute spaces apart. We know that 5 minute spaces is equal to 30° . Therefore 45 minute spaces implies 270° . Also, we know that in 1 minute, minute hand rotates by 6° whereas hour hand rotates by 0.5° . Therefore after 17 minutes minute hand rotates $(17 \times 6) = 102^\circ$ whereas hour hand rotates 8.5° . Hence the required angle is $(270 - 102 + 8.5) = 176.5^\circ$.

24. 1; At 7 O'clock the two hands of the clock are 35 minute spaces apart. We know that 5 minute spaces is equal to 30° . Therefore 35 minute spaces implies 210° . Also, we know that in 1 minute minute hand rotates by 6° whereas hour hand rotates by 0.5° . Therefore after 38 minutes minute hand rotates $(38 \times 6) = 228^\circ$ whereas hour hand rotates 19° . Hence the required angle is $(210 - 228 + 19) = 1^\circ$.

25. 1; At 12 O'clock the two hands of the clock are 0 minute spaces apart. Also, we know that in 1 minute minute hand rotates by 6° whereas hour hand rotates by 0.5° . Therefore after 48 minutes minute hand rotates $(48 \times 6) = 288^\circ$ whereas hour hand rotates 24° . Hence the required angle is $(288 - 24) = 264^\circ$.

26. 1; At 11 O'clock the two hands of the clock are 5 minute spaces apart. We know that 5 minute spaces is equal to 30° . Also, we know that in 1 minute minute hand rotates by 6° whereas hour hand rotates by 0.5° . Therefore after 56 minutes minute hand rotates $(56 \times 6) = 336^\circ$ whereas hour hand rotates 28° . Hence, the required angle is $(30 + 336 - 28) = 338^\circ$. But there is no such choices. Now look for the angle $(360 - 338) = 22^\circ$.

27. 3; The hands of a clock point opposite to each other 11 times in every 12 hours (because between 5 and 7, at 6 O'clock

only they point opposite to each other).

28. 4; In 12 hours, they are at right angles 22 times (because two positions of 3 O'clock and 9 O'clock are common). Therefore, in a day they are at right angles for 44 times.

29. 3; The hands coincide or are in opposite direction (22 + 22) ie 44 times in a day.

30. 2; Time between the given interval = 180 hrs.

The watch gains

$$= 5 + 5 \frac{4}{5} = \frac{54}{5} \text{ min. in 180 hrs.}$$

$$\therefore 5 \text{ min. is gained in } \frac{180 \times 5}{54} \times 5 = 83 \text{ hrs.}$$

$$20 \text{ min.} = 3 \text{ days } 11 \text{ hrs } 20 \text{ min.}$$

\therefore it was correct at 20 min. past 7 pm on wednesday.

31. 2; Time from 8 am on a day to 1 pm on the following day is 29 hrs.

Now, 24 hrs. 10 min. of this clock are the same as 24 hours of the correct clock.

$$\text{i.e. } \frac{145}{6} \text{ hrs. of this clock} = 24 \text{ hrs of correct clock.}$$

$$29 \text{ hrs. of this clock} = \left(\frac{24 \times 6}{145} \times 29 \right) \text{ hrs. of correct clock} = 28 \text{ hrs. } 48 \text{ min. of correct clock.}$$

So, the correct time is 28 hrs. 48 min. after 8 am or 48 min. past 12.

32. 1; Time from 4 am to 3 am on 3rd day
= $24 \times 3 - 1 = 71$ hrs.

Now, 23 hrs. 46 min. of this clock = 24 hrs. of correct clock.

$$\text{or, } \frac{23 \frac{46}{60}}{3} = \frac{71}{3} \text{ hrs of this clock}$$

23 hrs. of correct clock.

\therefore 71 hrs. of this clock

$$= \frac{24 \times 3 \times 71}{71} = 72 \text{ hrs. of correct clock.}$$

Therefore, the correct time

$$= 3 \text{ am } + (72 - 71) = 4 \text{ am}$$

33. 2; Time from Monday noon to 2 pm on following Monday = 7 days 2 hours = 170 hours

The watch gains $\left(2 + 4 \frac{4}{5} \right)$

or, $\frac{34}{5}$ min. in 170 hours

\therefore it will gain 2 min. in $\left(\frac{170 \times 5}{34} \times 2 \right)$ hrs.

$$= 50 \text{ hrs.} = 2 \text{ days } 2 \text{ hrs.}$$

So, the watch is correct 2 days 2 hours after Monday noon i.e., at 2 pm on Wednesday.

34. 2; Time from 7 am to quarter past 4 = 9 hours 15 min. = 555 min.

Now, $\frac{37}{12}$ min. of this watch = 3 min. of the correct watch.

$$555 \text{ min. of this watch} = \left(\frac{3 \times 12}{37} \times 555 \right) \text{ min.}$$

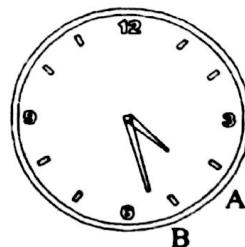
$$= \left(\frac{3 \times 12}{37} \times \frac{555}{60} \right) \text{ hrs.} = 9 \text{ hrs. of the correct watch.}$$

Correct time is 9 hours after 7 am i.e. 4 pm.

35. 4; The hands of a clock coincide 11 times in every 12 hours (because between 11 and 1, they coincide only once, at 12 O'clock). So, the hands coincide 22 times in a day.

36. 3; The hands will be equidistant from the figure 5,

- (i) when they are coincident between 4 and 5, and
- (ii) when they are in the position shown in the diagram.



For the 1st case the time would be

$$21 \frac{9}{11} \text{ min. past 4.}$$

In the second case suppose that the hour-hand is at A, and the minute-hand at B, so that A5 = 5B. Since the space

between 4 and 5 is equal to the space between 5 and 6,

$$\therefore 4A = 6B$$

$$\text{Hence, } 12B + 4A = 12B + 6B = 30 \text{ min.}$$

That is, the two hands, between them have moved through a space of 30 minutes since 4 O'clock. But the minute hand moves 12 times as fast as the hour hand.

$$\text{Hence, } 12B = 30 \times \frac{12}{13} = 27\frac{9}{13} \text{ min.}$$

\therefore the required time is $27\frac{9}{13}$ min. past 4.

37.2; The minute-hand gains 60 minutes over

the hour-hand in $\frac{60 \times 60}{55}$ or $65\frac{5}{11}$ minutes. Therefore, the hands of a correct clock coincide every $65\frac{5}{11}$ minutes.

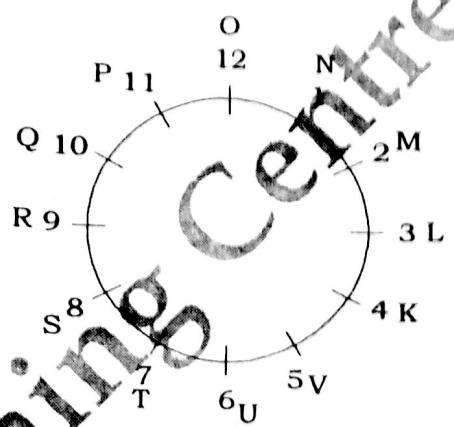
But the hands of the clock mentioned in the question coincide every 65 minutes.

Hence in 65 minutes, the clock gains $\frac{5}{11}$ min.

\therefore in 60×24 min. or 24 hours it gains

$$\frac{5}{11} \times \frac{1}{65} \times 60 \times 24 = 10\frac{10}{143} \text{ min.}$$

38. 2; Reflection time : $12 - 0.30 = 11 : 30$
39. 2; Reflection time : $12 - 6 = 6$ O'clock
40. 3; Reflection time : $12 - 1 : 40 = 10 : 20$
41. 3; Reflection time : $12 - 0 : 25 = 11 : 35$
42. 4;



In a number series, the number changes in accordance with certain specified rule/order. Read the series given in the questions carefully and find out which rule/order the series is following. Questions based on number series are mainly of two types:-

- Type A** - In this type of questions, a place is left blank or is replaced by a question mark.
- Type B** - In this type of questions, a number which must come at a certain place is replaced by a wrong number. We have to decide which of the alternatives given will come in the place of the wrong number.

Type-A

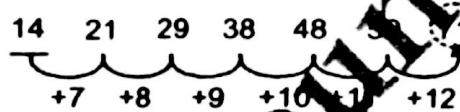
Some important rules of the questions asked in this type of number series:

- Arithmetic series** :- In arithmetic series the numbers in two continuous series increase or decrease in a definite order. For example-

Ex. 1. 14, 21, 29, 38, 48, 59, ?

- (1) 69 (2) 79 (3) 81 (4) 71 (5) 71

Sol.



Ans. (5)

Ex. 2. 34, 18, 10, 6, ?, ?

- (1) 6 (2) 1 (3) 0 (4) 2 (5) 3

Sol.



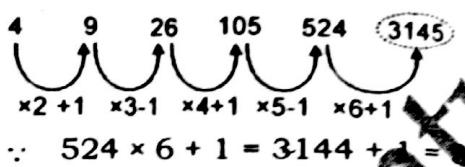
Ans. (5)

Geometric series: In geometric series, the next number is obtained by either multiplying or dividing the last one by a definite number. In this type of series there are certain addition/subtraction done along with some division or multiplication.

Ex. 1. 4, 9, 26, 105, 524, ?

- (1) 1524 (2) 3032 (3) 3144
(4) 3145 (5) 3154

Sol.



$$\therefore 524 \times 6 + 1 = 3144 + 1 = 3145$$

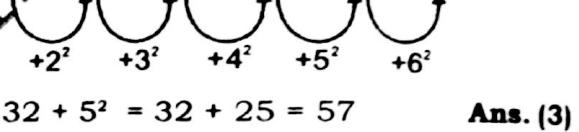
Ans. (4)

III. Series of squares and cubes: In the series of squares and cubes, the number in a series increases or decreases in squares or cubes and which are generally near to certain square or cube.

Ex. 1. 3, 7, 13, 21, 93

- (1) 5 (2) 56 (3) 57 (4) 58 (5) 60

Sol.



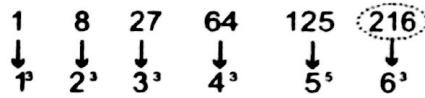
$$\therefore 32 + 5^2 = 32 + 25 = 57$$

Ans. (3)

Ex. 1. 1, 8, 27, 64, 125, ?

- (1) 216 (2) 150 (3) 169
(4) 196 (5) 225

Sol.



$$\therefore 6^3 = 216$$

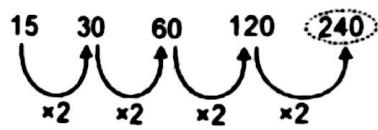
Ans. (1)

IV. Miscellaneous Number Series: In the type of miscellaneous number series, the series of numbers can be different. In this number series, numbers can increase/decrease by addition, subtraction, multiplication, division, arithmetic/geometric progression etc. For example-

Ex. 1. 15, 30, 60, 120, ?

- (1) 250 (2) 245 (3) 240
(4) 250 (5) 260

Sol.

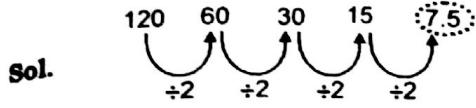


$$\therefore 120 \times 2 = 240$$

Ans. (3)

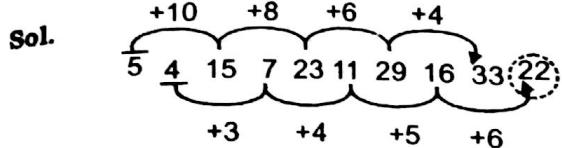
Ex. 2. 120, 60, 30, 15, ?

- (1) 7 (2) 7.5 (3) 30 (4) 5.7 (5) 8.5

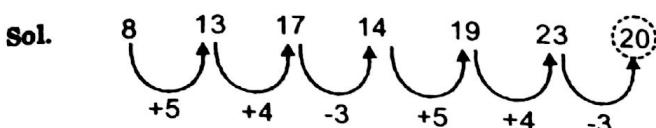


$$\therefore 15 + 2 = 7.5 \quad \text{Ans. (2)}$$

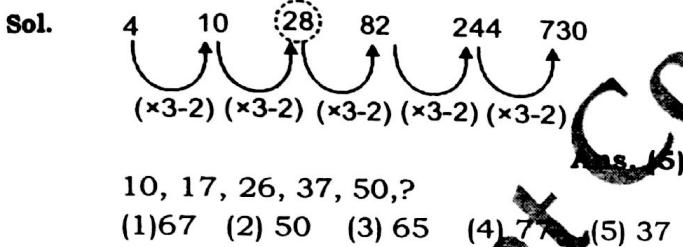
- Ex. 3.** 5, 4, 15, 7, 23, 11, 29, 16, 33,?
 (1) 22 (2) 11 (3) 34 (4) 29 (5) 32



- Ex. 4.** 8, 13, 17, 14, 19, 23,?
 (1) 22 (2) 24 (3) 25 (4) 20 (5) 18



- Ex. 5.** 4, 10,?, 82, 244, 730
 (1) 86 (2) 24 (3) 218 (4) 77 (5) 28



- Sol.**
-

Ans. (3)

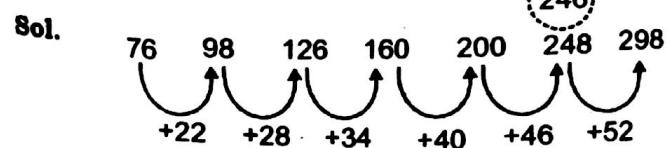
Type-1

Some important examples of this type of questions:

- Ex. 1.** Which number is unappropriate in the series given below?

76, 98, 126, 160, 200, 248, 298

- (1) 126 (2) 160 (3) 200
 (4) 248 (5) 98



So, 246 will be at the place of 248.

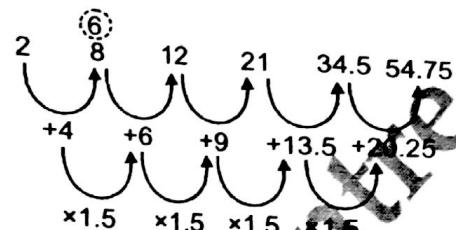
Ans. (4)

- Ex. 2.** Which number is unappropriate in the

series given below?

2, 8, 12, 21, 34.5, 54.75

- (1) 2 (2) 8 (3) 34.5 (4) 21 (5) 54.75



So, 6 will be at the place of 8.

Ans. (2)

Exercise:

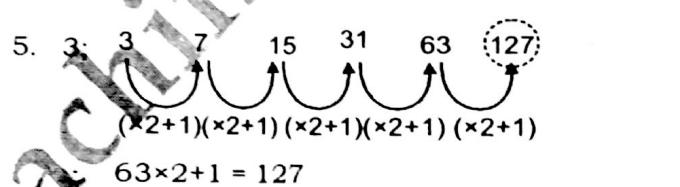
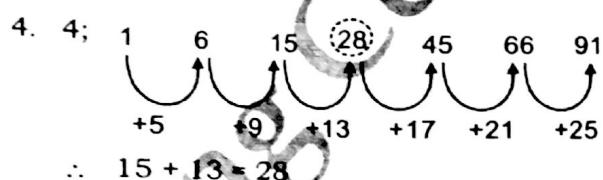
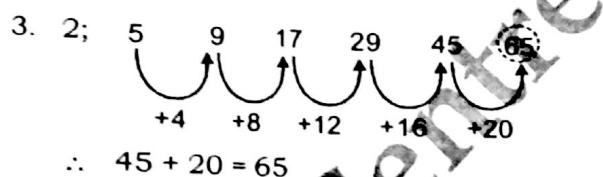
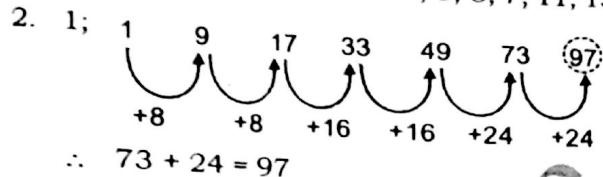
Type -A

1. 2, 5, 7, 11, ?, 17
 (1) 12 (2) 13 (3) 14
 (4) 15 (5) None of these
2. 1, 9, 17, 33, 49, 73,?
 (1) 97 (2) 98 (3) 99
 (4) 100 (5) None of these
3. 5, 9, 17, 29, 45,?
 (1) 60 (2) 65 (3) 68
 (4) 70 (5) None of these
4. 1, 6, 15, ?, 45, 66, 91
 (1) 25 (2) 26 (3) 27
 (4) 28 (5) None of these
5. 3, 7, 15, 31, 63,?
 (1) 92 (2) 115 (3) 127
 (4) 131 (5) None of these
6. 1, 2, 3, 5, 8,?
 (1) 9 (2) 11 (3) 13
 (4) 15 (5) None of these
7. $33\frac{1}{3}$, 20, $14\frac{2}{7}$, ?, $9\frac{1}{11}$
 (1) 14 (2) $5\frac{5}{17}$ (3) $5\frac{5}{19}$
 (4) $11\frac{1}{19}$ (5) None of these
8. 8, 15, 28, 53,?
 (1) 106 (2) 98 (3) 100
 (4) 102 (5) None of these

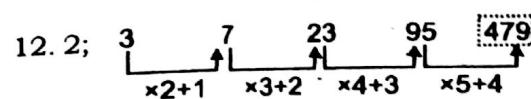
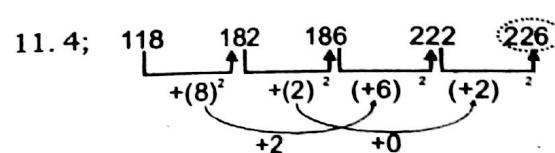
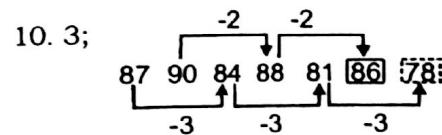
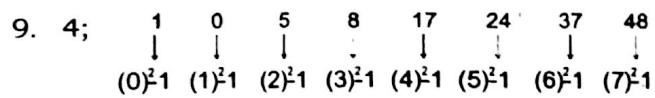
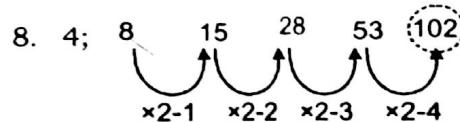
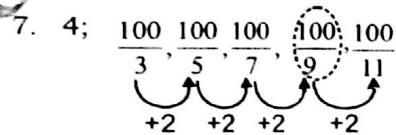
9. - 1, 0, 5, 8, 17, 24, 37,?
 (1) 40 (2) 43 (3) 46
 (4) 48 (5) None of these
10. - 87, 90, 84, 88, 81,?,?
 (1) 85,93 (2) 86,98 (3) 86,78
 (4) 86,68 (5) None of these
11. - 118, 182, 186, 222,?
 (1) 318 (2) 266 (3) 258
 (4) 226 (5) None of these
12. - 3, 7, 23, 95,?
 (1) 575 (2) 479 (3) 128
 (4) 62 (5) None of these
13. - 3, 28, 4, 65, 5, 126, 6, ?
 (1) 215 (2) 216 (3) 217
 (4) 218 (5) None of these
14. - 3691, 6931, 9361, 3691,?
 (1) 1369 (2) 6931 (3) 1963
 (4) 3961 (5) None of these
15. - 81, 192, 375,?, 1029
 (1) 684 (2) 486 (3) 648
 (4) 468 (5) None of these
16. - 1, 2, 6, 33, 49, 174, 210,?
 (1) 553 (2) 259 (3) 426
 (4) 274 (5) None of these
17. - 1, 5, 11, 49, 239,?
 (1) 429 (2) 956 (3) 1441
 (4) 1427 (5) None of these
18. - 1, 4, 15, 64, 325,?
 (1) 1630 (2) 275 (3) 1956
 (4) 1950 (5) None of these
19. - 1, 16, 44, 96, 207,?
 (1) 414 (2) 418 (3) 408
 (4) 41 (5) None of these
20. - 3, 9, 61,?, 651
 (1) 97 (2) 127 (3) 129
 (4) 109 (5) None of these
21. - 1, 30, 136, 417,?, 829
 (1) 856 (2) 828 (3) 834
 (4) 838 (5) None of these
22. - 2, 4, 11, 37,?, 771
 (1) 115 (2) 148 (3) 152
 (4) 118 (5) None of these
23. - 2, 9, 30, 105,?, 2195
 (1) 432 (2) 426 (3) 440
 (4) 436 (5) None of these
24. - 2, 40, 180, 552,?, 1112
 (1) 1110 (2) 1010 (3) 1008
 (4) 1080 (5) None of these
25. - 3, 4, 12, 45, 196,?
 (1) 800 (2) 1004 (3) 996
 (4) 955 (5) None of these
26. - 3, 4, 12, 45,? 1005
 (1) 152 (2) 198 (3) 144
 (4) 192 (5) None of these
27. - 3, 4, 16, 75, 864,?
 (1) 828 (2) 1293 (3) 1945
 (4) 783 (5) None of these
28. - 4, 2, ?, 3, 6,?
 (1) 2 (2) 15 (3) 6
 (4) 9 (5) None of these
29. - 4, 6,?, 30, 90, 315
 (1) 9 (2) 12 (3) 15
 (4) 8 (5) None of these
30. - 5,?, 4, 7.5, 17, 45
 (1) 3.5 (2) 3 (3) 2.5
 (4) 2 (5) None of these
31. - 6, 9, 18, 45,?
 (1) 135 (2) 99 (3) 115
 (4) 138 (5) None of these
32. - 6, 9, 11.25, 22.50, 26.50,?
 (1) 44.50 (2) 66.25 (3) 70.25
 (4) 45 (5) None of these
33. - 7, 8, 18, 66,?, 1938
 (1) 928 (2) 686 (3) 430
 (4) 324 (5) None of these
34. - 10, 11, 18, 38, 97.5, 295.5,?
 (1) 796 (2) 1186 (3) 889.5
 (4) 1037.75 (5) None of these
35. - 14, 10, 28, 17, 49,?
 (1) 21 (2) 8 (3) 10
 (4) 19 (5) None of these
36. - 15, 30,?, 40, 8, 48
 (1) 10 (2) 20 (3) 20
 (4) 10 (5) None of these

37. 64, 36, 22, 15, ?, 9.75
 (1) 11.75 (2) 12.5 (3) 11.5
 (4) 12.25 (5) None of these
38. 81, 41, 42, 64.5, ?, 330
 (1) 131 (2) 118.5 (3) 129
 (4) 105.5 (5) None of these
39. 114, 115, 107, 134, 70, ?
 (1) 140 (2) 35 (3) 195
 (4) 150 (5) None of these
- Type - B**
40. 2807, 1400, 697, 347, 171, 84, 41, 20
 (1) 697 (2) 347 (3) 371
 (4) 84 (5) 41
41. 828, 412, 204, 100, 48, 24, 9
 (1) 100 (2) 48 (3) 24
 (4) 412 (5) 204
42. 496, 242, 116, 54, 24, 8, 4
 (1) 8 (2) 24 (3) 54
 (4) 116 (5) 24
43. 324, 192, 92, 46, 16, 4, 2
 (1) 4 (2) 16 (3) 46
 (4) 92 (5) 192
44. 24, 36, 81, 180, 540, 1890, 7560
 (1) 540 (2) 1890 (3) 36
 (4) 81 (5) 180
45. 16, 4, 2, 1.5, 1.75, 1.875
 (1) 1.875 (2) 1.75 (3) 1.5
 (4) 2 (5) 4
46. 7, 4, 6, 9, 20, 52.5, 105
 (1) 52.5 (2) 9 (3) 20
 (4) 4 (5) 8
47. 7, 9, 16, 25, 36, 68, 107, 173
 (1) 25 (2) 68 (3) 41
 (4) 16 (5) 107
48. 6, 14, 45, 183, 925, 5556
 (1) 925 (2) 183 (3) 45
 (4) 14 (5) 6
49. 3, 2, 3, 6, 12, 37.5, 115.5
 (1) 12 (2) 2 (3) 6
 (4) 3 (5) 37.5
50. 3, 3, 4.5, 9, 27, 67.5, 236.25, 945
 (1) 236.25 (2) 4.5 (3) 9
 (4) 7 (5) 67.5

1. 2; Prime number series 2, 3, 5, 7, 11, 13, 17



6. 3; $1 + 2 = 3, 2 + 3 = 5, 5 + 3 = 8, 8 + 5 = 13$



13. 3; $\begin{array}{c} 3 \quad 28 \quad 4 \quad 65 \quad 5 \quad 126 \quad 6 \\ \text{---} \quad \text{---} \quad \text{---} \quad \text{---} \quad \text{---} \quad \text{---} \quad \text{---} \\ 3^2+1 \quad 4^2+1 \quad 5^2+1 \quad 6^2+1 \end{array}$

14. 2; $\begin{array}{cccc} 3691 & 6931 & 9361 & 3691 \\ \downarrow \downarrow \downarrow & \downarrow \downarrow \downarrow & \downarrow \downarrow \downarrow & \downarrow \downarrow \downarrow \\ 1234 & 2314 & 3134 & 1234 \\ & & 2314 & \end{array}$

15. 3;

$$\begin{array}{ccccc} 81 & 192 & 375 & 648 & 1029 \\ \downarrow & \downarrow & \downarrow & \downarrow & \downarrow \\ (9)^2 - (0)^2 & (14)^2 - (2)^2 & (20)^2 - (5)^2 & (27)^2 - (9)^2 & (35)^2 - (14)^2 \\ +5 & +2 & +6 & +3 & +7 \\ +4 & +8 & +5 & +6 & +7 \end{array}$$

16. 1;

$$\begin{array}{ccccccc} 1 & 2 & 6 & 33 & 49 & 174 & 210 \\ \uparrow & \uparrow & \uparrow & \uparrow & \uparrow & \uparrow & \uparrow \\ +1^2 & +2^2 & +3^2 & +4^2 & +5^2 & +6^2 & +7^2 \\ & & & & & & \\ & & & & & & 553 \end{array}$$

17. 3; $\begin{array}{ccccccc} 1 & 5 & 11 & 49 & 239 & 1441 & \\ \uparrow & \uparrow & \uparrow & \uparrow & \uparrow & \uparrow & \\ \times 2+3 & \times 3-4 & \times 4+5 & \times 5-6 & \times 6+7 & & \end{array}$

18. 3; $\begin{array}{ccccccc} 1 & 4 & 15 & 64 & 325 & 1956 & \\ \uparrow & \uparrow & \uparrow & \uparrow & \uparrow & \uparrow & \\ \times 2+2 & \times 3+3 & \times 4+4 & \times 5+5 & \times 6+6 & & \end{array}$

19. 1; $\begin{array}{ccccccc} 1 & 16 & 44 & 98 & 204 & 410 & \\ \uparrow & \uparrow & \uparrow & \uparrow & \uparrow & \uparrow & \\ +15 & +28 & +54 & +106 & +140 & & \\ +13 & +26 & +5 & +104 & & & \\ \times 2 & \times 2 & \times 2 & \times 2 & & & \end{array}$

20. 3; $\begin{array}{ccccccc} 1 & 3 & 9 & 31 & 129 & 651 & \\ \uparrow & \uparrow & \uparrow & \uparrow & \uparrow & \uparrow & \\ +1+2 & \times 2+3 & \times 3+4 & \times 4+5 & \times 5+6 & & \end{array}$

21. 4; $\begin{array}{ccccccc} 1 & 30 & 136 & 417 & 838 & 839 & \\ \uparrow & \uparrow & \uparrow & \uparrow & \uparrow & \uparrow & \\ \times 5+5^2 & \times 4+4^2 & \times 3+3^2 & \times 2+2^2 & \times 1+1^2 & & \end{array}$

22. 5; $\begin{array}{ccccccc} 2 & 4 & 11 & 37 & 153 & 771 & \\ \uparrow & \uparrow & \uparrow & \uparrow & \uparrow & \uparrow & \\ \times 1+2 & \times 2+3 & \times 3+4 & \times 4+5 & \times 5+6 & & \end{array}$

23. 4; $\begin{array}{ccccccc} 2 & 9 & 30 & 105 & 436 & 2195 & \\ \uparrow & \uparrow & \uparrow & \uparrow & \uparrow & \uparrow & \\ \times 1+7 & \times 2+12 & \times 3+15 & \times 4+16 & \times 5+15 & & \\ +5 & +3 & +1 & -1 & & & \\ -2 & -2 & -2 & -2 & & & \end{array}$

24. 1; $\begin{array}{ccccccc} 2 & 40 & 180 & 552 & 110 & 1112 & \\ \uparrow & \uparrow & \uparrow & \uparrow & \uparrow & \uparrow & \\ \times 5+30 & \times 4+20 & \times 3+12 & \times 2+6 & \times 1+2 & & \\ -10 & -8 & -6 & -4 & & & \end{array}$

25. 5; $\begin{array}{ccccccc} 3 & 4 & 2 & 45 & 196 & 1005 & \\ \uparrow & \uparrow & \uparrow & \uparrow & \uparrow & \uparrow & \\ \times 1+1 & \times 2+2 & \times 3+3^2 & \times 4+4^2 & \times 5+5^2 & & \end{array}$

26. 3; $\begin{array}{ccccccc} 3 & 4 & 12 & 45 & 196 & 1005 & \\ \uparrow & \uparrow & \uparrow & \uparrow & \uparrow & \uparrow & \\ \times 1+1^2 & \times 2+2^2 & \times 3+3^2 & \times 4+4^2 & \times 5+5^2 & & \end{array}$

27. 3; $\begin{array}{ccccccc} 3 & 4 & 16 & 75 & 364 & 1945 & \\ \uparrow & \uparrow & \uparrow & \uparrow & \uparrow & \uparrow & \\ \times 1+1^3 & \times 2+2^3 & \times 3+3^3 & \times 4+4^3 & \times 5+5^3 & & \end{array}$

28. 2; $\begin{array}{ccccccc} 4 & 2 & 2 & 3 & 6 & 15 & \\ \uparrow & \uparrow & \uparrow & \uparrow & \uparrow & \uparrow & \\ \times \frac{1}{2} & \times 1 & \times 1.5 & \times 2 & \times 2.5 & & \end{array}$

29. 2; $\begin{array}{ccccccc} 4 & 6 & 12 & 30 & 90 & 315 & \\ \uparrow & \uparrow & \uparrow & \uparrow & \uparrow & \uparrow & \\ \times 1.5 & \times 2 & \times 2.5 & \times 3 & \times 3.5 & & \end{array}$

30. 2; $\begin{array}{ccccccc} 5 & 3 & 4 & 7.5 & 17 & 45 & \\ \uparrow & \uparrow & \uparrow & \uparrow & \uparrow & \uparrow & \\ \times 0.5+0.5 & \times 1+1 & \times 1.5+1.5 & \times 2+2 & \times 2.5+2.5 & & \end{array}$

31. 1; $\begin{array}{ccccccc} 6 & 9 & 18 & 45 & 135 & \\ \uparrow & \uparrow & \uparrow & \uparrow & \uparrow & \\ \times 1.5 & \times 2 & \times 2.5 & \times 3 & & & \end{array}$

32. 2; $\begin{array}{ccccccc} 6 & 9 & 11.25 & 22.50 & 26.50 & 66.25 & \\ \uparrow & \uparrow & \uparrow & \uparrow & \uparrow & \uparrow & \\ \times 1.5 & \times (1.5)^2 & \times 2 & +(2)^2 & \times 2.5 & & \end{array}$

$$33.4; \quad 7 \xrightarrow{x2-6} 8 \xrightarrow{x3-6} 18 \xrightarrow{x4-6} 66 \xrightarrow{x5-6} 324 \xrightarrow{x6-6} 1938$$

$$38.1; \quad 81 \xrightarrow{x0.5+0.5} 41 \xrightarrow{x1+1} 42 \xrightarrow{x1.5+1.5} 64.5 \xrightarrow{x2+2} 131 \xrightarrow{x2.5+2.5} 330$$

34.4;

$$10 \xrightarrow{x1+1} 11 \xrightarrow{x1.5+1.5} 18 \xrightarrow{x2+2} 38 \xrightarrow{x2.5+2.5} 97.5 \xrightarrow{x3+3} 295.5 \xrightarrow{x3.5+3.5} 1037.75$$

39.1

40.2;

$$346 \\ 2807 \xrightarrow{-7\div2} 1400 \xrightarrow{-6\div2} 697 \xrightarrow{-5\div2} 347 \xrightarrow{-4\div2} 171 \xrightarrow{-3\div2} 84 \xrightarrow{-2\div2} 41 \xrightarrow{-1\div2} 20$$

$$35.5; \quad 14 \xrightarrow{x.5+3} 10 \xrightarrow{x3-2} 28 \xrightarrow{x.5+3} 17 \xrightarrow{x3-2} 49 \xrightarrow{x.5+3} 27.5$$

$$36.1; \quad 15 \xrightarrow{\times 2} 30 \xrightarrow{\times \frac{1}{3}} 10 \xrightarrow{\times 4} 40 \xrightarrow{\times \frac{1}{5}} 8 \xrightarrow{\times 6} 48$$

$$41.3; \quad 828 \xrightarrow{-4\times0.5} 412 \xrightarrow{-4\times1.5} 204 \xrightarrow{-4\times0.5} 100 \xrightarrow{-4\times0.5} 48 \xrightarrow{-4\times0.5} 24 \xrightarrow{-4\times0.5} 9$$

$$37.3; \quad 64 \xrightarrow{-28} 36 \xrightarrow{-14} 22 \xrightarrow{-7} 15 \xrightarrow{-3.5} 11.5 \xrightarrow{-1.75} 9.75$$

$$42.1 \\ 45.2; \quad 10 \xrightarrow{x0.25} 4 \xrightarrow{x0.5} 2 \xrightarrow{x0.75} 1.5 \xrightarrow{x1} 1.75 \xrightarrow{x1.25} 1.875$$

Paramount Coaching Centre

19

MISSING NUMBER

In this chapter, in each question some numbers/alphabets are given in one/more than one figures/matrix. The numbers/alphabets are arranged in a proper order. In a part of the figure a number is not given and it is replaced by a question mark (?). You have to evaluate the questions and find out which alphabet/numbers will come in place of question mark.

Some of the questions with their detailed analyses have been explained below.

For eg:

- (1) Find the missing number in the figure given below and choose the correct alternative from the options given.

7	4	9
14	8	?
28	16	36
56	32	32

- (1) 81 (2) 27 (3) 16 (4) 18

Sol. 4; In 1st column

$$7 \times 2 = 14$$

$$14 \times 2 = 28$$

$$28 \times 2 = 56$$

In 2nd column

$$4 \times 2 = 8$$

$$8 \times 2 = 16$$

$$16 \times 2 = 32$$

In the same way in 3rd column

$$9 \times 2 = 18$$

$$18 \times 2 = 36$$

$$36 \times 2 = 72$$

Ans. (4).

- (2) Which number will come in the place of question mark in the figure given below?

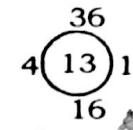
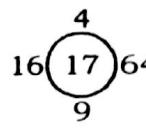


Figure A Figure B Figure C

- (1) 20 (2) 22 (3) 26 (4) 27

Sol. 2; In the figure given above the number given in the circle is the sum of the square roots of the numbers encircling the circle.

Figure in A,

$$\sqrt{4} + \sqrt{64} + \sqrt{9} + \sqrt{16} = 2 + 8 + 3 + 4 = 17$$

Figure in B,

$$\sqrt{36} + \sqrt{1} + \sqrt{16} + \sqrt{4} = 6 + 1 + 4 + 2 = 13$$

In the same type figure in C,
 $= 5 + 9 + 2 + 6 = \boxed{22}$

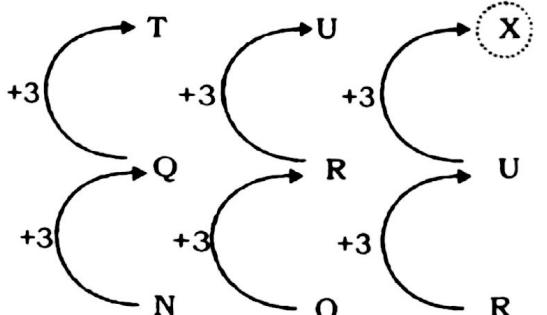
Ans. (2).

- (3) Find the missing alphabet

T	U	?
Q	R	U
N	O	R

- (1) L (2) O (3) I (4) X

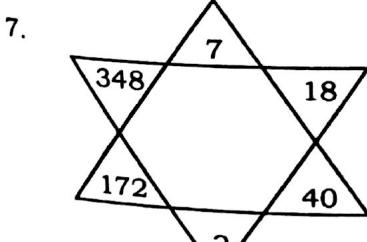
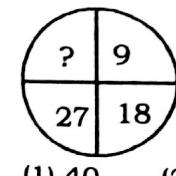
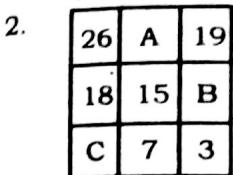
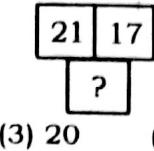
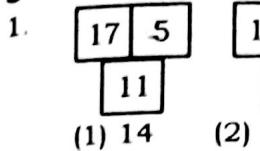
Sol. 4;



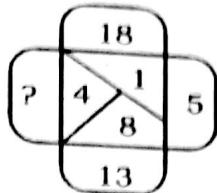
Ans. (4).

Exercise:

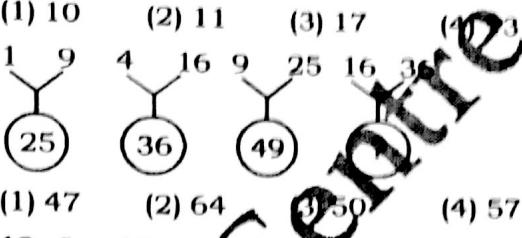
Directions (1 - 43): Find out missing number/letter/number and letter from the following given options/figures.



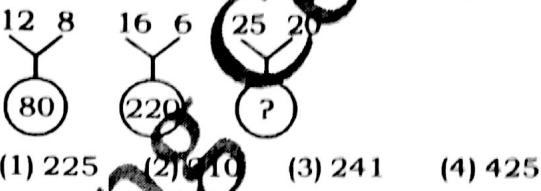
8.



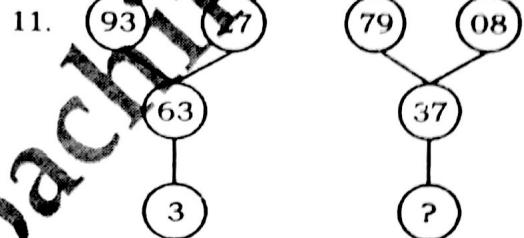
9.



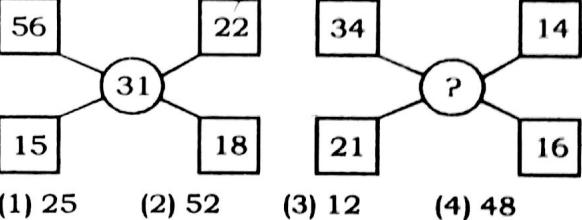
10.



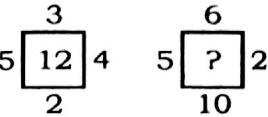
11.



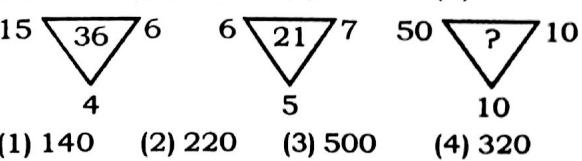
12.



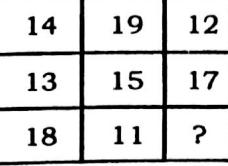
13.



14.



15.



- (1) 9 (2) 16 (3) 15 (4) 14

16.

9	8	7
6	7	8
5	4	6
260	214	?

(1) 191 (2) 326

(3) 277 (4) 336

17.

5	6	3
25	42	21
21	100	20
26	107	?

(1) 72 (2) 26

(3) 27 (4) 73

18.

0	-1	-2
1	0	-1
2	?	10

(1) 6 (2) -2

(3) -2 (4) 4

19.

5	5	2
8	3	10
2	4	1
160	120	?

(1) 40 (2) 12

(3) 13 (4) 20

20.

?	19	47
21	22	40
1	20	50
20	23	45

(1) 5 (2) 4

(3) 3 (4) 2

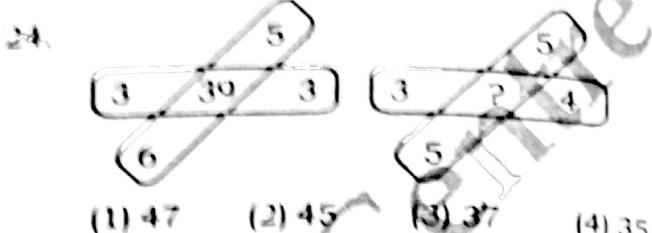
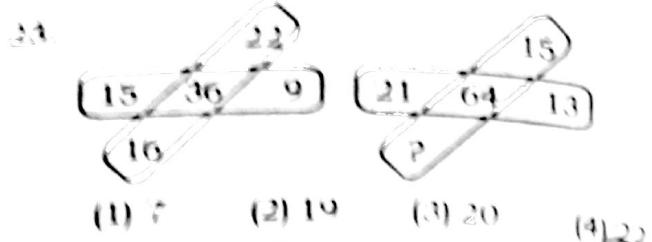
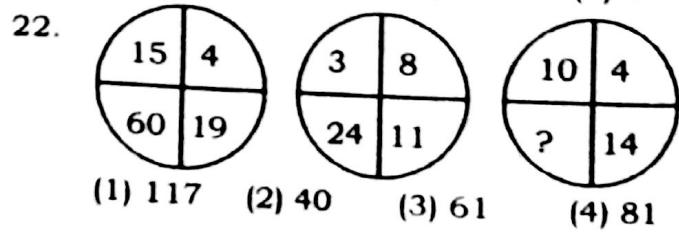
21.

18	24	32
2	24	16
3	?	4
3	7	12

(1) 2 (2) 3

(3) 4

(4) 5



25.

17	14	5
8	7	6
3	3	?
59	49	31

(1) 3 (2) 4

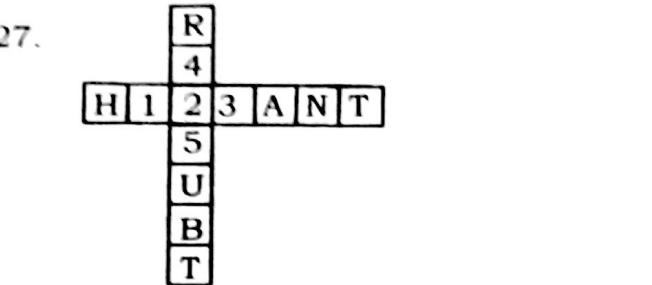
(3) 5 (4) 6

26.

7	9	21
4	81	36
9	?	45

(1) 18 (2) 25

(3) 36 (4) 58

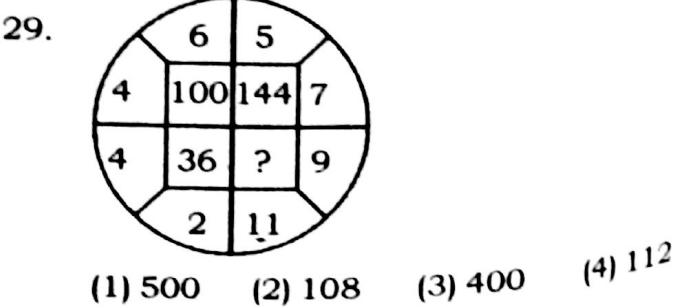


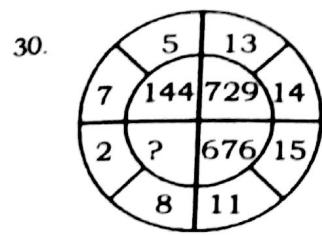
(1) EBE, UBH (2) ILI, ELL
(3) ONI, ONT (4) YDR, EDO

28.

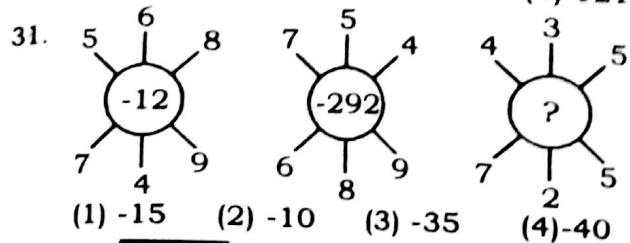
1	4
2	5
3	8
4	?
5	10

(1) 20 (2) 40
(3) 60 (4) 80

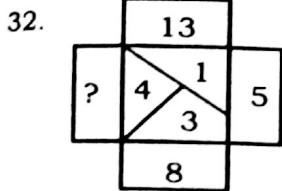




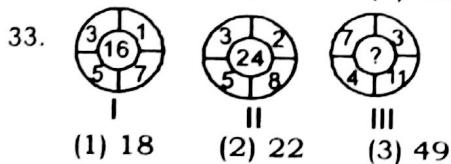
- (1) 64 (2) 81 (3) 100 (4) 121



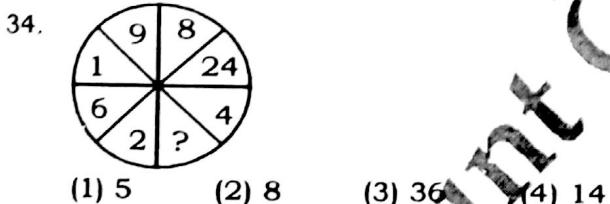
- (1) -15 (2) -10 (3) -35 (4) -40



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



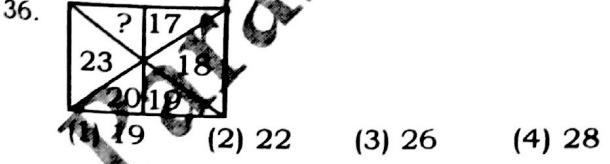
- (1) 18 (2) 22 (3) 49 (4) 33



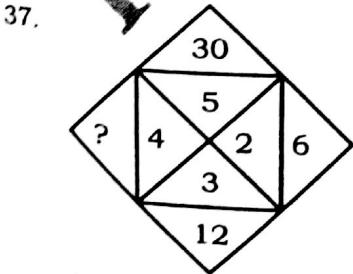
- (1) 5 (2) 8 (3) 36 (4) 14

3	27	9
7	21	3
4	?	7

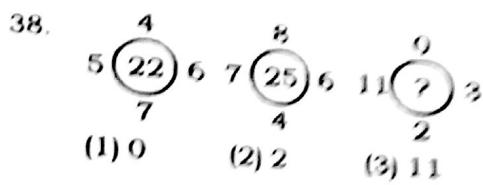
- (1) 11 (2) 28 (3) 35 (4) 48



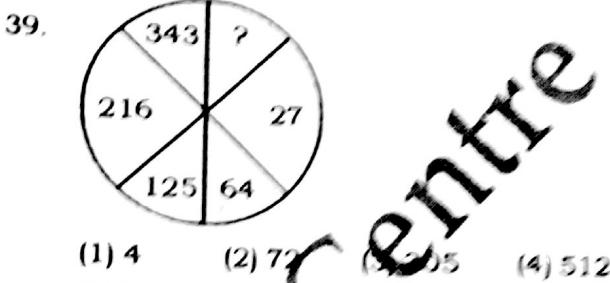
- (1) 19 (2) 22 (3) 26 (4) 28



- (1) 10 (2) 20 (3) 12 (4) 14



- (1) 0 (2) 2 (3) 11 (4) 16



- (1) 4 (2) 72 (3) 255 (4) 512

6	6	8
5	7	5
4	3	2
240	242	640

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

9	10	12
12	16	24
24	31	?

- (1) 31 (2) 45 (3) 33 (4) 35

4 ₁₅	3 ₁₈	2 ₂₁	1 ₂₄
?	6 ₉	7 ₆	8 ₃

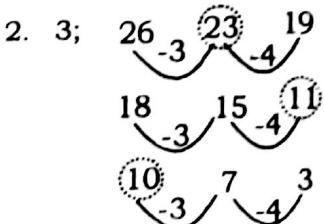
- (1) 5₂₁ (2) 5₁₂ (3) 6₁₂ (4) 8₃

9	13	12
19	10	5
8	?	11

- (1) 9 (2) 15 (3) 13 (4) 11

Answers with Explanation:

1. 4; $17 + 5 = 22 \div 2 = 11$
 $15 + 21 = 36 \div 2 = 18$
 $21 + 17 = 38 \div 2 = 19$



3. 3; In column I

$$1 \times 5 = 5 \times 5 = 25 \times 5 = 125$$

In column III

$$7 \times 2 = 14 \times 2 = 28 \times 2 = 56$$

So, In Column II

$$3 \times 4 = 12 \times 4 = 48 \times 4 = 192$$

4. 1; In I row

$$\text{Digits} - 1^2, 2^2, 3^2, 4^2$$

In row II

Digit 1, 2, 3, 4

In row III

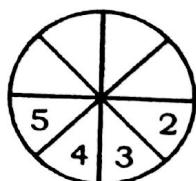
$$\text{Digits } 2 + 2 = 4, 4 + 2 = 6, 6 + 2 = 8$$

5. 2; $9 + 3^2 = 9 + 9 = 18$

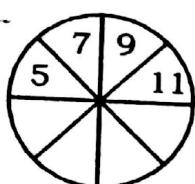
$$18 + 3^2 = 18 + 9 = 27$$

$$27 + 3^2 = 27 + 9 = 36$$

6. 2;



In half part of circle digit are increasing in ascending order i.e. 2, 3, 4, 5



In the half part of circle digits are increasing in ascending order in odd number if, 5, 7, 9, 11

7. 2; $7 \times 2 + 4 = 18$

$$= 18 \times 2 + 4 = 40$$

$$= 40 \times 2 + 4 = 84$$

$$= 84 \times 2 + 4 = 172$$

$$= 172 \times 2 = 348$$

8. 3; $5 + 8 = 13$

$$= 13 + 4 = 17$$

$$= 17 + 1 = 18$$

9. 2; missing number is = 17
In figure I

$$1^2 = 1$$

$$3^2 = 9$$

$$5^2 = 25$$

In figure II

$$2^2 = 4$$

$$4^2 = 16$$

$$6^2 = 36$$

In figure III

$$3^2 = 9$$

$$5^2 = 25$$

$$7^2 = 49$$

So, in figure IV

$$4^2 = 16$$

$$6^2 = 36$$

$$8^2 = 64$$

10. 1; In figure I

$$12^2 - 8^2$$

$$= 144 - 64 = 80$$

In figure II

$$16^2 - 6^2$$

$$= 256 - 36 = 210$$

In figure III

$$25^2 - 20^2$$

$$= 625 - 400$$

$$= 225$$

11. 4; In figure I

$$93 - (27 + 63) = 3$$

In figure II

$$79 - (08 + 37)$$

$$= 79 - 45 = 34$$

12. 1; In figure I

$$(56 + 15) - (22 + 18)$$

$$= 71 - 40 = 31$$

In figure II

$$(34 + 21) - (14 + 16)$$

$$= 55 - 30 = 25$$

13. 2; In figure I

$$(3 \times 4 \times 2 \times 5) \div 12$$

$$= 120 \div 12 = 10$$

In figure II

$$(6 \times 2 \times 10 \times 5) \div x = 10$$

$$600 \div x = 10$$

$$x = 600 \div 10$$

$$x = 60$$

14. 3; In figure I

$$(15 \times 6 \times 4) \div 36$$

$$= 360 \div 36 = 10$$

In figure II

$$(6 \times 7 \times 5) \div 21$$

$$= 210 \div 21 = 10$$

In figure III

$$(50 \times 10 \times 10) \div x = 10$$

$$5000 \div x = 10$$

$$x = 5000 \div 10$$

$$x = 500$$

15. 2; In row I

$$14 + \underline{19} + 12 = 45$$

In row II

$$13 + \underline{15} + 17 = 45$$

So, In row III

$$18 + 11 + x = 45$$

$$29 + x = 45$$

$$x = 45 - 29$$

$$x = 16$$

16. 2; In column I

$$9 \times 6 \times 5 = 270 - 10 = 260$$

In column II

$$8 \times 7 \times 4 = 224 - 10 = 214$$

So, in column III original number is

$$7 \times 8 \times 6 = 336 - 10 = 326$$

17. 3; In column I

$$(25 \div 5) + 21 = 26$$

In column II

$$(42 \div 6) + 100 = 107$$

In column III

$$(21 \div 3) + 20$$

$$= 7 + 20 = 27$$

18. 1; In row I

$$\frac{0 + (-2)}{2} = -1$$

In row II

$$\frac{1 + (\frac{-1}{2})}{2} = 0$$

∴ Missing Number is $\frac{2+14}{2} = 6$

19. 1; In column I

$$(5 \times 8 \times 2) \times 2 = 160$$

In column II

$$(5 \times 3 \times 4) \times 2 = 120$$

So, Missing number = $(2 \times 10 \times 1) \times 2 = 40$

20. 4; In Column II = $(22 + 20) - 23$

$$42 - 23 = 19$$

In Column III = $(40 + 50) - 43$

$$90 - 43 = 47$$

Then missing number = $(21 + 1) - 20 = 2$

21. 2; In column I = $18 - 12 - 3 = 3$

In column III = $32 - 16 - 4 = 12$

Then, in column II = $24 - 14 - x = 7$

$$10 - x = 7$$

$$x = 10 - 7$$

$$x = 3$$

So, missing no. is 3

22. 2; In figure I = $15 \times 4 = 60$, $15 + 4 = 19$

In figure II = $3 \times 8 = 24$, $3 + 8 = 11$

Then missing number is = $10 \times 4 = 40$

23. 1; In figure I = $(15 - 9) \times (22 - 16)$

$$= 6 \times 6 = 36$$

Then missing number = $(21 - 13) \times (15 -$

$$x) = 64$$

$$= 120 - 8x = 64$$

$$8x = 56$$

$$x = 7$$

24. 3; In figure I $(3 \times 3) + (3 \times 5) = 39$

Then missing number = $(3 \times 4) + (5 \times 5) = 37$

25. 3; In Column I = $(17 \times 3) + 8 = 59$

In Column II = $(14 \times 3) + 7 = 49$

Then missing number = $5 \times x + 6 = 31$

$$5x + 6 = 31$$

$$5x = 25$$

$$x = 5$$

26. 2; First Row $\rightarrow 21 \div 7 = 3$ and $3^2 = 9$

Second Row $\rightarrow 36 \div 4 = 9$ and $9^2 = 81$

Then missing number in third row = $45 \div 9 = 5$ and $5^2 = 25$

27. 4; In these question

in row \rightarrow YDR

in column \rightarrow EDO

Then complete word is REDOUBT and HYDRANT.

28. 3; We have $\rightarrow (2 \times 4) - (1 \times 3) = 8 - 3 = 5$

In the same way $(8 \times 10) - (4 \times 5) = 80 - 20 = 60$

29. 3; The arrangement is $4 + 6 = 10$,

$$10^2 = 100$$

$$5 + 7 = 12, 12^2 = 144$$

$$4 + 2 = 6, 6^2 = 36$$

In the same way $9 + 11 = 20; 20^2 = 400$

Then missing number is 400.

30. 3; The arrangement is $7 + 5 = 12; 12^2 = 144$

$$13 + 14 = 27; 27^2 = 729$$

$$15 + 11 = 26; 26^2 = 676$$

In the same way $8 + 2 = 10; 10^2 = 100$

Then missing number is 100.

31. 2; In figure I

$$(5 \times 6 \times 8) - (7 \times 4 \times 9)$$

$$= 240 - 252 = -12 \text{ (middle number)}$$

In figure II

$$(7 \times 5 \times 4) - (6 \times 8 \times 9)$$

$$= 140 - 432 = -292 \text{ (middle number)}$$

In figure III

$$(4 \times 3 \times 5) - (7 \times 2 \times 5)$$

$$= 60 - 70 = -10 \text{ (middle number)}$$

So, missing number is -10.

32. 3; Sum of number in triangle and square

= situated in next square

$$5 + 3 = 8, \quad 8 + 4 = 12, \quad 12 + 1 = 13$$

Then missing number is 12

33. 3; In ring I, $3 + 5 + 7 + 1^3 = 16$

In ring II, $3 + 5 + 8 + 2^3 = 24$

Then,

$$\text{Third ring} - 7 + 4 + 11 + 3^3 = 49$$

34. 3; Numbers are diagonally multiplied with 4.

$$1 \times 4 = 4, 6 \times 4 = 24, 2 \times 4 = 8$$

$$\text{So, } 9 \times 4 = 36$$

Then missing number is 36

35. 2; Middle number in first row = $3 \times 9 = 27$

Middle number is second row

$$= 7 \times 3 = 21$$

Then, Middle number in third row = 4×7

$$= 28$$

Then missing no. is 28

36. 3; $17 \xrightarrow{+1} 18 \xrightarrow{+1} 19$

So, $20 \xrightarrow{-3} 23 \xrightarrow{-3} 26$

Then missing number is 26.

37. 2; The arrangement is

$$2 \times 3 = 6$$

$$3 \times 4 = 12$$

$$4 \times 5 = 20$$

$$5 \times 6 = 30$$

Then, missing number is 20

38. 4; Number in the circle

$$= (5 + 6) + (4 + 7) = 22$$

Number in the circle

$$= (7 + 6) + (8 + 4) = 25$$

Number in the circle

$$= (11 + 3) + (2 + 0) = 16$$

39. 4; In order $3^3 = 27, 4^3 = 64,$

$$5^3 = 125, 6^3 = 216$$

$$7^3 = 343$$

$$\text{Then, } 8^3 = 512$$

Then, missing number is 512.

40. 2; Column I

$$= (6 \times 5 \times 4) \times 2$$

$$= 120 \times 2 = 240$$

Column II

$$= (6 \times 7 \times 3) \times 2$$

$$= 126 \times 2 = 252$$

Then, Column III

$$= (8 \times 5 \times x) \times 2 = 640$$

$$= 40x \times 2 = 640$$

$$= 40x = 640 \div 2$$

$$= 40x = 320$$

$$x = 8$$

Then, missing is 8

41. 2; In order,

$$\text{In row I, } 9 \xrightarrow{+1} 10 \xrightarrow{+2} 12$$

$$\text{In row II, } 12 \xrightarrow{+4} 16 \xrightarrow{+8} 24$$

Then, In row III, $24 \xrightarrow{+7} 31 \xrightarrow{+14} 45$

Then, missing no is 45.

Clearly, moving anticlockwise.

$$1 \xrightarrow{+1} 2 \xrightarrow{+1} 3 \xrightarrow{+1} 4 \xrightarrow{+1} [5] \xrightarrow{+1} 6 \xrightarrow{+1} 7 \xrightarrow{+1} 8$$

Moving Clockwise

$$3 \xrightarrow{+3} 6 \xrightarrow{+3} 9 \xrightarrow{+3} [12] \xrightarrow{+3} 15 \xrightarrow{+3} 18 \xrightarrow{+3} 21$$

Then, missing number is 5₁₂.

The Sum of all numbers of each row is = 34

Then, the missing number is

$$= 8 + 11 + x = 34$$

$$\text{or, } 19 + x = 34$$

$$\text{or, } x = 34 - 19$$

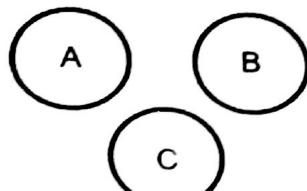
$$\text{or, } x = 15$$

VENN DIAGRAM

Venn diagram is named after a British Mathematician, **John Venn** who developed the idea of using diagrams to represent sets.

Here are a few different types of Venn diagrams with their implications. There are different ways of representing our problems by Venn diagram. In all representations only circles are used for simplicity. Different cases are shown below-

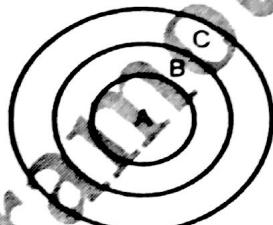
1. If the items given in the problem belong to three different groups, the Venn diagram representing it would be as shown below-



Ex. Solid (A), Liquid (B), Gas (C)

These three items bear no relationship to one-another. So they are represented by 3 disjoint circles.

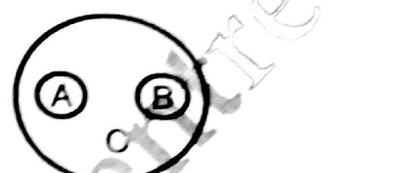
2. If one item belongs to the class of the second and the second belongs to the class of third, then the representation is in the form of three concentric circles, as shown below.



Ex. Drinking Water (A), Water (B), Liquid (C).

Clearly, drinking water is a part of water and water is a part of liquid. So, the Venn diagram would be as shown in the adjoining figure with circle A representing drinking water, circle B representing water and circle C representing liquid.

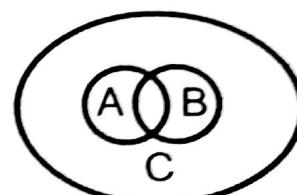
3. If two separate items belong to the class of the third, they are represented by two disjoint circles inside a bigger circle as shown. Note that the two items should be different i.e they shouldn't be related to



Ex. Desk (A), Chair (B), Furniture (C)

Clearly, table and chair are separate items but both are items of furniture. So, they would be represented as shown in the adjoining figure with circle A Desk, circle B representing Chair and circle C representing Furniture.

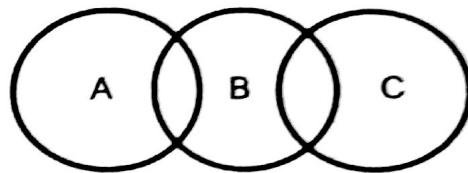
4. If two items belong to the class of the third items in such away that some items of each of these two groups are common in relationship, then they are represented by two intersecting circles enclosed within the bigger circle.



Ex. Females (C), Mothers (A), Sisters (B).

Clearly, some mothers may be sisters and vice-versa. So, mothers and sisters would be represented by two intersecting circles. Also mothers and sisters are females. So, in the diagrammatic representation mothers are represented by circle A, circle B represents sisters and circle C represents females.

5. If two items are partly related to the third, and are themselves independent of each other, they are represented by three intersecting circles in a line.



Ex. Cats (A), Pets (B), Dogs (C).

Clearly, some dogs and some cats are pets.