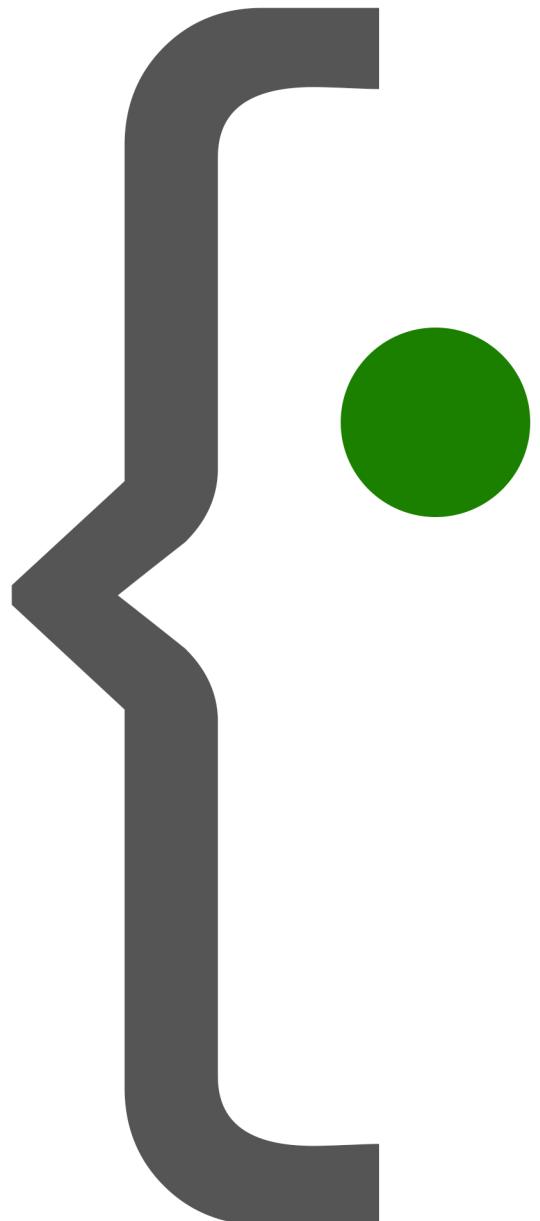


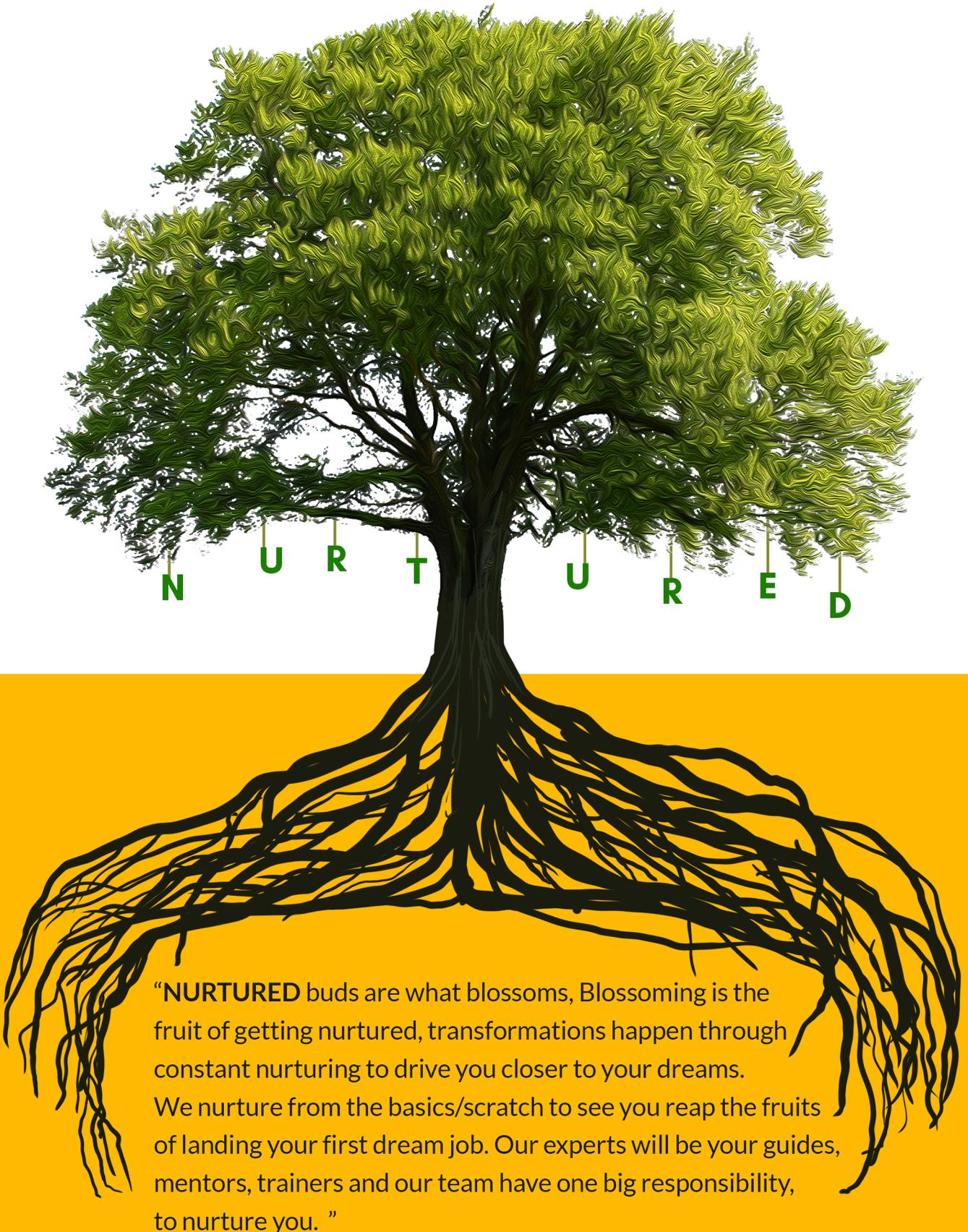


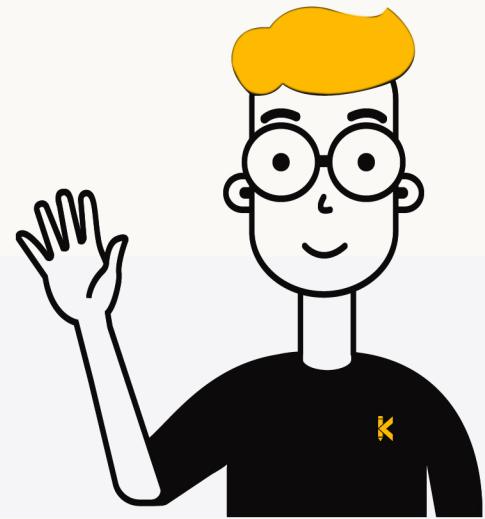
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# Hello Nick Name

**From Knowledge to Success, Your Career Path with KodNest!**

Welcome to KodNest. As you open this book, you embark on a journey that's all about you. Here's a space to mark your name and your unique KodnestID.

This book, like KodNest, is your companion, your guide, and your catalyst.

We built KodNest on a foundation of strong ethics and shared values. You, our students, are the core of this foundation, the reason we exist and the motivation that propels us forward. As long as KodNest exists, we commit to standing by your side, navigating the challenges and celebrating the triumphs together.

You're here because you have a goal, a vision, a destination. We acknowledge your dreams and respect the struggles you've faced to reach this point. Now, it's time for the next phase of your journey. Together, we'll help you move closer to your aspirations.

Remember, success at KodNest and beyond, demands effort, grit and resilience. It's a climb, but a climb worth every step. So, take a deep breath, embrace the journey, and keep sight of your goals. We believe in you. We know you can make it. And we'll be here, cheering for you at every step, until you get there.

So, let's get started, let's get there. Welcome aboard!

# The Way to Success



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# TOPIC 1

## NUMBER SYSTEM BASICS

- 1. Which of the following is not a Prime number?**
- A. 127      B. 137      C. 147      D. 157

**Solution**

147 is not a prime number as clearly visible that it is divisible by 3 and 7.

- 2. The product of 3 prime numbers is 1001. What is the sum of those prime numbers?**
- A. 31      B. 33      C. 29      D. 27

**Solution**

$$1001 = 7 \times 143 = 7 \times 11 \times 13$$

Therefore, the three prime numbers are 7, 11 and 13. Required sum =  $7+11+13 = 31$ .

- 3. Find the number of zeros in the given expression:  $25 \times 50 \times 75 \times 100$**
- A. 3      B. 4      C. 5      D. 6

**Solution**

$$25 \times 50 \times 75 \times 100 = 5^2 \times 2 \times 5^2 \times 3 \times 5^2 \times 2^2 \times 5^2 = 2^3 \times 5^8 \times 3$$

Number of zeros = Minimum of power of 2 and 5 = 3.

- 4. Find the number of zeros in 224 factorial.**
- A. 44      B. 53      C. 52      D. 54

**Solution**

In case of factorial, we keep on dividing the number by 5 until we get a quotient lesser than 5 and take the sum of all the quotients to get the number of zeros.

$224/5$  gives you a quotient of 44(more than 5).  $44/5$  gives a quotient of 8(more than 5).  $8/5$  gives a quotient of 1(less than 5). Therefore, the number of zeros =  $44 + 8 + 1 = 53$ .

- 5. Find the number of zeros in the given expression:  $2^6 \times 15^{30}$**
- A. 30      B. 36      C. 33      D. 6

**Solution**

$$2^6 \times 15^{30} = 2^6 \times (5 \times 3)^{30} = 2^6 \times 5^{30} \times 3^{30}$$

Number of zeros = Minimum of power of 2 and 5 = 6

- 6. What least number should you multiply in 3920 so that it becomes a perfect square?**
- A. 5      B. 4      C. 2      D. 20

**Solution**

$$3920 = 392 \times 10 = 2 \times 196 \times 2 \times 5 = 2^2 \times 14^2 \times 5$$

As the power of 5 is not even, we need to multiply 3920 by 5 to make it a perfect square.

- 7. The sum of digits of a number is 11. If 9 is subtracted from this number, you get the same number in reverse order. Find the number.**

- A. 65      B. 56      C. 74      D. 47

**Solution**

Check options by options:

All the options have sum of digits as 11. When you subtract 9 from 65, you will get 56 which is in reverse order.

- 8. The sum of digits of a number is 8. If 36 is added to this number, you get the same number in reverse order. Find the number.**

- A. 62      B. 35      C. 26      D. 74

**Solution**

All the options have sum of digits as 8 except (d). Therefore, it will be eliminated. When you add 36 in 26, you will get 62 which is in reverse order.

## Topic 1: NUMBER SYSTEM BASICS

9. The sum of digits of 3-digit number is 14. If 99 is subtracted from this number, we get the same number but in reverse order. Find the number.

A. 473      B. 464      C. 478      D. 482

**Solution**

All the options have sum of digits as 14. When you subtract 99 from 473, you will get 374 which is in reverse order.

10. If all the natural numbers from 50 to 99 are multiplied together (both inclusive), then the unit digit of the result will be:

A. 5      B. 9      C. 3      D. 0

**Solution**

When any multiple of 2 and 5 are multiplied together, we will always get zero at the unit place. Therefore, the unit digit in the result will be 0.

11. If all the odd numbers between 50 to 99 are multiplied together, then the unit digit of the result will be:

A. 5      B. 9      C. 3      D. 0

**Solution**

When any multiple of 5 is multiplied with only odd numbers, we will always get 5 at the unit place. Therefore, the unit digit in the result will be 5.

12. What is the unit digit of the sum of first 99 natural numbers?

A. 0      B. 2      C. 4      D. 8

**Solution**

Sum of n natural numbers =  $n(n+1)/2 = (99 \times 100)/2 = 99 \times 50$

Hence, unit place = 0

13. What is the unit digit of the given power expression:  $66^{66}$

A. 6      B. 2      C. 4      D. 8

**Solution**

Take the unit place of the base which is 6. As per the power series of 6, we know that any power of 6 will give a unit place of 6 only. Therefore, unit place is 6.

14. What is the unit digit of the given power expression:  $125^{66}$

A. 5      B. 2      C. 4      D. 8

**Solution**

Take the unit place of the base which is 5. As per the power series of 5, we know that any power of 5 will give a unit place of 5 only. Therefore, unit place is 5.

15. What is the unit digit of the given power expression:  $752^{67}$

A. 6      B. 2      C. 4      D. 8

**Solution**

Take the unit place of the base which is 2. As per the power series of 2, we know that power series of 2 will give cyclicity of 4. So, divide the power 67 by 4 and get the remainder which is 3. Hence,  $2^3=8$ . Therefore, unit digit will be 8.

16. What is the unit digit of the given power expression:  $67^{64}$

A. 1      B. 2      C. 4      D. 8

**Solution**

Take the unit place of the base which is 7. As per the power series of 7, we know that power series of 7 will give cyclicity of 4. So, divide the power 64 by 4 and get the remainder which is 0. When the remainder is 0, we replace the power with 4. Hence,  $7^4$  give you the unit digit as 1.

</DIY/>

1. The product of 3 prime numbers is 255. What is the sum of those prime numbers?  
A. 25      B. 26      C. 27      D. 28
2. Find the number of zeros in 24 factorial.  
A. 4      B. 5      C. 6      D. 7
3. Find the number of zeros in the given expression:  $2^6 \times 10^{30}$   
A. 30      B. 36      C. 33      D. 6
4. What is the least number by which 3920 must be divided so that it becomes a perfect square?  
A. 5      B. 4      C. 2      D. 20
5. The sum of digits of a 2- digit number is 12. If 18 is subtracted from this number, you get the same number in reverse order. Find the number.  
A. 75      B. 57      C. 84      D. 48

# TOPIC 2

## DIVISIBILITY RULES

1. If a number is divisible by both 15 and 18, then it must be necessarily divisible by:  
A.  $15+18$       B.  $18-15$       C.  $15 \times 18$       D.  $15 \times 6$

**Solution**

The number will be divisible by L.C.M of 15 and 18.

L.C.M =  $15 \times 6$  Ans.

2. If the number  $27954X604$  is divisible by 3, then the sum of possible digits in place of X is:  
A. 17      B. 15      C. 16      D. 19

**Solution**

$27954X604$  is divisible by 3.

$\Rightarrow 2 + 7 + 9 + 5 + 4 + X + 6 + 0 + 4$  is divisible by 3.

$\Rightarrow 4 + X$  is divisible by 3. [Remove 3 or its multiples]

$\Rightarrow 1 + X$  is divisible by 3.

$\Rightarrow 1 + X = 3, 6, 9 \Rightarrow X = 2, 5, \text{ or } 8$

$\Rightarrow \text{Sum} = 2 + 5 + 8 = 15$  Ans

3. The largest number which should replace X in the number  $2395X4$  to make the number divisible by 4 is:

- A. 9      B. 0      C. 2      D. 8

**Solution**

$X4$  is divisible by 4.

$\Rightarrow (10X + 4)$  is divisible by 4. (Remove  $8X$  and 4 as they are multiples of 4)

$\Rightarrow 2X$  is divisible by 4.  $\Rightarrow X = 0, 2, 4, 6, 8 \Rightarrow$  Maximum possible value of  $X = 8$  Ans.

4. If the number  $2695X4$  is divisible by 8, then smallest integer in place of X will be:

- A. 1      B. 0      C. 4      D. 2

**Solution**

$2695X4$  is divisible by 8.

$\Rightarrow 5X4$  is divisible by 8.

$\Rightarrow 500 + 10X + 4$  is divisible by 8.

$\Rightarrow 504 + 10X$  is divisible by 8.

Remove  $8X$  and 504 as they are multiples of 8.

$\Rightarrow 2X$  is divisible by 8.

$\Rightarrow 2X = 0, 8, 16$

$\Rightarrow X = 0, 4, 8 \Rightarrow$  Smallest  $X = 0$  Ans.

5. If  $339324X95$  is divisible by 9, then digit in place of X is:

- A. 7      B. 1      C. 6      D. 9

**Solution**

$339324X95$  is divisible by 9.

$\Rightarrow 3 + 3 + 9 + 3 + 2 + 4 + X + 9 + 5$  is divisible by 9.

$\Rightarrow 2 + X$  is divisible by 9.

$\Rightarrow X = 7$  Ans.

6. How many pairs of X and Y are possible in the number 982X1Y2, if the number is divisible by 9?

A. 8                      B. 9                      C. 10                      D. 11  
**Solution**  
~~982X1Y2~~ is divisible by 9.  
 $\Rightarrow \cancel{9} + \cancel{8} + 2 + X + \cancel{1} + Y + 2$  is divisible by 9.  
 $\Rightarrow 4 + X + Y$  is divisible by 9.

$$\begin{array}{ll} 4 + X + Y = 9 & 4 + X + Y = 18 \\ X + Y = 5 & X + Y = 14 \\ \left[ \begin{array}{l} 5 + 0 \\ 4 + 1 \\ 3 + 2 \\ 2 + 3 \\ 1 + 4 \\ 0 + 5 \end{array} \right] & \left[ \begin{array}{l} 9 + 5 \\ 8 + 6 \\ 7 + 7 \\ 6 + 8 \\ 5 + 9 \end{array} \right] \\ 6 \text{ pairs} & 5 \text{ pairs} \\ 6 + 5 = 11 \text{ pairs Ans.} & \end{array}$$

7. If 5947A86B1 is divisible by 9, where B is an odd number, find the sum of all possible values of A?

A. 26                      B. 27                      C. 30                      D. 36

~~5947A86B1~~ is divisible by 9.  
 $\Rightarrow 13 + A + B$  is divisible by 9. [Remove 9 or its multiples]  
 $\Rightarrow 4 + A + B$  is divisible by 9.  
 $\Rightarrow 4 + A + B = 9$  or 18

$$\begin{array}{lll} A + B = 5 & \text{or} & A + B = 14 \\ 4 + 1 & & 5 + 9 \\ 2 + 3 & & 7 + 7 \\ 0 + 5 & & 9 + 5 \end{array}$$

$\Rightarrow$  Required sum =  $4 + 2 + 0 + 5 + 7 + 9 = 27$  Ans.

8. What is the least value of X such that 425X524 is divisible by 12?

A. 3                      B. 1                      C. 0                      D. 2

**Solution**

$$\begin{array}{ccc} 12 & & \\ \swarrow 3 & & \searrow 4 \\ \cancel{4} \cancel{2} \cancel{5} \cancel{X} \cancel{5} \cancel{2} \cancel{4} & & 425X524 \\ \Rightarrow 4 + X \text{ is divisible by 3} & & 24/4 \\ \Rightarrow 1 + X \text{ is divisible by 3} & & \Rightarrow X \text{ can be any value.} \\ \Rightarrow X_{\min} = 2 \text{ Ans.} & & \end{array}$$

9. If 11-digit number 919835X121Y is divisible by 90, then the value of  $4X + 5Y$  is:

A. 24                      B. 21                      C. 25                      D. 16

**Solution**

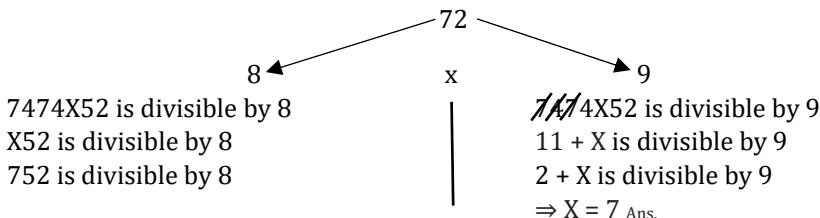
$$\begin{array}{ccc} 90 & & \\ \swarrow 9 & & \searrow 10 \\ \cancel{9} \cancel{1} \cancel{9} \cancel{8} \cancel{3} \cancel{5} \cancel{X} \cancel{1} \cancel{2} \cancel{1} \cancel{Y} & & 919835X121Y \text{ is divisible by 10} \\ 12 + X + Y \text{ is divisible by 9} & & \Rightarrow Y = 0 \text{ and } X = \text{any value} \\ 3 + X \text{ is divisible by 9 since } Y=0 & & \\ \Rightarrow X = 6 & & \\ \text{Hence, } 4X + 5Y = 4 \times 6 + 0 = 24 \text{ Ans.} & & \end{array}$$

## Topic 2: DIVISIBILITY RULES

10. If 7-digit number 7474X52 is divisible by 72, then the value of X is:

A. 5      B. 3      C. 7      D. 8

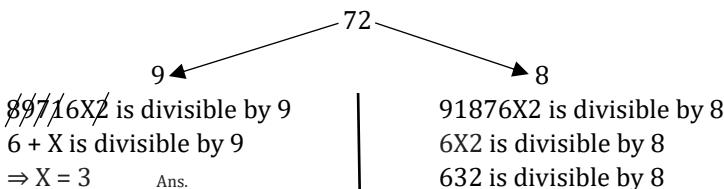
Solution



11. If 7-digit number 89716X2 is divisible by 72, then the value of X is:

A. 2      B. 6      C. 7      D. 3

Solution



</DIY/>

1. Which of the following says the same thing as "P is divisible by Q"?  
A. Q is a multiple of P      B. Q is divisible by P  
C. P is a multiple of Q      D. P is a divisor of Q
2. If 43322K is exactly divisible by 72, what is K?  
A. 4      B. 2      C. 6      D. 8
3. Which of the following numbers are completely divisible by 11?  
i. 3244682    ii. 283702    iii. 438416    iv. 36874  
A. Only I    B. Only iii    C. Only ii    D. All are divisible
4. If the number 26348X047 is divisible by 3, then the largest possible digit in place of X is:  
A. 7      B. 8      C. 6      D. 9
5. If 46732X781 is divisible by 9, then digit in place of X is:  
A. 7      B. 1      C. 6      D. 9
6. What should be the minimum value of P so that the number 211P245 is exactly divisible by 15?  
A. 3      B. 6      C. 0      D. 2
7. If 43329K is exactly divisible by 72, what is K?  
A. 4      B. 2      C. 6      D. 8
8. What should be the minimum value of A so that the number 6789P24 is exactly divisible by 24?  
A. 3      B. 6      C. 4      D. 2
9. Which of the following numbers is divisible by 9?  
A. 1247043      B. 9090970704      C. 17622199      D. 10101
10. What should be the minimum value of Q so that the number 322Q356 is exactly divisible by 12?  
A. 3      B. 6      C. 0      D. 2

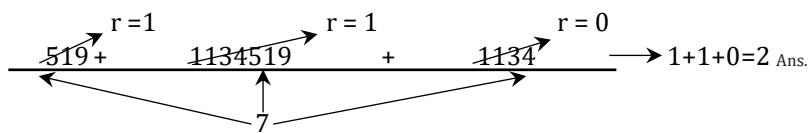
# TOPIC 3

## REMAINDER

1. What is the remainder when  $519 + 1134519 + 1134$  is divided by 7?

A. 2                              B. 1.999                              C. 3                              D. None of these

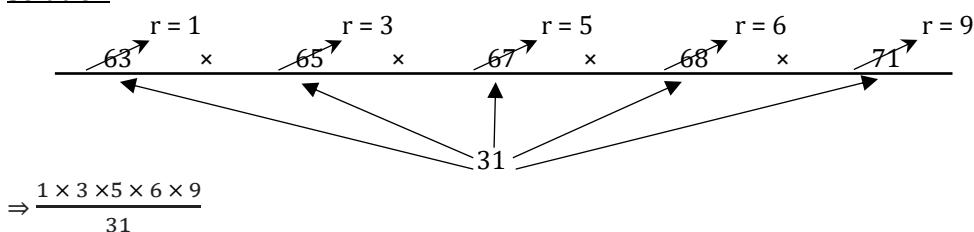
**Solution**



2. Find the remainder when  $63 \times 65 \times 67 \times 68 \times 71$  is divided by 31?

A. 27                              B. 31                                      C. 4                                      D. 34

**Solution**



$$\Rightarrow \frac{1 \times 3 \times 5 \times 6 \times 9}{31}$$

$$\Rightarrow \frac{90 \times 9}{31} \Rightarrow \frac{(-3) \times 9}{31} \Rightarrow \frac{-27}{31} \Rightarrow r = -27 + 31 = 4 \text{ Ans.}$$

3. A number when divided by 697 gives a remainder of 209. If the same number is divided by 41, the remainder will be?

**Solution**

$$\frac{N}{697} \Rightarrow r = 209$$

Let  $N = 209$

$$\text{Now, } \frac{N}{41} \Rightarrow \frac{209}{41} \Rightarrow r = 4 \text{ Ans.}$$

4. If a number is divided 92, then the remainder is 29. If 2 times of this number is divided by 46, what will be the value of remainder?

**Solution**

$$\frac{N}{92} \Rightarrow r = 29$$

Let  $N = 29$

$$\text{Now, } \frac{2N}{46} \Rightarrow \frac{2 \times 29}{46} \Rightarrow \frac{58}{46} \Rightarrow r = 12 \text{ Ans.}$$

5. If a number is divided by 31, then the remainder is 15. If thrice of the square of this number is divided by the same divisor, what will be the value of remainder?

**Solution**

$$\frac{N}{31} \Rightarrow r = 15$$

Let  $N = 15$

$$\text{Now, } \frac{3N^2}{31} \Rightarrow \frac{3 \times N \times N}{31} \Rightarrow \frac{3 \times 15 \times 15}{31} \Rightarrow \frac{3 \times 225}{31} \Rightarrow \frac{3 \times 8}{31} \Rightarrow \frac{24}{31} \Rightarrow r = 24 \text{ Ans.}$$

## Topic 3: REMAINDER

6. A number when divided by 232 gives a remainder of 59. If the same number is divided by 29, the remainder will be?

A. 1                      B. 2

C. 19

D. 31

**Solution**

$$\frac{N}{232} \Rightarrow r = 59$$

Let  $N = 59$

$$\text{Now, } \frac{N}{29} \Rightarrow \frac{59}{29} \Rightarrow r = 1 \text{ Ans.}$$

7. When  $N$  is divided by 7, the remainder is 5. When  $2N$  is divided by 7, what will be the remainder?

**Solution**

Given,

$$\frac{N}{7} \Rightarrow r = 5$$

Let  $N = 5$

$$\Rightarrow \frac{2N}{7} \Rightarrow \frac{2 \times 5}{7} \Rightarrow \frac{10}{7} \Rightarrow r = 3 \text{ Ans.}$$

8. When the integer 'N' is divided by 6, the remainder is 5. What is the remainder when  $4n$  is divided by 6?

A. 0                      B. 1

C. 2

D. 3

**Solution**

$$\frac{N}{6} \Rightarrow r = 5$$

Let  $N = 5$

$$\Rightarrow \frac{4N}{6} \Rightarrow \frac{4 \times 5}{6} \Rightarrow \frac{20}{6} \Rightarrow r = 2 \text{ Ans.}$$

9. When the integer 'N' is divided by 231, the remainder is 6. What will be the remainder when  $5N^2 + 4$  is divided by 21?

**Solution**

$$\frac{N}{231} \Rightarrow r = 6$$

Let  $N = 6$

$$\text{Now, } \frac{5 \times N^2 + 5}{21} \Rightarrow \frac{5 \times N \times N + 4}{21} \Rightarrow \frac{5 \times 6 \times 6 + 4}{21} \Rightarrow \frac{30 \times 6 + 5}{21} \Rightarrow \frac{9 \times 6 + 5}{21} \Rightarrow \frac{59}{21} \Rightarrow r = 17 \text{ Ans.}$$

10. When the integers  $N_1$  &  $N_2$  are divided by 13, the remainders are 11 and 7 respectively. What will be the remainder when  $N_1 + N_2$  is divided by 13?

**Solution**

$$\frac{N_1}{13} \Rightarrow r = 11 \text{ and } \frac{N_2}{13} \Rightarrow r = 7$$

Let  $N_1 = 11$  and  $N_2 = 7$

$$\text{Now, } \frac{(N_1+N_2)}{13} \Rightarrow \frac{11+7}{13} \Rightarrow \frac{18}{13} \Rightarrow r = 5 \text{ Ans.}$$

11. When the integer 'N' is divided by 19, the remainder is 10. What is the remainder when  $4N$  is divided by 19?

**Solution**

$$\frac{N}{19} \Rightarrow r = 10$$

Let  $N = 10$

$$\text{Now, } \frac{4 \times N}{19} \Rightarrow \frac{4 \times 10}{19} \Rightarrow \frac{40}{19} \Rightarrow r = 2 \text{ Ans.}$$

12. What is the remainder when 46699246467 is divided by 23?

**Solution**

$$\begin{array}{r} 0\ 0\ 0\ 0\ 0 \\ \cancel{4}\ 6\ 6\ 9\ 9\ 2\ 4\ 6\ 4\ 6\ 7 \\ \hline \end{array} \Rightarrow r = 7 \text{ Ans.}$$

13. If an integer  $N$  is divisible by 3, 5 and 12, what is the next larger integer divisible by all these numbers?

A.  $N+3$       B.  $N+5$       C.  $N+12$       D.  $N+60$

**Solution**

The next number divisible by 3, 5 and 12 =  $N + (\text{L.C.M. of } 3, 5, 12)$   
 $= N + 60$  Ans.

14. Find the maximum integer value of 'n' such that when  $(22)^{22}$  is divided by  $8^n$ , the remainder is zero.

**Solution**

$$\frac{(22)^{22}}{8^n} \Rightarrow r = 0$$

Break into prime factors

$$\frac{(2 \times 11)^{22}}{(2^3)^n} = \frac{2^{22} \times 11^{22}}{2^{3n}} \Rightarrow r = 0$$

As  $r = 0 \Rightarrow 2^{22} \times 11^{22}$  is completely divisible by  $2^{3n}$ .

For this to be possible, the power of 2 in denominator should be less than or equal to that in numerator.

$$\Rightarrow 3n \leq 22$$

$$\Rightarrow n \leq \frac{22}{3}$$

$$\Rightarrow n \leq 7.33$$

$$\Rightarrow n_{\max} = 7 \text{ Ans.}$$

</DIY/>

1. Find the remainders when the numbers 76550, 76551 and 76552 are divided by 3?

A. 2, 0, 2      B. 1, 0, 1      C. 1, 2, 3      D. 2, 0, 1

2. What is the remainder when 466992461157 is divided by 23?

A. 6      B. 7      C. 9      D. 8

3. Find the remainder when  $137 \times 71 \times 77 \times 93$  is divided by 15.

A. 9      B. 13      C. 12      D. 10

4. What is the remainder when  $98 \times 97 \times 96 \times 95$  is divided by 99?

(Hint: use negative remainder concept)

A. 75      B. 24      C. 65      D. 57

5. Find the remainder when  $635 \times 636 \times 637 \times 638$  is divided by 9.

A. 8      B. 5      C. 6      D. 4

6. What is the remainder when  $648 + 1701 \times 4049 \times 4052$  is divided by 4?

A. 1      B. 2      C. 3      D. 0

7. When a square of an odd number is divided by 8

- A. the remainder could be any odd number.
- B. nothing definite can be said about the remainder.
- C. the remainder is always 1.
- D. the remainder could be any even number.

8. When the integer 'n' is divided by 7, the remainder is 5. What is the remainder if  $6n$  is divided by 7?

A. 0      B. 1      C. 2      D. 3

9. If a number is divided by 253, the remainder is 8. If 5 added to 7 times the square of this number is divided by 23, then what will be the value of remainder will be \_\_\_\_.

10. A number divided by 435 leaves a remainder of 117. The remainder when it is divided by 29 will be \_\_\_\_.

# TOPIC 4

## HCF AND LCM

1. Find L.C.M. & H.C.F. of 54, 216 and 540.

Solution

$$\begin{array}{c}
 9 \& 6 \\
 \text{divides} \\
 \text{all the} \\
 \text{numbers} \\
 \hline
 6 | 54, 216, 540 \\
 6 | 6, 24, 60 \\
 1 \quad 4 \quad 10 \\
 \hline
 \text{So, H.C.F} = 9 \times 6 = 54 \\
 \text{And L.C.M} = 9 \times 6 \times \text{L.C.M. of } (1, 4, 10) \\
 = 54 \times 20 = 1080
 \end{array}$$

2. Find L.C.M. & H.C.F. of 64, 69 and 84.

Solution

$$\begin{array}{c}
 4 | 64, 69, 84 \\
 3 | 16, 69, 21 \\
 16 \quad 23 \quad 7 \\
 \hline
 \text{L.C.M} = 4 \times 3 \times 16 \times 23 \times 7
 \end{array}$$

There is no number which divides all of them  $\Rightarrow$  H.C.F. = 1. Think of a no which divides two of them.

Now there is nothing common even pairwise

3. Find L.C.M. & H.C.F. of 128, 484 and 424.

Solution

$$\begin{array}{c}
 4 | 128, 484, 424 \\
 2 | 32, 121, 106 \\
 16 \quad 121 \quad 53 \\
 \hline
 \text{So, H.C.F} = 4 \\
 \text{L.C.M} = 4 \times 2 \times 16 \times 121 \times 53
 \end{array}$$

4 divides all of them

No number divides all of them, so think pairwise now

Now there is nothing common even pairwise

4. Find the largest 3-digit number which is a multiple of 29.

Solution

$$\begin{array}{r}
 29 \overline{)999} (34 \\
 \underline{-87} \\
 \hline
 129 \\
 \underline{-116} \\
 \hline
 13 \\
 \hline
 \Rightarrow \frac{999}{29} \Rightarrow r = 13 \\
 \hline
 \Rightarrow \frac{986}{29} \Rightarrow r = 0 \Rightarrow 986 \text{ is the required answer}
 \end{array}$$

5. Find the smallest 4-digit number which is a multiple of 49.

Solution

$$\begin{array}{r}
 49 \overline{)1000} (20 \\
 \underline{-98} \\
 \hline
 20 \\
 \underline{-00} \\
 \hline
 20 \\
 \hline
 \Rightarrow \frac{1000}{49} \Rightarrow r = 20
 \end{array}$$

So, to make dividend as a 4-digit number, add divisor in dividend.

$$\Rightarrow \frac{1000 - 20 + 49}{49} \Rightarrow r = 0$$

$\Rightarrow 1029$  is the required answer

6. Find the smallest number (greater than divisor) which when divided by 5, 7 or 11 leaves same remainder of 4 in each case.

**Solution**

Given,

$$\begin{array}{c} 5 \overline{)N} \\ r = 4 \end{array} \quad \begin{array}{c} 7 \overline{)N} \\ r = 4 \end{array} \quad \begin{array}{c} 11 \overline{)N} \\ r = 4 \end{array}$$

$$\begin{array}{c} \underline{r = 4} \\ \underline{r = 4} \\ \underline{r = 4} \end{array}$$

This is L.C.M model 1.

$$\begin{aligned} \Rightarrow \text{Least value of } N &= \text{L.C.M of divisors} + r \\ &= (5 \times 7 \times 11) + 4 \\ &= 385 + 4 \\ &= 389 \text{ Ans.} \end{aligned}$$

7. Find the smallest 4-digit number which when divided by 5, 7 or 11 leaves same remainder of 4 in each case.

**Solution4**

We know,

$$\begin{aligned} \text{In general, } N &= K(\text{L.C.M of divisors}) + r \\ &= 385K + r \end{aligned}$$

$$385 \overline{)1000} \quad \underline{2}$$

$$\begin{array}{r} 770 \\ - \\ 230 \end{array}$$

$$\Rightarrow \frac{1000}{385} \Rightarrow r = 230$$

$$\Rightarrow \frac{1000 - 230 + 385}{385} \Rightarrow r = 0$$

$$\Rightarrow \frac{1000 - 230 + 385 + 4}{385} \Rightarrow r = 0 + 4$$

$$\Rightarrow \text{Required number} = 1159 \text{ Ans.}$$

8. Find the largest 4-digit number which when divided by 4, 7 or 11 leaves same remainder of 3 in each case.

**Solution**

$$308 \overline{)9999} \quad \underline{32} \quad [308 \text{ is the L.C.M of divisors}]$$

$$\begin{array}{r} 924 \\ - \\ 759 \end{array}$$

$$\begin{array}{r} 616 \\ - \\ 143 \end{array}$$

$$\Rightarrow \frac{9999}{308} \Rightarrow r = 143$$

$$\Rightarrow \frac{9999}{308} \Rightarrow r = 143$$

$$\Rightarrow \frac{9999 - 143}{308} \Rightarrow r = 0$$

$$\Rightarrow \frac{9999 - 143 + 3}{308} \Rightarrow r = 0 + 3$$

$$\Rightarrow \text{Required } N = 9999 - 143 + 3 = 9859 \text{ Ans.}$$

9. Find the smallest number which when divided by 5 & 7 gives remainder of 3 & 5 respectively.

**Solution**

$$\text{Given, } 5 \overline{)N} \quad 7 \overline{)N}$$

$$\begin{array}{c} \underline{r = 3} \\ \text{-ve remainder} \end{array} \quad \begin{array}{c} \underline{r = 5} \\ \text{-ve remainder} \end{array}$$

$$\begin{array}{l} = 3 - 5 \\ = -2 \end{array} \quad \begin{array}{l} = 5 - 7 \\ = -2 \end{array}$$

$$\begin{array}{ccc} \nearrow \text{Same} & & \searrow \end{array}$$

$$\Rightarrow \text{L.C.M model 2}$$

$$\Rightarrow N_{\text{Least}} = \text{L.C.M of divisors} + (\text{-ve remainder})$$

$$= \text{L.C.M of } (5, 7) + (-2) = 35 - 2 = 33 \text{ Ans.}$$

## Topic 4: H.C.F. AND L.C.M.

- 10. Find the smallest number which when divided by 4, 5, 7 or 11 gives remainder of 1, 2, 4 and 8 respectively.**

**Solution**

Given,	$4 \overline{)N}$	$5 \overline{)N}$	$7 \overline{)N}$	$11 \overline{)N}$
	$\frac{1}{\overline{1}}$	$\frac{2}{\overline{2}}$	$\frac{4}{\overline{4}}$	$\frac{8}{\overline{8}}$
	-ve rem	-ve rem	-ve rem	-ve rem
	$= 1 - 4$	$= 2 - 5$	$= 4 - 7$	$= 8 - 11$
	$= -3$	$= -3$	$= -3$	$= -3$

Same -ve remainder  
⇒ L.C.M model 2

$$\begin{aligned}
 \Rightarrow N_{\text{Least}} &= \text{L.C.M of divisors} + (-\text{ve remainder}) \\
 &= \text{L.C.M of } (4, 5, 7, 11) + (-3) \\
 &= (4 \times 5 \times 7 \times 11) - 3 \\
 &= 20 \times 77 - 3 \\
 &= 1540 - 3 \\
 &= 1537 \text{ Ans.}
 \end{aligned}$$

- 11. Find the largest 4-digit number which when divided by 7 & 9 gives remainder of 5 & 7 respectively.**

**Solution**

Given,	$7 \overline{)N}$	$9 \overline{)N}$
	$\frac{5}{\overline{5}}$	$\frac{7}{\overline{7}}$
	-ve remainder	-ve remainder
	$= 5 - 7 = -2$	$= 7 - 9 = -2$

63  $\overline{)9999}$  (158)      (63 is the L.C.M of 7 & 9)

$$\begin{array}{r}
 63 \\
 369 \\
 315 \\
 549 \\
 504 \\
 45 \\
 9999-45 \\
 \hline
 63 \\
 \frac{9999-45+(-2)}{63} \\
 \hline
 \end{array}$$

$\Rightarrow \frac{9999-45}{63} \Rightarrow r = 45 - 45$   
 $\Rightarrow \frac{9999-45+(-2)}{63} \Rightarrow r = 0 + (-2) = -2$   
 $\Rightarrow \text{Required } N = 9952 \text{ Ans.}$

- 12. Find the smallest 6-digit number which when divided by 7 & 11 gives remainder of 3 & 7 respectively.**

**Solution**

Given,	$7 \overline{)N}$	$11 \overline{)N}$
	$\frac{3}{\overline{3}}$	$\frac{7}{\overline{7}}$
	-ve remainder	-ve remainder
	$= 3 - 7$	$= 7 - 11$
	$= -4$	$= -4$

77  $\overline{)100000}$  (1298)

$$\begin{array}{r}
 77 \\
 230 \\
 154 \\
 760 \\
 693 \\
 670 \\
 616 \\
 54 \\
 \hline
 \end{array}$$

$$\begin{array}{r}
 77 \\
 +77 \\
 \hline
 -4 \\
 \hline
 54-54-4 = -4 \\
 \hline
 \end{array}$$

$\Rightarrow \text{Required number is } 100000-54+77-4$   
 $= 100000+19 = 100019 \text{ Ans.}$

13. The least number which when divided by 24, 30, 36, 54 and 70 leaves 14, 20, 26, 44 and 60 as remainder respectively, is:

A. 4562

B. 15110

C. 2135

D. 7589

**Solution**

$$\frac{N}{24} \Rightarrow r = 14 \Rightarrow r = -10$$

$$\frac{N}{30} \Rightarrow r = 20 \Rightarrow r = -10$$

$$\frac{N}{36} \Rightarrow r = 26 \Rightarrow r = -10$$

$$\frac{N}{54} \Rightarrow r = 44 \Rightarrow r = -10$$

$$\frac{N}{70} \Rightarrow r = 60 \Rightarrow r = -10$$

$\Rightarrow$  L.C.M model 2

$\Rightarrow$  Least value of N = L.C.M of (24, 30, 36, 54, 70) + (-ve remainder)

2	24, 30, 36, 54, 70
3	12 15 18 27 35
3	4 5 6 9 35
2	4 5 2 3 35
5	2 5 1 3 35
	2 1 1 3 7

$$\Rightarrow N = (2 \times 3 \times 3 \times 2 \times 5 \times 2 \times 3 \times 7) + (-10)$$

= 7560 - 10 = 7550 Ans.

14. In KodTech, there are less than 450 employees. When divided by 7, it gives a whole number. Similarly, when it is divided by 3, 4 or 5, it gives a whole number. Find the no. of employees in the company:

A. 242

B. 424

C. 342

D. 420

**Solution**

Let the number of students be N.

$$\frac{N}{7} \Rightarrow r = 0$$

$$\frac{N}{3} \Rightarrow r = 0$$

$$\frac{N}{4} \Rightarrow r = 0$$

$$\frac{N}{5} \Rightarrow r = 0$$

$\Rightarrow N = K \times \text{L.C.M of } (7, 3, 4, 5) + (\text{remainder})$

$$= K [7 \times 3 \times 4 \times 5] + (0)$$

$$= 420K$$

For N < 500, K = 1  $\Rightarrow N = 420$  Ans.

15. What is the largest number which when divides 300, 360, 288 leaves the same remainder in each case?

A. 12

B. 6

C. 3

D. 8

**Solution**

Required no. = H.C.F of [(360 - 300), (360 - 288), (300 - 288)]

= H.C.F of (60, 72, 12) = 12 Ans.

16. H.C.F of  $2^3 \times 3^2 \times 7^2$  and  $2^2 \times 3^3 \times 7$  is?

A. 128

B. 126

C. 146

D. 434

**Solution**

$$N_1 = 2^3 \times 3^2 \times 7^2$$

$$N_2 = 2^2 \times 3^3 \times 7^1$$

For H.C.F, we take minimum powers

$$\Rightarrow \text{H.C.F} = 2^2 \times 3^2 \times 7^1 = 4 \times 9 \times 7 = 252 \text{ Ans.}$$

## Topic 4: H.C.F. AND L.C.M.

17. What is the least perfect square, which is divisible by 12, 15, 30?

- A. 1600      B. 3600      C. 900      D. 32400

Solution

L.C.M of 12, 15, 30

$$\begin{array}{r} 3 \\ \hline 12, 15, 30 \\ \hline 5 \\ \hline 4 \quad 5 \quad 10 \\ \hline 2 \quad 1 \quad 2 \\ \hline 2 \quad 1 \quad 1 \end{array}$$

$$\text{L.C.M} = 2 \times 2 \times 3 \times 5$$

$$\text{Now, Required no.} = K \times \text{L.C.M} + 0 = (2 \times 2 \times 3 \times 5)K$$

$$\text{For making a perfect square, } K = 3 \times 5 = 15$$

$$N = (2 \times 2 \times 3 \times 5) \times 3 \times 5 = 900 \text{ Ans.}$$

18. The G.C.D of 2.16, 0.72 and 1.8 is:

- A. 0.036      B. 0.9      C. 0.18      D. 0.36

Solution

G.C.D means H.C.F

$$N_1 = 2.16 = \frac{216}{100} = \frac{54}{25}$$

$$N_2 = 0.72 = \frac{72}{100} = \frac{18}{25}$$

$$N_3 = 1.8 = \frac{18}{10} = \frac{9}{5}$$

$$\begin{aligned} \text{H.C.F} \left( \frac{54}{25}, \frac{18}{25}, \frac{9}{5} \right) &= \frac{\text{H.C.F}(54, 18, 9)}{\text{L.C.M}(25, 25, 5)} \\ &= \frac{9}{25} = \frac{36}{100} = 0.36 \text{ Ans.} \end{aligned}$$

19. The L.C.M of 0.4, 5.4 and 0.18 is:

- A. 5.4      B. 0.54      C. 5.5      D. 0.054

Solution

0.4, 5.4, 0.18

$$\frac{4}{10}, \frac{54}{10}, \frac{18}{100}$$

$$\frac{2}{5}, \frac{27}{5}, \frac{9}{50}$$

$$\text{L.C.M} = \frac{\text{L.C.M}(2, 27, 9)}{\text{H.C.F}(5, 5, 50)} = \frac{54}{5} = \frac{108}{10} = 10.8 \text{ Ans.}$$

20. What is the largest number that will divide 90207, 232585 and 127986 without leaving a remainder?

- A. 257      B. 905      C. 351      D. 498

Solution

90207 $\begin{cases} 3 \checkmark \\ 9 \checkmark \end{cases}$ odd	232585 $\begin{cases} 5 \\ 9 \times \end{cases}$	127986 $\begin{cases} 3 \checkmark \\ 9 \times \\ 2 \checkmark \end{cases}$
H.C.F: (a) 257	(b) 905	(c) 351
$\downarrow$	$\downarrow$	$\downarrow$
5 does not divide 90207 & 127986	9 does not divide 232585 & 127986	2 does not divide 90207 & 232585

21. Diljit goes to the market once every 128 days and Badshah goes to the same market once every 144 days. They met each other one day. How many days later will they meet each other again?  
 A. 1134      B. 1152      C. 1530      D. None of these

**Solution**

$$\begin{aligned} \text{L.C.M of } 128, 144 \\ &= 16 \times 8 \times 9 \\ &= 16 \times 72 \\ &= 1152 \text{ Ans.} \end{aligned}$$

$$16 \overline{)128, 144} \\ 8, 9$$

22. The H.C.F of two numbers is 13 and their L.C.M is 5200. If one of the numbers is 400, then the other is:  
 A. 308      B. 208      C. 169      D. 283

**Solution**

$$\begin{aligned} \text{H.C.F} \times \text{L.C.M} &= N_1 \cdot N_2 \\ \Rightarrow 13 \times 5200 &= 400 \times N_2 \\ \Rightarrow N_2 &= 13 \times 13 = 169 \text{ Ans.} \end{aligned}$$

23. Let m and n be two prime numbers such that m is greater than n. If 203 is their L.C.M, then the difference of four times of n and m is:

A. 1

B. 0

C. -1

D. 4

**Solution**

$$\begin{aligned} \text{H.C.F} = 1, \text{L.C.M} &= 203 \text{ and } m \& n \text{ are prime} \\ \Rightarrow \text{L.C.M} &= \text{H.C.F} \times \text{Co-prime pair} \\ \Rightarrow 203 &= 1 \times \begin{cases} 203 \\ 7 \times 29 \end{cases} \Rightarrow n = 1 \times 7 = 7 \text{ and } m = 1 \times 29 = 29 \\ \text{Or} \\ &= 1 \times 1 \times 203 \Rightarrow n = 1 \text{ and } m = 203 \text{ (Not prime)} \\ \Rightarrow 4n - m &= 4 \times 7 - 29 = -1 \text{ Ans.} \end{aligned}$$

24. Let 17 and 357 are the H.C.F and L.C.M of two numbers respectively. If one of them is less than 150 and greater than 50, then what will be that number?

A. 119

B. 91

C. 109

D. 121

**Solution**

$$\begin{aligned} \text{H.C.F} &= 17, \text{L.C.M} = 357 \\ \Rightarrow \text{L.C.M} &= \text{H.C.F} \times \text{Co-prime pair} \\ \Rightarrow 357 &= 17 \times 21 \\ &\quad \boxed{\begin{array}{l} 1 \times 21 \\ \text{or} \\ 3 \times 7 \end{array}} \Rightarrow N_1 = 17 \times 1 = 17 \text{ and } N_2 = 17 \times 21 = 357 (> 150) \\ &\quad \boxed{\begin{array}{l} 1 \times 21 \\ \text{or} \\ 3 \times 7 \end{array}} \Rightarrow N_1 = 17 \times 3 = 51 \text{ and } N_2 = 17 \times 7 = 119 (50 < 119 < 150) \text{ Ans.} \end{aligned}$$

25. Sum of squares of two numbers is 2125, their H.C.F is 5 and L.C.M is 90. Find the numbers.

A. 45, 36

B. 45, 27

C. 45, 10

D. None of these

**Solution**

$$\begin{aligned} \text{H.C.F} &= 5, \text{L.C.M} = 90 \\ \Rightarrow \text{L.C.M} &= \text{H.C.F} \times \text{Co-prime pair} \\ \Rightarrow 90 &= 5 \times 18 \\ &\quad \boxed{\begin{array}{l} 1 \times 18 \\ \text{or,} \\ 2 \times 9 \end{array}} \times \\ &\quad \Rightarrow N_1 = 5 \times 2 = 10 \text{ and } N_2 = 5 \times 9 = 45 \end{aligned}$$

$$\text{Also, } 10^2 + 45^2 = 2125$$

$$\text{So, } N_1 = 10 \text{ and } N_2 = 45 \text{ Ans.}$$

26. The ratio of two numbers is 4:5 and their H.C.F is 3. Their L.C.M is:

A. 15

B. 12

C. 48

D. 60

**Solution**

$$\text{H.C.F} = 3$$

$$\text{L.C.M} = \text{H.C.F} \times \text{Co-prime pair} = \text{H.C.F} \times \text{Ratio} = 3 \times (4 \times 5) = 60 \text{ Ans.}$$

## Topic 4: H.C.F. AND L.C.M.

27. If 17 and 510 are the respective H.C.F and L.C.M of two numbers, which are greater than 17, then what will be the possible number of such pair?

A. 0      B. 2      C. 3      D. 4

Solution

$$\text{H.C.F} = 17, \text{L.C.M} = 510$$

$$\Rightarrow \text{L.C.M} = \text{H.C.F} \times \text{Co-prime pair}$$

$$\Rightarrow 510 = 17 \times 30$$

So, all possibilities of co-prime pair will be

17	N1	N2	
	1	30 ×	
	2	15 ✓	
	3	10 ✓	3 pairs possible. Ans.
	5	6 ✓	
	6	5	(Repeating case)

28. The H.C.F of two numbers is 21 and their difference is also 21. The numbers are -

A. 66, 78      B. 84, 105      C. 70, 82      D. 84, 96

Solution

$$\text{H.C.F} = 21$$

$$N_2 - N_1 = 21$$

12	N1	N2	
x		x + 1	(\because N_2 - N_1 = 21)
1		2	
2		3	
3		4	
4		5	→ 21 × 4      21 × 5 = 84            = 105

29. What is the least amount that Mahi can have, such that when he distributes it into his friends in groups of Rs.12 or Rs.16 or Rs. 18 or Rs. 20, he is always left with Rs. 5?

A. Rs. 795      B. Rs. 805      C. Rs. 595      D. Rs. 725

Solution

$$\begin{aligned} \text{Least amount} &= \text{L.C.M of } (12, 16, 18, 20) + 5 \\ &= 720 + 5 = 725 \text{ Rs. Ans.} \end{aligned}$$

2	12, 16, 18, 20
2	6, 8, 9, 10
3	3, 4, 9, 5
1, 4, 3, 5	

$$\text{L.C.M} = 2 \times 2 \times 3 \times 4 \times 3 \times 5 = 720$$

30. The least number which when divided by 3, 4, 5 and 6 leaves a remainder 2, but when divided by 11 leaves no remainder.

A. 22      B. 16      C. 18      D. 32      E. None of these

Solution

$$\begin{aligned} \text{Least no.} &= \text{L.C.M of } (3, 4, 5, 6) + 2 \\ &= 60K + 2 \end{aligned}$$

$$\begin{aligned} \frac{60K+2}{11} &\rightarrow r = 0 \\ -55K &\cancel{\quad} \\ \frac{5K+2}{11} &\rightarrow r = 0 \\ \Rightarrow K &= 1, 2, 3, 4, 5, 6, 7 \dots \\ &\times \times \times \checkmark \times \times \times \\ \Rightarrow \text{Least no.} &= 5 \times 4 + 2 \\ &= 22 \text{ Ans.} \end{aligned}$$

31. If an integer k is divisible by 3, 4 and 11, what is the next largest number that is divisible by all the three given numbers?

A.  $k+132$       B.  $k+130$       C.  $2k+13$       D.  $2k+132$       E.  $2k$

Solution

$$\frac{K}{3, 4, 11} \checkmark$$

$$\Rightarrow \text{next largest number} = K + \text{L.C.M of } (3, 4, 11) = K + 132 \text{ Ans.}$$

&lt;/DIY/&gt;

1. Find H.C.F AND L.C.M of the numbers 12, 84 and 36.  
 A. 4, 168      B. 12, 504      C. 84,12      D. 12,252
  
2. Find LCM of 12, 15, 20, 27.  
 A. 500      B. 540      C. 550      D. NONE OF THESE
  
3. The GCD of any 3 consecutive numbers will be?  
 A. 1      B. 2      C. 3      D. 4
  
4. Find L.C.M. of 1.05 and 2.1  
 A. 1.3      B. 1.25      C. 2.1      D. 4.30
  
5. If a number is divisible by both 12 and 16, then it must be necessarily divisible by:  
 A. 12+16      B. 16-12      C. 12x16      D. 48
  
6. The greatest 3-digit number which is divisible by 3, 8 and 9.  
 A. 936      B. 864      C. 720      D. 1008
  
7. What is the number nearest to 10000 which is exactly divisible by 3, 4, 5, 6, 7 and 8?  
 A. 9956      B. 10080      C. 10096      D. 9240
  
8. The least perfect square, which is divisible by each of 21, 36 and 66 is:  
 A. 213444      B. 214344      C. 214434      D. 231444
  
9. Find the smallest 8-digit number which gives 15 as a remainder when divided by 38, 22 and 16.  
 A. 10002004      B. 10002015      C. 10001919      D. 10000015
  
10. The H.C.F. of two numbers is 23 and the other two factors of their L.C.M. are 13 and 14. The larger of the two numbers is:  
 A. 276      B. 299      C. 322      D. 345
  
11. Sum of squares of two numbers is 2754, their HCF is 9, LCM is 135, Find the numbers  
 A. 45, 36      B. 45, 27      C. 54, 27      D. None of these
  
12. The H.C.F. of two numbers is 19 and the other two factors of their L.C.M. are 11 and 13. The larger of the two numbers is:  
 A. 247      B. 299      C. 322      D. 345
  
13. Find the greatest number which divides 32, 80, and 116 and leaves the same remainder in each case.  
 A. 15      B. 17      C. 14      D. 12
  
14. The ratio of two numbers is 3 : 4 and their HCF is 4. Their L.C.M is:  
 A. 12      B. 16      C. 24      D. 48
  
15. Find the greatest number which divides 46, 94, and 118 and leaves the same remainder in each case.  
 A. 24      B. 17      C. 14      D. 13

# TOPIC 5

## RATIO AND PROPORTION

1. A sum of money has to be distributed among P, Q, R, S in the ratio [7 : 3 : 5 : 4]. If R gets Rs. 1200 more than S, what is Q's share?

A. Rs. 3500      B. Rs. 2400      C. Rs. 3600

E. None of these

Solution

Given,

$$P : Q : R : S$$

$$[7 : 3 : 5 : 4]x$$

Hence, P = 7x, Q = 3x, R = 5x and S = 4x

Given,

$$R - S = 1200$$

$$\Rightarrow 5x - 4x = 1200$$

$$\Rightarrow x = 1200$$

Hence, share of Q = 3x = Rs. 3600

2. The sum of three numbers is 126. If the ratio of first to second is [3 : 4] and that of second to third is [5 : 7], then the second number is:

A. 20

B. 30

C. 40

D. 48

Solution

(First, the number representing the second number in the ratio must be made same)

$$[I : II : III]$$

$$[3 : 4] \times 5$$

$$\underline{[5 : 7] \times 4}$$

$$[15 : 20 : 28]x$$

$$\Rightarrow I = 15x, II = 20x \text{ and } III = 28x$$

Given,

$$I + II + III =$$

$$\Rightarrow 15x + 20x + 28x = 126$$

$$\Rightarrow 63x = 126$$

$$\Rightarrow x = 2$$

Therefore, II = 20x = 40

3. In a mixture of X, Y & Z, if X and Y are mixed in the ratio [2:5] and Y and Z are mixed in the ratio [4:5] and the final mixture is 106 litres, find the amount of Y in the mixture?

A. 30

B. 25

C. 40

D. 45

Solution

(The number representing 'Y' in both the ratios must be made same)

$$[X : Y : Z]$$

$$[2 : 5] \times 4$$

$$\underline{[4 : 5] \times 5}$$

$$[8 : 20 : 25]k$$

$$\Rightarrow X = 8k, Y = 20k \text{ and } Z = 25k$$

Given,

$$X + Y + Z = 106$$

$$\Rightarrow 8k + 20k + 25k = 106$$

$$\Rightarrow 53k = 106$$

$$\Rightarrow k = 106/53 = 2$$

Therefore, Y = 20k = 20 x 2 = 40

4. Fifteen years ago, P was half of Q's age. If the ratio of their present ages is 4:5, then what is the total of their present ages?

A. 45 years

B. 8 years

C. 35 years

D. 20 years

**Solution**

	P	:	Q
15 years ago	[1]	:	$2x$
Present	[4]	:	$5x$

$2-1=1$

$5-4=1$

IN AGE BASED QUESTIONS, THE DIFFERENCE IN BOTH THE RATIOS MUST BE MADE SAME AND AFTER THAT SAME VARIABLE CAN BE TAKEN FOR BOTH THE RATIOS.

Now, in relation to P, we can write

$$4x - x = 15$$

$$\Rightarrow x = 5$$

$$\text{Hence, sum of present ages} = 4x + 5x = 9x = 9 \times 5 = 45$$

5. Abhishek and Vishal started a business in which they invested Rs. 49500 and Rs. 77000 respectively. If the total profit is Rs. 16100, Vishal's share will be:

A. Rs. 5400

B. Rs.7200

C. Rs. 8400

D. Rs. 9800

**Solution**

Ratio of investments of Abhishek and Deepak-

Abhishek : Deepak

$$49500 : 77000$$

$$9 : 14$$

The profit will be divided in the ratio of their investments.

$$\text{Hence, Vishal's share} = [14/(9+14)] \times 16100 = 9800$$

6. Two numbers are respectively 20% and 50% more than a third number. The ratio of the two numbers is:

A. 2:5

B. 3:5

C. 4:5

D. 5:3

**Solution**

According to question,

$$I = 120\% \text{ of III and } II = 150\% \text{ of III}$$

So,

$$I : II$$

$$120 : 150$$

$$4 : 5$$

7. Seats for Science, Commerce and Arts in a school are in the ratio [3 : 6 : 7]. The number of seats will increase by 50%. What is the ratio of increased seats?

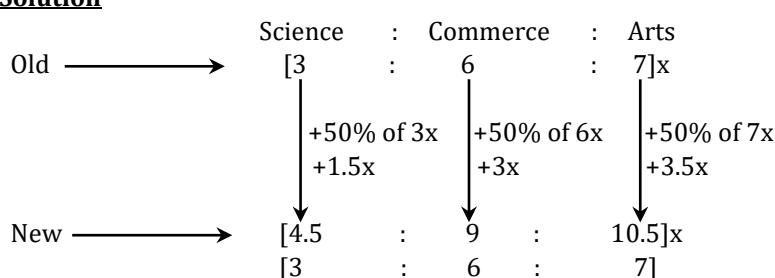
A. 2:3:4

B. 6:7:8

C. 3:6:7

D. None of these

**Solution**



## Topic 5: RATIO AND PROPORTION

8. Rs 12000 was divided among 8 men, 5 women and 4 boys, such that the ratio of the shares of men, women and boys is [9:7:4]. What is the share of each boy?

A. Rs. 400

B. Rs. 800

C. Rs. 450

D. Rs. 600

**Solution**

$$\begin{array}{ccccc}
 & & 12000 & & \\
 & \swarrow & \downarrow & \searrow & \\
 [9] & : & 7 & : & 4]x \\
 \text{Shares of men} = 9x & & \text{Shares of women} = 7x & & \text{Shares of boys} = 4x \\
 \text{So, } 9x + 7x + 4x = 12000 & & & & \\
 \Rightarrow 20x = 12000 & & & & \\
 \Rightarrow x = 600 & & & & \\
 \text{Shares of boys} = 4x = 2400 & & & & \\
 \text{Share of each boy} = 2400/4 = \text{Rs. 600} & & & &
 \end{array}$$

9. Vision and Clint are moving in to a new house. Both love games and thus packed several boxes with games. If Clint packed 60% of the total number of boxes, what was the ratio of the number of boxes Vision packed to the number of boxes Clint packed?

A. 2:3

B. 3:4

C. 3:2

D. None of these

**Solution**

Given, Boxes packed by Clint = 60% of total

$\Rightarrow$  Boxes packed by Vision = 40% of total

Boxes packed by Vision : Boxes packed by Clint

$$\begin{array}{ccc}
 40 & : & 60 \\
 2 & : & 3
 \end{array}$$

10. Clay and cement were mixed in the ratio [ 3 : 1 ] to make up 1 tonne. How much clay must be added to make the ratio [6 : 1]?

A. 1 tonne

B. 750 kg

C. 500 kg

D. 5 tonnes

E. None of these

**Solution**

$$\begin{array}{ccc}
 \text{Clay} & : & \text{Cement} \\
 \text{Old} \longrightarrow [3 & : & 1]x \\
 \text{New} \longrightarrow [6 & : & 1]x
 \end{array}$$

Now, in relation to Clay, we can write

Quantity of clay added =  $6x - 3x = 3x$

Given,

Total quantity of old mixture = 1000kg

$\Rightarrow 3x + 1x = 1000$

$\Rightarrow x = 250$

Hence, quantity of sand added =  $3x = 750\text{kg}$

SINCE CEMENT VALUE IS NOT CHANGING, THE VALUE REPRESENTING CEMENT IN THE RATIOS MUST BE MADE SAME IF NOT AND AFTER THAT SAME VARIABLE CAN BE TAKEN FOR BOTH THE RATIOS.

11. A, B and C started a business as partners and their shares are in the ratio 6 : 4 : 3. After two months, A takes out 50% of his capital and after 10 months, a profit of Rs 4221 is divided among them. What is B's share?

A. Rs.1280

B. Rs.1440

C. Rs.1560

D. Rs.1608

**Solution**

Ratio of investment = 6:4:3

Considering the time for which investment was put, Ratio of profit of A, B and C will be

A : B : C

$6 \times 2 + 50\% \text{ of } 6 \times 10 : 4 \times 12 : 3 \times 12$  (initial investment of A was put only for 2 months and then for the remaining 10 months, only 50% of his initial investment was put into business)

42 : 48 : 36

7 : 8 : 6

Profit of A, B and C respectively will be  $7x$ ,  $8x$  and  $6x$ .

$21x = 4221$

$x = 201$

B's share =  $8x = 8 \times 201 = 1608$

12. If 3 numbers are in the ratio of [4:3:7] such that sum of their squares is equal to 1850, what is the middle number?

A. 25  
**Solution**

B. 14

C. 30

D. 34

$$[I : II : III] \\ [4 : 3 : 7]x$$

According to question,

$$I^2 + II^2 + III^2 = 1850$$

$$\Rightarrow (4x)^2 + (3x)^2 + (7x)^2 = 1850$$

$$\Rightarrow 74x^2 = 1850$$

$$\Rightarrow x^2 = 25$$

$$\Rightarrow x=5$$

$$\Rightarrow \text{Middle Number} = 3x = 15$$

</DIY>

1. The incomes of Ankit and Bhavya is in the ratio of 5:4 and their expenditures are in the ratio of 14:11. If they save 1000 rupees each then what is the total income of Ankit?  
 A. Rs 17000      B. Rs 15000      C. Rs 15500      D. Rs 14500
2. Hrithik has a piece of cake 60 cm long. He gives Raman half of it. He then gives Gajendra  $\frac{1}{4}$ th of what is left. After giving a piece to Shiva, he is left with  $\frac{1}{10}$ th of the original. How much did he give to Shiva?  
 A. 16.5 cm      B. 21.5 cm      C. 19.5 cm      D. 31.5 cm
3. The ratio of adults to teenagers in a locality is 1:30. If teenagers are increased by 50 and adults by 5, the new ratio becomes 1:25. What is number of adults at present?  
 A. 15      B. 14      C. 12      D. 13
4. A bag contains Rs 216 in the form of one rupee, 50 paise and 25 paise coins in the ratio of 3 : 4 : 4. The number of 50 paise coins is ?  
 A. 96      B. 128      C. 144      D. 100
5. If  $(1/3)A = (1/4)B = (1/5)C$ . Then A : B : C is  
 A. 4 : 3 : 5      B. 5 : 4 : 3      C. 3 : 4 : 5      D. 20 : 15 : 12
6. Two numbers are in the ratio 2 : 3. If eight is added to both the numbers, the ratio becomes 3 : 4. The numbers are ?  
 A. 15 and 20      B. 16 and 24      C. 13 and 17      D. 17 and 9.
7. What is the value of  $(P + Q)/(P - Q)$  if  $P/Q$  is 7?  
 A.  $4/3$       B.  $2/3$       C.  $2/6$       D.  $7/8$
8. If  $2/3$ rd of the contents of a container evaporated on the 1st day. And  $1/4$ th of the remaining evaporated on the second day. What part of the contents of the container is left at the end of the second day?  
 A.  $1/4$       B.  $1/12$       C.  $1/18$       D.  $1/6$
9. In an island, there are four men for every three women and five children for every three men. How many children are there in the island if it has 531 women?  
 A. 454      B. 1180      C. 1070      D. 389
10. Kiran earned Rs. 8000 as his profit share out of the total profit value of Rs.24000 which he and Arun earned after one year. If Kiran invested Rs. 60,000 for 3 months only, whereas Arun invested his share for the complete year then what was the amount invested by Arun?  
 A. Rs.30000      B. Rs.36000      C. Rs.40000      D. Rs.45000

# TOPIC 6

## PERCENTAGE

1. 4% of (25% of Rs. 1800) is  
 A. Rs. 5      B. Rs 18      C. Rs 20      D. Rs 25

**Solution**

$$4\% \text{ of } (25\% \text{ of } \text{Rs. } 1800)$$

$$= \frac{4}{100} \times \frac{25}{100} \times 1800$$

$$= \frac{1}{25} \times \frac{1}{4} \times 1800 = 18$$

2. How much is 70% of 50 greater than  $\frac{3}{5}$  of 35?  
 A. 12      B. 10      C. 11      D. 13

**Solution**

$$70\% \text{ of } 50 = 35$$

$$\text{and } \frac{3}{5} \times 25 = 15$$

$$\Rightarrow \text{Required difference} = 35 - 15 = 20$$

3.  $(p\% \text{ of } p) + (q\% \text{ of } q) = 2\% \text{ of } pq$ , then what percentage of p is q?  
 A. 50%      B. 75%      C. 100%      D. Cannot be determined.

**Solution**

$$(p\% \text{ of } p) + (q\% \text{ of } q) = 2\% \text{ of } pq$$

$$\Rightarrow p^2 + q^2 = 2pq \Rightarrow p^2 + q^2 - 2pq = 0$$

$$\Rightarrow (p - q)^2 = 0 \Rightarrow p - q = 0 \Rightarrow p = q$$

$$\Rightarrow q = 100\% \text{ of } p$$

4. A is thirty percent of B; B is twenty percent of C and D is fifty percent of C. Find the value of A/D.  
 A. 0.33      B. 3.33      C. 16.67      D. None of these

**Solution**

$$A = \frac{30}{100} B = \frac{3}{10} B \text{ and } B = \frac{20}{100} C = \frac{1}{5} C \text{ and } D = \frac{50}{100} C = \frac{1}{2} C$$

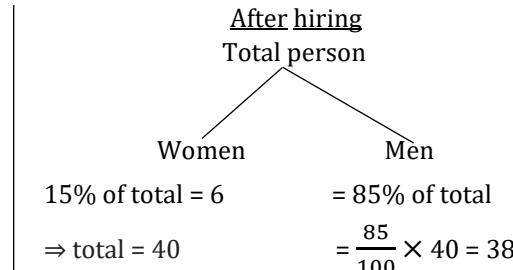
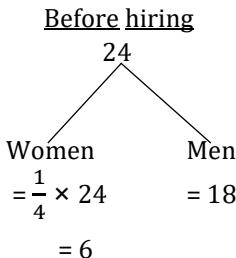
Now,

$$A = \frac{3}{10} B = \frac{3}{10} \times \frac{1}{5} C = \frac{3}{10} \times \frac{1}{5} \times 2D = \frac{6}{50} D$$

$$\text{Hence, } \frac{A}{D} = \frac{6}{50} = \frac{3}{25}$$

5. In a team of 24 persons,  $\frac{1}{4}$ th are women and  $\frac{3}{4}$ th are men. To obtain a team with 15% women, how many men should be hired?

- A. 6      B. 18      C. 38      D. 20

**Solution**

Hence, number of men to be hired =  $38 - 18 = 20$

6. The population of Daman is 6000. The number of men and women increases by 15% and 10% respectively and consequently, the population of the village becomes 6800. What was the number of men in Daman?

A. 4000      B. 3000      C. 2500      D. 2000

**Solution**

Let the number of men and women be  $100x$  and  $100y$ .

$$\Rightarrow \text{Increase in men} = 15\% \text{ of } 100x = 15x$$

$$\Rightarrow \text{Increase in women} = 10\% \text{ of } 100y = 10y$$

New number of men and women =  $115x$  and  $110y$

According to question,

$$100x + 100y = 6000 \quad \dots \dots \dots 1$$

$$115x + 110y = 6800 \quad \dots \dots \dots 2$$

Solving equations 1 and 2, we get

$$x = 40$$

$$\Rightarrow \text{Old population of men} = 100x = 4000$$

7. Two students appeared at an examination. One of them secured 6 marks more than the other and his marks was 45% of the sum of their marks. What are the marks obtained by them?

A. 33, 46      B. 33, 42      C. 27, 33      D. None of these

**Solution**

$$A - B = 6 \text{ and}$$

$$A = 45\% \text{ of } (A + B)$$

$$\Rightarrow 100A = 45(A + B)$$

$$\Rightarrow 55A = 45B \Rightarrow 11A = 9B$$

$$\Rightarrow A : B$$

$$\Rightarrow 9 : 11$$

$$\Rightarrow 27 : 33$$

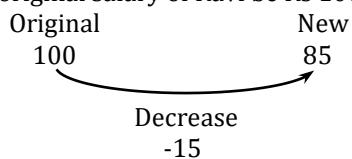
Hence, the marks of two students are 27 and 33.

8. Ravi's salary was reduced by 15%. Percentage increase to be affected to bring the salary to the original level is

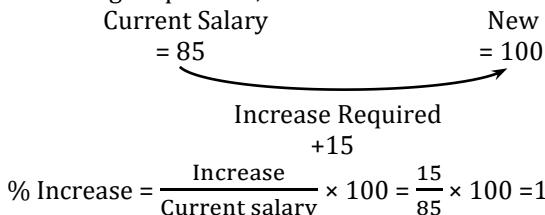
A. 33.33%      B. 20%      C. 17.65%      D. 30%

**Solution**

Let the original salary of Ravi be Rs 100.



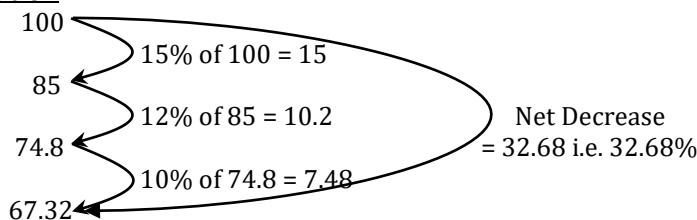
According to question,



9. A person's salary is decreased in steps of 15%, 12% and 10%. What will be the percentage decrease, if the salary is decreased in a single shot?

A. 38.00%      B. 32.68%      C. 67.32%      D. 28.00%

**Solution**



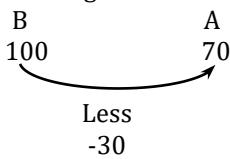
## Topic 6: Percentage

10. If A's height is 30% less than that of B, then by how much percent is B's height more than that of A?

A. 66.66%      B. 42.86%      C. 30%      D. 86.66%

Solution

Let the height of B be 100.



According to question,



$$\% \text{ More} = \frac{\text{More}}{\text{Lesser value}} \times 100 = \frac{30}{70} \times 100 = 42.86\%$$

11. In an examination, P got 5% marks less than Q, Q got 25% marks more than R and R got 20% less than S. If P got 380 marks out of 500. The percentage of marks obtained by S was:

A. 70%      B. 75%      C. 80%      D. 85%

Solution

$$P = 95\% \text{ of } Q \Rightarrow P = \frac{95}{100} Q \Rightarrow Q = \frac{100}{95} P = \frac{100}{95} \times 380 = 400$$

$$Q = 125\% \text{ of } R \Rightarrow Q = \frac{125}{100} R \Rightarrow R = \frac{4}{5} Q = \frac{4}{5} \times 400 = 320$$

$$R = 80\% \text{ of } S \Rightarrow R = \frac{4}{5} S \Rightarrow S = \frac{5}{4} R = \frac{5}{4} \times 320 = 400$$

$$\Rightarrow \% \text{ of marks score by } S = \frac{400}{500} \times 100 = 80\%$$

12. A student multiplied a number by  $7/20$  instead of  $20/7$ . What is the percentage error in the calculation?

A. 74.75%      B. 87.75%      C. 54.65%      D. 64%

Solution

Let the number be L.C.M (20, 7) = 140

A diagram comparing two calculations. On the left, under "INCORRECT", is the equation  $\frac{7}{20} \times N = 49$ . On the right, under "CORRECT", is the equation  $\frac{20}{7} \times N = 400$ . A vertical line connects the two equations. Below the equations is the formula for percentage error:  $\% \text{ error} = \frac{\text{error}}{\text{correct value}} \times 100 = \frac{351}{400} \times 100 = 87.75\%$ .

13. In a certain company, 15% of the men and 20% of the women attended the annual company picnic. If 40% of all the employees are men, what percent of all the employees went to the picnic?

A. 33.33%      B. 18%      C. 12%      D. 33%

Solution

$$\text{Total Employees} = 100$$

$$\text{Men} = 40\% \text{ of } 100$$

$$= 40$$

$$\begin{aligned} & \text{Attended} \\ & = 15\% \text{ of } 40 \\ & = 6 \end{aligned}$$

$$\text{Women} = 60$$

$$\begin{aligned} & \text{Attended} \\ & = 20\% \text{ of } 60 \\ & = 12 \end{aligned}$$

Hence, 18 out of 100 employees attended the outing i.e. 18%

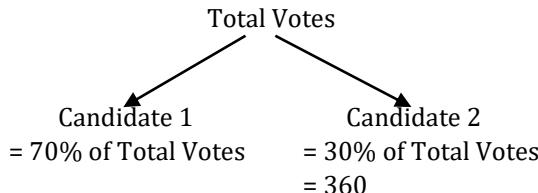
14. In an election between two candidates, first candidate got 70% of votes polled and second candidate got 360 votes. The total number of votes polled was.

A. 800 votes

B. 700 votes

C. 1200 votes

D. 720 votes

**Solution**

So, 30% of total votes = 360

$$\Rightarrow \frac{3}{10} \times \text{Total Votes} = 360 \Rightarrow \text{Total Votes} = 1200$$

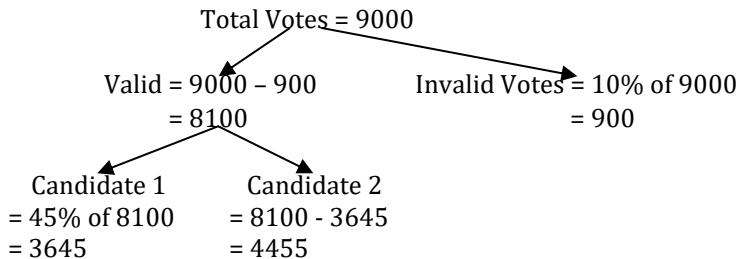
15. There was an election between two candidates, one got 45% of the total valid votes, 10% of the votes were invalid. If the total number of votes was 9000, the number of valid votes that the other candidate got, was:

A. 3645

B. 2900

C. 3000

D. 4455

**Solution**

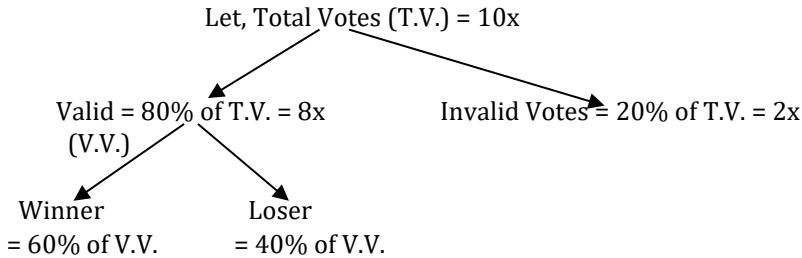
16. Out of total votes in an election between two candidates, 20% of votes were invalid. Winner got 60% of valid votes and was elected by a majority of 800 votes. find the total number of votes?

A. 6000

B. 5500

C. 4500

D. 5000

**Solution**

Given, Winner's votes - Loser's votes = 800

$$\Rightarrow 60\% \text{ of V.V.} - 40\% \text{ of V.V.} = 800$$

$$\Rightarrow 20\% \text{ of } 8x = 800 \Rightarrow 20\% \text{ of } x = 100 \Rightarrow x = 500$$

$$\Rightarrow \text{Total votes} = 10x = 5000$$

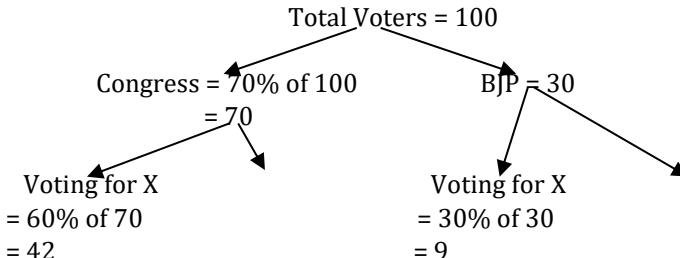
17. In a certain city, 70% of the registered voters are congress supporters and the rest are BJP supporters. In an assembly election, if 60% of the registered congress supporters and 30% of the registered BJP supporters are expected to vote for candidate X, what percent of the registered voters are expected to vote for candidate X?

A. 56%

B. 45%

C. 53%

D. None of these

**Solution**

Hence, 51 out of 100 are voting for candidate X, i.e. 51%

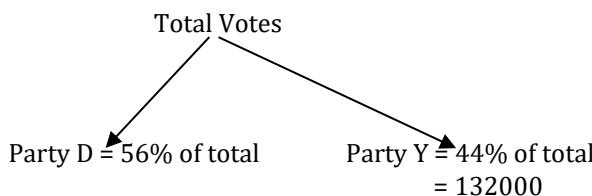
## Topic 6: Percentage

18. In an election contested by two parties, Party D secured 12% of the total votes more than Party R.

If party R got 132,000 votes, by how many votes did it lose the election?

A. 46000      B. 33000      C. 16000      D. 36000

Solution



19. The price of sugar is increased by 10%. As a result, a family decreases its consumption by 20%. The expenditure of the family on sugar will be decreased by

A. 10%      B. 5%      C. 12%      D. 15%

Solution

<u>Price</u>	<u>Consumption</u>	<u>Expenditure</u>
$+10\% = \frac{+1}{10}$	$-20\% = \frac{-1}{5}$	
Initial = 10 $\downarrow +1$ Final = 11	Initial = 5 $\downarrow -1$ Final = 4	Initial = $5 \times 10 = 50$ $\downarrow -6$ Final = $11 \times 4 = 44$

$$\% \text{ Decrease in Expenditure} = \frac{6}{50} \times 100 = 12\%$$

20. Salt price is increased by 25%. By how much percent should the consumption be decreased so as to keep the expenditure at the same level?

A. 16.67%      B. 25%      C. 20%      D. 15%

Solution

<u>Price</u>	<u>Consumption</u>	<u>Expenditure</u>
$+25\% = \frac{+1}{4}$		No change
Initial = 4 $\downarrow +1$ Final = 5	Initial = $20/4 = 5$ $\downarrow -1$ Final = $20/5 = 4$	Initial = 20 $\downarrow 0$ Final = 20

$$\% \text{ Decrease in consumption} = \frac{\text{Decrease}}{\text{Initial value}} \times 100 = \frac{1}{5} \times 100 = 20\%$$

21. The price of rice got reduced by 25% which enabled a customer to purchase 16 kg more for Rs. 600.

The original price of rice per kg is:

A. Rs. 16      B. Rs. 12.5      C. Rs. 14      D. Rs. 15

Solution

<u>Price</u>	<u>Consumption</u>	<u>Expenditure</u>
$-25\% = \frac{-1}{4}$		No change
Initial = $4x$ $\downarrow -1x$ Final = $3x$	Initial = $600/4x = 150/x$ $\downarrow$ Final = $600/3x = 200/x$	Initial = Rs 600 $\downarrow 0$ Final = Rs 600

Given, change in consumption = 16kg

$$\frac{200}{x} - \frac{150}{x} = 16 \Rightarrow \frac{50}{x} = 16 \Rightarrow x = \frac{50}{16}$$

$$\text{Original price} = 4x = 4 \times 50/16 = \text{Rs. } 12.5/\text{kg}$$

22. X's income is 20% more than Y's income. Y's income in terms of X's income is:

A. 75%      B. 83.33%      C. 87.33%      D. 96%

**Solution**

$$X = 120\% \text{ of } Y$$

$$\Rightarrow X = \frac{6}{5} Y$$

$$\Rightarrow Y = \frac{5}{6} X = \frac{5}{6} \times 100\% \text{ of } X = 83.33\% \text{ of } X$$

</DIY/>

1. Student A scores 20 marks in an examination out of 30 while another student B scores 40 marks out of 70. Who has performed better?
 

A. STUDENT A	B. STUDENT B
C. BOTH PERFORMED EQUALY	D. CAN'T BE DETERMINED
2. Ambuja was a contractor. Ambuja won a contract with a big corporate and his business began to grow exponentially. So, he decided to hire more resources in his projects. If he had to increase his work force by 33.33%, what will be percentage reduction in the workload of each person?
 

A. 75%	B. 20%
C. 25%	D. 33.33%
3. A father, his little son and his new-born infant girl together weigh 74kgs. How much does the son weight if the father weighs 46kg more than the combined weight of son and the infant and the infant weighs 60% less than the son.
 

A. 18	B. 20
C. 10	D. Cannot be Determined
4. Rohit Sharma scored 80% marks in his exams of 5 subjects. After re-evaluation he got 30 marks in one subject, and 10 marks less in another. Marks of the remaining three subjects were unchanged. What is his new percentage?
 

A. 85%	B. 84%
C. 80%	D. 86%
5. If  $10 = 5\% \text{ of } a$  and  $5 = 10\% \text{ of } b$  then  $c = b/a$  What is c?
 

A. $1/3$	B. $1/5$
C. $1/2$	D. $1/4$
6. I started with an amount money. First, I purchased a thing by paying 20% of the money which I had and also for second thing I paid 20% of the money left with me, which is equal to 16. Then how much money I started with?
 

A. 81	B. 54
C. 63	D. 25
7. In an office, there are 60% of men employees out of which 25% are eligible for the post of manager. What is the probability that an eligible man is selected as manager?
 

A. 15%	B. 50%
C. 80%	D. 30%
8. A bakery opened yesterday with its daily supply of 40 dozen rolls. Half of the rolls were sold by noon and 80 % of the remaining rolls were sold between noon and closing time. How many dozen rolls had not been sold when the bakery closed yesterday?
 

A. 4	B. 5
C. 8	D. 2
9. B's monthly salary is 10% less than that of A's. C's monthly salary is less by 25% than that of A's. By what percent is B's salary more than that of C's?
 

A. 20%	B. 15%
C. 23%	D. 13%
E. None of these	
10. If  $98\% \text{ of } 1640 + 4\% \text{ of } 820 = X\% \text{ of } 410$ . find X?
 

A. 200	B. 400
C. 100	D. 102

# TOPIC 7

## AGES

1. The difference between the age of two persons is 12 years. Eighteen years ago, the elder was twice as old as the younger one. The present age of the elder person is:

A. 32

B. 20

C. 42

D. 26

**Solution**Given.

Difference between the age of 2 persons = 12 years

	I	II
Eighteen years ago	Let $x$	$2x$

$$\Rightarrow \text{Age difference} = 2x - x = x$$

$$\Rightarrow x = 12 \text{ (age difference never changes)}$$

$$\Rightarrow \text{Age of II (18 years ago)} = 2x = 24$$

$$\Rightarrow \text{Present age of II} = 2x + 18 = 42$$

2. The sum of the present ages of the father and son is 80 years. Five years ago, father's age was four times the age of son. After 5 years, son's age will be:

A. 12 years

B. 24 years

C. 18 years

D. 20 years

**Solution**

	Son	Father
5 yrs ago	(1 : $4)x$	
	$x$	$4x$

Given,

$$\text{Sum of present ages} = 80$$

$$\Rightarrow \text{Sum of ages (5 yrs ago)} = 80 - 5 - 5 = 70 \Rightarrow x + 4x = 70 \Rightarrow x = 14$$

$$\Rightarrow \text{Present age of son} = \text{Age 5 yrs. ago} + 5 = x + 5 = 19$$

$$\Rightarrow \text{Age of son after 5 yrs.} = \text{Present age of son} + 5 = 19 + 5 = 24 \text{ yrs.}$$

3. A father is 24 years older than his son, however, he will be only four times as old as the son after 8 years. What is father's present age?

A. 32 years

B. 30 years

C. 24 years

D. None of these

**Solution**

Age difference between father and son = 25

Now,

	Father	Son
After 8 yrs.	(4 : $1)x$	
	$4x$	$x$

$$\text{Age diff} = 4x - x = 3x = 24 \Rightarrow x = 8$$

$$\text{Now, Father's present age} = \text{Father's age (after 8 yrs.)} - 8 = 4x - 8 = 24 \text{ yrs.}$$

4. P is three years older than Q who is thrice as old as R. If the sum of ages of P, Q and R is 17, then how old is Q?

A. 7

B. 8

C. 9

D. 10

E. 11

**Solution**

	P	Q	R
Present	$x + 3$	Let $x$	$\frac{x}{3}$

$$\text{Given, } P + Q + R = 17$$

$$(x+3) + x + \frac{x}{3} = 17 \Rightarrow \frac{3x+9+3x+x}{3} = 17 \Rightarrow 7x + 9 = 51$$

$$\Rightarrow x = 6$$

$$\text{Hence, age of Q} = 6$$

5. The sum of the ages of a mother and her son is 30 years. 3 years ago, the product of their ages was 2 times the mother's age at that time, then the present age of the son is:

A. 8

B. 10

C. 5

D. None of these

**Solution**

	Mother	Son
Present	x	$30 - x$
3 yrs. ago	$x - 3$	$27 - x$

$$\Rightarrow (x - 3)(27 - x) = 2(x - 3) \Rightarrow (27 - x) = 2 \Rightarrow x = 27 - 2 \Rightarrow x = 25.$$

$$\Rightarrow \text{Present age of son} = 30 - x = 30 - 25 = 5$$

6. Ten years ago, Kalavati's mother was four times older than her daughter. After 10 years, the mother will be twice older than daughter. The present age of Kalavati is:

A. 20 years

B. 15 years

C. 25 years

D. None of these

**Solution**

	Mother	:	Daughter
10 years ago	[4	:	$1]x$
After 10 yrs.	$2x_3$	:	$1x_3]x$

IN AGE BASED QUESTIONS, THE DIFFERENCE IN BOTH THE RATIOS MUST BE MADE SAME AND AFTER THAT SAME VARIABLE CAN BE TAKEN FOR BOTH THE RATIOS.

Now, in relation to daughter (Kalavati), we can write

$$3x - 1x = 20 \Rightarrow x = 10$$

$$\text{Hence, present age of Kalavati} = x + 10 = 20 \text{ yrs.}$$

7. Father is aged two times more than his son Rohit. After 6 years, he would be two times of Rohit's age. After further 6 years, how many times would he be of Ronit's age?

A. 2 times

B. 1.67 times

C. 2.7 times

D. 3 times

**Solution**

	Father	:	Son
Present	[3	:	$1]x$
After 6 yrs.	$2x_2$	:	$1x_2]x$

Now, in relation to Son (Rohit), we can write

$$2x - 1x = 6 \Rightarrow x = 6$$

$$\text{Hence, present age of Rohit} = x = 6 \text{ yrs. and present age of Rohit's father} = 3x = 18 \text{ yrs.}$$

$$\Rightarrow \text{Age of Rohit after 12 yrs.} = 18 \text{ yrs. and age of Rohit's father after 12 yrs.} = 30 \text{ yrs.}$$

Hence, after further 6 yrs., father will be **1.67 times** of Rohit's age.

8. The sum of ages of 5 children born at the intervals of 2 years each is 30 years. What is the age of the youngest child?

A. 2 years

B. 4 years

C. 6 years

D. None of these

**Solution**

$$\frac{X-4}{\text{Youngest}}$$

$$\frac{X-2}{}$$

$$\frac{X}{}$$

$$\frac{X+2}{}$$

$$\frac{X+4}{\text{Oldest}}$$

As per question,

Sum of age of all children = 30

$$\Rightarrow (X-4) + (X-2) + X + (X+2) + (X+4) = 30$$

$$\Rightarrow 5X = 30 \Rightarrow X = 6$$

$$\text{Hence, age of youngest} = X-4 = 2$$

## Topic 7: AGES

9. When 5 is subtracted from the present age of Ramu and the remainder is divided by 5, then the present age of Sahil is obtained. If Sahil is 4 years younger to Raj whose age is 12 years, then find the age of Ramu.

A. 45      B. 50      C. 54      D. 58      E. Data inadequate

Solution

Present	Ramu	Sahil	Raj
		$12 - 4 = 8$	12

As per question,

$$\frac{\text{Ramu} - 5}{5} = \text{Sahil} \Rightarrow \text{Ramu's age} = 5. \text{Sahil} + 5 = 45$$

10. The average of ages of three persons is 60 years. Those ages are in the ratio 2:4:6. What is the age of youngest one among them?

A. 30      B. 15      C. 60      D. NONE OF THESE

Solution

Average of ages of three persons = 60

Sum of ages of three persons = Average  $\times$  3 =  $60 \times 3 = 180$

$$\begin{array}{ccc} \text{I} & : & \text{II} & : & \text{III} \\ [2 & : & 4 & : & 6]x \end{array}$$

$$\text{Sum of ages} = 2x + 4x + 6x = 180 \Rightarrow 12x = 180 \Rightarrow x = 15$$

$$\text{Hence, age of youngest one} = 2x = 30$$

11. The present ages of three persons is in the ratio 2 : 5 : 7. Six years ago, the sum of their ages was 52.

Find their present ages.

A. 8, 20, 28      B. 16, 28, 36      C. 20, 35, 45      D. None of these

Solution

$$\begin{array}{ccccccc} \text{Present} & \longrightarrow & \text{I} & : & \text{II} & : & \text{III} \\ & & [2 & : & 5 & : & 7]x \\ & & \downarrow 6 & & \downarrow 6 & & \downarrow 6 \\ \text{6 Years Ago,} & & 2x-6 & & 5x-6 & & 7x-6 \end{array}$$

Given,

$$\text{Sum of ages 6 years ago} = 52$$

$$\Rightarrow (2x-6) + (5x-6) + (7x-6) = 52 \Rightarrow x = 5$$

$$\text{Hence, Present ages of three persons} = 2x, 5x, 7x = 10, 25, 35$$

12. When Rajeev was born, his father was 32 years older than his brother and his mother was 25 years older than his sister. If Rajeev's brother is 6 years older than Rajeev and his mother is 3 years younger than his father, how old was Rajeev's sister when Rajeev was born?

A. 15 Years      B. 7 Years      C. 17 Years      D. 10 Years      E. None of these

Solution

Given,

Age difference of Rajeev's father and brother = 32

Age difference of Rajeev's mother and sister = 25

Age difference of Rajeev's brother and Rajeev = 6

Age difference of Rajeev's father and mother = 3

Now,

Age of Rajeev when he was born = 0

$\Rightarrow$  Age of Rajeev's brother when Rajeev was born =  $0+6 = 6$

$\Rightarrow$  Age of Rajeev's father when Rajeev was born =  $6+32 = 38$

$\Rightarrow$  Age of Rajeev's mother when Rajeev was born =  $38-3 = 35$

$\Rightarrow$  Age of Rajeev's sister when Rajeev was born =  $35-25 = 10$

13. A father said to his son, "I was as old as you are at the present at the time of your birth". If the father's age is 38 years now, the son's age five years back was:

(HINT: the difference between the ages of two persons never change)

- A. 14      B. 19      C. 33      D. 38

**Solution**

	Father	Son
When son was born	x	0
Present	38	x

We know that age difference between two persons never changes.

Therefore, we can write,

$$x - 0 = 38 - x \Rightarrow x = 19 \Rightarrow \text{Son's age 5 years back} = x - 5 = 19 - 5 = 14$$

</DIY/>

- 7 years ago, the ages (in years) of A and B were in the ratio 4:5 and 7 years hence, they will be in the ratio 5:6. The present age of B is:  
A. 56 years      B. 63 years      C. 70 years      D. 77 years
- The sum of ages of family members (both children and parents) is 360 years. The total ages of children and parents are in the ratio 2:1 and the ages of wife and husband are in the ratio 5:7. What will be the age of husband?  
A. 65      B. 75      C. 72      D. 70
- The sum of the ages of a mother and her son is 45 years. Five years ago, the product of their ages was 3 times the mother's age at that time, then the present age of the son is:  
A. 8      B. 10      C. 12      D. 14
- The ages of two persons differ by 14 years. 5 years ago, the elder one was 3 times as old as the younger one. What is the present age of the elder person?  
A. 36      B. 24      C. 32      D. 26
- Present ages of Simmi and Anu are in the ratio of 5 : 4 respectively. Three years hence, the ratio of their ages will become 11 : 9 respectively. What is Anu's present age in years?  
A. 20      B. 24      C. 28      D. 35
- Ten years ago, the ages of the members of a joint family of eight people added up to 231 years. Three years later, one member died at the age of 60 years and a child was born during the same year. After another three years, one more member died, again at 60, and a child was born during the same year. The current average age of this eight-member joint family is nearest to:  
A. 23 years      B. 22 years      C. 25 years      D. 24 years
- Rahul is 15 years older than Rohan. If 5 years ago, Rahul was 3 times as old as Rohan, then find Rahul's present age.  
A. 32.5 years      B. 27.5 years      C. 25 years      D. 24.9 years
- In 4 years, Raj's father's age will be twice as Raj. Two years ago, Raj's mother's age was twice as Raj. If Raj will be 32 years old, eight years from now, what is the present age of Raj's mother and father?  
A. 32,34      B. 51,50      C. 32,36      D. 52,46
- When you reverse the digits of age of father you will get the age of son. one year ago, the age of father was twice that of son's age. What are the current ages of father and son?  
A. 73 & 37      B. 73 & 45      C. 65 & 37      D. None of these
- Five years ago, the average age of a family of six members was 20 years. A baby is born and now the average age is 22 years. How old is the baby at present?  
A. 2 years      B. 5 years      C. 3 years      D. 4 years

# TOPIC 8

## PROFIT AND LOSS

1. A man buys an article for Rs. 27.50 and sells it for Rs. 28.60. Find his gain percent.

A. 4%                                    B. 8%                                    C. 10%                                    D. 6%

Solution

$$\begin{array}{ccc}
 \underline{\text{CP}} & & \underline{\text{SP}} \\
 27.50 & & 28.60 \leftarrow \\
 275 & : & 286 \\
 [25 & : & 26] \times 4 \leftarrow \\
 100 & : & 104 \\
 \downarrow & & \downarrow \\
 \text{If CP} = 100 \text{ then \%P} = P = 4\%
 \end{array}$$

These are decimal values. So before calculating anything, make a ratio and simplify.

Now make CP as 100 in the ratio

2. A man gains 10% by selling a certain article for a certain price. If he sells it at double the price, the profit made is:

A. 20%                                    B. 120%                                    C. 100%                                    D. 140%

Solution

Using 10%. make a ratio}  $10\% = 10/100$

$$\begin{array}{ccc}
 \underline{\text{C.P.}} & : & \underline{\text{S.P.}} \\
 100 & : & 110 \\
 \downarrow & +10 & \downarrow \\
 100 & : & 220 \\
 \downarrow & +120 & \downarrow \\
 \text{If C.P.} = 100, \% P = P \\
 \Rightarrow \% P = 120 \%
 \end{array}$$

$\times 2$  Now, sell at double price

3. A radio when sold at a certain price gives a gain of 20%. What will be the gain percent, if sold for thrice the price?

A. 4%                                    B. 8%                                    C. 10%                                    D. 6%

Solution

Gain (20%) =  $20/100$

$$\begin{array}{ccc}
 \underline{\text{C.P.}} & : & \underline{\text{S.P.}} \\
 100 & : & 120 \\
 \downarrow & +20 & \downarrow \\
 100 & : & 360 \\
 \downarrow & +260 & \downarrow \\
 \Rightarrow 260\%
 \end{array}$$

$\times 3$

4. A person sells an article at 16% below its cost price. Had he sold for 30 rupees more, he would have gained 14%. To gain 25%, he should sell the article for \_\_\_\_\_ rupees.

A. 100                                    B. 200                                    C. 125                                    D. 150

Solution

$$\text{SP}_1 \Rightarrow 84\%$$

$$\text{SP}_2 \Rightarrow 114\%$$

$$\text{SP}_3 \Rightarrow 125\% \Rightarrow ?$$

$$\begin{aligned}
 \Rightarrow \text{SP}_2 - \text{SP}_1 &= 30\% = 30 \text{ Rs} \\
 \Rightarrow 1\% &= 1 \text{ Rs} \\
 \Rightarrow 125\% &= 125 \text{ Rs}
 \end{aligned}$$

5. A man sold a book at loss of 10%. Had he sold it for 104 Rs more, he would have earned a profit of 10%. Find the cost price of the book.

A. Rs. 400

B. Rs. 520

C. Rs. 640

D. Rs. 840

**Solution**

$$SP_1 = 90\% \text{ of C.P}$$

$$SP_2 = 110\% \text{ of C.P}$$

$$\left. \begin{array}{l} \text{Given, } SP_2 - SP_1 = 104 \text{ Rs} \\ 20\% \text{ of C.P.} = 104 \end{array} \right\}$$

$$\frac{1}{5} \times \text{C.P.} = 104$$

$$\text{C.P.} = 104 \times 5 = 520 \text{ Rs.}$$

6. The cost price of 20 article is the same as the selling price of X articles. If the profit is 25%, then the value of X is:

A. 15

B. 16

C. 18

D. 25

**Solution**

$$\begin{array}{c:c} \text{C.P.} & : \quad \text{S.P.} \\ X & \quad 20 \end{array}$$

$$\text{Using profit\% (25\% = } \frac{25}{100})$$

$$\begin{array}{c:c} \text{C.P.} & \text{S.P.} \\ 100 & 125 \\ [4 & : \quad 5] \times 4 & (\text{Multiply by 4 to make the ratios match}) \\ [16 & : \quad 20] \\ \Rightarrow X = 16 \end{array}$$

7. If the cost price of 20 articles is equal to the selling price of 16 articles. What is the percentage of profit or loss that the merchant makes?

A. 15% Profit

B. 25% Loss

C. 25% Profit

D. 15% Loss

**Solution**

$$\text{C.P. of 20 articles} = \text{S.P. of 16 articles}$$

$$\Rightarrow 20(\text{C.P. of 1 unit}) = 16(\text{S.P. of 1 unit})$$

$$\Rightarrow \text{C.P./S.P.} = 16/20$$

$$\begin{array}{c:c} \text{C.P.} & \text{S.P.} \\ 16 & 20 \\ [4 & : \quad 5] \times 25 & \text{Now multiply by 25 to make C.P. as 100.} \\ [100 & : \quad 125] \\ + 25 & \end{array}$$

$$\%P = 25\%$$

8. Sam Purchased 20 dozen of toys at the rate of Rs. 375 per dozen. He sold each one of them at the rate of Rs. 33. What was his percentage profit?

A. 3.5%

B. 4.5%

C. 6.5%

D. 5.6%

**Solution**

$$\begin{array}{c:c} \text{C.P.} & \text{S.P.} \\ 375 \times 20 & 33 \times 20 \times 12 \\ 125 & : \quad 132 \\ 7 & \end{array}$$

$$\Rightarrow \%P = (7/125) \times 100 = \frac{28}{5}\% = 5.6\%$$

## Topic 8: PROFIT AND LOSS

9. A vendor bought toffees at 6 for a rupee. How many for a rupee must he sell to gain 20%?

A. 3      B. 4      C. 5      D. 6

**Solution**

C.P. of 6 toffees = 1 Rs

Let 1 Rs. is the SP of x toffees.

$$\Rightarrow C.P_6 = S.P_x$$

$$As, \text{gain\%} = 20\% = 1/5$$

<u>C.P.</u>	<u>S.P.</u>
x	6

$$\begin{array}{l} \text{C.P.} \\ \hline 5 & : & 6 \\ \text{Equating both the ratios, we get} \\ x = 5 \end{array}$$

10. On selling 17 balls at Rs. 720, there is a loss equal to the cost of 5 balls. The cost price of a ball is:

A. Rs. 45      B. Rs. 50      C. Rs. 55      D. Rs. 60

**Solution**

Let CP of 1 ball = x Rs

$$\begin{array}{ll} \text{CP of 17 balls} & \text{SP of 17 balls} \\ = 17x \text{ Rs} & = 720 \text{ Rs} \\ \text{Loss} = \text{CP of 5 balls} & = (17-5)x \\ = 5x \text{ Rs} & = 12x \text{ Rs} \\ & = 5x \text{ Rs} \end{array}$$

Now,

$$12x = 720$$

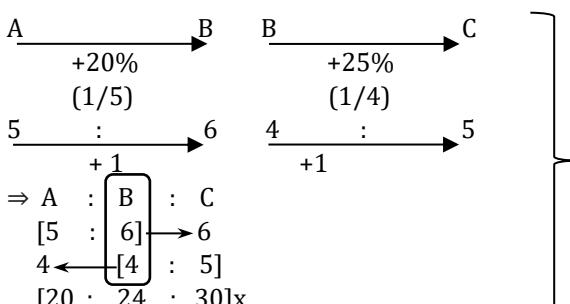
$$x = 60$$

$$\Rightarrow \text{CP of 1 ball} = x = 60 \text{ Rs}$$

11. A sells a bicycle to B at a profit of 20%. B sells it to C at a profit of 25%. If C pays Rs. 225 for it, the cost price of the bicycle for A is:

A. Rs. 110      B. Rs. 120      C. Rs. 125      D. Rs. 150

**Solution**



Make ratios using two % given & combine them to make a single ratio

$$\text{Given, } 30x = 225 \Rightarrow x = 15/2 \Rightarrow \text{CP of bicycle for A} = 20x = \text{Rs } 150$$

12. I bought a book for Rs 60, I sold off to a friend for Rs 70 but after a while I felt sorry, that I sold it and bought it back for Rs 80, how much loss did I incur?

A. No loss    B. No gain    C. Rs 10    D. Rs. 15    E. None of these

**Solution**

- I. I have 60 Rs
- II. I buy the book
- III. I have (60 Rs book) + 0 Rs in my pocket.
- IV. I sell the book
- V. I have 70 Rs in my pocket
- VI. I buy the book again for 80 Rs.
- VII. I have the book and I owe my friend 10 Rs  
⇒ 10Rs Loss

Order of events

13. John buys a cycle for 31 dollars and given a cheque of amount 35 dollars. Shop keeper exchanged the cheque with his neighbour and given change to John. After 2 days, it is known that cheque is bounced. Shop keeper paid the amount to his neighbour. The cost of cycle is 19 dollars. What is the profit/loss for shop keeper?

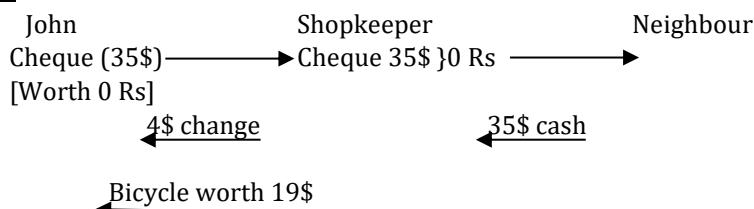
A. loss 23

B. gain 23

C. gain 54

D. loss 54

Solution



Shopkeeper gave 19\$ bicycle & a cash of 4\$ & got nothing in return. So, he is at a loss of 23\$(19\$ + 4\$).

14. A quantity of tea is sold at Rs. 5.75 per kilogram. The total gain by selling the tea at this rate is Rs. 60. Find the quantity of tea being sold if a profit of 15% is made on the deal.

A. 9 kg

B. 60 kg

C. 80 kg

D. 70 kg

Solution

Using profit %, make a ratio  $15\% \Rightarrow 15/100$

Ratio

$$\begin{array}{ccc}
 \text{C.P.} & & \text{S.P.} \\
 \frac{100 \times 4}{+15 \times 4} : & \longrightarrow & 115 \times 4 \\
 \text{Actual} & & \\
 400 \text{ Rs} & \longrightarrow & 460 \text{ Rs}
 \end{array}
 \quad \boxed{\text{Make the ratio match the actual value given in the question}}$$

By matching,

$$\begin{aligned}
 \text{CP} = 400 \text{ Rs} &\Rightarrow \text{SP} = 460 \text{ Rs} \\
 \text{Profit} = 60 \text{ Rs} &\Rightarrow 460 = 5.75 \times (\text{Quantity of tea}) \\
 \text{SP} = 460 \text{ Rs} &\Rightarrow 460 = (23/4) \times Q \\
 &\Rightarrow Q = 80 \text{ kg}
 \end{aligned}$$

15. Two lots of Mango with equal quantity, one costing Rs. 10 per kg and the other costing Rs. 15 per kg, are mixed together and whole lot is sold at Rs. 15 per kg. What is the profit or loss?

A. 10% loss

B. 10% profit

C. 20% profit

D. 20% loss

Solution

Lot 1 ( $q_1$ )

$p_1 = 10 \text{ Rs/kg}$

Lot 2 ( $q_2$ )

$p_2 = 15 \text{ Rs/kg}$

Given ( $q_1 = q_2$ )

$$p = \frac{(p_1 q_1 + p_2 q_2)}{(q_1 + q_2)} = \frac{(p_1 + p_2)}{2} = \frac{(10+15)}{2} = 12.5 \text{ Rs/kg}$$

Now,

C.P.  $<$  S.P.

$$\begin{array}{c}
 12.5 \text{ Rs} \xrightarrow{15 \text{ Rs}} \\
 \text{Profit} = 2.5 \text{ Rs}
 \end{array}$$

$$\Rightarrow \%P = (2.5/12.5) \times 100 = 20\%$$

## Topic 8: PROFIT AND LOSS

16. How many kgs of wheat costing Rs.24 per kg must be mixed with 30 kgs of wheat costing Rs.18.40 per kg so that 15% profit can be obtained by selling the mixture at Rs.23 per kg?

A. 10

B. 12

C. 15

D. 20

Solution

$$\begin{array}{l} CP_1 \\ = 24 \text{ Rs/kg} \\ \text{kg} \\ \text{---} \\ \text{MIX} \end{array} \quad \begin{array}{l} CP_2 \\ = 18.40 \text{ Rs/kg} \\ 30 \text{ kg} \end{array}$$

$$\begin{array}{l} \text{Using } 15\% (15/100) \\ CP_{Mix} : SP_{Mix} \\ 100 : 115 \end{array}$$

$$CP_{Mix} = 20 \text{ Rs/kg}$$

$$\begin{array}{l} 20-18.40 \\ = 1.6 \\ \Rightarrow 16 \\ [4 \\ [12 \end{array} \quad \begin{array}{l} 24-20 \\ = 4 \\ 40 \\ [10] \times 3 \\ 30 \end{array}$$

Alligation Rule

Ans.

$$20 : 23$$

Matching actual value given

Matching actual value given (i.e. 30kg)

17. The cost price of an article is 80% of its marked price for sale. How much per cent does the tradesman gain after allowing a discount of 12%?

A. 20%

B. 12%

C. 10%

D. 8%

Solution

$$\begin{array}{l} C.P. \\ = 80\% \text{ of M.P.} \\ = 80 \text{ Rs} \\ \text{---} \\ P=8 \text{ Rs} \end{array} \quad \begin{array}{l} S.P. \\ < \\ = 100-12 \\ = 88 \text{ Rs} \end{array} \quad \begin{array}{l} M.P. \\ \text{let M.P.} = 100 \text{ Rs} \\ -12 \% \text{ of M.P.} \\ \Rightarrow Dis = 12 \text{ Rs} \end{array}$$

$$\Rightarrow \% P = (8/80) \times 100 = 10\%$$

18. A shopkeeper allows a discount of 10% on the marked price and still gains 17% on the whole. Find at what percent above the cost price did he mark his goods.

A. 35%

B. 25%

C. 30%

D. 45%

Solution

$$\begin{array}{l} \text{Discount } 10\% (10/100) \Rightarrow S.P. \\ \quad 90 \quad M.P. \\ \quad [9 \quad : \quad 10] \end{array}$$

$$\begin{array}{l} \text{Gain \% (17\%)} = 17/100 \quad C.P. : S.P. \\ \quad [100 : 117] \\ \Rightarrow C.P. : S.P. \quad \& \quad S.P. : M.P. \\ \quad [100 : 117] \quad \quad [9 : 10] \times 13 \end{array}$$

$$\begin{array}{l} \Rightarrow C.P. : S.P. : M.P. \\ \Rightarrow 100 : 117 : 130 \end{array}$$

$$\begin{array}{r} C.P. \quad M.P. \\ 100 : 130 \\ \text{---} \\ +30 \end{array}$$

$$\Rightarrow \% \text{ Mark-up} = (30/100) \times 100 = 30\%$$

19. If on an item, a company gives 25% discount, they earn 25% profit. If they now give 10% discount, then what is the profit percentage?

A. 40%      B. 50%      C. 35%

D. 30%

**Solution**

CASE I  $\Rightarrow SP_1 = 75\% \text{ of M.P.} = 125\% \text{ of C.P.}$

CASE II  $\Rightarrow SP_2 = 90\% \text{ of M.P.} = X\% \text{ of C.P.}$

$$\Rightarrow \frac{75\% \text{ of MP}}{90\% \text{ of MP}} = \frac{125\% \text{ of CP}}{X\% \text{ of CP}}$$

$$\Rightarrow X = 25 \times 6 = 150 \Rightarrow SP_2 = 150\% \text{ of CP}$$

$$\Rightarrow \%P = 50\% \text{ of C.P.}$$

20. A horse and a cow were sold for Rs. 12,000 each. The horse was sold at a loss of 20% and the cow at a gain of 20%. The entire transaction resulted in?

A. no loss or gain      B. loss of Rs. 1000      C. gain of Rs. 1000      D. gain of Rs. 2000

**Solution**

As per situation,  $SP_{\text{Horse}} = SP_{\text{cow}}$

Horse (-20% = (-1/5))

$$\begin{array}{rcl} CP_1 & & SP_1 \\ [5] & : & 4]_{x3} \\ -1 & & \\ \hline [15 & : & 12] \\ 15x & & 12x \\ -3x & & \\ \hline \end{array}$$

Cow (+20% = (+1/5))

$$\begin{array}{rcl} CP_1 & & SP_1 \\ [5] & : & 6]_{x2} \\ +1 & & \\ \hline [10 & : & 12] \\ 10x & & 12x \\ +2x & & \\ \hline \end{array}$$

Now, SP are same in ratio also.

$$SP_1 = SP_2 = 12000$$

$$\Rightarrow 12x = 12000 \Rightarrow x = 1000$$

$$\Rightarrow \text{Net result} = -3x + 2x = -x = -1000 \text{ Rs} = \text{Loss of 1000 Rs}$$

21. A man sold two cows for Rs. 210 at a total profit of 5 %. He sold one cow at a loss of 10% and another at a profit of 10%. What is the price of each cow?

A. Rs. 100 & Rs. 50

B. Rs. 150 & Rs. 50

C. Rs. 150 & Rs. 75

D. None of these

**Solution**

1<sup>st</sup> cow (-10% = (-1/10))

$$\begin{array}{rcl} CP_1 & & SP_1 \\ [10] & : & 9]_{x} \\ -1 & & \\ \hline [20 & : & 11]_{x10} \\ \Rightarrow 200 \text{ Rs} & & 210 \text{ Rs} \\ & & 210 \text{ Rs} \end{array}$$

2<sup>nd</sup> Cow (+10% = (+1/10))

$$\begin{array}{rcl} CP_2 & & SP_2 \\ [10] & : & 11]_{y} \\ +1 & & \\ \hline [20 & : & 11]_{y} \\ \Rightarrow 200 \text{ Rs} & & 210 \text{ Rs} \\ & & 210 \text{ Rs} \end{array}$$

$$\text{Now, } CP_1 + CP_2 = 200 \text{ Rs}$$

$$10x + 10y = 200 \text{ Rs}$$

$$90x + 90y = 1800 \quad \dots\dots\dots 1$$

$$SP_1 + SP_2 = 210 \text{ Rs}$$

$$9x + 11y = 210 \text{ Rs}$$

$$90x + 110y = 2100 \quad \dots\dots\dots 2$$

$$\text{Eq}^n 2 - 1$$

$$\Rightarrow 20y = 300$$

$$\Rightarrow y = 15 \Rightarrow CP_2 = 10y = 10 \times 15 = 150 \text{ and } CP_1 = 200 - CP_2 = 50$$

22. A Samsung duo and a Galaxy are bought for Rs.40000. The Duo is sold at a profit of 33.33% and the Galaxy is sold at a loss of 20%. There was no loss or gain. Find the cost price of the Samsung duo?

A. Rs. 15,000      B. Rs. 25,000      C. Rs. 20,000      D. Rs. 18,000

Solution

$$\begin{array}{c|c} \text{Samsung Duo } (+33.33\% = (+1/3)) & \text{Galaxy } (-20\% = (-1/5)) \\ \text{CP}_1 & \text{SP}_1 \\ 3 & 4 \\ \hline : & \\ +1 & \end{array} \quad \begin{array}{c|c} & \text{SP}_2 \\ \text{CP}_2 & 4 \\ 5 & -1 \\ \hline : & \end{array}$$

Given situation: No loss no gain

⇒ Profit on Duo = Loss on galaxy

As per the ratio also,  $+1-1=0$

⇒ We can take same variable (x) for both ratios.

Now, ⇒  $\text{CP}_1 + \text{CP}_2 = 40,000$  Rs (Given)

$$\Rightarrow 3x + 5x = 40,000 \Rightarrow x = 5000$$

$$\Rightarrow \text{CP of Duo} = \text{CP}_2 = 3x = 15,000 \text{ Rs}$$

</DIY/>

- Lalit marks up his goods by 40% and gives a discount of 10%. Apart from this, he uses a faulty balance also, which reads 1000 gm for 800 gm. What is his net profit percentage?  
 A. 57.5%      B. 57%      C. 61%      D. 62.5%
- A shopkeeper expects a gain of 22.5% on his cost price. If in a week, his sale was of Rs. 392, what was his profit?  
 A. Rs. 18.20      B. Rs. 70      C. Rs. 72      D. Rs. 88.25
- In a certain store, the profit is 320% of the cost. If the cost increases by 25% but the selling price remains constant. Approximately what percentage of the selling price is the profit?  
 A. 30%      B. 70%      C. 100%      D. 250%
- The percentage profit earned by selling an article for Rs. 1920 is equal to the percentage loss incurred by selling the same article for Rs. 1280. At what price should the article be sold to make 25% profit?  
 A. Rs. 2000      B. Rs. 2200      C. Rs. 2400      D. Data inadequate
- The cost price of 4 ice-creams is equal to the selling price of 6 ice creams. Find profit or loss %.  
 A. 25% GAIN      B. 20% GAIN      C. 40% GAIN      D. 33.33% LOSS
- A shopkeeper sells two different items at the same price. If he sells one at a profit of 10% and another at a loss of 10%, find the net profit or loss%.  
 A. 2% gain      B. 1% loss      C. 1% gain      D. 2% loss
- A shopkeeper sells 18 mangoes for the purchase price of 20 mangoes. The percent profit made by the shopkeeper is:  
 A. 10%      B. 11.11%      C. 9.09%      D. 12%
- A trader gives three successive discounts of 10%, 20% and 10% respectively. Find the net discount percentage.  
 A. 35.2%      B. 40%      C. 20%      D. 30%
- If on an item a company gives 25% discount, they earn 25% profit. If they now give 10% discount then what is the profit percentage.  
 A. 40%      B. 50%      C. 35%      D. 30%
- A person sold an article for Rs. 3,600 and got a profit of 20%. If he sold the article for Rs. 3,150, then how much profit he will make?  
 A. 6%      B. 10%      C. 15%      D. 5%

# TOPIC 9

## SIMPLE INTEREST

1. Given that the interest is only earned on principal, if an investment of Rs.1000.00 amounts to Rs.1440.00 in two years, then what is the rate of interest earned?

A. 20%                    B. 21%                    C. 22%                    D. 23%

**Solution**

$$\begin{aligned} S.I. &= \frac{P \times r \times t}{100} \\ \Rightarrow 1440 - 1000 &= \frac{1000 \times r \times 2}{100} \\ \Rightarrow 440 &= 10 \times r \times 2 \\ \Rightarrow r &= 22\% \text{ Ans.} \end{aligned}$$

2. A sum of Rs 468.75 was lent out at simple interest and at the end of 1 year and 8 months, the total amount of Rs 500 is received, find the rate of interest.

A. 4%                    B. 4.50%                    C. 6%                    D. 8%

**Solution**

$$\begin{aligned} P &= 468.75 \\ A &= 500 \\ t &= 1 \text{ yr } 8 \text{ months} = 1 + \frac{8}{12} = \frac{5}{3} \text{ yrs.} \\ S.I. &= A - P \\ &= 500 - 468.75 = 31.25 \\ \Rightarrow 31.25 &= \frac{P \times r \times t}{100} \\ \Rightarrow 31.25 &= \frac{468.75 \times r \times 5}{100 \times 3} \\ \Rightarrow 625 &= \frac{15625 \times r \times 1}{100} \\ \Rightarrow r &= 4\% \text{ Ans.} \end{aligned}$$

3. How long will it take for a sum of money to grow from Rs. 1250 to Rs. 10,000, if it is invested at 12.5% p.a. simple interest?

A. 26 Years                    B. 35 Years                    C. 76 Years                    D. 56 Years

**Solution**

$$\begin{aligned} S.I. &= A - P \\ &= 10000 - 1250 = 8750 \\ \Rightarrow \frac{1250 \times 12.5 \times t}{100} &= 8750 \\ \Rightarrow t &= 56 \text{ years.} \end{aligned}$$

4. Simple Interest on a certain sum is  $\frac{16}{25}$  of the sum. Find the rate percent and time, if both are numerically equal.

A. Rate=8% & Time=8 years                    B. Rate=8% & Time=9 years  
C. Rate=18% & Time=8 years                    D. None of these

**Solution**

$$\begin{aligned} S.I. &= \frac{P \cdot r \cdot t}{100} \\ \Rightarrow \frac{16}{25} \times P &= \frac{P \times r \times r}{100} \quad [\because t = r] \\ \Rightarrow r^2 &= 64 \\ \Rightarrow r &= 8\% \text{ and } t = 8 \text{ yrs.} \end{aligned}$$

## Topic 9: SIMPLE INTEREST

5. Rambo took a loan of Rs. 1200 with simple interest for as many years as the rate of interest. If he paid Rs. 432 as interest at the end of the loan period, what was the rate of interest?

A. 3.6      B. 6      C. 18      D. Data inadequate      E. None of these

**Solution**

$$\begin{aligned} P &= \text{Rs. } 1200 \\ r &= t \text{ (numerically)} \\ S.I. &= \text{Rs. } 432 \\ \Rightarrow \frac{P \times r \times t}{100} &= 432 \\ \Rightarrow \frac{1200 \times r \times r}{100} &= 432 \\ \Rightarrow r = 6\% \text{ and } t &= 6 \text{ yrs.} \end{aligned}$$

6. If you deposit Rs. 110 in a bank at a simple interest of 12% per year, how much money will you have in the bank after 2 years?

A. 134      B. 136.4      C. 26.4      D. 24 136

**Solution**

$$\begin{aligned} P &= \text{Rs. } 110, \quad t = 2 \text{ yrs.}, \quad r = 12\% \\ A &= P + rt\% \text{ of } P \\ \Rightarrow A &= P + 24\% \text{ of } P \\ &= \text{Rs. } 110 + 20\% \text{ of } \text{Rs. } 110 + 4 \times (1\% \text{ of } \text{Rs. } 110) \\ &= \text{Rs. } 110 + 2 \times 11 + 4 \times (1.1) \\ &= \text{Rs. } 136.4 \end{aligned}$$

7. What sum of money will accumulate to Rs.5300 at 8% rate of interest in 9 months?

A. 5000      B. 5400      C. 4500      D. 4000

**Solution**

$$\begin{aligned} r\% &= 8\%, \quad t = 9 \text{ months} = \frac{9}{12} \text{ yr.} = \frac{3}{4} \text{ yr.} \\ 100\% \text{ of } P &\quad S.I. = rt\% \text{ of } P \\ &= \left(8 \times \frac{3}{4}\right)\% \text{ of } P \\ &= 6\% \text{ of } P \\ A &= \text{Rs. } 5300 \\ \Rightarrow 106\% &= \text{Rs. } 5300 \\ \Rightarrow 1\% &= \frac{\text{Rs. } 5300}{106} \\ \Rightarrow 100\% &= \frac{\text{Rs. } 5300}{106} \times 100 \\ \Rightarrow P &= \text{Rs. } 5000 \end{aligned}$$

8. In how much time would the simple interest on a certain sum be 0.125 times the principal at 10% per annum?

A.  $2\frac{3}{4}$  years.      B.  $1\frac{1}{4}$  years.      C.  $2\frac{1}{4}$  years.      D.  $3\frac{1}{4}$  years.

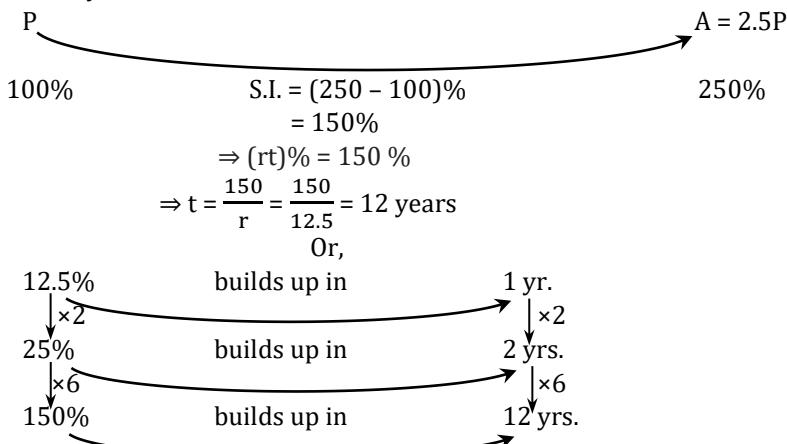
**Solution**

$$\begin{aligned} r\% &= 10\%, \quad t \text{ yr.} \\ P &\quad A \\ S.I. &= 0.125P \\ S.I. = 0.125P &= 12.5\% \text{ of } P \\ (rt)\% &\\ So, rt &= 12.5 \\ \Rightarrow t &= \frac{12.5}{r} = \frac{12.5}{10} = 1.25 \text{ years} = 1\frac{1}{4} \text{ years} \end{aligned}$$

9. A sum of money becomes 2.5 times itself at 12.5% simple interest p.a. The period of investment is  
 A. 10 years      B. 14 years      C. 12 years      D. 9 years

**Solution**

$$r\% = 12.5\%, t \text{ yrs.}$$

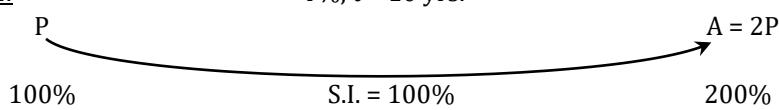


10. At a certain rate of simple interest, a sum doubles itself in 10 years. In how many years would it treble itself?

- A. 30      B. 40      C. 15      D. Data inadequate      E. None of these

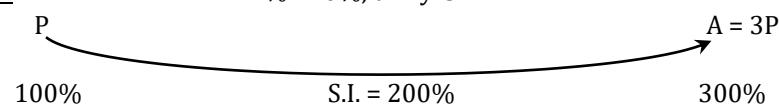
**Solution**

Case1:  $r\%, t = 10 \text{ yrs.}$



$$\Rightarrow rt = 100 \\ \Rightarrow r = \frac{100}{t} = \frac{100}{10} = 10\% \\ r\% = 10\%, t = ? \text{ yrs.}$$

Case2:  $r\% = 10\%, t = ? \text{ yrs.}$



$$\Rightarrow rt = 200 \\ \Rightarrow t = \frac{200}{r} = \frac{200}{10} = 20 \text{ yrs.}$$

11. Simple interest on an amount at 4% per annum for 13 months is more than the simple interest on the same sum for 8 months at 6% per annum by Rs 40. What is the principal amount?

- A. 16000      B. 12000      C. 4800      D. 22000

**Solution**

Case1:

$$\begin{matrix} P \\ 4\% \\ 13 \text{ months} = \frac{13}{12} \text{ yr.} \end{matrix}$$

$$\Rightarrow S.I.(I) > \text{by Rs. 40}$$

$$\Rightarrow S.I.(I) - S.I.(II) = \text{Rs. 40}$$

$$(rt)\% \quad (rt)\%$$

$$\Rightarrow \left( \frac{13}{12} \times 4 \right)\% - \left( \frac{8}{12} \times 6 \right)\% = \text{Rs. 40}$$

$$\Rightarrow \left( \frac{52-48}{12} \right)\% = \text{Rs. 40}$$

$$\Rightarrow 4\% = 12 \times 40$$

$$\Rightarrow 100\% = 12 \times 40 \times 25 = \text{Rs. 12000}$$

Case2:

$$\begin{matrix} P \\ 6\% \\ 8 \text{ months} = \frac{8}{12} \text{ yr.} \end{matrix}$$

$$S.I.(II)$$

## Topic 9: SIMPLE INTEREST

12. A sum was put at simple interest at a certain rate for 3 years. Had it been put at 1% higher rate it would have fetched Rs. 63 more. The sum is:

A. Rs. 2400      B. Rs. 2100      C. Rs. 2200      D. Rs. 2480

Solution

Case1:

P

r%

3 yrs.

$$S.I.(I) = \frac{P \times r \times 3}{100}$$

$$\therefore S.I.(II) - S.I.(I) = \text{Rs. } 63$$

$$\Rightarrow \frac{P \times (r+1) \times 3}{100} - \frac{P \times r \times 3}{100} = \text{Rs. } 63$$

$$\Rightarrow \frac{P \times 3}{100} \times [(r+1) - r] = \text{Rs. } 63$$

$$\Rightarrow P \times [1] = \text{Rs. } 2100$$

$$\therefore P = \text{Rs. } 2100$$

Case2:

P

(r+1)%

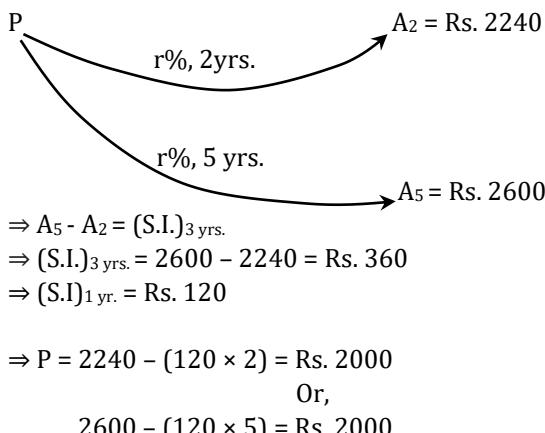
3 yrs.

$$S.I.(II) = \frac{P \times (r+1) \times 3}{100}$$

13. A sum of money at simple interest amounts to Rs. 2240 in 2 years and to Rs. 2600 in 5 years. What is the principal amount?

A. 1000      B. 1500      C. 2000      D. 2500

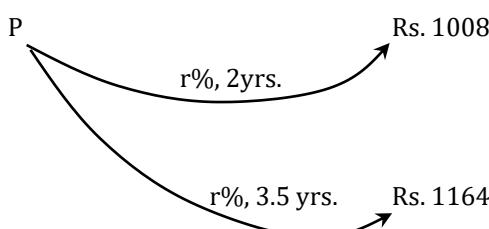
Solution



14. A certain sum of money amounts to Rs. 1008 in 2 years and to Rs. 1164 in 3.5 years. Find the sum and rate of interest.

A. 700, 13%      B. 700, 15%      C. 800, 13%      D. 800, 15%

Solution



$$\Rightarrow P = 1008 - (104 \times 2) = \text{Rs. } 800$$

Or,

$$1164 - (104 \times 3) = \text{Rs. } 800$$

$$S.I. = \frac{P \times r \times t}{100}$$

$$\Rightarrow 104 = \frac{800 \times r \times 1}{100}$$

$$\Rightarrow r = 13\%$$

&lt;/DIY/&gt;

1. A sum fetched a total simple interest of Rs. 4016.25 at the rate of 9% p.a. in 5 years. What is the sum?  
 A. Rs. 4462.50      B. Rs. 8032.50      C. D. Rs. 8900      D. Rs. 8925
  
2. If you deposit Rs. 120 in a bank at a simple interest of 12% per year, how much money will you have in the bank after 2 years?  
 A. 134      B. 148.8      C. 128.8      D. 144      E. 288
  
3. A sum was put at simple interest at certain rate for 4 years. Had it been put at 1% higher rate, it would have fetched Rs. 64 more. The sum is:  
 A. Rs. 3200      B. Rs. 1600      C. Rs. 2000      D. Rs. 2400
  
4. A sum of Rs 450 was lent out at simple interest and at the end of 1 year and 8 months, the total amount of Rs 500 is received. find the rate of interest.  
 A. 6.67%      B. 4.5%      C. 6%      D. 8%
  
5. At a certain rate of simple interest, a sum double itself in 10 years. In how many years would it treble itself?  
 A. 30      B. 40      C. 15      D. Data inadequate      E. None of these
  
6. How long will it take for a sum of money to grow from Rs.1250 to Rs.8,750, if it is invested at 12.5% p.a. simple interest?  
 A. 26 Years.      B. 35 Years.      C. 76 Years.      D. 48 Years.
  
7. A sum at simple interest at 13.5% per annum amounts to Rs 2502.50 after 4 years. Find the sum.  
 A. Rs. 1425      B. Rs. 1225      C. Rs. 1625      D. Rs. 1565
  
8. A certain sum amounts to Rs. 7350 in 2 years and to Rs. 8575 in 3 years. Find the sum and rate percent.  
 A. Sum = Rs. 4400 and Rate=16 2/3 %.      B. Sum = Rs. 5400 and Rate=14 2/3 %.  
 C. Sum = Rs. 5400 and Rate=16 2/3 %.      D. None of these
  
9. A certain sum of money amounts to Rs. 1040 in 2 years and to Rs.1196 in 3.5 years. Find the sum and rate of interests.  
 A. 1092, 13%      B. 936, 12.5%      C. 832, 12.5%      D. 988, 25%
  
10. A lent Rs. 5000 to B for 2 years and Rs. 3000 to C for 4 years on simple interest at the same rate of interest and received Rs. 2200 in all from both of them as interest. The rate of interest per annum is:  
 A. 5%      B. 7%      C. 8%      D. 10%

# TOPIC 10

## COMPOUND INTEREST

1. The amount of principal Rs.4000 at compound interest at the ratio of 10% p.a. for 3 years is:

A. Rs. 4325      B. Rs. 5324      C. Rs. 3425      D. Rs. 5342

Solution

1 <sup>st</sup> year	2 <sup>nd</sup> year	3 <sup>rd</sup> year
10%	10%	10%
400	400	400
	+40	+ 40
		+ 40
		+ 4
4000		
+1200		
+ 120		
+ 4		
<u>5324</u>		

2. If the compound interest on a sum of Rs.5000 at the rate 10% per annum is Rs.1050, then time period is (interest compounded yearly):

A. 1 Year      B. 2 Years      C. 3 Years      D. 2 Years

Solution

$$\begin{aligned} \frac{A_n}{P_0} &= \left( \frac{100+r}{100} \right)^n \\ \Rightarrow \frac{5000+1050}{5000} &= \left( \frac{110}{100} \right)^n \\ \Rightarrow \frac{6050}{5000} &= \left( \frac{11}{10} \right)^n \\ \Rightarrow \frac{1210}{1000} &= \left( \frac{11}{10} \right)^n \\ \Rightarrow n &= 2 \end{aligned}$$

3. At what rate of interest (compounded yearly) will Rs 10,000 amount to Rs. 12,100 in 2 years?

A. 9%      B. 11%      C. 8%      D. 10%

Solution

$$\begin{aligned} \frac{A_n}{P_0} &= \left( \frac{100+r}{100} \right)^n \\ \Rightarrow \frac{12100}{10000} &= \left( \frac{100+r}{100} \right)^2 \\ \Rightarrow \frac{100+r}{100} &= \frac{110}{100} \\ \Rightarrow \frac{100+r}{100} &= \frac{100+10}{100} \\ \Rightarrow r &= 10\% \end{aligned}$$

4. The principal that amounts to Rs. 4913 in 3 years at  $6\frac{1}{4}\%$  per annum C.I. compounded annually, is?

A. Rs. 3406

B. Rs. 4096

C. Rs. 3096

D. Rs. 4085

**Solution**

$$\begin{aligned} r\% &= 6\frac{1}{4}\% = \frac{25}{4}\% \\ \Rightarrow 1 + \frac{r}{100} &= 1 + \frac{25/4}{100} = 1 + \frac{1}{16} = \frac{17}{16} \\ \frac{A_n}{P_0} &= \left(\frac{100+r}{100}\right)^n \\ \Rightarrow \frac{4913}{P} &= \left(\frac{17}{16}\right)^3 \\ \Rightarrow P &= \frac{4913 \times 16^3}{17 \times 17 \times 17} \\ \Rightarrow P &= 16^3 = 4096 \end{aligned}$$

5. A sum of money amounts to Rs. 6690 after 3 years and to Rs. 10035 after 6 years on compound interest.

Find the sum.

A. Rs. 4400

B. Rs. 4560

C. Rs. 4600

D. Rs. 4460

**Solution**Case: - I

$$\begin{array}{ccc} P_0 & & r\%, t = 3 \text{ yrs.} \\ \curvearrowright & & \curvearrowright \\ \Rightarrow \frac{A_3}{P_0} & = & \left(\frac{100+r}{100}\right)^3 \quad \dots \dots \dots \textcircled{1} \end{array}$$

Case: - II

$$\begin{array}{ccc} P_0 & & r\%, t = 6 \text{ yrs.} \\ \curvearrowright & & \curvearrowright \\ \Rightarrow \frac{A_6}{P_0} & = & \left[\left(\frac{100+r}{100}\right)^3\right]^2 \quad \dots \dots \dots \textcircled{2} \\ \Rightarrow \frac{A_6}{P_0} & = & \left(\frac{A_3}{P_0}\right)^2 \\ \Rightarrow \frac{10035}{P_0} & = & \frac{6690 \times 6690}{P_0 \times P_0} \\ \Rightarrow P_0 & = & \text{Rs. } 4460 \end{array}$$

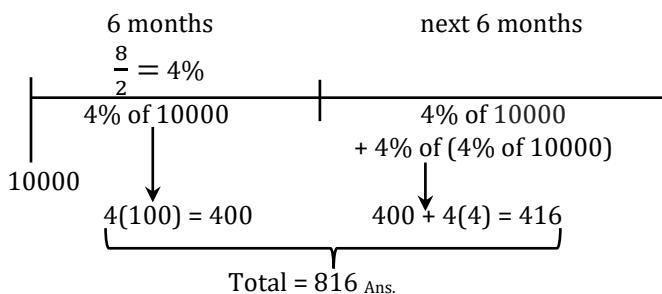
6. Analysing the good returns that Halocircle Insurance Pvt. Ltd. was giving, Ratika bought a 1-year, Rs 10,000 certificate of deposit that paid interest at an annual rate of 8% compounded semi-annually. What was the total amount of interest paid on this certificate at maturity?

A. 716

B. 816

C. 886

D. None of these

**Solution****Note**

For period of 6 months,  
take half of rate %.

## Topic 10: COMPOUND INTEREST

7. Compound interest of Rs.3000 at 10% p.a. for  $1\frac{1}{2}$  years will be (interest compounded half yearly).

A. Rs.473

B. Rs.374

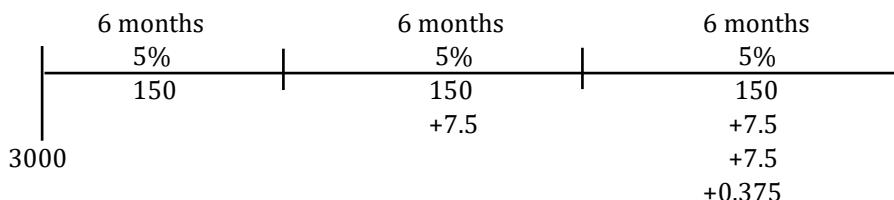
C. Rs.495

D. Rs.347

E. None of these

Solution

$$\begin{array}{c} 3000 \\ \downarrow 5\% \\ 5(30) = 150 \\ \downarrow 5\% \\ 5(1.5) = 7.5 \\ \downarrow 5\% \\ 5(0.075) = 0.375 \end{array}$$



Note

For period of 6 months, take half of rate %.

$$\begin{array}{rcl} \Rightarrow A = & 3000 & = 3000 \\ & +150 \times 3 & +450 \\ & + 7.5 \times 3 & +22.5 \\ & + 0.375 & + 0.375 \\ & \hline & \text{Rs.3472.875} \end{array} \quad \Rightarrow \text{C.I.} = 472.875 \text{ Rs.}$$

8. What is the difference between the compound interests on Rs. 5000 for  $1\frac{1}{2}$  years at 4% per annum compounded yearly and half-yearly?

A. Rs. 2.04

B. Rs. 3.06

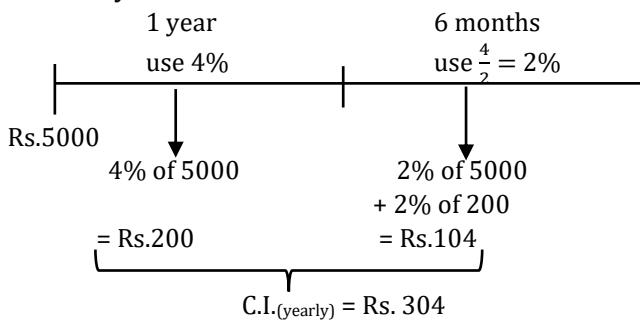
C. Rs. 4.80

D.Rs. 8.30

E. Data inadequate

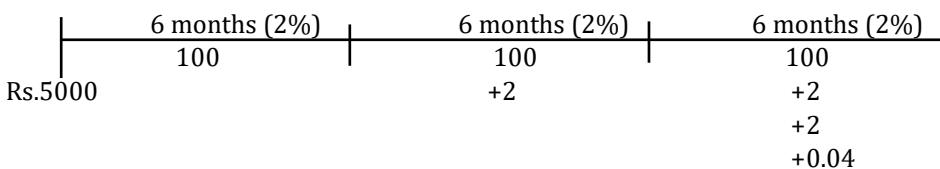
Solution

Yearly



Half-Yearly

$$\begin{array}{c} 5000 \\ \downarrow 2\% \\ 2(1\%) = 2(50) = 100 \\ \downarrow 2\% \\ 2 \\ \downarrow 2\% \\ 2(0.02) = 0.04 \end{array}$$



$$\Rightarrow \text{C.I.}_{(\text{half-yearly})} = 300 + 6 + 0.04 = \text{Rs. } 306.04$$

$$\Rightarrow \text{C.I.}_{(\text{half-yearly})} - \text{C.I.}_{(\text{yearly})} = 306.04 - 304 = \text{Rs. } 2.04$$

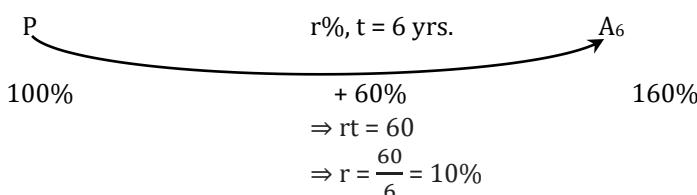
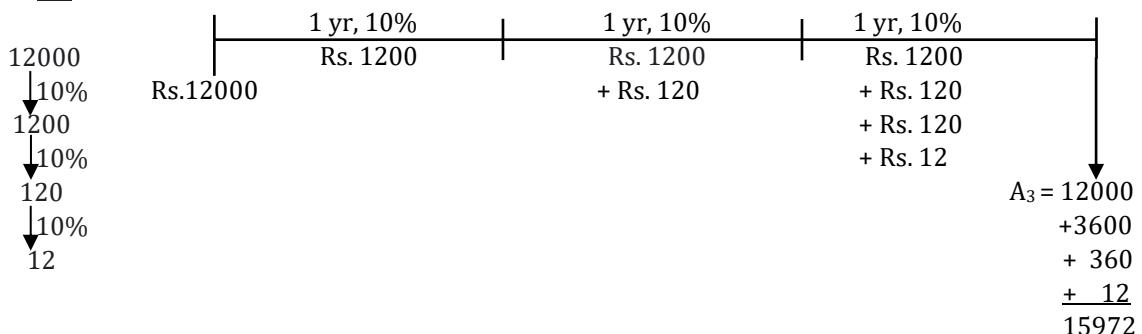
9. There is 60% increase in an amount in 6 years at simple interest. What will be the compound interest of Rs.12,000 after 3 years at the same rate?

A. Rs. 3420

B. Rs. 3120

C. Rs. 3972

D. Rs. 3240

**Solution**S.I.C.I.

$$\begin{aligned} C.I. &= 3600 + 360 + 12 \\ &= \text{Rs. 3972 Ans.} \end{aligned}$$

10. The difference between simple interest and compound interest on a certain deposit for two years at 8% p.a. is Rs 8. What is the amount of deposit?

A. Rs. 2250

B. Rs. 1250

C. Rs. 1550

D. Rs. 2000

E. None of these

**Solution**

For a period of two years

$$\begin{aligned} (C.I. - S.I.)_{2 \text{ yrs.}} &= \left( \frac{r}{100} \right)^2 \times P \\ \Rightarrow C.I. - S.I. &= \text{Rs. 8} \\ \Rightarrow \frac{r^2}{100^2} \times P &= 8 \\ \Rightarrow P &= \frac{8 \times 100 \times 100}{8 \times 8} = 1250 \end{aligned}$$

11. The difference between the compound interest and the simple interest on a certain sum at 12% p.a. for two years is Rs.90. What will be the value of the amount at the end of 3 years?

A. 9780.8

B. 8780.80

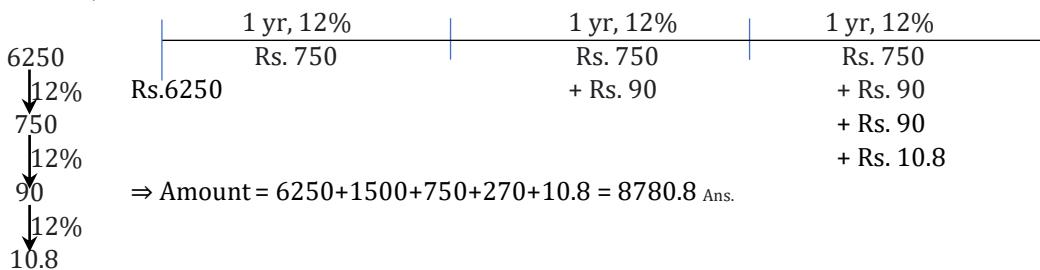
C. 7654.4

D. None of these

**Solution** $(C.I. - S.I.)_{2 \text{ yrs.}} = \text{Rs. 90}$ 

$$\begin{aligned} \Rightarrow \left( \frac{r}{100} \right)^2 \times P &= 90 \\ \Rightarrow \frac{12}{100} \times \frac{12}{100} \times P &= 90 \\ \Rightarrow P &= \text{Rs. 6250} \end{aligned}$$

Now,



## Topic 10: COMPOUND INTEREST

12. Anil invests an amount for 2 years at the rate of 15% p.a. at simple interest. Had he invested in a scheme in which interest was compounded yearly, he would have got Rs.450 more. Find the principal:

A. Rs. 8,000      B. Rs. 15,000      C. Rs. 20,000      D. Rs. 10,000

Solution     $(C.I. - S.I.)_{2 \text{ yrs.}} = \left(\frac{r}{100}\right)^2 \times P$

$$\Rightarrow 450 = \left(\frac{15}{100}\right)^2 \times P$$

$$\Rightarrow P = \frac{450 \times 100 \times 100}{15 \times 15} = \text{Rs.}20000$$

13. If the simple interest on a sum of money for 2 years at 5% per annum is Rs. 50, what is the compound interest on the same at the same rate and for the same time?

A. Rs. 51.25      B. Rs. 54.25      C. Rs. 60      D. Rs. 52

Solution    S.I.

P                  5%, 2 yrs.                  A<sub>2</sub>

S.I. = Rs.50  
 $\Rightarrow rt\% = \text{Rs.}50$   
 $\Rightarrow 10\% = \text{Rs.}50$   
 $\Rightarrow P = 100\% = \text{Rs.}500$

Now,  $(C.I. - S.I.)_{2 \text{ yrs.}} = \left(\frac{r}{100}\right)^2 \times P$   
 $\Rightarrow C.I. - 50 = \left(\frac{5}{100}\right)^2 \times 500$   
 $\Rightarrow C.I. = 1.25 + 50 = \text{Rs.}51.25 \text{ Ans.}$

14. The compound interest on a certain sum for 2 years at 10% per annum is Rs. 525. The simple interest on the same sum for double the time at half the rate percent per annum is:

A. 400      B. 500      C. 600      D. 800

Solution

C.I.                   $\frac{A_n}{P_0} = \left(\frac{100+r}{100}\right)^n$

$$\Rightarrow \frac{P_0+525}{P_0} = \left(\frac{110}{100}\right)^2$$

$$\Rightarrow \frac{P_0+525}{P_0} = \frac{121}{100}$$

$$\Rightarrow 100P_0 + 52500 = 121P_0$$

$$\Rightarrow 21P_0 = 52500 \Rightarrow P_0 = \text{Rs.}2500$$

S.I.                  P<sub>0</sub>                  5%, 4 years                  } Time is doubled  $\rightarrow$  4 yrs.  
                        Rs.2500                  S.I. = rt% of P                  Rate is halved  $\rightarrow$  5% p.a.  
                                                 = 20% of 2500 = Rs.500 Ans.

15. A sum of money doubles itself at C.I. in 15 years. In how many years will it become eight times?

A. 40 years.      B. 35 years.      C. 55 years.      D. 45 years.

Solution    P                  2P                  4P                  8P  
                        15 yrs.                  15 yrs.                  15 yrs.                  45 Years

16. A sum of money triples itself at compound interest in 3 years. In 9 years, it will be?

A. 6 times the principal  
C. 18 times the principal

Solution

P                  3 yrs                  3P                  x3                  9P                  x3                  27P  
                        3 yrs                  3 yrs                  3 yrs                  3 yrs                  27P Ans.

&lt;/DIY/&gt;

1. What is the difference between the compound interests on Rs. 5000 for  $1\frac{1}{2}$  years at 10% per annum compounded yearly and half-yearly?  
 A. Rs. 13.125      B. Rs. 13.5      C. Rs. 14.5      D. Rs. 15
2. The principal that amounts to Rs. 729 in 3 years at 12.5% per annum C.I. compounded annually, is?  
 A. Rs. 1728      B. Rs. 512      C. Rs. 1000      D. Rs. 1331
3. If the compound interest (compounded yearly) on a certain sum for 2 years at 3% is Rs.101.50 then what will be the corresponding simple interest?  
 A. Rs.98.25      B. Rs.100.00      C. Rs.90.00      D. Rs.95.50
4. If the compound interest on a sum of Rs.5000 at the rate of 10% per annum is Rs.1655, then time period is (interest compounded yearly):  
 A. 1 Year      B.  $2\frac{1}{2}$  Years      C. 3 Years      D. 2 Years
5. Compound interest of Rs. 4000 at 10% p.a. for  $1\frac{1}{2}$  years will be (interest compounded half yearly).  
 A. Rs. 630.5      B. Rs. 625      C. Rs. 650      D. Rs. 675
6. What is the difference between compound interest on Rs.3000 for 2 years at 5% p.a. when interest is compounded yearly and compound interest on the same sum and for the same term except that it is compounded half yearly?  
 A. Rs.3.93      B. Rs.30      C. Rs.15.3      D. Rs.41.28      E. 1
7. There is 60% increase in an amount in 6 years at simple interest. What will be the compound interest of Rs. 10,000 after 3 years at the same rate?  
 A. Rs. 3420      B. Rs. 3120      C. Rs. 3310      D. Rs. 3240
8. If the ratio of difference between CI and SI for 3 years and 2 years is 31:10, then find the Rate of Interest.  
 A. 11.11%      B. 10%      C. 20%      D. 25%      E. None of these

# TOPIC 11

## AVERAGE, MIXTURE, ALLIGATION

1. Determine the average of the following data: 45, 50, 33, 22, 15.

A. 32

B. 33

C. 34

D. 35

Solution

$$\begin{array}{ccccccc} 45 & , & 50 & , & 33 & , & 22 & , & 15 \\ & +15 & & +20 & & +3 & & -8 & \\ \text{Average} = 30 + \frac{15}{5} & = 30 + \frac{15}{5} & = 30 + 3 = 33 \end{array}$$

2. Determine the average of the following data: 127, 63, 81, 44, 95.

A. 72

B. 75

C. 79

D. 82

Solution

$$\begin{array}{ccccccc} 127 & , & 63 & , & 81 & , & 44 & , & 95 \\ 57 & & -7 & & +11 & & -26 & & +25 \\ \text{Average} = 70 + \frac{57 - 7 + 11 - 26 + 25}{5} & = 70 + \frac{60}{5} & = 70 + 12 = 82 \end{array}$$

3. Determine the average of the following data: 40, 19, 75, 83, 56, 33.

A. 51

B. 61

C. 62

D. 52

Solution

$$\begin{array}{ccccccc} 40 & , & 19 & , & 75 & , & 83 & , & 56 & , & 33 \\ -10 & & -31 & & +25 & & +33 & & +6 & & -17 \\ \text{Average} = 50 + \frac{-10 - 31 + 25 + 33 + 6 - 17}{6} & = 50 + \frac{6}{6} & = 51 \end{array}$$

4. Find the average of scores of the tests taken by Ram, given his scores were 92, 94, 88, 89, 91, 90, 86, 90.

Solution

$$\begin{array}{cccccccc} 92 & 94 & 88 & 89 & 91 & 90 & 86 & 90 \\ (+2) & (+4) & (-2) & (-1) & (+1) & (+0) & (-4) & (+0) \\ \text{Avg score} = 90 + \frac{(+2) + (+4) + (-2) + (-1) + (+1) + (+0) + (-4) + (+0)}{8} & = 90 + \frac{0}{8} & = 90 \end{array}$$

5. The monthly incomes of Ravi, his wife and their son are Rs 4000, Rs 2000 and Rs 3000 respectively. What is the average income of the family?

Solution

$$\begin{array}{ccccccc} 4000 & , & 2000 & , & 3000 \\ \Rightarrow \text{Avg} = \frac{4000 + 2000 + 3000}{3} & = 3000 \end{array}$$

6. In a cricket tournament, Kapil played seven games. His scores in these games were 71, 49, 52, 46, 48, 52, 53. Find his average score.

Solution

$$\begin{array}{cccccccc} 71 & , & 49 & , & 52 & , & 46 & , & 48 & , & 52 & , & 53 \\ [21 & & -1 & & +2 & & -4 & & -2 & & +2 & & +3] \\ \text{Avg} = 50 + \frac{[21 - 1 + 2 - 4 - 2 + 2 + 3]}{7} & = 50 + \frac{21}{7} & = 53 \end{array}$$

7. Manish purchased three dozen mangoes at Rs 7 per dozen, two dozen at Rs 8.50 and one dozen at Rs 10. What is the average cost per dozen of the mangoes purchased by Manish?

Solution

Type I (3)	Type II (2)	Type III (1)
7Rs/dozen	8:50	10

$$\Rightarrow \text{Avg. cost} = \frac{7 \times 3 + 8.5 \times 2 + 10 \times 1}{3+2+1}$$

$$= \frac{21 + 17 + 10}{6} = \frac{48}{6} = 8 \text{ Rs.}$$

8. The average age of 5 boys is 19 years. A new boy joins them and their average age increase to 20 years. What is the age of the new boy?

Solution

5 Boys Avg (A <sub>1</sub> ) = 19 $\sum = 19 \times 5$ = 95	+ 1 Boy	6 Boys A <sub>2</sub> = 20 yrs $\sum = 120$
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$$95 + \text{Boy's age} = 120$$

$$\Rightarrow \text{Boy's age} = 25$$

9. 7 kg of wheat having a rate of Rs 14 per kg is mixed with 4 kg of wheat having a rate of Rs 8.50. what is the average rate per kg of the mixture?

Solution

I (7 kg) 14Rs/ kg		II (4 kg) Rs 8.5/kg
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$$\text{Avg. rate of mixture} = \frac{14 \times 7 + 8.5 \times 4}{7+4} = \frac{132}{11} = \text{Rs } 12 \text{ per kg}$$

10. A batsman scored an average of 55 runs in the first 6 test. If the first test is not counted and the 7<sup>th</sup> is counted then his average score goes to 57. Find the score in the 7<sup>th</sup> test match.

Solution

6 tests Avg A <sub>1</sub> = 55 runs. $\sum = 55 \times 6$ = 330 runs.	change -1 <sup>st</sup> Test +7 <sup>th</sup> Test	6 tests Avg = 57 $\sum = 342$
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$$\Rightarrow 330 - [1^{\text{st}}] + 7^{\text{th}} = 342$$

$$\Rightarrow 7^{\text{th}} = 62$$

11. The average marks of three sections in 10<sup>th</sup> class were 76, 79 and 80 respectively. If the number of students in these three sections were 70, 60 and 55 respectively, find the average marks of the 10<sup>th</sup> class.

Solution

Class 10 <sup>th</sup> = section A, B, C		
A (70)	B (60)	C (55)
76	79	80

$$\text{Avg} = \frac{76 \times 70 + 79 \times 60 + 80 \times 55}{70+60+55}$$

OR

$$\text{Avg} = 75 + \frac{[1 \times 70 + 4 \times 60 + 5 \times 55]}{70+60+55}$$

12. The sales recorded by a salesman in 6 days of a week are follows: Rs 20000 per day for the first three days, Rs 16000 on Thursday, and Rs 24000 on Friday and on Saturday, it was Rs 30,000. Find his average sales per day.

Solution

$$\text{Avg. sales per day} = \frac{\text{sum of sales}}{\text{No of days}}$$

$$= \frac{(20000 \times 3) + 16000 + 24000 + 30000}{6} = \frac{130000}{6} = 21667 \text{ (Approx.)}$$

13. Shrikant earned an average of Rs 1600 per month from January to June. Then he earned Rs 1500, Rs 1800, Rs 1900 and Rs 2150 respectively during the months July, through October. During November, he earned 50 % of what he earned in December. If his average earnings in the month of November is 50% of the earnings in December, then find his earning in the month of November.

Solution

	First 6 months	July to October	Nov	Dec
Avg	$\frac{1600 \times 6}{12}$	$+ \frac{1500+1800+1900+2150}{12}$	$\downarrow x$	$\downarrow 2x$
	$\Rightarrow 19200 = 9600 + 7350 + 3x$		Nov	Dec
	$\Rightarrow x = \frac{2250}{3} = 750$	$\Rightarrow 1500$	Rs	Rs

14. The average age of a group of friends is 34 years. If 5 new friends with an average age of thirty years join the group, the average of the entire group becomes 32 years. How many people were there in the group initially?

Solution

Group I ( $N_1$ )	Group II (5)	$N_1 + 5$
$A_1 = 34$ years	$A_2 = 30$ years	$A_3 = 32$
$\Sigma = 34 N_1$	$\Sigma = 150$	$\Sigma = 32 (N_1 + 5)$

$$\Rightarrow 34 N_1 + 150 = 32 (N_1 + 5)$$

$$\Rightarrow 2 N_1 = 10 \Rightarrow N_1 = 5$$

15. If 20 kg of wheat costing Rs 16 per kg is mixed with 16 kg of a second variety of wheat costing Rs 25/kg then what is the average cost of the resulting mixture?

Solution

<u>Type I</u> (20 kg) Rs 16 / kg	<u>Type II</u> (16 kg) Rs 25 / kg
-------------------------------------	--------------------------------------

$$\Rightarrow \text{Avg. price} = \frac{16 \times 20 + 25 \times 16}{20 + 16} = 20 \text{ Rs/kg}$$

16. If two kinds of grapes costing Rs 16 a kg and Rs 21 a kg are mixed in the ratio of 2:3 then find the cost of mixture per kg.

Solution

$\frac{2}{\text{Type I}}$ Rs. 16 per kg	$\frac{3}{\text{Type II}}$ Rs. 21 per kg
--	---

$$\Rightarrow \text{Rate of mixture} = \frac{16 \times 2 + 21 \times 3}{2 + 3} = \text{Rs } 19 \text{ per kg}$$

17. If 15 liters of 20% alcohol is mixed with 12 liters of 24% alcohol, then find the concentration of the resulting solution.

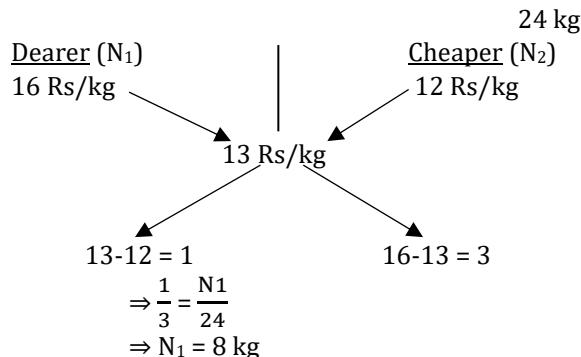
Solution

<u>Type I</u> (15 ltr) 20 % alcohol	<u>Type II</u> (12 ltr) 24 % alcohol
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$$\Rightarrow \text{Concentration} = \frac{20 \times 15 + 24 \times 12}{15 + 12} = \frac{588}{27} = 21\frac{7}{9}\%$$

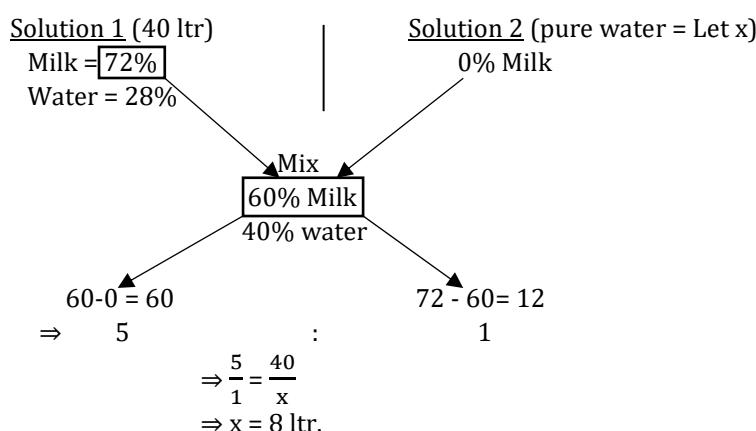
- 18. How many kilograms of rice costing Rs 16 per kg must be mixed with 24 kg of rice costing Rs 12 per kg so that the resultant mixture costs Rs 13 per kg?**

**Solution**



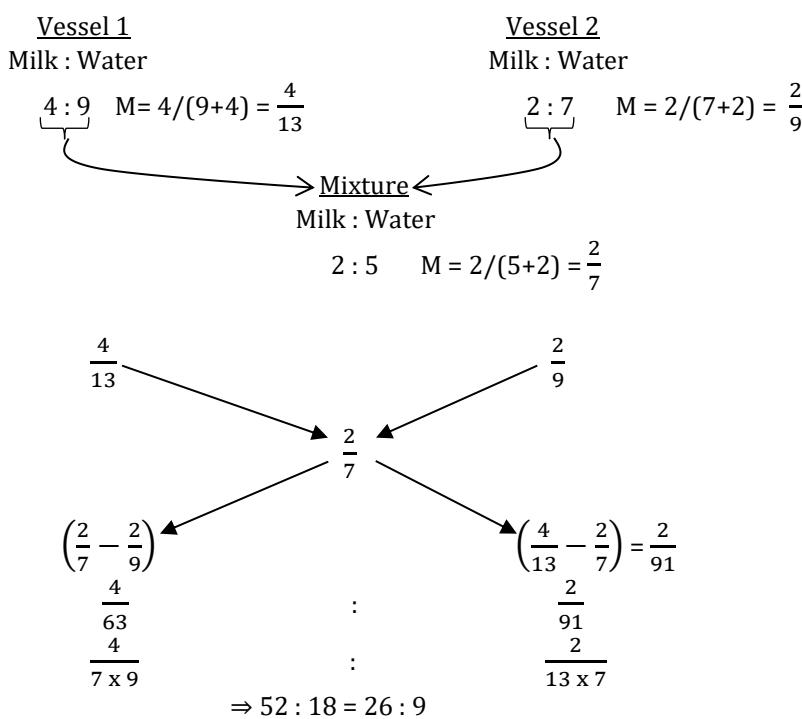
- 19. There is a 40-liter solution of milk and water in which milk forms 72%. How much water must be added to the solution to make it a solution in which milk forms 60%?**

**Solution**



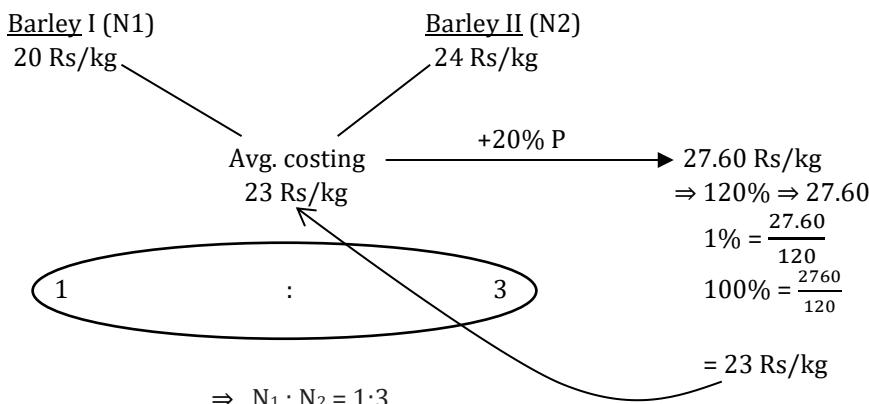
- 20. Two vessels contain mixtures of milk and water in the ratio of 4:9 in the first vessel and in the ratio of 2:7 in the second. In what ratio should the contents of these two vessels be mixed such that the resulting mixture has milk and water in the ratio of 2:5?**

**Solution**



21. In what ratio should Hanuman mix two varieties of Barley costing Rs 20 and Rs 24 per kg so that by selling it at Rs 27.60 per kg, hanuman makes a profit of 20%?

Solution



</DIY/>

1. The average weight of A, B and C is 45 kg. If the average weight of A and B be 40 kg and that of B and C be 43 kg, then the weight of B is  
 A. 17 kg    B. 20 kg    C. 26 kg    D. 31 kg
2. There are three sections of a class in a school. The number of students in the three sections is 38, 42 and 40 and the average age of the students in these sections separately is 15.3 years, 16.5 years and 15.9 years respectively. What is the average age of the class?  
 A. 15.22 years    B. 15.92 years    C. 15 years    D. 15.11 years
3. The average score of boys in an examination in a school is 71 and that of the girls is 73. The average score of the school is 71.8. The ratio of the number of boys to that of the girls that appeared in the examination is  
 A. 1 : 2    B. 3 : 2    C. 2 : 2    D. 4 : 2
4. The average of 11 numbers is 10.9. If the average of the first six is 10.5 and that of the last six is 11.4, the sixth number is?  
 A. 11.4    B. 11.5    C. 11.0    D. 11.3
5. The average of 20 numbers is zero. Of them, at the most, how many may be greater than zero?  
 A. 0    B. 1    C. 10    D. 19
6. The average salary of 3 workers is 95 Rs. per week. If one earns Rs.115 and second earns Rs.65, how much is the salary of the 3rd worker.  
 A. 285    B. 150    C. 105    D. 104
7. A library has an average of 510 visitors on Sundays and 240 on other days. The average number of visitors per day in a month of 30 days beginning with a Sunday is:  
 A. 250    B. 276    C. 280    D. 285
8. The average weight of 8 persons increases by 2.5 kg when a new person comes in place of one of them weighing 65 kg. What might be the weight of the new person?  
 A. 76 kg    B. 76.5 kg    C. 85 kg    D. Data inadequate
9. Average weight of 3 men A, B and C is 80 kg. Another man D joins the group and the average now becomes 75 kg. If another man E, whose weight is 2 kg more than that of D, replaces A then the average weight of B, C, D and E becomes 77 kg. The weight of A is:  
 A. 54 kg    B. 60 kg    C. 52 kg    D. 64 kg.
10. If the average of 10% of a number, 25% of that number, 50% of that number and 75% of that is 24, then the number will be  
 A. 50    B. 80    C. 70    D. 60

# TOPIC 12

## TIME AND DISTANCE

1. An athlete runs 200m in 24 sec. His speed is:

A. 20 kmph      B. 24 kmph      C. 28.5 kmph      D. 30 kmph

Solution

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}} = \frac{200}{24} \text{ m/s} = \frac{200}{24} \times \frac{18}{5} = 30 \text{ kmph}$$

2. Albert is travelling on his cycle & has calculated to reach, point A at 2p.m. if he travels at 10 kmph. He will reach there at 12 noon if he travels at 15 kmph. At what speed must he travel to reach A at 1 p.m.

A. 6 kmph      B. 11 kmph      C. 12 kmph      D. 14 kmph

Solution

Case 1

D

t<sub>1</sub>

S<sub>1</sub> = 10 kmph

2 pm

$$D = (t_1) \frac{S_1}{S_2} = 2 \text{ hrs} \frac{15 \times 10}{[15-10=5]} \\ = 60 \text{ km}$$

$$t_1 = \frac{60}{10} = 6 \text{ hr}$$

To reach at 1 p.m.

Time taken should be = 5 hrs

D = 60 km

$$\text{Speed required} = \frac{60}{5} = 12 \text{ kmph}$$

Case 2

D

t<sub>2</sub>

S<sub>2</sub> = 15 kmph

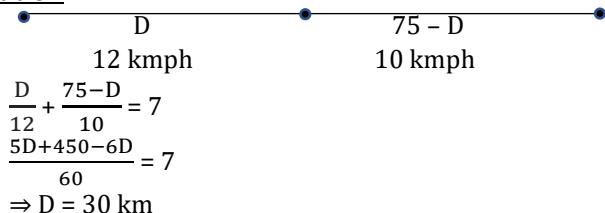
12 noon

$$t_2 = \frac{60}{15} = 4 \text{ hr}$$

3. Virat travelled 75km in the 7 hrs. He went some distance at the rate the rate of 12 kmph and the rest at 10 kmph. How far did he travel at the rate of 12 kmph?

A. 30 kmph      B. 25 kmph      C. 40 kmph      D. 35 kmph

Solution



4. A person travelled by train for 1 hr at 50 kmph. He then travelled by taxi for 30 minutes at a speed of 32 kmph to complete his journey. What is the average speed at which he travelled during the journey?

A. 44 kmph      B. 42 kmph      C. 41 kmph      D. 33 kmph

Solution

$$\text{Avg. speed} = \frac{\text{total distance}}{\text{total time}} = \frac{50+16}{1+0.5} = \frac{66}{3} \times 2 = 44 \text{ kmph}$$

## Topic 12: TIME AND DISTANCE

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5. A car covers four successive 6km stretches at speeds of 25kmph, 50 kmph, 75kmph and 150kmph respectively. Its average speed over this distance is:

A. 25 kmph      B. 50 kmph      C. 75 kmph      D. 50 kmph

Solution

$$\text{Avg. speed} = \frac{\text{total distance}}{\text{total time}}$$

25 kmph      50kmph      75kmph      150kmph

6t<sub>1</sub>      3t<sub>1</sub>      2t<sub>1</sub>      t<sub>1</sub>  
6km      6km      6km      6km

$$\Rightarrow \text{Avg. speed} = \frac{4 \times 150 t_1}{12 t_1} = 50 \text{ kmph}$$

6. Excluding stoppages, the speed of a bus is 54 kmph and including stoppage, it is 45kmph. For how many minutes does the bus stop per hour?

A. 9 min      B. 10 min      C. 12 min      D. 20 min      D. None of these

Solution

Excluding stoppage

$$54\text{km} \rightarrow 1 \text{ hr}$$

$$\Rightarrow 45\text{km} + 9 \text{ km} \rightarrow 1 \text{ hr}$$

$\Rightarrow$  Stoppage time = Time taken to cover 9km at 54 kmph

$$= 9/54 = 1/6 \text{ hr} = \frac{1}{6} \times 60 \text{ min} = 10 \text{ min}$$

Including stoppage

$$45\text{km} \rightarrow 1 \text{ hr}$$

7. A thief steals a car at 2:30pm and drives at 60kmph. The theft is discovered at 3p.m. and the owner sets off in another car at 75 kmph. When will he catch the thief?

A. 4.30 p.m.      B. 5.15 p.m.      C. 4.45 p.m.      D. 5:00 p.m.

Solution

Distance travelled by thief (from 2:30 to 3:00 pm)

$$= 60 \text{ kmph} \times \frac{1}{2} \text{ hr} = 30 \text{ km}$$

Time taken to catch the thief (after 3 pm) =  $\frac{\text{Distance to cover to catch the thief}}{\text{Relative speed}}$

$$= \frac{30 \text{ km}}{75-60 \text{ kmph}} = 2 \text{ hr} \Rightarrow 3 \text{ pm} + 2 \text{ hrs} \Rightarrow 5 \text{ pm}$$

8. Kartik rides his bicycle at 8 kmph and reaches his school 2.5 minutes late. The next day, he increases his speed to 10 kmph and reaches the school 5 minutes early. How far is the school from his house?

A. 5/8 km      B. 8 km      C. 5 km      D. 10 km

Solution

First day

D

$$S_1 = 8 \text{ kmph}$$

2.5 min late

$$D = (t_-) \frac{S_x}{S_-} = \frac{7.5}{60} \times \frac{8 \times 10}{[10-8=2]} \\ = \frac{15}{2 \times 60} \times \frac{8 \times 10}{2} = 5 \text{ km}$$

Second day

D

$$S_2 = 10 \text{ kmph}$$

5 min early

9. If I walk at 30 kmph, I reach 1 hour early and if I walk 20 kmph, I reach 1 hour late. Find the distance between 2 points and if exact time of reaching destination is 11 a.m., then find the speed at which I should walk?

A. 125 km and 24 kmph  
C. 120 km and 20 kmph

B. 120 km and 30 kmph  
D. 120 km and 24 kmph

**Solution**

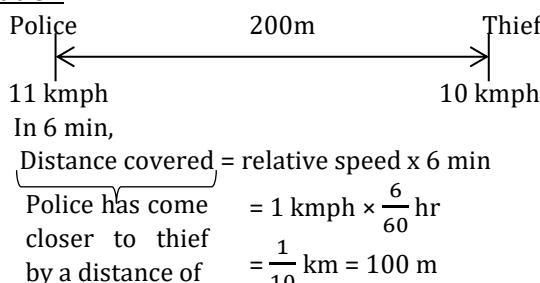
$$D = (t) \frac{Sx}{S_1} = 2 \times \frac{20 \times 30}{10} = 120 \text{ km}$$

120 km 30 kmph 1 hr early $\Rightarrow$ reach 10am	To reach 11 a.m. $t = 5 \text{ hr}$ $D = 120 \text{ km}$ $S = \frac{120}{5} = 24 \text{ kmph}$
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10. A thief is noticed by a policeman from a distance of 200m. The thief and policeman running at the rate of 10 kmph and 11 kmph respectively. What is the distance between them after 6 minutes?

A. 50 m      B. 100 m      C. 110 m      D. 150 m

**Solution**



$\Rightarrow$  Remaining distance between them after 6 minutes =  $200 - 100 = 100 \text{ m}$

11. A train running at the speed of 60 km/hr crosses a pole in 9 seconds. What is the length of the train?

A. 120 m      B. 180 m      C. 324 m      D. 150 m

**Solution**

Distance to travel to cross the pole =  $L_{\text{Train}}$

$$\begin{aligned} \text{Speed of train} &= 60 \text{ kmph} \\ &= 60 \times \frac{5}{18} \text{ m/s} \end{aligned}$$

Time taken to cross = 9 sec

$$\begin{aligned} \Rightarrow L_{\text{Train}} &= 60 \times \frac{5}{18} \times 9 \\ &= 150 \text{ m} \end{aligned}$$

12. A 600m long train is running at 73 kmph. How much time train will take to cross an electric pole?

A. 29.58 sec      B. 28.58 sec      C. 29 sec      D. 28 sec      E. None of these

**Solution**

Distance to travel to cross the pole = Length of the train  
 $= 600 \text{ m}$

$$\text{Speed} = 73 \text{ kmph} = 73 \times \frac{5}{18} \text{ m/s}$$

$$t = \frac{D}{S} = \frac{600 \times 18}{73 \times 5} = \frac{2160}{73} = 29.58 \text{ sec}$$

13. A 120m long train is running at 72 kmph. How much time train will take to cross a man standing on the platform?

A. 6 sec      B. 2.5 sec      C. 5 sec      D. 12 sec

**Solution**

Distance to travel to cross the man = Length of the train = 120m, Speed = 72 kmph = 20 m/s

$$\Rightarrow \text{Time taken to cross the man} = \frac{D}{S} = \frac{120}{20} = 6 \text{ sec}$$

## Topic 12: TIME AND DISTANCE

14. A train 360m long is running at a speed of 45 kmph. In what time will it pass a bridge 140m long?

A. 40 sec      B. 42 sec      C. 45 sec      D. 48 sec

Solution

Train	Bridge
360m	140m
45 kmph	0 kmph

$$D = S \times t$$

$$\Rightarrow (360+140)m = 45 \times \frac{5}{18} m/sec \times t$$

$$\Rightarrow t = 40 \text{ sec}$$

15. Two trains are running at 40 km/hr and 20 km/hr respectively in the same direction. Fast train completely passes a man sitting in the slower train in 5 seconds. What is the length of the fast train?

A. 27 m      B. 33 m      C.  $27\frac{7}{9}$  m      D.  $23\frac{4}{9}$  m

Solution

$$\begin{aligned} \text{Distance to travel to cross the man} &= L_{\text{Fast train}} \\ &= x \text{ (let)} \end{aligned}$$

$$\begin{aligned} \text{Relative speed of man \& train} &= (40 - 20) \text{ kmph} \\ &= 20 \times \frac{5}{18} \text{ m/sec} \end{aligned}$$

$$\text{Time} = 5 \text{ sec}$$

$$D = S \times T$$

$$\begin{aligned} \Rightarrow x &= 20 \times \frac{5}{18} \times 5 \\ &= \frac{250}{9} \text{ m} = 27\frac{7}{9} \text{ m} \end{aligned}$$

16. Two trains 400m and 300m long are running at the speeds of 50 km/hr and 40 km/hr respectively in opposite directions on parallel tracks. The time taken to cross each other will be \_\_\_\_?

A. 20 sec      B. 28 sec      C. 25 sec      D. 24 sec      E. None of these

Solution

$$\begin{aligned} \text{Distance to travel to cross each other} &= L_{\text{Train1}} + L_{\text{Train2}} \\ &= 400 + 300 \\ &= 700 \text{ m} \end{aligned}$$

$$\begin{aligned} \text{Relative speed (opposite directions)} &= (50 + 40) \text{ kmph} = 90 \text{ kmph} \\ &= 25 \text{ m/sec} \end{aligned}$$

$$\text{Time taken to cross} = \frac{D}{S} = \frac{700}{25} = 28 \text{ sec}$$

17. Two trains of lengths 400m and 600m respectively are running in same direction. The faster train can cross the slower train in 180 sec. The speed of slower train is 48 kmph, then find the speed of the faster train?

A. 58 kmph      B. 78 kmph      C. 55 kmph      D. 68 kmph

Solution

T1	T2
$L_{T1} = 400\text{m}$	$L_{T2} = 600\text{m}$
$S = 48\text{kmph}$	Let $V_{T2}$ kmph

$$D = R.S \times t$$

$$(400 + 600) = (V_{T2} - 48) \times 180 \times \frac{5}{18}$$

$$100 = (V_{T2} - 48) \times 5$$

$$\Rightarrow V_{T2} = 20 + 48 = 68 \text{ kmph}$$

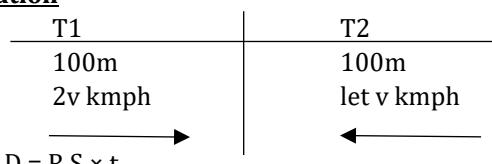
18. Two trains of each 100m long, moving in opposite directions cross each other in 8 sec. If one is moving twice as fast as the other, then find the speed of the faster train?

A. 30 kmph

B. 60 kmph

C. 30 kmph

D. 30 kmph

**Solution**

$$(200) = (2v + v) \times \frac{5}{18} \times 8$$

$$\Rightarrow 5 = \frac{3v}{18}$$

$$\Rightarrow v = 30 \text{ kmph}$$

$$\Rightarrow \text{Speed of faster train} = 2v = 2 \times 30 = 60 \text{ kmph}$$

19. A train passes a station platform in 36 seconds and a man standing on the platform in 20 seconds. If the speed of the train is 54 kmph. What is the length of the platform?

A. 120 m

B. 240 m

C. 300 m

D. None of these

**Solution**Case1

T	Platform
$L_T$	
54 kmph	$L_P$
$= 15 \text{ m/sec}$	$0 \text{ m/sec}$
$t = 36 \text{ sec}$	
$D = S \times T$	
$L_T + L_P = 15 \times 36 = 540$	
$\Rightarrow 300 + L_P = 540$	
$\Rightarrow L_P = 240 \text{ m}$	

Case2

T	Man on Platform
$L_T$	$L = 0$
$S = 15 \text{ m/s}$	$S = 0$
$t = 20 \text{ sec}$	
$\Rightarrow D = S \times T$	
$\Rightarrow L_T = 15 \times 20$	
	$= 300 \text{ m}$

20. Two trains for Palwal leave Kanpur at 10 a.m. and 10 : 30 a.m. and travel at the speeds of 60 kmph and 75 kmph respectively. How far from Kanpur will the two trains meet?

A. 250 km

B. 150 km

C. 100 km

D. 200 km

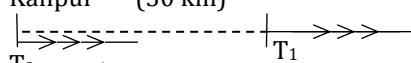
**Solution**T<sub>1</sub>, 10 a.m., 60 kmphT<sub>2</sub>, 10:30 a.m., 75 kmphFrom 10am to 10:30 (1/2 hr)T<sub>1</sub> moving but T<sub>2</sub> is not.Distance travelled by T<sub>1</sub> = S<sub>T1</sub> × t

$$= 60 \times \frac{1}{2}$$

$$= 30 \text{ km}$$

After 10:30 p.m.Both T<sub>1</sub> and T<sub>2</sub> moving

Kanpur (30 km)



$$D = R.S \times t$$

$$30 = (75 - 60) \text{ kmph} \times t$$

$$\Rightarrow t = 2 \text{ hrs.}$$

Distance of meeting point = Distance travelled by T<sub>2</sub> train in 2 hrs = 75 kmph × 2 = 150 km

## Topic 12: TIME AND DISTANCE

21. Two stations A and B are 110 km apart on a straight line. One train starts from A at 7 a.m. and travels towards B at 20 kmph. Another train from B at 8 a.m. and travels towards A at a speed of 25 kmph. At what time will they meet?

A. 10 a.m.      B. 11 a.m.

C. 10 p.m.

D. 11 p.m.

**Solution**



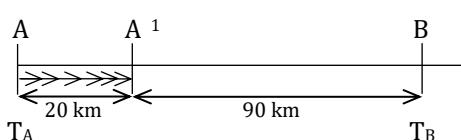
7:00 a.m.

20 kmph

From 7 a.m. to 8 a.m. (1hr)

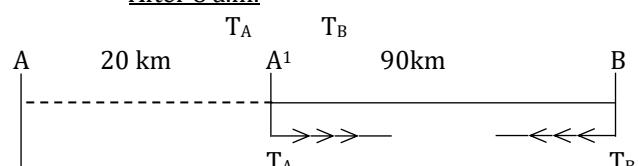
$T_A$  is moving,  $T_B$  is not

$$\begin{aligned} D_A &= S_A \times t \\ &= 20 \text{ kmph} \times 1 \text{ hr} \\ &= 20 \text{ km} \end{aligned}$$



$T_B$   
8 a.m.  
25 kmph

After 8 a.m.



$$\begin{aligned} D &= R.S \times t_{\text{meet}} \\ 90 \text{ km} &= (20 + 25) \text{ kmph} \times t_{\text{meet}} \end{aligned}$$

$$t_{\text{meet}} = 2 \text{ hr}$$

Meeting time = 8 a.m. + 2 hr = 10 a.m.

22. Train A starts from Meerut at 12:00 pm & reach Delhi at 2:30 pm & train B starts from Delhi at 12:15 pm and reach Meerut at 2:15 pm. At what time both trains meet each other?

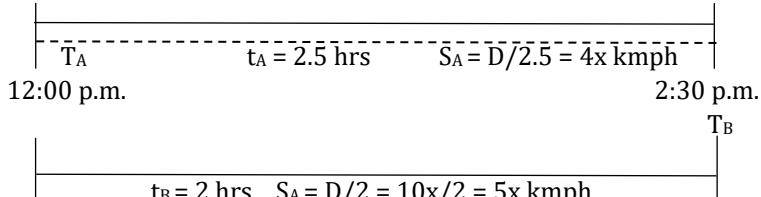
A. 2:00 pm      B. 1:30 pm

C. 1:15 pm

D. 1:00 pm

**Solution**

Meerut      Let  $D=10x \text{ km}$



$$t_A = 2.5 \text{ hrs}$$

$$S_A = D/2.5 = 4x \text{ kmph}$$

12:00 p.m.

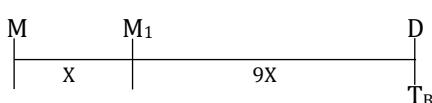
2:30 p.m.

2:15 p.m.

From 12 p.m. to 12:15 p.m.

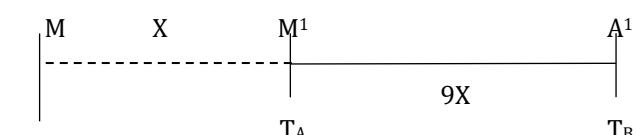
$$t = 15 \text{ min} = \frac{1}{4} \text{ hr}$$

$$\begin{aligned} D_A &= S_A \times t \\ D_A &= 4x \cdot \left(\frac{1}{4}\right) \\ &= x \text{ km} \end{aligned}$$



After 12:15 p.m.

12:15 p.m.



$$D = R.S \times t_{\text{meet}}$$

$$9X = (4X + 5X) \text{ kmph} \times t_{\text{meet}}$$

$$t_{\text{meet}} = 9X/9X = 1 \text{ hr}$$

Meeting time = 12:15 pm + 1 hr = 1: 15 pm

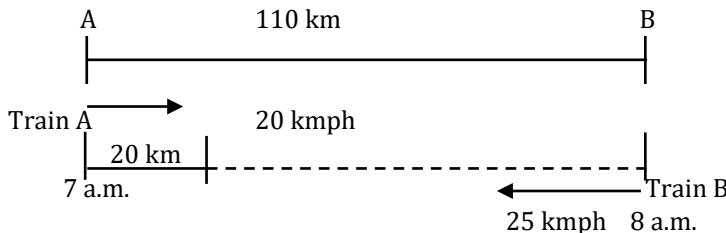
23. Two stations A and B are 110 km apart on a straight line. One train starts from A at 7 a.m. and travels towards B at 20 kmph. Another train from B at 8 a.m. and travels towards A at a speed of 25 kmph. At what time will they meet?

A. 10 a.m.      B. 11 a.m.

C. 10 p.m.

D. 11 p.m.

**Solution**



From 7 a.m. to 8 a.m. (only Train A is moving)

Distance covered in this 1hr =  $20 \text{ kmph} \times 1 \text{ hr} = 20 \text{ km}$

After 8 a.m. (Both trains are moving)

Distance to travel to meet = Remaining distance b/w them

$$= 110 - 20 = 90 \text{ km}$$

Relative speed =  $(20 + 25) \text{ kmph}$

Time taken to meet =  $90/45 = 2 \text{ hr}$

Time of meet = 8 a.m. + 2 hr

$$= 10 \text{ a.m.}$$

24. A man can row a distance of 5 km in 60 min with the help of the tide. The direction of the tide reverses with the same speed. Now, he travels 20 km further in 10 hours. How much time he would have saved if the direction of tide has not changed?

A. 5 hrs      B. 6 hrs

C. 12 hrs

D. None of these

**Solution**

With the help of tide (i.e. down the stream)

5 km in 60 min

$\Rightarrow$  5 km in 1 hr

$\Rightarrow$  downstream speed = 5 kmph

Direction of tide reversed (i.e. upstream)

20 kmph in 10 hr

$\Rightarrow$  upstream speed = 2 kmph

If the direction has not changed then 20 km would be travelled downstream instead of upstream in  $20/5 = 4$  hrs instead of 10 hrs

$$\Rightarrow \text{Time saved} = 10 - 4 = 6 \text{ hrs}$$

25. Rakesh runs  $4/3$  times as fast as Mukesh. In a race, if Rakesh gives a lead of 60 m to Mukesh, find the distance from the starting point where both of them will meet.

**Solution**

$$\text{Speed of Rakesh} = \frac{4}{3} \text{ speed of Mukesh}$$

Rakesh runs 4m  $\longrightarrow$  Mukesh runs 3m

$\Rightarrow$  Rakesh takes 1m lead

Now, to meet Mukesh again, Rakesh has to take a lead of 60m.

$\Rightarrow$  Rakesh runs  $\longrightarrow$  Mukesh runs

$$4m \times 60$$

$$= 240m$$

$$3m \times 60$$

$$= 180m$$

Lead of 60m Ans.

26. A hare and a tortoise have a race along a circle of 100 yards diameter. The tortoise goes in one direction and the Hare in the other. The hare starts after the tortoise has covered  $\frac{1}{4}$  of its distance and that too leisurely. The hare and tortoise meet when the hare has covered only  $\frac{1}{8}$  of the distance. By what factor should the hare increase its speed so as to tie the race?

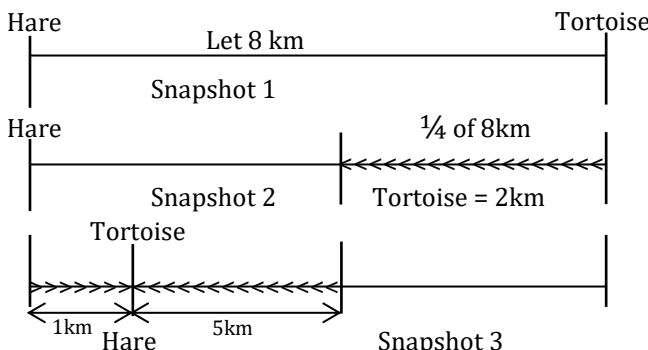
A. 37.8

B. 28

C. 40

D. 35

Solution



Comparison:

	Hare	Tortoise
Distance	1km	5km
Time	t	t
Speed	v	$5v$ (Since speed is proportional to distance if time is constant)

To tie the race

	Hare	Tortoise
Distance remaining:	7km	1km
	t	t
Speed	$\frac{7}{t}$	$\frac{1}{t}$
	$= 7\left(\frac{1}{t}\right)$	
	$= 7(5v) = 35v$	

(They should take same time to tie race)

Hence, speed of hare should become 35 times of original.

27. In a race of 1000 metre, A beats B by 50m or 5 seconds. Find (I) A's speed (ii) B's speed (iii) time taken by A to complete the race.

Solution

$$L = 1000 \text{ m}$$

A beats B by 50 m

$$\begin{array}{ccc} \textbf{A} & & \textbf{B} \\ 1000 \text{ m} & & 1000 - 50 \text{ m} = 950 \text{ m} \xrightarrow{t_1} \\ V_a & & V_b \end{array}$$

A beats B by 5 sec.

$$\begin{array}{ccc} & & \textbf{A} \\ & & | \\ & & \textbf{B} \\ & & | \\ & & \text{50 m or 5 sec} \end{array}$$

$$\Rightarrow V_b = \frac{50}{5} = 10 \text{ m/s}$$

$$\Rightarrow t_b = \frac{1000}{10} = 100 \text{ s}$$

$D \propto S$

$$\Rightarrow \frac{1000}{950} = \frac{V_a}{V_b}$$

$$\Rightarrow \frac{1000}{950} = \frac{V_a}{10}$$

$$\Rightarrow V_a = \frac{1000}{95} = \frac{200}{19} \text{ m/s}$$

$$\Rightarrow t_a = \frac{1000}{200} \times 19 = 19 \times 5 = 95 \text{ sec}$$

28. In 1500 metre race, Tinu beats Minu by 150m and in the same race Minu beats Rinu by 75m. By what distance does Tinu beat Rinu?

**Solution**

	V <sub>1</sub>	V <sub>2</sub>	V <sub>3</sub>
	Tinu	Minu	Rinu
(i)	1500	1350	X ← t <sub>1</sub>
(ii)		1500	1425m ← t <sub>2</sub>

Speed  $\propto$  distance

$$\frac{V_2}{V_3} = \frac{1350}{X}$$

$$\Rightarrow \frac{1350}{X} = \frac{1500}{1425} \Rightarrow X = \frac{1350}{1500} \times 1425 = \frac{135[20-1]}{2} = \frac{2700-135}{2}$$

$$= \frac{2565}{2} = 1282.5 \text{ m} \Rightarrow \text{Tinu beats Rinu by } (1500 - 1282.5 = 217.5 \text{ m})$$

</DIY/>

- A car travels at a speed of 60 km/h and returns with a speed of 40 km/h, calculate the average speed for the whole journey.  
 A. 48 kmph      B. 38kmph      C. 32 kmph      D. 16 kmph
- A man travels three-fifths of distance AB at a speed of 3a, and the remaining at a speed of 2b, if he goes from A to B and back at a speed of 5c in the same time, then  
 A.  $1/a + 1/b = 1/c$       B.  $a + b = c$       C.  $1/a + 1/b = 2/c$       D. None of these
- The air-conditioned bus service from Siruseri industry park runs at regular intervals throughout the day. It is now 3:12 pm and it arrived 1 minute ago but it was 2 minutes late. The next bus is due at 3:18 pm. When is the next bus due?  
 A. 3:27 pm      B. 3:29 pm      C. 3:24 pm      D. 3:25 pm
- A truck covers a distance of 376 km at a certain speed in 8 hours. How much time would a car take at an average speed which is 18 kmph more than that of the speed of the truck to cover a distance which is 14 km more than that travelled by the truck?  
 A. 7 hours      B. 5 hours      C. 6 hours      D. 8 hours
- A and B are running around a circular track of 1000m at speeds of 10kmph and 8kmph respectively in opposite directions. If they started at the same time and from the same starting point, then after how much time will they meet again?  
 A. 100 seconds      B. 80 seconds      C. 125 seconds      D. 200 seconds
- A man can row downstream at 18 kmph and upstream at 10 kmph. Find the speed of the man in still water and the speed of stream respectively?  
 A. 13, 3      B. 12, 6      C. 15, 3      D. 14, 4
- Two cars namely A and B start simultaneously from a certain place at the speed of 40 kmph and 55 kmph, respectively. The car B reaches the destination 2 hours earlier than A. What is the time taken by A to reach the destination?  
 A. 8 hours 12 min      B. 6 hours 15 min      C. 7 hours 20 min      D. 7 hours 12 min
- Virat travelled 60 kms in 5 hours. He went some distance at the rate of 12 km/hr and the rest at 10 km/hr. How far did he travel at the rate of 12 km/hr?  
 A. 36 kms      B. 25 kms      C. 40 kms      D. 35 kms.
- A man rows his boat 85 km downstream and 45 km upstream, taking 2.5 hours each time. Find the speed of the stream?  
 A.5 kmph      B.6 kmph      C.7 kmph      D.8 kmph
- A man can row with a speed of 15 kmph in still water. If the stream flows at 5 kmph, then the speed in downstream is?  
 A. 10 kmph      B. 5 kmph      C.20 kmph      D. 22 kmph

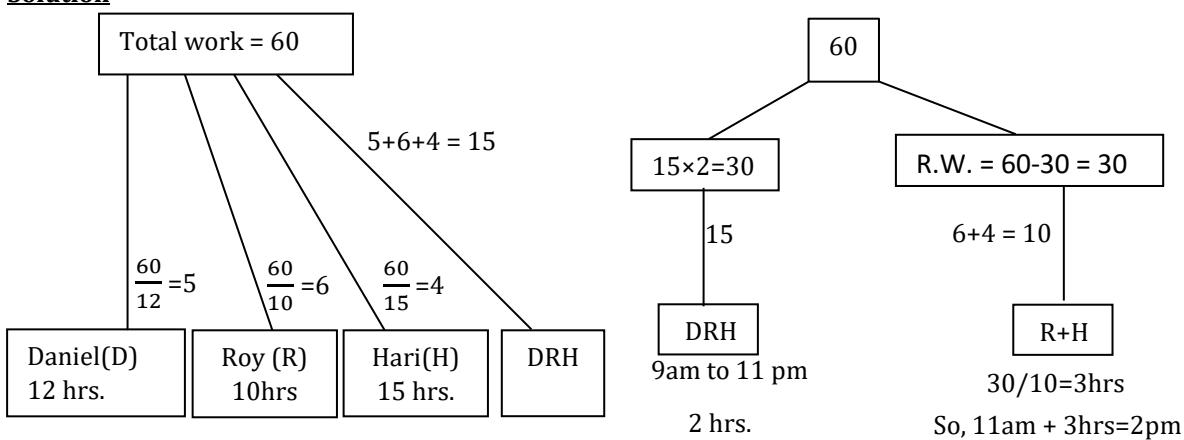
# TOPIC 13

## TIME AND WORK

1. Daniel can do some work in 12 hrs; Roy can do the same work in 10 hrs while Hari can do the same work in 15 hrs. All three of them start working together at 9 a.m. while Daniel stops working at 11 a.m. and the remaining two complete the work. Approximately, at what time will the work be finished?

A. 1:30 pm      B. 12:30 am      C. 2:00 pm      D. 1:00 pm

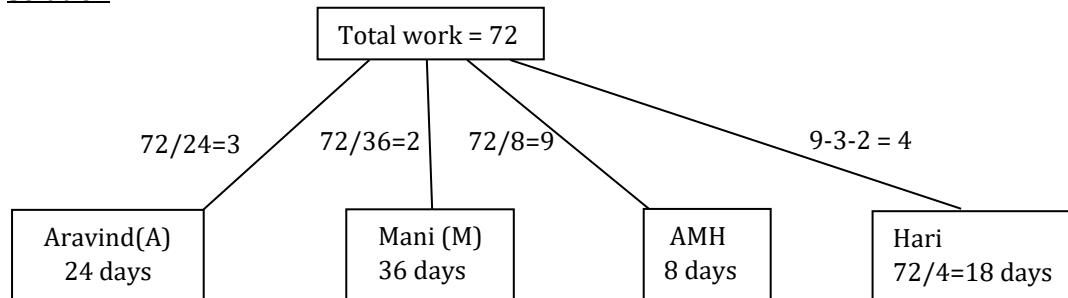
Solution



2. Aravind can dig a well in 24 days. Mani can dig the same well in 36 days. Aravind, Mani and Hari can dig the same well working together in 8 days. Hari, working alone, can dig the same well in how many days?

A. 12 days      B. 18 days      C. 16 days      D. 24 days

Solution



3. There are 3 trucks A, B and C. A loads at the rate of 10kg/min and B loads at the rate of  $13\frac{1}{3}$  kg/min. C unloads at the rate of 5kg/min. If all the 3 trucks are acting simultaneously, find the time taken to load 2.4 tonnes.

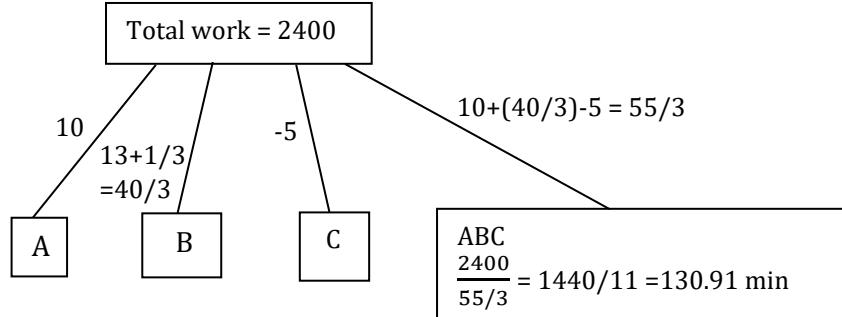
A. 120.81min

B. 130.91min

C. 240 min

D. 100min

Solution



4. A and B together can complete a work in 12 days. A alone can complete it in 20 days. If B does the work only for half a day daily, then in how many days A and B together will complete the work?

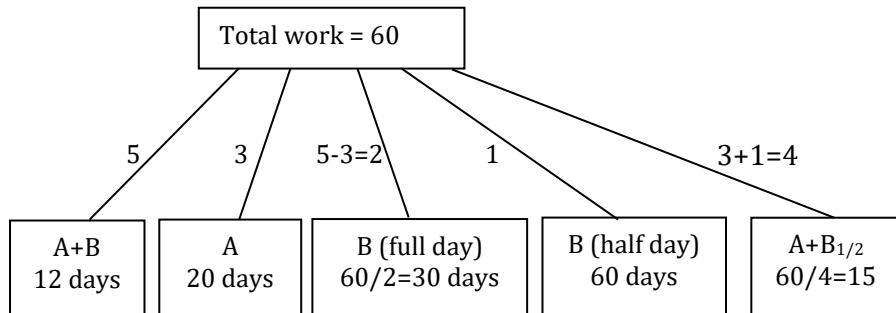
A. 10 days

B. 11 days

C. 15 days

D. 20 days

Solution



5. A can complete a piece of work in 8 hours, B can complete in 10 hours and C in 12 hours. If A, B, C start the work together but A leaves after 2 hours. Find the time taken by B and C to complete the remaining work.

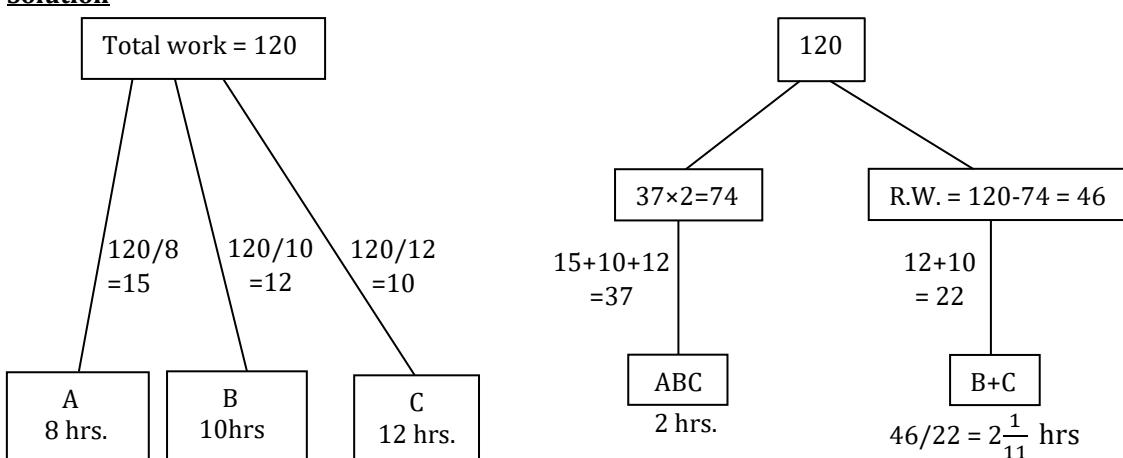
A.  $2\frac{1}{11}$  hours

B.  $4\frac{1}{11}$  hours

C.  $2\frac{6}{11}$  hours

D. 2 hours

Solution



6. A does  $\frac{4}{5}$ th of work in 20 days. He then calls in B and they together finish the remaining work in 3 days. How long B alone would take to do the whole work?

A. 37 days

B. 37.5 days

C. 35 days

D. None of these

Solution

From diagram 1 and 2,

$$\frac{A \times 20}{4W/5} = \frac{3(A+B)}{1W/5}$$

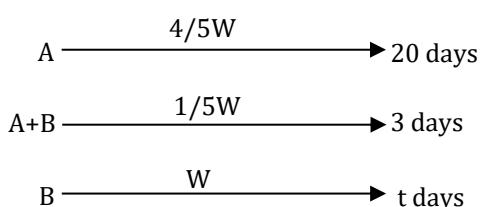
$$2A = 3B$$

From diagram 1 and 3,

$$\frac{A \times 20}{4W/5} = \frac{Bt}{W}$$

$$25A = Bt$$

$$t = 25 \frac{A}{B} = 25 \times \frac{3}{2} = 37.5 \text{ days}$$

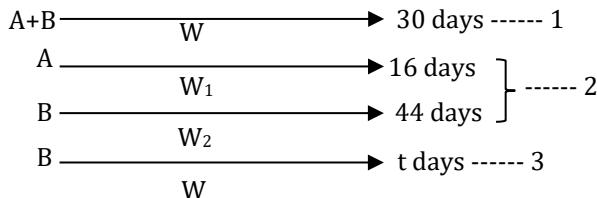


## Topic 13: TIME AND WORK

7. A and B together can do a piece of work in 30 days. A having worked for 16 days, B finishes the remaining work alone in 44 days. In how many days shall B finish the whole work alone?

A. 30 days      B. 40 days      C. 60 days      D. 70 days

Solution



From diagram 1 and 2,

$$W_1 + W_2 = W$$

$$16A + 44B = 30(A+B)$$

$$A = B$$

From diagram 1 and 3,

$$(A + B) 30 = Bt$$

$$(2B) 30 = Bt$$

$$t = 60$$

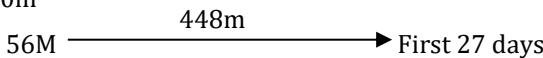
8. Amit wants to make a 1000 m long wall within 50 days. He made a decision to hire 56 men however, after 27 days, Amit realized that team was only able to make 448m of wall. Find out the additional number of men that Amit should employ as a means of finishing the work on the stipulated time.

A. 35      B. 49      C. 25      D. 52

Solution

Deadline: 50 days

Total work = 1000m



$$\frac{56 \times 27}{448} = \frac{23X}{552}$$

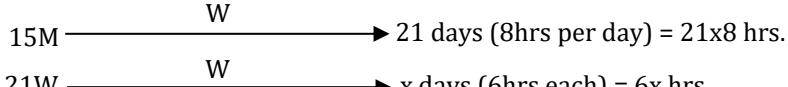
$$X = 81$$

$$\text{Additional men required} = 81 - 56 = 25$$

9. 15 Men take 21 days of 8 hrs. each to do a piece of work. How many days of 6 hrs. each would it take for 21 women if 3 women do as much work as 2 men?

A. 30      B. 20      C. 19      D. 29

Solution



From the diagrams, we can write

$$15M \times 21 \times 8 = 21W (6x)$$

Substituting  $3M=2W$  i.e.  $15M=10W$ , we get

$$x = 30 \text{ days}$$

10. 10 women can complete a work in 7 days and 10 children take 14 days to complete the work. How many days will 5 women and 10 children take to complete the work?

A. 1      B. 3      C. 5      D. 7

Solution



From diagram 2 and 3, we can write

$$10C \cdot 14 = (5W+10C) t$$

Substituting  $1W=2C$ , we get

$$10C \cdot 14 = 20C \cdot t \Rightarrow t = 7$$

11. 16 men can complete a work in 12 days. 24 children can complete the same work in 18 days. 12 men and 8 children started working and after 8 days, 3 more children joined them. How many days will they now take to complete the remaining work?

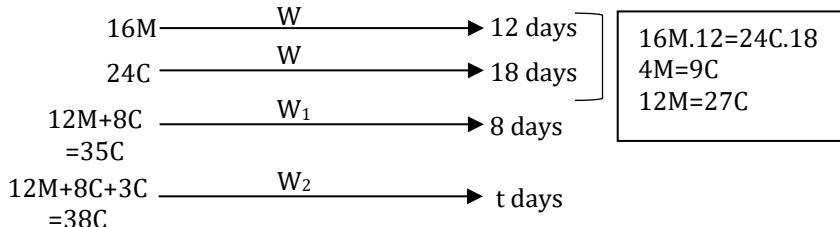
A. 2 days

B. 4 days

C. 6 days

D. 8 days

**Solution**



From diagram 2 and 3, we can write

$$W = W_1 + W_2$$

$$24C \cdot 18 = 35C \cdot 8 + 38Ct$$

Solving this, we get

$$t = 4$$

11. 2 men and 3 boys can do a piece of work in 10 days while 3 men and 2 boys can do the same work in 8 days. In how many days can 2 men and 1 boy do the work?

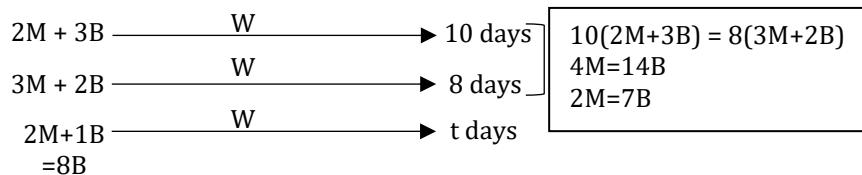
A. 5 days

B. 12 days.

C. 12.5 days

D. None of these

**Solution**



From diagram 1 and 3, we can write

$$10(2M+3B) = 8B \cdot t$$

$$10(7B+3B) = 8Bt$$

$$t = 12.5 \text{ days}$$

12. A can do a certain work in 12 days. B is 60% more efficient than A. How many days does B alone take to do the same job?

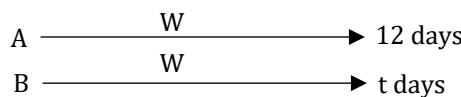
A. 6 days.

B. 7.5 days.

C. 8 days.

D. 8 days.

**Solution**



Given,

$$B = 160\% \text{ of } A$$

$$\Rightarrow 5B = 8A$$

From the diagram, we can write

$$12A = Bt$$

$$t = 12 \times \frac{A}{B} = 12 \times \frac{5}{8} = 7.5 \text{ days.}$$

13. To finish a piece of work, P takes five times as Q and six times as R. Working together, they can finish the work in 4 days. Q can do the work alone in:

A. 24 days

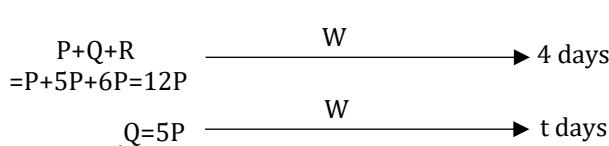
B.  $48/5$  days

C. 13 days

D. 11 days

**Solution**

$$Q = 5P \text{ and } R = 6P$$



From the diagrams, we can write

$$12P \cdot 4 = 5P \cdot t$$

$$t = 48/5 \text{ days}$$

## Topic 13: TIME AND WORK

14. A is 6 times as fast as B and takes 100 days less to complete a work than B. Find the total no. of days taken by A and B to complete the work.

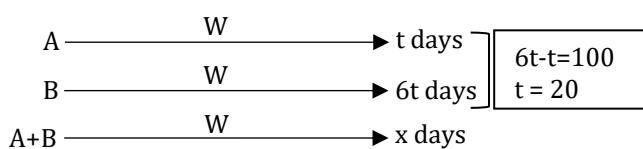
A.  $172/7$  days

B.  $120/7$  days

C.  $121/7$  days

D. None of these

**Solution**



Given,

$$A = 6B$$

From diagram 1 and 3, we can write

$$At = (A+B)x$$

$$6Bt = 7Bx$$

$$6t = 7x$$

$$x = 120/7 \text{ days}$$

15. A is 30% more efficient than B. Working together, how much time will they take to complete a job which A alone could have done in 23 days?

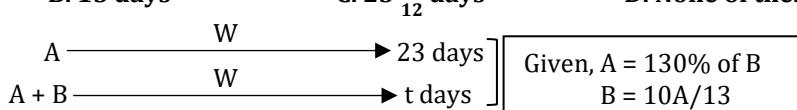
A. 13 days

B. 15 days

C.  $23 \frac{1}{12}$  days

D. None of these

**Solution**



From the diagrams, we can write

$$23A = t(A+B)$$

$$23A = t\left(A + \frac{10}{13}A\right)$$

$$t = 13 \text{ days}$$

16. Hanuman can complete a bridge in 10 days and Ravan can complete the same bridge in 20 days. Now, they are working together and they are completing the bridge in 20 days. What is the contribution of Ravan in constructing the bridge?

A. Half the work

B. One-third of the work

C. Two-fourth of the bridge

D. Destucting the bridge

**Solution**



If someone helps Hanuman, time taken by Hanuman will become less than 10 days.

If someone joins Hanuman but don't do any work, then time taken by Hanuman will remain same.

If someone is destroying the work done by Hanuman, time taken by Hanuman will become more than 10 days.

As per question,



Ravan is not helping but obstructing or destroying the work done by Hanuman. Ravan is destructing the bridge.

17. A task can be completed by D and E within 12 days if they worked together. E and F however, can complete within period of 20 days. If three of them agree to work together, then how many days will be required to complete the task?

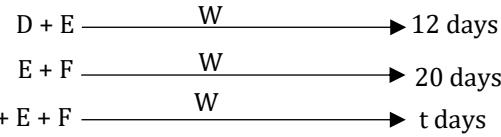
A. 20

B. 40

C. 50

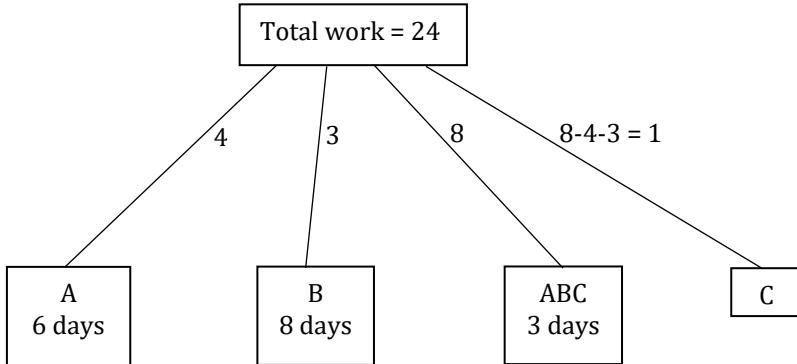
D. None of these

**Solution**



In this question, 3 persons are there and only 2 information given. Therefore, whatever we do, we cannot find the answer as the data is inadequate.

18. A alone can do a piece of work in 6 days and B alone in 8 days. A and B undertook to do it for Rs 3200. With the help of C, they completed the work in 3 days. How much is to be paid to C?  
 A. Rs. 375      B. Rs. 400      C. Rs. 600      D. Rs. 800  
Solution



The total amount will be shared between A, B and C in the ratio of the work that they have done.

Ratio of division:

$$\begin{array}{ccc}
 A & : & B & : & C \\
 4 \times 3 & & 3 \times 3 & & 1 \times 3 \\
 4 & : & 3 & : & 1 \\
 4x & & 3x & & 1x
 \end{array}$$

Now,

$$4x + 3x + 1x = 3200$$

$$x = 400$$

$$\text{Share of } C = 1x = \text{Rs. } 400$$

</DIY/>

1. Sruthi, Swetha and Swati together can cut 216 Apples of the same size in 3 hours. Number of Apples cut by Sruthi in 9 hours is same as the number of Apples cut by Swati in 7 hours. In one hour, Swati can cut as many Apples more than Swetha as Swetha can cut more than Sruthi. Then, the number of Apples cut by Swetha in one hour?  
 A. 21      B. 24      C. 27      D. 29
2. If 10 men take 30 days to complete a job, in how many days 25 men complete the job?  
 A. 10      B. 11      C. 15      D. 12
3. A can complete a piece of work in 15 days and B in 20 days. If they work together for 4 days, then the fraction of the work that is left is:  
 A.  $1/4$       B.  $1/10$       C.  $7/15$       D.  $8/15$
4. Abhishek starts to paint a fence on one day. On the second day, two more friends of Abhishek join him. On the third day 3 more friends of him join him and so on. If the fence is completely painted this way in exactly 20 days, then find the number of days in which 10 girls painting together can paint the fence completely, given that every girl can paint twice as fast as Abhishek and his friends (Boys)? (Assume that the friends of Abhishek are all boys).  
 A. 20      B. 40      C. 45      D. 77
5. George can do some work in 8 hours: Paul can do some work in 10 hours while Hari can do the same work in 12 hours. All the three of them start working at 9 a.m. while George stops work at 11 a.m. and the remaining two complete the work. Approximately at what time the work be finished.  
 A. 11:30 a.m.      B. 1 p.m.      C. 12 noon      D. 12:30 p.m.
6. 2 workers, one young and one old, live together and work in the same office. It takes 20 minutes for the young man to walk to office. The old man takes 30 minutes for the same distance. When will the young man catch up with the old man if the old man starts at 10:00 a.m. and the young man start 10:05 a.m.?  
 A. 11:00 a.m.      B. 10:20 a.m.      C. 10:10 a.m.      D. 10:15 a.m.

# TOPIC 14

## AREA MENSURATION

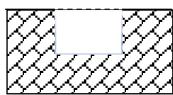
1. The dimensions of a certain machine are  $48'' \times 30'' \times 52''$ . If the size of the machine is increased proportionately until the sum of its dimensions equals 156", what will be the increase in the shortest side?

Solution

$$\begin{array}{l}
 M_1: \left| \begin{array}{|c|c|c|} \hline 48'' & 30'' & 52'' \\ \hline \end{array} \right. \\
 M_2 = \frac{M_1}{10}: \left| \begin{array}{|c|c|c|} \hline 4.8'' & 3'' & 5.2'' \\ \hline \end{array} \right. \\
 M_3 = 12M_2: \left| \begin{array}{|c|c|c|} \hline 36'' & 36'' & 64'' \\ \hline \end{array} \right. \\
 \text{Sum of Dimensions} = 48 + 30 + 52 = 130 \\
 \text{Sum of Dimensions} = \frac{13}{10} = 13 \\
 \text{Sum of Dimensions} = 13 \times 12 = 156 \\
 \text{Change in shortest dimension} = 36'' - 30'' = 6'' \text{ Ans.}
 \end{array}$$

2. A hollow space on earth surface is to be filled. Total cost of filling is Rs.20000. The cost of filling per  $m^3$  is Rs 225. How many times a size of  $3 m^3$  soil is required to fill the hollow space?

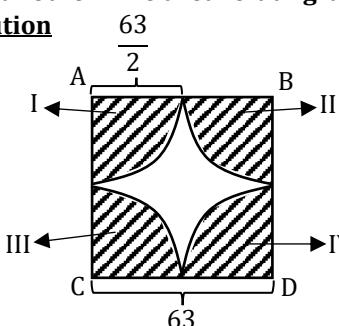
Solution



$$\begin{aligned}
 \text{Total cost} &= \text{Cost per } m^3 \times \text{Volume} \\
 \Rightarrow \text{Rs. } 20000 &= 225 \text{ Rs. per } m^3 \times \text{Volume} \\
 \Rightarrow \text{Volume} &= \frac{20000}{225} m^3 \\
 \text{Let } 3m^3 \text{ size soil is required K times,} \\
 \Rightarrow 3K &= \text{Volume} \\
 \Rightarrow 3K &= \frac{20000}{225} \\
 \Rightarrow K &= \frac{800}{27} = 29.63 \approx 30 \\
 \therefore 30 \text{ packets of } 3m^3 \text{ soil is required to fill the hollow space.}
 \end{aligned}$$

3. 4 horses are tethered at 4 corners of a square plot of side 63 meters so that they just cannot reach one another. The area left ungrazed is?

Solution



$$\begin{aligned}
 \text{Ungrazed area} &= \text{Area of Square ABCD} \\
 &\quad - \text{Total area of regions I, II, III and IV} \\
 &= 63^2 - \pi \left( \frac{63}{2} \right)^2 \\
 &= 850.5 \text{ m}^2 \text{ Ans.}
 \end{aligned}$$

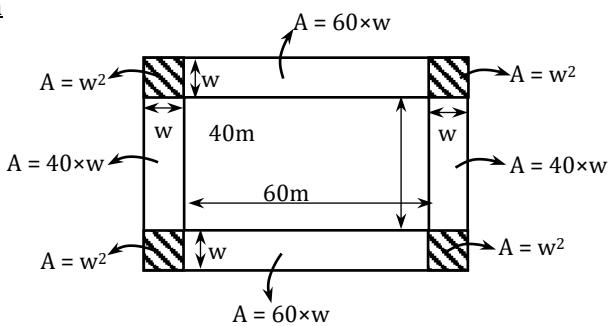
4. What is the percentage of increase in area of a triangle if its sides are doubled?

Solution

$$\begin{array}{ll}
 \text{Side (m)} & \text{Area (m}^2\text{ = m.m)} \\
 2 \text{ times (Doubled)} & 2^2 = 4 \text{ times} \\
 \underline{A_{\text{old}}} & \underline{A_{\text{new}}} \\
 X & 4X \\
 \xrightarrow{\quad 3X \quad} & \xrightarrow{\quad \text{Increase} \quad} \\
 \therefore \% \text{ inc.} & = \frac{3X}{X} \times 100 = 300\% \text{ Ans.}
 \end{array}$$

5. There is a rectangular Garden whose length and width is 60m x 20m. There is a walkway of uniform width around garden. Area of walkway is 516m<sup>2</sup>. Find width of walkway?

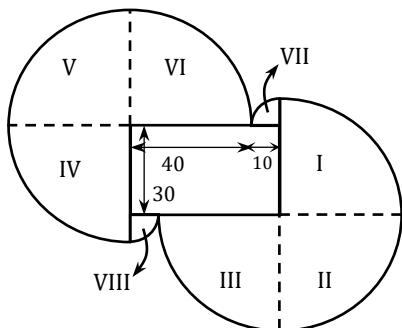
Solution



$$\begin{aligned} \text{Area of Walkway} &= 516 \text{ m}^2 \\ \Rightarrow 4w^2 + 2(60w) + 2(20w) &= 516 \\ \Rightarrow 4w^2 + 160w - 516 &= 0 \\ \Rightarrow w^2 + 40w - 129 &= 0 \\ \Rightarrow w^2 + 43w - 3w - 129 &= 0 \\ \Rightarrow w(w + 43) - 3(w + 43) &= 0 \\ \Rightarrow (w - 3)(w + 43) &= 0 \\ \Rightarrow w = 3 \text{ or, } & w = -43, \\ \text{Ans. } & \quad \boxed{w = -43} \\ \text{Width cannot be negative.} & \end{aligned}$$

6. Two goats are tied with a rope of length 40m outside of a rectangular shed of dimensions 50m x 30m. The goats are tied to different corners which lie on the opposite ends of a diagonal of the shed. What is the area in which the two goats can eat grass, if they choose not to eat in the common approachable area?

Solution



$$\begin{aligned} \text{Grazed Area} &= \text{Sum of areas I, II, III, IV, V, VI, VII \& VIII} \\ &\quad \underbrace{\qquad\qquad\qquad}_{r=40} \quad \underbrace{\qquad\qquad\qquad}_{r=10} \\ &= 6 \left[ \frac{1}{4} \times \pi(40)^2 \right] + 2 \left[ \frac{1}{4} \times \pi(10)^2 \right] \\ &= 2400 \pi + 50 \pi \\ &= 2450 \pi \text{ Ans.} \end{aligned}$$

7. The ratio between the perimeter and the breadth of a rectangle is 5:1. If the area of the rectangle is 216 sq. cm, what is the length of the rectangle?

Solution

$$\begin{aligned} \text{Perimeter : Breadth} & \\ (2L+2B) : B & \\ 5 : 1 & \\ L : B & \\ \left[ \frac{3}{2} : 1 \right] & \\ [3 : 2] & \\ \text{If } L = 3x \text{ then } B = 2x & \end{aligned}$$

$$\begin{aligned} \text{Area} &= L \times B \\ &= 3x \cdot 2x = 6x^2 \\ \Rightarrow 6x^2 &= 216 \text{ cm}^2 \\ \Rightarrow x^2 &= 36 \text{ cm}^2 \\ \Rightarrow x &= 6 \text{ cm} \\ \therefore L &= 3x = 3 \times 6 = 18 \text{ cm Ans.} \end{aligned}$$

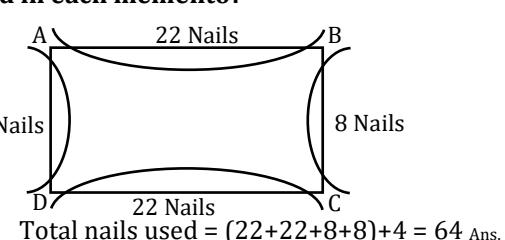
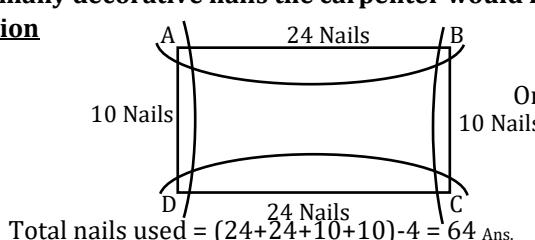
8. Find the cost of fencing around a circular field of diameter 28 m at the rate of Rs 1.50 a meter?

Solution

$$\text{Total Cost of fencing} = \text{Rate} \times \text{Circumference} = 1.5 \times \pi d = 1.5 \times \frac{22}{7} \times 28 = \text{Rs. } 132 \text{ Ans.}$$

9. Ms. Ganesh Mahal, Coimbatore wanted to present each of its customers with a memento rectangle in size. The mementos were of size 25 x 20 cm. The company requested the carpenter to make it in such a way that both 25 cm sides should have 24 nails each and the shorter sides should have 10 nails each. How many decorative nails the carpenter would have used in each memento?

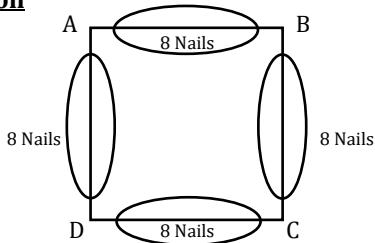
Solution



## Topic 14: AREA MENSURATION

10. Ramnath and Company was celebrating silver Jubilee celebrations and the authorities wanted to present a square cardboard memento fitted with decorative pins on all the four sides. They fitted 36 decorative pins with 1 cm distance between any two pins and with equal number of pins when counted on any side. Find the dimension of the cardboard.

Solution



$$\begin{aligned} 36 - 4 \text{ corner nails} &= 32 \text{ nails, 8 on each side} \\ \Rightarrow 8 + 2 \text{ corner nails} &= 10 \text{ nails on each side.} \\ 10 \text{ nails mean } 9 \text{ gaps, each gap is of } 1\text{cm.} \\ \therefore \text{Length of each side} &= 9 \times 1\text{cm} = 9\text{cm. Ans.} \end{aligned}$$

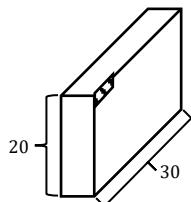
11. A triangle is made from a rope. The sides of the triangle are 21 cm, 24 cm and 28 cm. What will be the area of the square made from the same rope?

Solution

$$\begin{aligned} \text{Length of rope} &= 21+24+28 = 73\text{cm} \\ \Rightarrow \text{Perimeter of square} &= 73\text{cm} \\ \Rightarrow \text{side of square} &= \frac{73}{4} \text{ cm} \\ \Rightarrow \text{Area of square} &= \left(\frac{73}{4}\right)^2 = 333.0625 \text{ cm}^2 \text{ Ans.} \end{aligned}$$

12. One man wants to build a wall. The length and breadth of the wall are 20 and 30 cms respectively. He needs 35 bricks for one square centimeter then how many bricks he needs?

Solution



$$\begin{aligned} \text{For } 1\text{cm}^2 &\longrightarrow 35 \text{ bricks are needed} \\ \text{For } 20 \times 30 \text{ cm}^2 &\longrightarrow 20 \times 30 \times 35 \text{ bricks will be needed} \\ &= 21000 \text{ bricks. Ans.} \end{aligned}$$

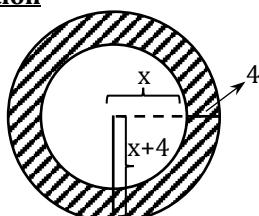
13. Raj drives slowly along the perimeter of a rectangular park at 24 kmph and completes one full round in 4 minutes 30 seconds. If the ratio of the length to the breadth of the park is 5:7, what are its dimensions?

Solution

$$\begin{aligned} L : B &\\ 5 : 7 &\\ 5x : 7x \Rightarrow \text{Perimeter} &= 2(L+B) = 2 \times 12x = 24x \\ \Rightarrow \text{Perimeter} &= \text{Speed} \times \text{Time} \\ \Rightarrow 24x &= 24 \times \frac{5}{18} \text{ m/s} \times 270 \text{ s} \\ \Rightarrow x &= 75 \\ \Rightarrow L &= 5x = 375\text{m and } B = 7x = 525\text{m Ans.} \end{aligned}$$

14. There is a pool of radius  $x$  and there is a pathway around the pool with a width of 4 feet. Find the radius of the pool if the path area/pool area =  $11/25$ .

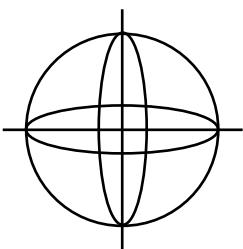
Solution



$$\begin{aligned} \text{Path Area} &= \pi(x+4)^2 - \pi x^2 \\ \Rightarrow \frac{\text{Path Area}}{\text{Pool Area}} &= \frac{11}{25} \Rightarrow \frac{\text{Pool Area}}{\text{Total Area}} = \frac{25}{36} \\ \Rightarrow \frac{\pi x^2}{\pi(x+4)^2} &= \frac{25}{36} \\ \Rightarrow \frac{x^2}{(x+4)^2} &= \frac{25}{36} \\ \Rightarrow \frac{x}{x+4} &= \frac{5}{6} \Rightarrow \frac{2+x}{x^2} = \frac{11}{200} \Rightarrow x = 20 \text{ Ans.} \end{aligned}$$

15. A sphere is cut into 4 identical pieces after it was painted. What is the ratio of painted area to the unpainted area?

Solution



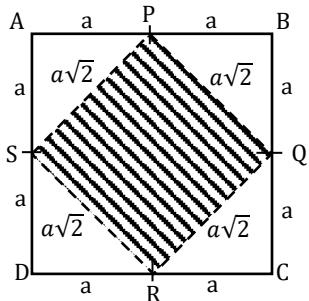
$$\text{Painted area} = \text{Surface area of sphere} = 4\pi r^2$$

$$\text{Unpainted area} = 2\pi r^2 + 2\pi r^2 = 4\pi r^2$$

$$\text{Ratio} = \frac{\text{Painted Area}}{\text{Unpainted Area}} = \frac{4\pi r^2}{4\pi r^2} = 1:1$$

16. In a square, all the mid points are joined. The inner square is shaded. If the area of the square is A, what is the shaded area?

Solution

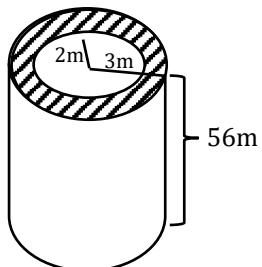


$$\text{Area of Square } ABCD = (2a)^2 = 4a^2 = A$$

$$\text{Area of Shaded Square } PQRS = (\sqrt{2}a)^2 = 2a^2 = \frac{A}{2} \text{ Ans.}$$

17. A thermal chimney of circular cross section has outer and inner radii of 3m and 2m respectively. Find the cost of cement finishing for the inner and outer surface at Rs.20 per sq. meter, if the height of the chimney is 56m.

Solution



$$\text{Height of Chimney} = 56\text{m}$$

$$\text{Outer radius } (r_1) = 3\text{m}$$

$$\text{Inner radius } (r_2) = 2\text{m}$$

$$\begin{aligned}\text{Total surface area (Inner + Outer)} &= 2\pi r_1 h + 2\pi r_2 h \\ &= 2\pi h (r_1 + r_2) \\ &= 2 \times \frac{22}{7} \times 56(3 + 2) \\ &= 2 \times 880 = 1760\text{m}^2\end{aligned}$$

$$\begin{aligned}\text{Cost (Rs.)} &= \text{Rate (Rs/m}^2) \times \text{Area (m}^2) \\ &= 20 \times 1760 \\ &= \text{Rs. 35200 Ans.}\end{aligned}$$

18. A store owner is packing small radios into larger boxes that measure 25 in. by 42 in. by 60 in. If the measurement of each radio is 7 in. by 6 in. by 5 in., then how many radios can be placed in the box?

Solution

Let  $x$  radios are there

(Volume of 1 radio). $x$  = Volume of Box

$$\Rightarrow [7'' \times 6'' \times 5''].x = 25'' \times 42'' \times 60''$$

$$\Rightarrow x = 300 \text{ Ans.}$$

19. A photograph is to be fitted in a photo frame of sides 18 cm by 15 cm such that there is a margin of 1.5 cm left. What should be the area of the photograph?

Solution

Outer dimensions = 18 cm  $\times$  15 cm

Margin = 1.5 cm

$$\begin{aligned}\text{Inner dimension} &= (18 - 3) \text{ by } (15 - 3) \\ &= 15 \text{ by } 12\end{aligned}$$

$$\Rightarrow \text{Area of photo} = 15 \times 12 = 180 \text{ cm}^2$$

20. A closed wooden box of thickness 0.5 cm and length 21 cm, width 11 cm, and height 6 cm, is painted on the inside. The cost of painting is Rs.70. What is the rate of painting in rupees per sq.cm?

Solution

$$\text{Outer dimensions} = 21 \times 11 \times 6$$

$$\text{Margin} = 0.5 \text{ cm}$$

$$\text{Inner dimensions} = 20 \times 10 \times 5$$

$$\Rightarrow \text{Inner surface area} = 2LB + 2BH + 2HL = 2(20 \times 10) + 2(10 \times 5) + 2(20 \times 5)$$

$$= 400 + 100 + 200$$

$$= 700 \text{ cm}^2$$

$$\text{Cost (Rs.)} = \text{Rate (Rs/cm}^2\text{)} \times \text{Area (cm}^2\text{)}$$

$$\Rightarrow \text{Rs. } 70 = \text{Rate} \times 700 \text{ cm}^2$$

$$\Rightarrow \text{Rate} = \frac{1}{10} = 0.1 \text{ Rs/cm}^2 \text{ Ans.}$$

</DIY/>

1. A triangle is made from a rope. The sides of the triangle are 20 cm, 24 cm and 28 cm. What will be the area of the square made from the same rope?
2. The slant height of a right circular cone is 10 m and its height is 8 m. Find the area of its curved surface.  
A.  $30\pi \text{ m}^2$       B.  $40\pi \text{ m}^2$       C.  $60\pi \text{ m}^2$       D.  $80\pi \text{ m}^2$
3. 12 cm thick to cover an area 10 m long and 2 m wide. How many cubic meters of concrete will the builder need?  
A. 2      B. 2.4      C. 3      D. 4
4. Find the slant height of a cone of radius 21 cm and height 28 cm.  
A. 45      B. 35      C. 36      D. 25
5. If the wheel of a bicycle makes 560 revolutions in travelling 1.1 km, what is its radius?  
A.  $r = 30.25 \text{ cm}$       B.  $r = 23.25 \text{ cm}$       C.  $r = 31.25 \text{ cm}$       D.  $r = 20.25 \text{ cm}$
6. If each edge of a cube is increased by 50%, find the percentage increase in its surface area.  
A. 105%      B. 125%      C. 100%      D. 95%
7. A circular tent is cylindrical to a height of 3 meters and conical above it. If its diameter is 105 m and the slant height of conical portion is 53m, calculate the length of the canvas 5m wide to make the required tent?  
A. 973.5m      B. 3894m      C. 1800m      D. 1947m

# TOPIC 15

## NUMBER BASED REASONING

### - NUMBER SERIES

1.  $\underbrace{16}_{-1}, \underbrace{15}_{+3}, \underbrace{18}_{-1}, \underbrace{17}_{+3}, \underbrace{20}_{-1}, \underbrace{19}_{+3}, \underbrace{22}_{-1}, \underbrace{21}_{-1}$

2.  $\underbrace{6}_{-2}, \underbrace{7}_{-2}, \underbrace{\textcircled{26}}_{-2}, \underbrace{6}_{-2}, \underbrace{7}_{-2}, \underbrace{\textcircled{24}}_{-2}, \underbrace{6}_{-2}, \underbrace{7}_{-2}, \underbrace{\textcircled{22}}_{-2}$

3.  $\underbrace{16}_{-1}, \underbrace{17}_{-1}, \underbrace{14}_{+1}, \underbrace{18}_{-1}, \underbrace{19}_{+1}, \underbrace{14}_{-1}, \underbrace{20}_{-1}, \underbrace{21}_{+1}, \underbrace{14}_{-1}, \underbrace{\textcircled{22}}, \underbrace{\textcircled{23}}, \underbrace{14}_{-1}$

4.  $\underbrace{10}_{-1}, \underbrace{11}_{-1}, \underbrace{12}_{+1}, \underbrace{18}_{-1}, \underbrace{19}_{+1}, \underbrace{13}_{-1}, \underbrace{14}_{+1}, \underbrace{15}_{-1}, \underbrace{18}_{-1}, \underbrace{19}_{+1}, \underbrace{\textcircled{16}, \textcircled{17}, \textcircled{18}}_{-1}$

5.  $\underbrace{5}_{+1}, \underbrace{5}_{+1}, \underbrace{6}_{+2}, \underbrace{6}_{+2}, \underbrace{8}_{+3}, \underbrace{8}_{+3}, \underbrace{11}_{+4}, \underbrace{11}_{+4}, \underbrace{\textcircled{15}}, \underbrace{\textcircled{15}}_{+4}$

6.  $\underbrace{5}_{+2}, \underbrace{5}_{+2}, \underbrace{7}_{+2}, \underbrace{7}_{+2}, \underbrace{9}_{+2}, \underbrace{9}_{+2}, \underbrace{11}_{+2}, \underbrace{11}_{+2}, \underbrace{\textcircled{13}}, \underbrace{\textcircled{13}}_{+2}$

7.  $\underbrace{1}_{+2}, \underbrace{1}_{+2}, \underbrace{3}_{+2}, \underbrace{9}_{+2}, \underbrace{3^2}_{+2}, \underbrace{11}_{+2}, \underbrace{121}_{+2}, \underbrace{11^2}_{+2}, \underbrace{\textcircled{123}}, \underbrace{\textcircled{123}^2}_{+2}$

8.  $\underbrace{1}_{\times 2}, \underbrace{2}_{\times 2}, \underbrace{3}_{\times 2}, \underbrace{2}_{\times 2}, \underbrace{4}_{\times 2}, \underbrace{6}_{\times 2}, \underbrace{4}_{\times 2}, \underbrace{8}_{\times 2}, \underbrace{12}_{\times 2}, \underbrace{8}_{\times 2}, \underbrace{\textcircled{16}}, \underbrace{\textcircled{24}}_{\times 2}$

9.  $\underbrace{32}_{-1}, \underbrace{32}_{-1}, \underbrace{33}_{+1}, \underbrace{32}_{-1}, \underbrace{33}_{+1}, \underbrace{35}_{-1}, \underbrace{35}_{-1}, \underbrace{36}_{+1}, \underbrace{35}_{-1}, \underbrace{36}_{+1}$

10.  $\underbrace{11}_{+6}, \underbrace{17}_{+13}, \underbrace{-6}_{-13}, \underbrace{-13}_{-13}, \underbrace{24}_{+6}, \underbrace{30}_{+13}, \underbrace{-19}_{-7}, \underbrace{-26}_{+13}, \underbrace{\textcircled{37}}, \underbrace{\textcircled{43}}_{-7}$

## Topic 15: NUMBER BASED REASONING

**11.** 3 , 1 , 13 , 11 , 31 , 29 , 57

$$\begin{array}{ccccccc} \downarrow & \downarrow & \downarrow & \downarrow & \downarrow & \downarrow & \downarrow \\ 1^2 & 2^2 & 3^2 & 4^2 & 5^2 & 6^2 & 7^2 \\ +2 & -3 & +4 & -5 & +6 & -7 & +8 = 57 \end{array}$$

**12.** 6 , 120 , 504 , 1320 , 2730

$$\begin{array}{cccccc} \downarrow & \downarrow & \downarrow & \downarrow & \downarrow & \downarrow \\ 2^3 & \rightarrow 5^3 & \rightarrow 8^3 & \rightarrow 11^3 & \rightarrow 14^3 \\ -2 & -5 & -8 & -11 & -14 \\ \hline & & & & & 2730 \end{array}$$

**13.** 23 , 8 , 34 , 81 , 33 , 27 , 43 , 64

$$\begin{array}{cccc} \downarrow & \downarrow & \downarrow & \downarrow \\ 2^3 = 8 & 3^4 = 81 & 3^3 = 27 & 4^3 = 64 \end{array}$$

**14.** 20 , 21 , 23 , 24 , 27 , 28 , 32 , 33 , **38**

**15.** 16 , 19 , 23 , 26 , 30 , 33 , 37

**16.** 5 , 5 , 15 , 75 , 525 , 4725

**17.** 1 , 4 , 2 , 8 , 6 , 24 , 22 , 88 , 86

**18.** 70 , 54 , 45 , 41 , 40

**19.** 5 , 5 , 15 , 75 , 525 , 4725

### - ODD MAN OUT

1. A. 92      B. 64      C. 58      D. 72

**Solution** All numbers except 58 are divisible by 4.

2. A. 31      B. 33      C. 37      D. 41

**Solution** All numbers except 33 are prime numbers.

3. A. 122      B. 123      C. 125      D. 127

**Solution** All numbers except 122 are odd numbers.

4. A. 122      B. 123      C. 126      D. 129

**Solution** All numbers except 122 are divisible by 3.

**- FIND THE WRONG NUMBER IN THE SERIES:**

1. 3, 7, 11, 15, 20, 23

**Solution**

20. In each term 4 is getting added to get the next term. While we need to add 5 to get 20.

2. 1, 4, 9, 16, 25, 49

**Solution**

49. All the numbers are perfect squares of consecutive natural numbers (1, 2, 3, 4, 5). So, the next values should be  $6^2 = 36$  not 49.

3. 10, 17, 26, 35, 50, 65, 82

**Solution**

35. All the numbers except 35 are of the form  $n^2 + 1$ .

</DIY/>

**Find the Missing Number in the following number series:**

1. 2, 5, 8, 11, 14, \_\_\_

2. 21, 18, 15, 12, 9, 6, \_\_\_

3. 2, 6, 18, 54, 162, \_\_\_

4. 2, 4, 12, 48, \_\_\_

5. 2, 5, 11, 23, \_\_\_

6. 2, 5, 12, 27, 58, \_\_\_

7. 5, 11, 24, 51, 106, \_\_\_

8. 5, 13, 29, 61, 125, \_\_\_

9. 5, 16, 51, 158, \_\_\_

10. 7, 12, 19, 28, 39, \_\_\_

11. 2, 8, 18, 32, 50, \_\_\_

**Find the Odd Man Out:**

12. A. 225      B. 289      C. 576      D. 512

13. A. 8      B. 64      C. 27      D. 81

14. A. 28      B. 65      C. 1332      D. 82

**Find the wrong number in the series:**

15. 3, 8, 15, 24, 35, 50, 63, 80

16. 5, 8, 17, 24, 37, 50, 65

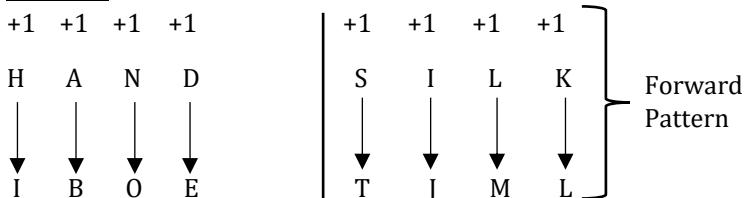
17. 34, 47, 62, 80, 98, 119

# TOPIC 16

## CODING DECODING

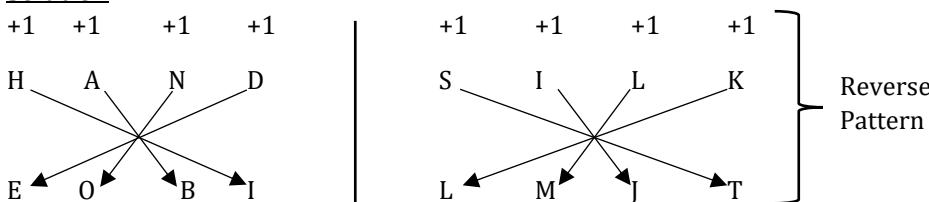
1. If HAND is written as IBOE in a certain code, how is SILK written in that code?

Solution



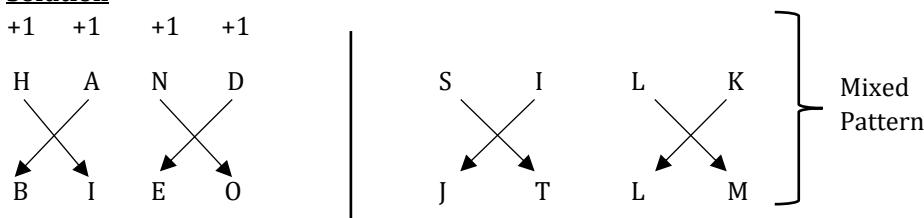
2. If HAND is written as EOBI in a certain code, how is SILK written in that code?

Solution



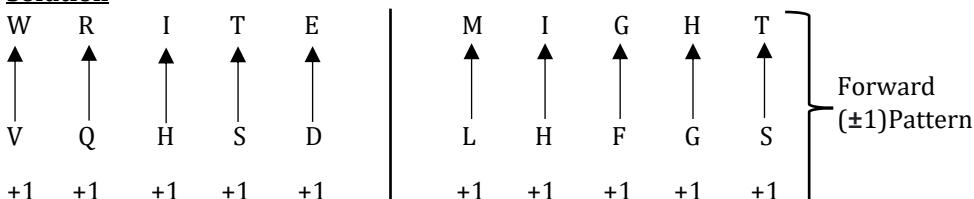
3. If HAND is written as BIEO in a certain code, how is SILK written in that code?

Solution



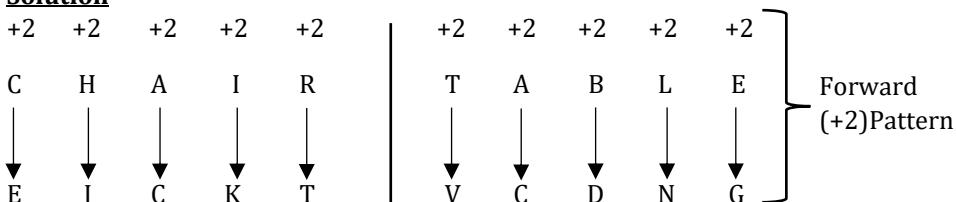
4. If WRITE is written as VQHSD in a certain code, how is MIGHT written in that code?

Solution



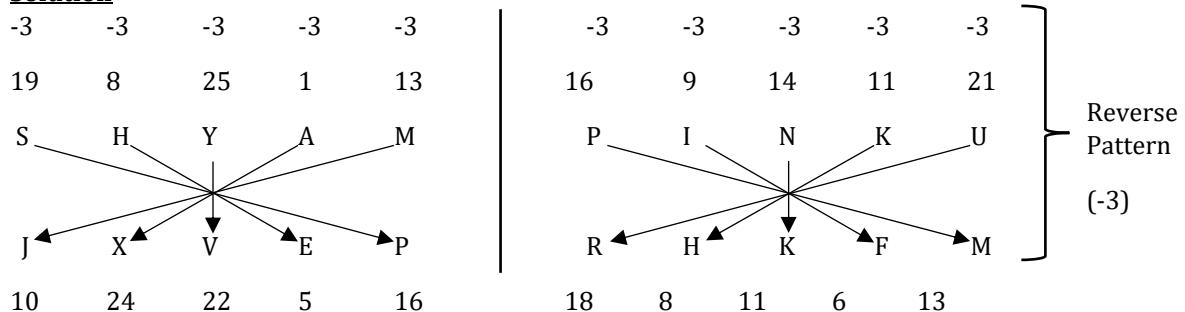
5. If CHAIR is written as EJCKT in a certain code, how is TABLE written in that code?

Solution



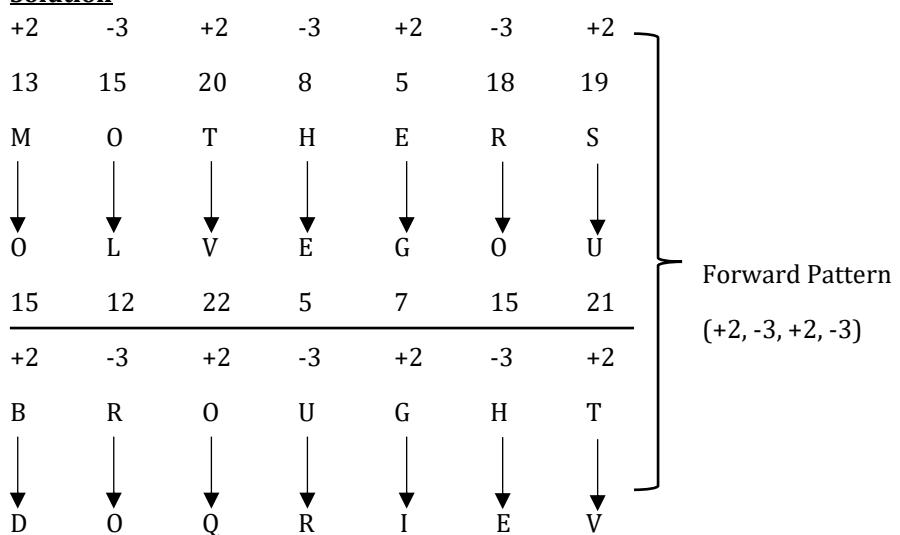
6. If SHYAM is written as JXVEP in a certain code, how is PINKU written in that code?

Solution



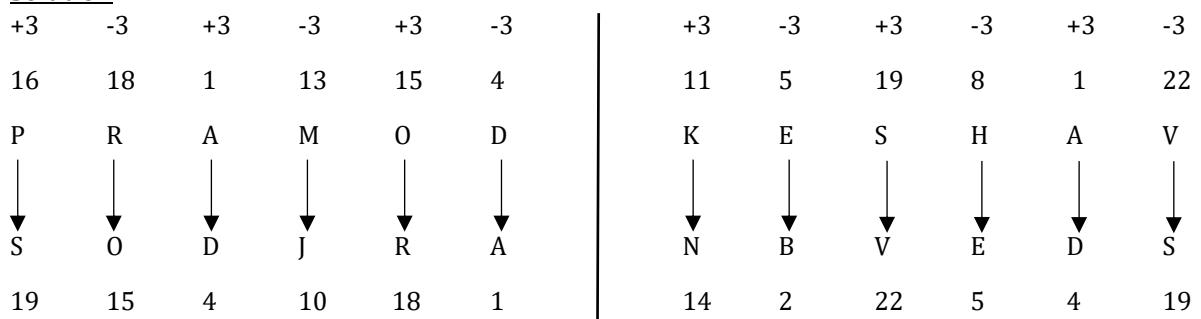
7. If MOTHERS is written as OLVEGOU in a certain code, how is BROUGHT written in that code?

Solution



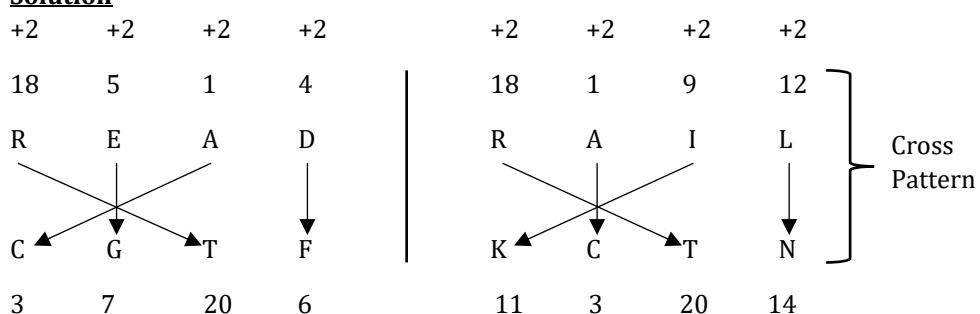
8. If PRAMOD is written as SODJRA in a certain code, how is KESHAV written in that code?

Solution



9. If READ is written as CGTF in a certain code, how is RAIL written in that code?

Solution



## Topic 16: CODING DECODING

10. If MIRACLE is written as XMOAYHA in a certain code, how is PRELIMS written in that code?

Solution

+2	+4	+6	-2	-4	-6
13	9	18	1	3	12
M	I	R	A	C	L
X	M	O	A	Y	H
24	13	15	1	25	8
24	13	15	-2	-4	-6

+2	+4	+6	-2	-4	-6
16	18	5	12	9	13
P	R	E	L	I	M
K	V	R	L	M	I
11	22	18	12	13	9
11	22	18	-2	-4	-6

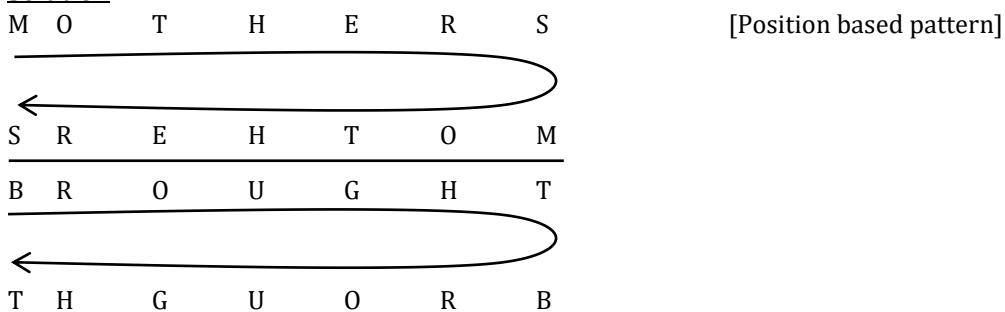
11. If VASTU is written as WCVXZ in a certain code, how is STAIR written in that code?

Solution

+1	+2	+3	+4	+5	+1	+2	+3	+4	+5
22	1	19	20	21	19	20	1	9	18
V	A	S	T	U	S	T	A	I	R
W	C	V	X	Z	T	V	D	M	W
23	3	22	24	26	20	22	4	13	23
23	3	22	24	26	-1	-2	-3	-4	-5

12. If MOTHERS is written as SREHTOM in a certain code, how is BROUGHT written in that code?

Solution



[Position based pattern]

13. If HUMIDITY is written as UHIMIDTY in a certain code, how is POLITICS written in that code?

Solution

H	U	M	I	D	I	T	Y
U	H	I	M	I	D	T	Y
P	O	L	I	T	I	C	S
O	P	I	L	I	T	C	S

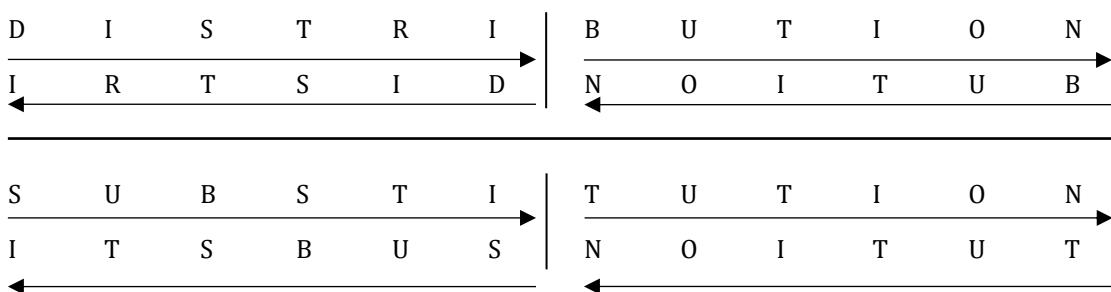
14. If MANUFACTURE is written as AMFUNUTCARE in a certain code, how is ELECTRONICS written in that code?

**Solution**

M	A	N	U	F	A	C	T	U	R	E
A	M	F	U	N	U	T	C	A	R	E
E	L	E	C	T	R	O	N	I	C	S
L	E	T	C	E	I	N	O	R	C	S

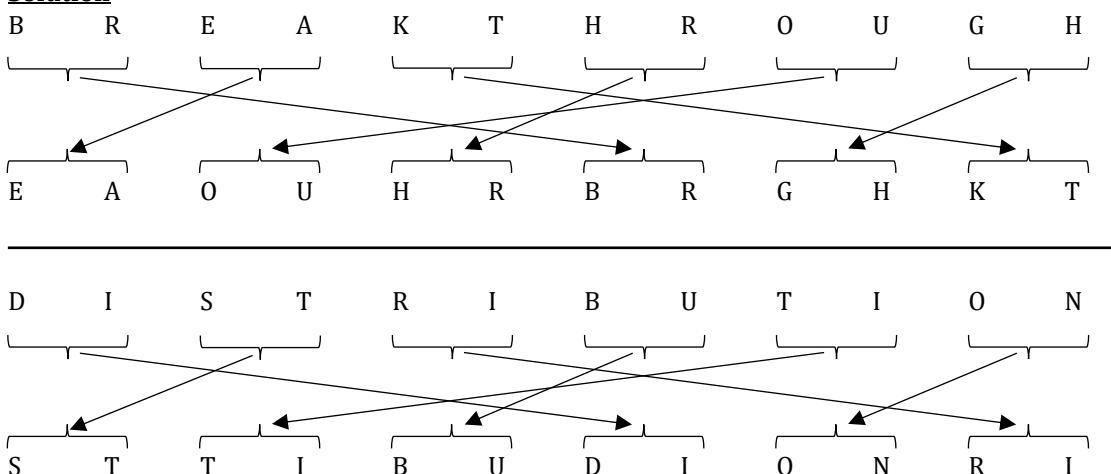
15. If DISTRIBUTION is written as IRTSIDNOITUB in a certain code, how is SUBSTITUTION written in that code?

**Solution**



16. If BREAKTHROUGH is written as EAOUHRBRGHKT in a certain code, how is DISTRIBUTION written in that code?

**Solution**



17. Find the odd man out.

- A. ZW      B. TQ      C. SP      D. NL      E. PM  
**Solution**

If you observe the place values of all the letters in each option, there is a difference of 3 except in option D. in which the difference is 2.

18. Complete the analogy GJMP : MPSV :: HKNQ :

- A. RTVX      B. PSVX      C. JLNP      D. PSVY

**Solution**

The following pattern is being followed

G h i J k l M n o P

M n o P q r S t u V

H i j K l m N o p Q

P q r S t u V w x Y

19. If SPLINTER is coded as 67408192, how will PRISTINE be coded as?

A. 72061089      B. 72061098      C. 27061089      D. 72016089

**Solution** A. 72061089

Both SPLINTER and PRISTINE contain the same letters. See the number code for each letter in the given word SPLINTER and correspondingly put the values in the word PRISTINE to get the required code.

20. Which is the wrong term in the following series: HER, JGT, LIV, NKX, PMY

A. LIV      B. NKX      C. PMY      D. JGT

**Solution** C. PMY

First letter: H i J k L m N o P

Second letter: E f G h I j K l M

Third letter: R s T u V w X y Z

</DIY/>

1. In a certain language, LIEUTENANT is coded as 1232212021411420, then what will be the code for MANGO in the same language?

A. 13114715      B. 1311474      C. 14141375      D. 13114157

2. In a certain code language, HEART is written as FGYTR. How is MOUSE written in that code?

A. KQWQG      B. OMWQG      C. OMSUC      D. KQSUC

3. If WATER is coded as YCVGT, then what word is written as HKTG in the same code?

A. IRFE      B. FIRE      C. REFI      D. ERIF

4. If CARING is coded as EDVGKC, SHARES is coded as UKEPBO, then what will the code for CASKET?

A. EDXIBP      B. EDWIAP      C. EDWPAI      D. EDWIBP

5. If  $1 + 4 = 9$ ,  $2 + 8 = 18$  and  $3 + 6 = 15$  then  $7 + 8$  equals-

A. 23      B. 30      C. 32      D. 41

6. If A = 1 and ACT = 24 then FAT = ?

A. 26      B. 25      C. 27      D. 24

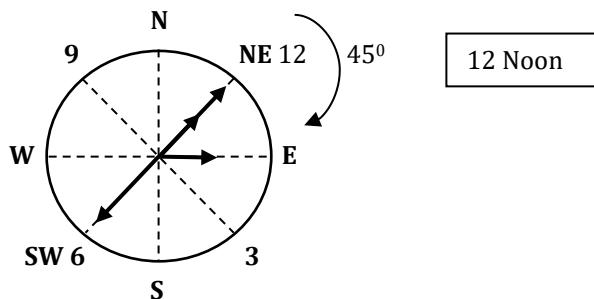
# TOPIC 17

## CLOCKS

1. A clock is so placed that at 12 noon, its minute hand points towards north-east. In which direction does its hour hand point at 1.30 p.m.?

A. East      B. West      C. North      D. South      E. None of these

Solution



Hour Hand

$$1 \text{ hr} \longrightarrow 30^\circ$$

$$12 \text{ Noon to } 1:30 \text{ pm} \longrightarrow 1.5 \times 30^\circ$$

$$1.5 \text{ hr} = 45^\circ$$

⇒ Hour hand will move clockwise by  $45^\circ$  from north east and therefore it will be pointing towards East at 1:30 pm.

2. A clock is started at noon. After 5hrs 10 minutes, the hour hand has turned through how many degrees with respect to the starting position?

A.  $145^\circ$       B.  $150^\circ$       C.  $155^\circ$       D.  $160^\circ$

Solution

Hour Hand

$$\text{We know, } 1 \text{ min} \longrightarrow 1/2^\circ$$

$$\text{Noon to } 5:10 \text{ pm} \longrightarrow 310 \text{ min} \times \frac{1}{2} = 155^\circ$$

3. How many times in a day, are the hands of a clock in straight line, but opposite in direction?

A. 20      B. 22      C. 24      D. 48

Solution

Every 12 hr  $\longrightarrow 180^\circ$  occur 11 times

⇒ In 1day  $\longrightarrow 180^\circ$  occurs  $11 \times 2 = 22$  times  
(24 hrs)

4. In a day, how many times are the hands of a clock together?

A. 12 times      B. 24 times      C. 20 times      D. 22 times

Solution

Together  $\Rightarrow 0^\circ$

Every 12 hr  $\longrightarrow 0^\circ$  occur 11 times

⇒ In 1day  $\longrightarrow 0^\circ$  occurs  $11 \times 2 = 22$  times  
(24 hrs)

5. What is the angle between the two hands at 8:20 'O' clock?

A. 150 degrees      B. 130 degrees      C. 250 degrees      D. 320 degrees

Solution

$h \quad m$

Time: 8 : 20

$$\Theta = \left| \frac{11}{2} \times m - 30 \times h \right| = \left| \frac{11}{2} \times 20 - 30 \times 8 \right| = \left| 110 - 240 \right| = 130^\circ$$

## Topic 17: CLOCKS

6. The angle between two hands at 3.45 is:

A. 110 degrees

B. 115 degrees

C. 157.5 degrees

D. 117 degrees

Solution

h m

Time: 3 : 45

$$\Theta = \left| \frac{11}{2} \times m - 30 \times h \right| = \left| \frac{11}{2} \times 45 - 30 \times 3 \right| = |247.5 - 90| = 157.5^\circ$$

7. At what time between 7 and 8 'o'clock will the hands of clock be together?

A. 23 minutes past 7

B.  $21\frac{1}{11}$  minutes past 7

C.  $38\frac{2}{11}$  minutes past 7

C.  $11\frac{1}{11}$  minutes past 7

E. None of these

Solution

Time = 7 : \_\_\_ 'O' clock

$$\Theta = \left| \frac{11}{2} \times m - 30 \times h \right|$$

$$0^\circ = \left| \frac{11}{2} \times m - 30 \times 7 \right|$$

$$\Rightarrow \frac{11}{2} m = 30 \times 7 \Rightarrow m = \frac{420}{11} = 38\frac{2}{11}$$

$$\Rightarrow 38\frac{2}{11} \text{ min past 7 'O' Clock}$$

8. At what time between 9' O clock and 10 O'clock will the hands of clock point in the opposite directions?

A.  $23\frac{2}{11}$  minutes past 10' O clock

B. 21 minutes past 9 O clock

C.  $2\frac{2}{11}$  minutes past 9 O clock

D.  $16\frac{4}{11}$  minutes past 10' O clock

Solution

Time = 9 hr \_\_\_ m minutes

$\Theta = 180^\circ$

$$\Theta = \left| \frac{11}{2} \times m - 30 \times h \right| = 180^\circ$$

Case 1

$$= \frac{11}{2} m - 270 = 180^\circ$$

$$\Rightarrow \frac{11}{2} m = 450^\circ$$

$$\Rightarrow m = \frac{900}{11} = 81\frac{9}{11}$$

$$\Rightarrow 81\frac{9}{11} \text{ min past 9 'O' Clock}$$

$m > 60$  is not allowed

Case 2

$$\frac{11}{2} m - 270 = -180^\circ$$

$$\Rightarrow \frac{11}{2} m = 90^\circ$$

$$\Rightarrow m = \frac{180}{11}$$

$$= 16\frac{4}{11}$$

$$\Rightarrow 16\frac{4}{11} \text{ min past 9 'O' Clock}$$

9. At what time between 4 and 5 'O'clock will the hands of clock point in the opposite directions?

A. 54 past 4

B.  $53\frac{7}{11}$  past 4

C.  $54\frac{8}{11}$  past 4

D.  $54\frac{6}{11}$  past 4

Solution

Time = 4 hr \_\_\_ m minutes

$\Theta = 180^\circ$

$$\Theta = \left| \frac{11}{2} \times m - 30 \times 4 \right| = 180^\circ$$

Case 1

$$\frac{11}{2} m - 120 = 180^\circ$$

$$\Rightarrow \frac{11}{2} m = 300$$

$$\Rightarrow m = \frac{600}{11} = 54\frac{6}{11}$$

$$\Rightarrow 54\frac{6}{11} \text{ min past 4 'O' Clock}$$

Case 2

$$\frac{11}{2} m - 120 = -180^\circ$$

$$\Rightarrow \frac{11}{2} m = -60^\circ$$

$$\Rightarrow m = \frac{-120}{11} = -10\frac{10}{11}$$

$m < 0$  is not allowed

10. Find the time between 7 and 8 O'clock when two hands are at right angles?

A.  $2\frac{2}{11}$  minutes past 7 O'clock

C.  $21\frac{2}{11}$  minutes past 7 O'clock

B.  $3\frac{2}{11}$  minutes past 7 O'clock

D.  $7\frac{10}{11}$  minutes past 7 O'clock

Solution

$$\text{Time} = 7 \text{ hr } \underline{\quad} \text{m minutes}$$

$$\Theta = 180^\circ$$

$$\Theta = \left| \frac{11}{2} \times m - 30 \times h \right| = 90^\circ$$

Case 1

$$= \frac{11}{2} m - 30 \times 7 = 90^\circ$$

$$\Rightarrow \frac{11}{2} m = 300$$

$$\Rightarrow m = \frac{600}{11} = 54\frac{4}{11}$$

$$\Rightarrow 54\frac{4}{11} \text{ past 7 O'clock}$$

Case 2

$$\frac{11}{2} m - 30 \times 7 = -90^\circ$$

$$\Rightarrow \frac{11}{2} m = 120^\circ$$

$$\Rightarrow m = \frac{240}{11} = 21\frac{9}{11}$$

$$\Rightarrow 21\frac{9}{11} \text{ past 7 O'clock}$$

11. Find the time between 5 and 6 O'clock when two hands of clock are of 6 minutes spaces apart.

A.  $3\frac{2}{11}$  minutes past 5 O'clock

C.  $20\frac{8}{11}$  minutes past 5 O'clock

B.  $6\frac{6}{11}$  minutes past 5 O'clock

D.  $4\frac{2}{11}$  minutes past 5 O'clock

Solution

$$\text{Time} = 5 \text{ hr } \underline{\quad} \text{m minutes}$$

$$\Theta = 6 \text{ min spaces}$$

$$= 6 \times 6^\circ = 36^\circ \text{ (minute hand} \Rightarrow 1 \text{ min} = 6^\circ \Rightarrow 1 \text{ min spaces} = 6^\circ \Rightarrow 6 \times 6 = 36^\circ)$$

$$\Theta = \left| \frac{11}{2} \times m - 30 \times h \right| = 36$$

Case 1

$$= \frac{11}{2} m - 30 \times h = 36$$

$$\Rightarrow \frac{11}{2} m - 30 \times 5 = 36$$

$$\Rightarrow \frac{11}{2} m = 186$$

$$\Rightarrow m = \frac{372}{11} = 33\frac{9}{11}$$

Case 2

$$\frac{11}{2} m - 30 \times 5 = -36^\circ$$

$$\Rightarrow \frac{11}{2} m = 114$$

$$\Rightarrow m = \frac{228}{11}$$

$$\Rightarrow 20\frac{8}{11}$$

12. A watch gains 5 min every hour. If it was set right at 12 noon, what is the true time when the watch is showing 5 pm, on the same day?

A. 4:480/13    B. 3:480/13

C. 0.569444444

D. None of these

Solution

Faulty clock	Correct clock
12 noon	12 noon
5:00 pm	?
5hr	

FC	CC
65 min	60 min
13 min	12 min
1 min	$\frac{12}{13}$ min

FC	CC
260 min	240 min (4hrs)
39 min	36 min
1 min	$\frac{12}{13}$ min
$\Rightarrow 300 \text{ min}$	$= 4 \text{ hrs.} + 36 + \frac{12}{13} \text{ min} = 4 \text{ hr} + \frac{480}{13} \text{ min}$

## Topic 17: CLOCKS

13. A clock is late by 1 minute 27 seconds in a month, then by how much seconds will it be late in 1 day?

A. 2.9      B. 3.9      C. 4.9      D. 5.9

**Solution**

Faulty clock	Correct clock
Delay of 1 min 27 sec = 87 seconds	1 month (30 day)
Delay of $\frac{87}{30}$ sec = 2.9 sec	1 day

14. The famous church in the city of Kumbakonnam has a big clock tower and is said to be over 300 years old. Every Monday 10.00 a.m., the clock is set right by Antony, doing service in the church. The clock loses 6 mins every hour. What will be the actual time when the faulty clock shows 3 p.m. on Friday?

A. 1:06 am Saturday      B. 4:54 am Friday  
C. 2:13:20 am Saturday      D. 3 am Friday

**Solution**

FC	CC
loses 6 min	1 hr
54 min	60 min
54 hrs	60 hrs
9 hrs	10 hrs
1 hr	$\frac{10}{9}$ hrs

FC	CC
Mon 10 am	Mon 10 am
Fri 3 pm	?

FC	CC
99hrs	110hrs
2hrs	$\frac{20}{9}$ hrs = $2 + \frac{2}{9}$ hrs = $2\text{hrs} + \frac{40}{3}$ min = $2\text{hrs } 13\text{min} + \frac{1}{3}\text{sec}$

$$\Rightarrow 101 \text{ hrs} = 101\text{hrs.} + (11\text{hrs} + 13\text{min} + 20\text{sec})$$

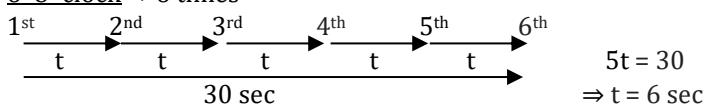
FRIDAY 3 p.m. + 11 hrs + 13 min + 20 sec  
= 2:13:20 am Saturday

15. At 6'o clock, the clock ticks 6 times. The time between first and last ticks was 30sec. How much time it takes at 12'o clock?

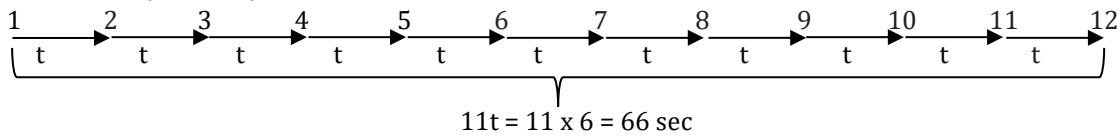
A. 60 sec      B. 56 sec      C. 76 sec      D. 66 sec

**Solution**

6 'O' clock  $\Rightarrow$  6 times



12 'O' clock (12 times)



16. In a clock, the long hand is of 8cm and the short hand is of 7cm. If the clock runs for 4 days, find out the total distance covered by both the hands.

A.  $1824\pi$  cm      B.  $1648\pi$  cm      C.  $1724\pi$  cm      D.  $2028\pi$  cm

**Solution**

Long Hand

Radius(R) = 8 cm

1hr  $\rightarrow$  1 revolution( $2\pi R$ )

1day (24hrs)  $\rightarrow$  24rev  $\times$  ( $2\pi R$ )

4 days  $\rightarrow$   $24 \times (2\pi R) \times 4$

Total distance travelled =  $24 \times (2\pi R) \times 4 + 2 \times (2\pi r) \times 4 = 4 \times 4 [6 \times 2\pi \times 8 + 7\pi]$

$$= 16 [96\pi + 7\pi] = 16 \times 103\pi = 1648\pi$$

Short Hand

Radius(r) = 7 cm

12hr  $\rightarrow$  1 revolution( $2\pi r$ )

1day (24hrs)  $\rightarrow$  2rev  $\times$  ( $2\pi r$ )

4 days  $\rightarrow$   $2 \times (2\pi r) \times 4$

&lt;/DIY/&gt;

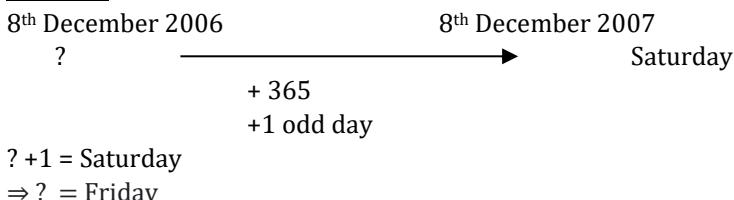
1. A clock is started at noon. By 10 minutes past 6, the hour hand has turned through:  
 A.  $175^\circ$       B.  $195^\circ$       C.  $185^\circ$       D.  $180^\circ$
2. What is the angle between the two hands at 7.20 'O'clock?  
 A. 150 degree    B. 100 degree    C. 250 degree    D. 320 degree
3. What is the angle between the two hands at 3 o'clock?  
 A.  $122^\circ$     B.  $70^\circ$     C.  $48^\circ$     D.  $90^\circ$
4. What is the angle between two hands, when time is 5:30?  
 A. 15 degree    B. 14 degree    C. 16 degree    D. 11 degree
5. At what time between 7 and 8 o'clock will the hands of clock point in the opposite directions?  
 A. 5 minutes past 7    B.  $21\frac{1}{11}$  minutes past 7    C.  $5\frac{5}{11}$  minutes past 7    D.  $11\frac{1}{11}$  minutes past 7
6. At what time between 2' O clock and 3' O clock, will the hands of a clock point in the opposite directions?  
 A.  $2\frac{2}{11}$  minutes past 2' O clock    B. 16 minutes past 2  
 C.  $20\frac{2}{11}$  minutes past 2    D.  $43\frac{7}{11}$  minutes past 2' O clock
7. At what time between 4 and 5 o'clock will the hands of a watch point in same direction?  
 A. 24 past 4    B.  $24\frac{7}{11}$  past 4    C.  $23\frac{9}{11}$  past 4    D.  $21\frac{9}{11}$  past 4
8. At what time between 3 and 4 o'clock, the hands are in opposite directions?  
 A.  $49\frac{1}{11}$  min past 3    B. 16 min past 3    C. 2 min past 4    D.  $3\frac{2}{11}$  min past 3
9. Find the time between 5 and 6 o'clock, when the two hands of clock are 4 minute spaces apart.  
 A.  $31\frac{7}{11}$  minutes past 5 o'clock    B.  $6\frac{6}{11}$  minutes past 5 o'clock  
 C.  $20\frac{8}{11}$  minutes past 5 o'clock    D.  $4\frac{2}{11}$  minutes past 5 o'clock
10. Exact time of a clock was set right at 5:00 am, then it loses 16 min every day. On the 4th day, when it shows 10:00 pm, what is the exact time?  
 A. 11:00 PM    B. 10:00 PM    C. 9:00 PM    D. 8:00 PM
11. A clock showed 5 min past 3'0 clock on Sunday evening when the correct time was 3'0 clock. It loses uniformly and was observed to be 10 min slow, on the subsequent Tuesday at 9pm. When did the clock show the correct time?  
 A. 10 AM Monday    B. 10 PM Monday    C. 9 PM Monday    D. 9 AM Monday

# TOPIC 18

## CALENDAR

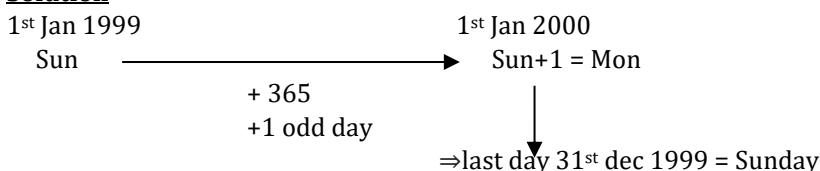
1. On 8<sup>th</sup> December 2007, Saturday falls. What day was it on 8<sup>th</sup> December 2006?

Solution



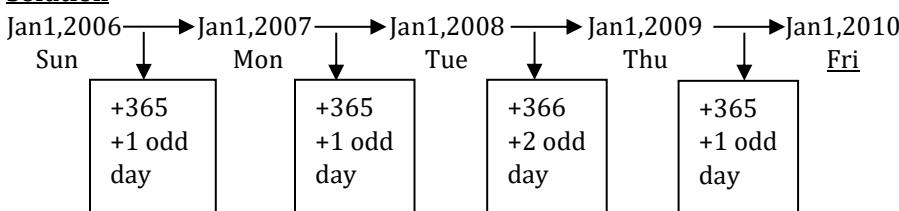
2. First day of 1999 is Sunday, what is the last day?

Solution



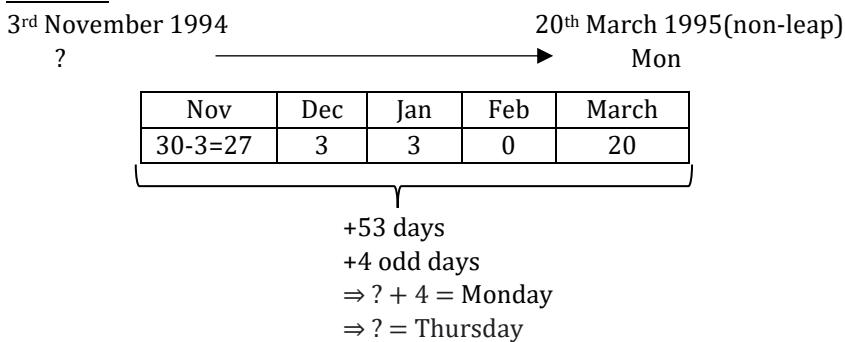
3. It was Sunday on Jan 1, 2006. What is the day of the week on Jan 1, 2010?

Solution



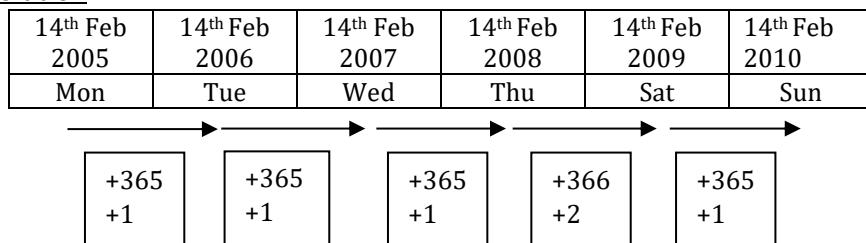
4. Monday falls on 20<sup>th</sup> March 1995. What was the day on 3<sup>rd</sup> November 1994?

Solution



5. If the Valentine's Day in 2005 falls on Monday, then on which day will the Valentine's Day fall in 2010?

Solution



6. Today is Monday, after 61 days, it will be:

Solution

$$\begin{array}{ccccccc} \text{Today} & & +61 \text{ days} & & \text{Mon} + 5 \\ \text{Mon} & \xrightarrow{\hspace{1.5cm}} & & & =\text{Saturday} \\ & & +5 \text{ odd days} & & \end{array}$$

7. The day on 5<sup>th</sup> march of a year is the same day on what date of same year?

A. 5<sup>th</sup> Nov

B. 6<sup>th</sup> Nov

C. 5<sup>th</sup> Dec

D. 6<sup>th</sup> Dec

Solution

March (31 days)	A	M	J	J	A	S	O	Nov(5 <sup>th</sup> )
31-5		X	3	2	3	3	2	3 5 days
=26								

21 odd days  
⇒ 0 odd day  
⇒ 5<sup>th</sup> Nov = 5<sup>th</sup> march

8. A person has to work 8 continuous days & rests on 9th day. If a person starts on Monday, what day is on 12th rest day?

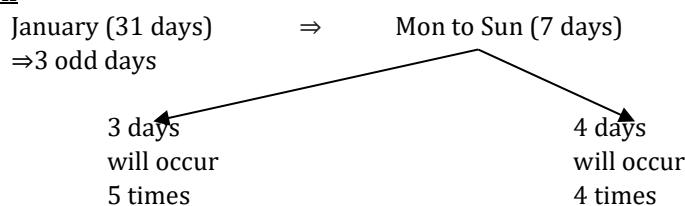
Solution

1 <sup>st</sup> – 8 <sup>th</sup>	9 <sup>th</sup>	Next 8 days	18 <sup>th</sup> day	Next 8 days	27 <sup>th</sup> day	.....	12 <sup>th</sup> rest day
working	Rest	Working	Rest	Working	Rest		⇒ 12 × 9 = 108 <sup>th</sup> day

$$\begin{array}{ccccc} \text{1st day} & & +107 \text{ days} & & \text{12th rest day} \\ \text{Mon} & \xrightarrow{\hspace{1.5cm}} & & & (\text{108th day}) \\ & & +2 \text{ odd day} & & \Rightarrow \text{Mon} + 2 \\ & & & & = \text{Wednesday} \end{array}$$

9. In the month of January of a certain year, there are 4 Thursdays & 4 Sunday. What will the day on 1<sup>st</sup> Jan of that month?

Solution



Mon	Tue	Wed	Thu	Fri	Sat	Sun
1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	--	--	--	--
--	--	--	--	--	--	--
--	--	--	--	--	--	--
--	--	--	--	--	--	--
29 <sup>th</sup>	30 <sup>th</sup>	31 <sup>st</sup>				

1<sup>st</sup> Jan is Monday.

10. If day before yesterday was Monday, what day will fall a day after tomorrow?

Solution



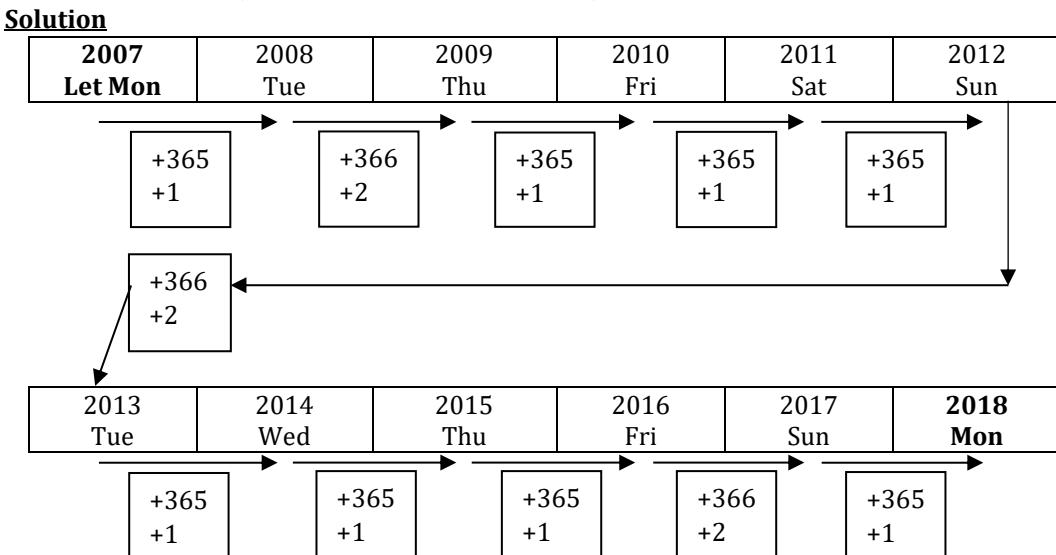
11. Mamuni went to the movies 9 days ago. She goes to the movies only on Thursday. What day is today? .

Solution

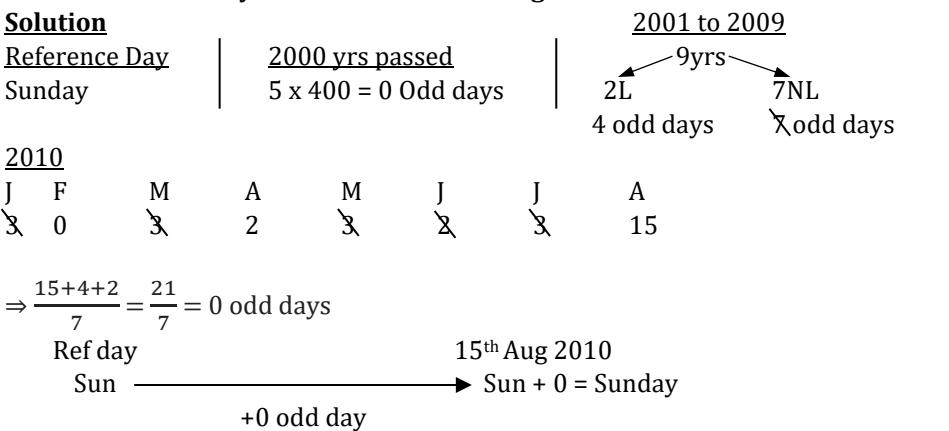
$$\begin{array}{ccccc} \text{Thursday} & & +9 & & \text{Today} = \text{Thursday} + 9 \\ & \xrightarrow{\hspace{1.5cm}} & & & = \text{Thursday} + 2 \\ & & +2 \text{ odd day} & & = \text{Saturday} \end{array}$$

## Topic 18: CALENDAR

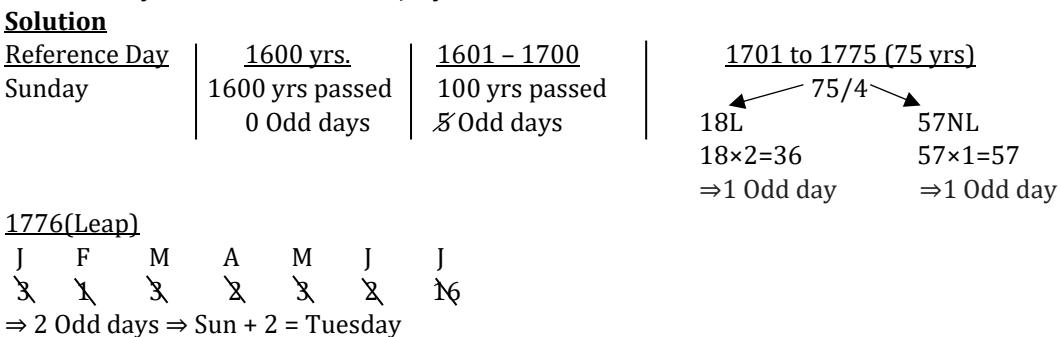
12. The calendar for the year 2007 will be same for the year:



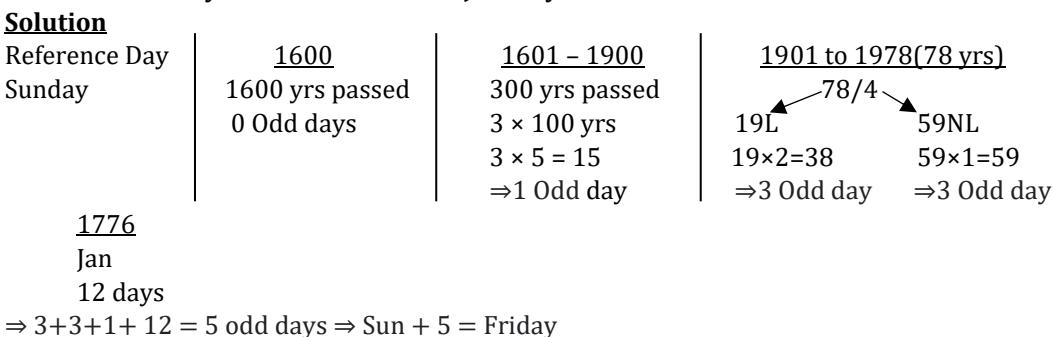
13. What will be the day of the week on 15<sup>th</sup> August 2010?



14. Find the day of the week on 16<sup>th</sup> July 1776?



15. What was the day of the week on 12<sup>th</sup> January 1979?



**16. What was the day of the week on 26<sup>th</sup> December 1995?****Solution**

<u>Reference Day</u>	<u>1600</u>	<u>1601 – 1900</u>	<u>1901 to 1994(94 yrs)</u>
Sunday	1600 yrs passed =0 Odd days	300 yrs passed $3 \times 100$ yrs $3 \times 5 = 15$ ⇒ 1 Odd day	94 yrs 23L      71NL $23 \times 2 = 46$ $71 \times 1 = 71$ ⇒ 4 Odd day      ⇒ 1 Odd day
	<u>1995</u>		
		1 <sup>st</sup> Jan to 26 <sup>th</sup> Dec = 365 – (5 days) = 360 days ⇒ 3 odd days	
		⇒ 1 + 4 + 1 + 3 = 9 ⇒ 2 odd days ⇒ Sun + 2 = Tuesday	

**18. The last day of the century cannot be:**

- A. Monday      B. Wednesday      C. Tuesday      D. Friday

**Solution**

Remember: The last day of the century cannot be Tuesday, Thursday, Saturday. Hence Tuesday is the answer.

&lt;/DIY/&gt;

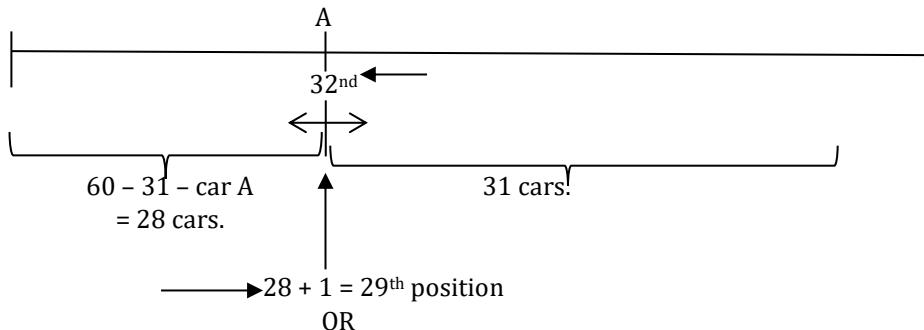
- If day after tomorrow will be Friday, what day was there on day before yesterday?  
 A. Sunday      B. Monday      C. Saturday      D. Friday
- If the third day of the month is Monday, which of the following will be the fifth day from 21st of that month?  
 A. Tuesday      B. Monday      C. Wednesday      D. Thursday
- Mani went to the movies 16 days ago. She goes to the movies only on Thursday. What day of the week is today?  
 A. Sunday      B. Tuesday      C. Thursday      D. Saturday      E. Friday
- Today is Monday. After 64 days, it will be:  
 A. Wednesday      B. Saturday      C. Tuesday      D. Thursday
- First day of 1999 is Sunday. What is the first day of the year 2000?  
 A. Wednesday      B. Monday      C. Friday      D. Sunday
- It was Sunday on Jan 1, 2006. What was the day of the week on Jan 1, 2009?  
 A. Sunday      B. Saturday      C. Friday      D. Thursday
- On 8th Dec, 2007 Saturday falls. What was the day of the week on 8th Dec, 2005?  
 A. Saturday      B. Friday      C. Thursday      D. Tuesday
- If Valentine's day of 2005 was celebrated on a Monday. What day is Feb 14th, 2011?  
 A. Monday      B. Sunday      C. Tuesday      D. Wednesday
- In 2003, there are 28 days in February and there are 365 days in the year. In 2004, there are 29 days in February and there are 366 days in the year. If the date March 11, 2003 is Tuesday, then on which of the following day would the date March 11, 2004 be?  
 A. Monday      B. Thursday      C. Wednesday      D. Tuesday
- What was the day of week on October 24, 1992?  
 A. Sunday      B. Thursday      C. Monday      D. Saturday
- What was the day of the week on December 26, 1995?  
 A. Friday      B. Tuesday      C. Sunday      D. Monday      E. None of these
- What was the day of week on January 1, 1989?  
 A. Thursday      B. Monday      C. Sunday      D. Tuesday

# TOPIC 19

## ORDER AND RANKING

1. In a row of 60 cars, car A is 32<sup>nd</sup> from right end. What is its position from the left end?

Solution



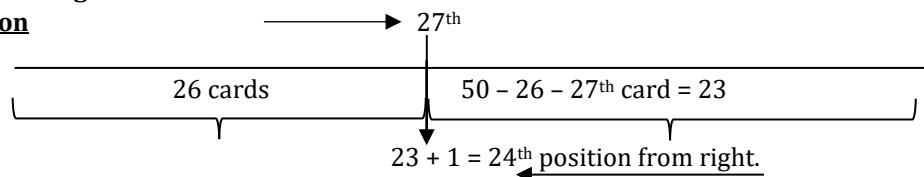
$$\text{Total cars} = \text{Position from Left} + \text{Position from right} - 1$$

$$60 = x + 32 - 1$$

$$\Rightarrow x = 60 - 32 + 1 = 29$$

2. Radha selected the 27<sup>th</sup> card from the left in a row of 50 cards. What will be the position of same card from right side?

Solution



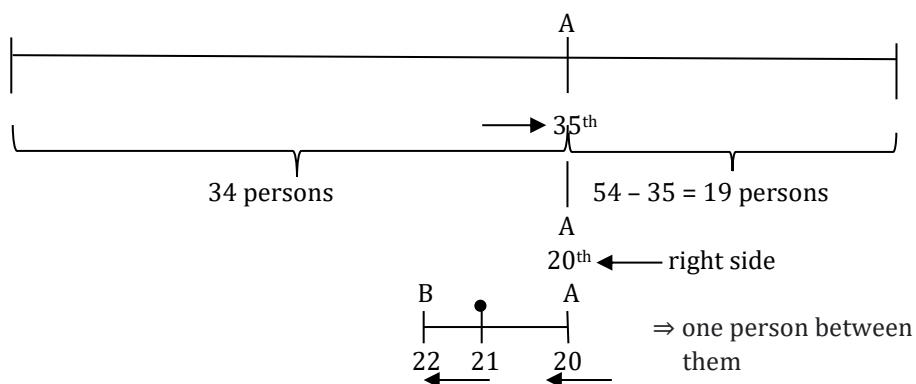
3. Radha ranks 16<sup>th</sup> from the top and 13<sup>th</sup> from the bottom in a certain examination. How many students gave the exam?

Solution

$$\begin{aligned}\text{Total students} &= \text{position from top} + \text{position from bottom} - 1 \\ &= 16 + 13 - 1 = 28\end{aligned}$$

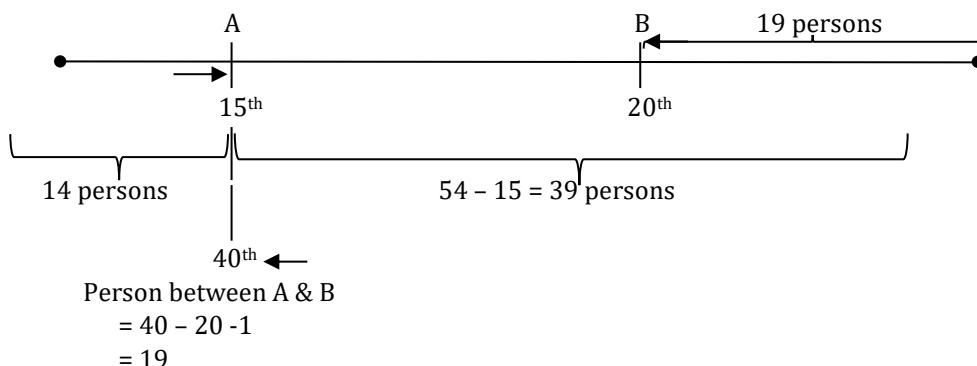
4. In a row of 54 persons, A is 35<sup>th</sup> from left side & B is 22<sup>nd</sup> from right side. Find the total number of persons between them.

Solution



5. In a row of 54 persons, A is 15<sup>th</sup> from left side and B is 20<sup>th</sup> from right side. Find total number of persons between A and B.

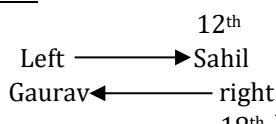
Solution



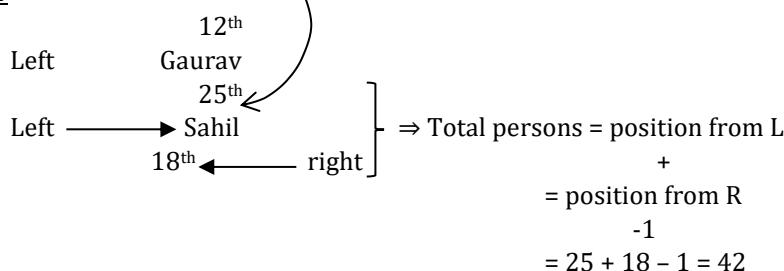
6. Sahil and Gaurav are standing in a row of persons. Sahil is 12<sup>th</sup> from left side & Gaurav is 18<sup>th</sup> from right side. If they interchange their position, Sahil becomes 25<sup>th</sup> from left. What is the total no. of persons standing in a row?

Solution

Before



After



7. In a school, there are 147 people. The ratio of Girls : Boys is 1:6. Soumya is a girl who stands 15<sup>th</sup> from top of that row and 7 girls are in front of her. How many boys are behind her?

Solution

$$\begin{array}{rcl} \text{Girls} & : & \text{Boys} \\ (1) & : & 6x \end{array} \left[ \begin{array}{l} \text{Total} \\ 147 \end{array} \right] \Rightarrow 7x = 147 \Rightarrow x = 21 \Rightarrow G = x = 21 \quad B = 6x = 126$$

15<sup>th</sup> → SOUMYA  
14 students  
7 Girls  
 $\Rightarrow 14 - 7 = 7$  Boys  
Remaining boys will be behind Soumya.  
126 Boys  
In front of Soumya 7  
Behind Soumya  $126 - 7 = 119$

$$\begin{array}{c} 21 \text{ Girls} \\ \swarrow \quad \searrow \\ \text{Girls in front of Soumya} \quad \text{Behind Soumya} \\ 7 \quad \Rightarrow 21 - 7 - \text{Soumya} \\ \quad \quad \quad = 21 - 7 - 1 \\ \quad \quad \quad = 13 \end{array}$$

## Topic 19: ORDER AND RANKING

---

8. When Abhinav, Bhavya, Chandan, Dharam and Esha are arranged in descending order of their weights from top, Abhinav becomes 3rd.

Esha is between Dharam and Abhinav.

Chandan and Dharam are not on top.

Who among them is the second?

**Solution**

Based on the 1st information, we can write

----- < ----- < Abhinav < ----- < -----

Based on second information, we have 2 possibilities-

Dharam < Esha < Abhinav or Abhinav < Esha < Dharam

Chandan and Dharam are not on top.

Combining all the information, we find that Abhinav < Esha < Dharam possibility will be removed.

Therefore, finally we can say,

Dharam < Esha < Abhinav < ----- < -----

Since Chandan is not on top so it will come at second place from top.

Dharam < Esha < Abhinav < Chandan < Bhavya

Therefore, Chandan is the person who will come at 2nd place.

9. Rohit is taller than Manikant but not as tall as Gagan. Shiva is taller than Gagan but not as tall as Ankit. Ankit is shorter than Tushar but not as short as Bhavya.

Who is the tallest?

A. Manikant      B. Ankit      C. Tushar      D. Bhavya      E. Shiva

**Solution**

Based on the first information, we can write-

Manikant < Rohit < Gagan

It implies that Rohit and Manikant are not tallest. So, option a is removed.

Based on the second information, we can write

Gagan < Shiva < Ankit

It implies that Gagan and Shiva are not tallest. So, option e is removed.

Based on the third information, we can write

Bhavya < Ankit < Tushar

It implies that Bhavya and Ankit are not tallest. So, option b and d is removed.

Therefore, the correct option is (C) Tushar.

10. Rohit stands third in a row of 20 students when all of them are arranged in ascending order of their heights. Now, 5 more students, all taller than Rohit join the group. What will be Rohit's position if they are now arranged in descending order of their heights?

**Solution**

Shortest ----- → Tallest

Based on the 1st information, we can write-

1 < 2 < 3(ROHIT) < ..... < 20

Based on the second information, we can write-

1 < 2 < 3(ROHIT) < ..... + (5 new members) ..... < 25

Rohit's position as per descending order will be  $25 - 3 + 1 = 23$

</DIY/>

1. Rohit is thinner than Ankit and Bhavya. Manikant is thinner as compared to Ankit but fatter than Bhavya. Two other men are fatter than Ankit. Who is the thinnest person among all?

A. Ankit      B. Rohit      C. Bhavya      D. Manikant

2. Ankit is Taller than Roshni but shorter than Manikant. Roshni is as tall as Saurabh but taller than Shaurya. Then, Saurabh is –

A. Taller than Manikant.      B. Shorter than Ankit.  
C. As tall as Ankit.      D. Shorter than Shaurya.

# TOPIC 20

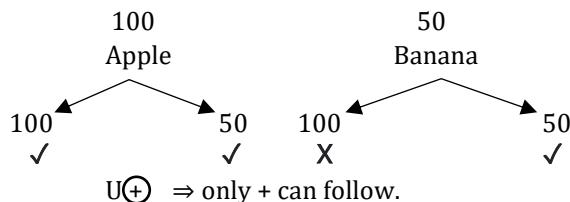
## SYLLOGISM

- **STATEMENT:**

**ALL APPLES ARE BANANAS**  
100                50

**CONCLUSIONS:**

1. **NO APPLE IS BANANA.**  
50                50
2. **SOME APPLES ARE BANANAS.**  
50                50
3. **SOME APPLES ARE NOT BANANAS.**
4. **ALL BANANAS ARE APPLES.**  
100                50
5. **NO BANANA IS APPLE.**
6. **SOME BANANAS ARE APPLES.**  
50                50
7. **SOME BANANAS ARE NOT APPLES.**



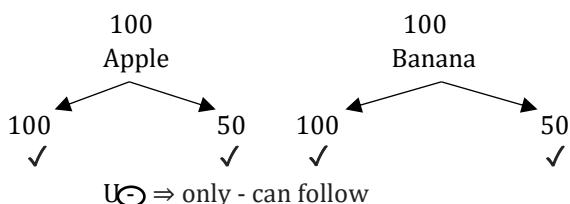
Since the statement is positive, only positive conclusions can follow and therefore all negative conclusions (1<sup>st</sup>, 3<sup>rd</sup>, 5<sup>th</sup>, 7<sup>th</sup>) are automatically cancelled. As per the statement, banana 100 is not allowed. Therefore, in positive conclusions, if anywhere, banana holds a value of 100, it will be cancelled.

- **STATEMENT:**

**NO APPLES IS BANANA**  
100                100

**CONCLUSIONS:**

1. **ALL APPLES ARE BANANAS**  
100                50
2. **SOME APPLES ARE BANANAS.**  
50                50
3. **SOME APPLES ARE NOT BANANAS.**
4. **ALL BANANAS ARE APPLES.**
5. **NO BANANA IS APPLE.**
6. **SOME BANANAS ARE APPLES.**
7. **SOME BANANAS ARE NOT APPLES.**



Since the statement is negative, only negative conclusions can follow and therefore all positive conclusions (1<sup>st</sup>, 2<sup>nd</sup>, 4<sup>th</sup>, 6<sup>th</sup>) are automatically cancelled. As per the statement, all values are allowed. Therefore, all negative conclusions follow.

- **STATEMENTS:**

**1.ALL CHAIRS ARE TABLES.**  
100                50

**2. SOME TABLES ARE DESK.**  
50                50

**CONCLUSIONS:**

1. **ALL CHAIRS ARE DESK.**
2. **NO CHAIR IS DESK.**

The common term TABLE stands invalid as it does not hold a value of 100 in any of the statements. Therefore, no conclusion will follow.

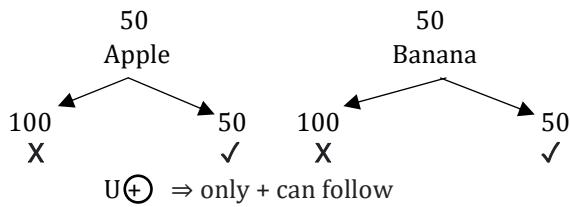
## Topic 20: SYLLOGISM

- **STATEMENT:**

**SOME APPLES ARE BANANAS**  
 50                    50

**CONCLUSIONS:**

1. **NO APPLE IS BANANA.**
2. **ALL APPLES ARE BANANAS.**  
~~100~~                    50
3. **SOME APPLES ARE NOT BANANAS.**
4. **ALL BANANAS ARE APPLES.**  
~~100~~                    50
5. **NO BANANA IS APPLE.**
6. **SOME BANANAS ARE APPLES.**  
 50                    50
7. **SOME BANANAS ARE NOT APPLES.**



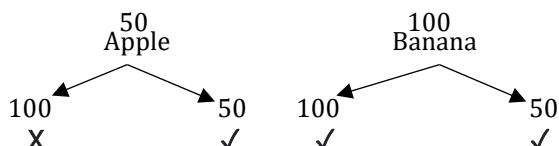
Since the statement is positive, only positive conclusions can follow and therefore all negative conclusions (1<sup>st</sup>, 3<sup>rd</sup>, 5<sup>th</sup>, 7<sup>th</sup>) are automatically cancelled. As per the statement, 100 is not allowed. Therefore, in positive conclusions, if anywhere, anything holds a value of 100, it will be cancelled.

- **STATEMENT:**

**SOME APPLES ARE NOT BANANAS**  
 50                    100

**CONCLUSIONS:**

1. **ALL APPLES ARE BANANAS.**
2. **SOME APPLES ARE BANANAS.**
3. **NO APPLES ARE BANANA.**  
~~100~~                    100
4. **ALL BANANAS ARE APPLES.**
5. **NO BANANA IS APPLE.**  
 100                    ~~100~~
6. **SOME BANANAS ARE APPLES.**
7. **SOME BANANAS ARE NOT APPLES.**  
 50                    ~~100~~



Since the statement is negative, only negative conclusions can follow and therefore all positive conclusions (1<sup>st</sup>, 2<sup>nd</sup>, 4<sup>th</sup>, 6<sup>th</sup>) are automatically cancelled. As per the statement, 100 for apples is not allowed. Therefore, in negative conclusions, if anywhere, apple holds a value of 100, it will be cancelled.

1. **QUESTION:**

**STATEMENTS:**

**1.ALL BOYS ARE GIRLS.**  
 100                    50

**2.ALL BOYS ARE COWS.**  
 100                    50

**CONCLUSIONS:**

1. **ALL GIRLS ARE COWS.**  
~~100~~                    50
2. **ALL COWS ARE GIRLS.**  
~~100~~                    50

**3. SOME GIRLS ARE COWS.**  
 50                    50

**4. SOME COWS ARE GIRLS.**  
 50                    50

The common term BOYS stands valid. Since both statements are positive, only positive conclusions can follow and all negative conclusions will stand cancelled automatically. As per the statement, Girls and cows holds a value of 50. Therefore, in the conclusions, they are allowed to hold 50 but not more than 50 (i.e., 100). Therefore, conclusions 1 and 2 are cancelled. Conclusions 3 and 4 will follow.

**2. QUESTION:****STATEMENTS:****1.ALL TREES ARE GREEN.**

100            50

**2.ALL PLANTS ARE GREEN.**

100            50

**CONCLUSIONS:****1.ALL TREES ARE PLANTS.**

The common term GREEN stands invalid as it does not hold a value of 100 in any of the statements. Therefore, no conclusion will follow.

**2. SOME TREES ARE PLANTS.****3.ALL PLANTS ARE TREES.****3. QUESTION:****STATEMENTS:****1.ALL ENGINEERS ARE DOCTOR.**

100            50

**2.ALL DOCTORS ARE ARCHITECT.**

100            50

**3. SOME DOCTORS ARE LAWYERS.**

50            50

**CONCLUSIONS:****1.ALL ENGINEERS ARE ARCHITECT.**

100            50

As per Statements 1 and 2, ENGINEER connects DOCTOR connects ARCHITECT. The common term DOCTOR stands valid. As per the statements, ENGINEER holding a value of 100 and ARCHITECT holding a value of 50 in the conclusions is allowed.

**2. SOME ARCHITECTS ARE LAWYERS.**

50            50

As per Statements 2 and 3, LAWYERS connects DOCTOR connects ARCHITECT. The common term DOCTOR stands valid. As per the statements, LAWYERS holding a value of 50 and ARCHITECT holding a value of 50 in the conclusions is allowed.

**3.ALL ENGINEERS ARE LAWYERS.**

As per Statements 1 and 3, LAWYERS connects DOCTOR connects ENGINEER. The common term DOCTOR stands invalid. Therefore, conclusion do not follow.

**4. QUESTION:****STATEMENTS:****1.ALL ENGINEERS ARE DOCTOR.**

100            50

**2.ALL DOCTORS ARE ARCHITECT.**

100            50

**3.ALL ARCHITECT ARE LAWYERS.**

100            50

**CONCLUSIONS:****1.ALL ENGINEERS ARE LAWYERS.**

100            50

**2. SOME LAWYERS ARE ENGINEERS.**

50            50

As per Statements 1, 2 and 3, ENGINEER connects DOCTOR connects ARCHITECT connects LAWYERS. The common term DOCTOR and ARCHITECT stands valid. As per the statements, ENGINEER holding a value upto 100 and LAWYERS holding a value upto 50 is allowed in the conclusions. Therefore, both conclusions follow.

## Topic 20: SYLLOGISM

### 5. STATEMENTS:

1. SOME STUDENTS ARE ACTORS.

50                50

2. ALL ACTORS ARE FOOLS.

100                50

3. ALL STUDENTS ARE BOYS.

100                50

#### CONCLUSIONS:

1. SOME BOYS ARE FOOLS.

50                50

2. ALL BOYS ARE FOOLS.

100                50

As per Statements 1, 2 and 3, BOYS connects STUDENTS connects ACTORS connects FOOLS. The common term STUDENTS and ACTORS stands valid. As per the statements, BOYS holding a value upto 50 and FOOLS holding a value upto 50 is allowed in the conclusions. Therefore, ONLY conclusion 1 follows.

### 6. QUESTION:

#### STATEMENTS:

1. NO PEN IS COPY.

100                100

2. NO COPY IS BOOK.

100                100

As both the statements are negative, no conclusion follows.

#### CONCLUSIONS:

1. NO PEN IS BOOK.

2. NO BOOK IS PEN.

3. ALL BOOKS ARE PEN.

4. ALL PENS ARE BOOK.

### 7. QUESTION

#### STATEMENTS:

1. ALL MEN ARE BLACK.

100                50

2. NO MEN IS WHITE.

100                100

As one statement is positive and one is negative, only negative conclusions can follow. Therefore, all positive conclusions (5th) stand cancelled.

The common term MEN stands valid.

As per the statements, BLACK holding a value up to 50 and WHITE holding a value up to 100 is allowed in the conclusions.

Therefore, conclusion 1, 3, 4 will not follow.

Only conclusion 2 follows

#### CONCLUSIONS:

1. NO BLACK IS WHITE.

100                100

2. SOME BLACK ARE NOT WHITE.

50                100

3. NO WHITE IS BLACK.

100                100

4. SOME WHITE ARE NOT BLACK.

50                100

5. ALL BLACKS ARE WHITES.

**8. QUESTION****STATEMENTS:****1.ALL GIRLS ARE ENGINEER.**  
100            50**2.NO BOY IS ENGINEER.**  
100            100**CONCLUSIONS:****1.NO GIRL IS BOY.****2. SOME GIRLS ARE NOT BOYS.****3. SOME BOYS ARE NOT GIRLS.****4.NO BOY IS GIRL.****5.ALL GIRLS ARE BOYS.****6.ALL BOYS ARE GIRLS.**

As one statement is positive, and one is negative, only negative conclusions can follow. Therefore, all positive conclusions (5<sup>th</sup> and 6<sup>th</sup>) stand cancelled.

The common term ENGINEER stands valid.

As per the statements, BOYS holding a value up to 100 and GIRLS holding a value up to 100 is allowed in the conclusions.

Therefore, ALL negative conclusions follow.

**9. QUESTION:****STATEMENTS:****1.ALL WINDOWS ARE KEYS.**  
100            50**2.NO WINDOW IS LOCK.**  
100            100**3.NO KEY IS DOOR.**  
100            100**CONCLUSIONS:****1. SOME KEYS ARE NOT LOCKS.**  
50            100**2. SOME LOCKS ARE NOT KEYS.**  
50            100

As per Statements 1(+) and 2(-), LOCK connects WINDOWS connects KEYS. The common term WINDOWS stands valid. As per the statements, KEYS holding a value up to 50 and LOCK holding a value up to 100 is allowed in the negative conclusions. Therefore, CONCLUSION 1 follows but 2 does not follow.

**3. SOME WINDOWS ARE NOT DOORS**  
50            100**4. SOME DOORS ARE NOT WINDOWS.**  
50            100

As per Statements 1(+) and 3(-), DOOR connects KEYS connects WINDOWS. The common term KEYS stands valid. As per the statements, DOORS holding a value up to 100 and WINDOWS holding a value up to 100 is allowed in the negative conclusions. Therefore, conclusions 3 and 4 follow.

**5. SOME DOORS ARE NOT LOCKS.****6. SOME LOCKS ARE NOT DOORS.**

As per Statements 1(+), 2(-) and 3(-), DOOR connects KEYS connects WINDOWS connects LOCK. The common term KEYS and WINDOWS stands valid. As in the connection, two of the statements required are negative, no conclusion will follow.

**10. QUESTION****STATEMENTS:****1.ALL GOOD ARE BAD.**  
100            50**2.ALL ACT ARE TEN.**  
100            50**3.NO ACT IS BAD.**  
100            100**CONCLUSIONS:****1. SOME GOOD ARE NOT TEN.**  
50            100**2. SOME TEN ARE NOT GOOD.**  
50            100

As per Statements 1(+), 2(+) and 3(-), GOOD connects BAD connects ACT connects TEN. The common term BAD and ACT stands valid. As in the connection, ONE of the statements required is negative, only negative conclusion can follow.

As per the statements, GOOD holding a value upto 100 and TEN holding a value up to 50 is allowed in the conclusions. Therefore, conclusion 2 follows, 1 does not follow.

</DIY/>

1. Statements:

Most Associates are B.Com graduates.

No B.Com graduate is a Manager.

All Managers are Associates.

Conclusion:

1. Some B.Com graduates are Associates

2. All Associates are Managers

3. No Manager is an B.Com graduate

4. Some Managers are B.Com graduates

A. Only 1 follows

B. Only 1 and 3 follow

C. Only 2 follows

D. Only 2 and 3 follow

2. Statements:

Some Engineers are salespersons.

All Coders are Engineers.

Conclusion:

I. No Coder is a salesperson

II. Some salespersons are Engineers

A. Only I follows

B. Both I and II follow

C. Only II follows

D. Neither I nor II follows

3. Statements:

All gorillas are apes.

All apes are primates.

Conclusion:

I. Some primates are apes.

II. Some primates are gorillas.

A. Only I follows

B. Both I and II follow

C. Only II follows

D. Neither I nor II follows

4. Statements:

Some dancers are actors.

All actors are performers.

All dancers are performers.

Conclusion:

I. All performers are actors.

II. Some performers are actors.

A. Only I follows

B. Both I and II follow

C. Only II follows

D. Neither I nor II follows

# TOPIC 21

## SEATING ARRANGEMENT

**1. Question:** -

**Directions for questions 1 to 5:**

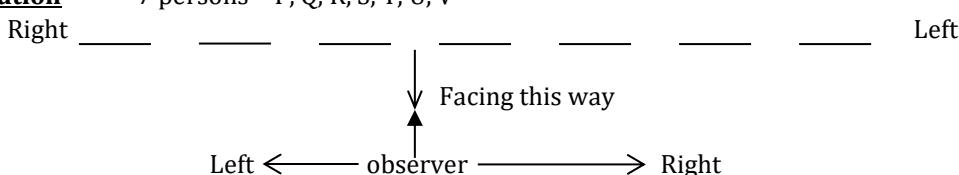
Read the data given below carefully and answer the questions that follow.

Seven persons P, Q, R, S, T, U and V are sitting in a row facing us. R and S sit next to each other. There must be exactly four persons between Q and V. S sits to the immediate right of Q.

1. If P and T are separated exactly by two persons then who sits to the immediate left of V?
- A. P      B. T      C. U      D. R
2. If Q is not sitting at either extremes of the row, then who among the following has as many persons on his left as on his right?
- A. S      B. U      C. R      D. V
3. If Q sits at one extreme, then who is at the other extreme?
- A. P      B. T      C. V      D. Can't be determined
4. T sits to the right of Q and P is separated from T by exactly three persons. Then, who is sitting to the immediate left of V?
- A. S      B. P      C. T      D. U
5. In how many different ways can the seven persons sit in a row?
- A. 3      B. 2      C. 10      D. 12

**Solution**

7 persons – P, Q, R, S, T, U, V



**Data given**

- I. R & S sit next to each other  
⇒ R S or S R } 2 possibilities for S, R
  - II. Q \_\_\_\_\_ V }  
V \_\_\_\_\_ Q }  
III. S sits to the immediate right of Q
- Right ← Q → Left ⇒ S Q
- from I & III information, we get



R S Q [ because S R is not possible ]

Now, merge II information and 7 places available.

I Q V } 2 possibilities.

II \_\_\_\_\_ Q V or V Q } 2 possibilities.

Now, combine all the data and get more useful information.

Merge R S Q in I and II arrangement & eliminate.

I Q \_\_\_\_\_ V x } ← R S Q cannot fit in this so neglected.  
V \_\_\_\_\_ R S Q ✓

II \_\_\_\_\_ Q V \_\_\_\_\_ R S Q x } R-S Q not possible so neglected. ✓

## Topic 21: SEATING ARRANGEMENT

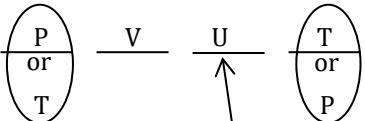
### Final Possibilities

I    V    \_\_\_\_\_    R    S    Q    \_\_\_\_\_

II    \_\_\_\_\_    V    \_\_\_\_\_    R    S    Q

**Solution(i)** P    \_\_\_\_\_    T  
 or                              or  
T                              P  
 \_\_\_\_\_  
 4 places.

This cannot fit in arrangement I. So, take only arrangement II

II    

Only place left for U, so U will sit in this place.

V  → immediate left of V is U.

Ans

**Solution(ii)** Q is not sitting at end. This eliminates arrangement II. So, think only arrangement I.

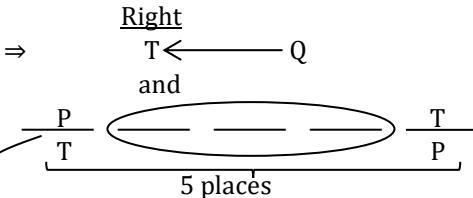
I    V    \_\_\_\_\_    R    S    Q    \_\_\_\_\_  
 3 on right                      middle person      3 on left  
 R (Ans)

**Solution(iii)** If Q sits at one extreme. So, we have to take only arrangement II.

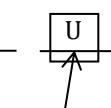
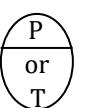
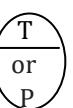


anyone can be sitting at this position. (P, T, or U)  
 so, we are not sure. i.e., can't be determined. (option d) (Ans)

**Solution (iv)** T sits to the right of Q

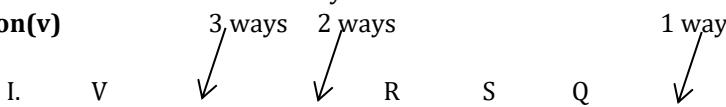


This can only fit in arrangement I but not arrangement II.

I.    V            R    S    Q    

U will take the only seat left.

Ans U.

**Solution(v)** 

$3 \times 2 \times 1 \Rightarrow 6$  possibilities.

II.    V    R    S    Q  
 3 ways    2 ways    1 ways

$3 \times 2 \times 1 \Rightarrow 6$  possibilities.

Total possibilities =  $6 + 6 = 12$  (Ans)

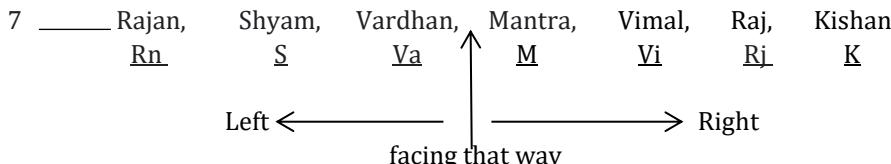
2. Read the data given below carefully and answer the questions that follow.

Question: - 7 boys – Rajan, Shyam, Vardhan, Mantra, Vimal, Raj and Kishan are sitting in a row. Shyam sits to the immediate left to Vardhan and third to the right of Rajan whereas Mantra who sits at the extreme left, is next to Kishan.

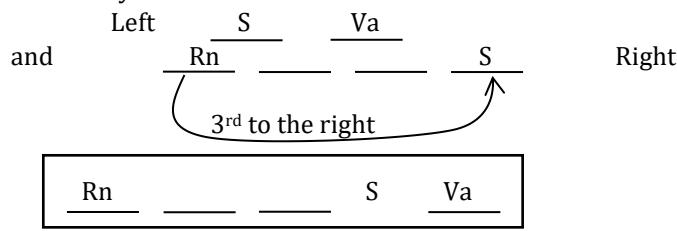
1. Who is sitting to the immediate right of Shyam?  
A. Mantra   B. Kishan   C. Vimal   D. Vardhan
2. If Vardhan and Kishan exchange places with each other without changing the rest arrangement that is already done then who will be sitting to the immediate left to Rajan?  
A. Kishan   B. Raj   C. Vimal   D. Vardhan
3. If only Shyam sits between Raj and Vardhan, who is exactly in the middle of the row?  
A. Raj   B. Vardhan   C. Vimal   D. Rajan
4. Which of the following cannot confirm the sitting arrangement of all the boys?  
A. Raj is to the immediate right of Rajan whereas Vimal is to the left of Shyam  
B. Mantra and Raj have two persons between them  
C. Kishan and Raj have two persons between them  
D. Shyam and Rajan have two persons between them
5. After arranging all the boys as per the conditions given in the data, if Rajan now exchanges his place with Mantra and Vardhan exchanges his place with Vimal, then how many persons will be there between Vimal and Rajan?

A. 3      B. 2      C. 5      D. 1

Solution



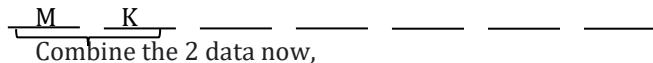
I. Shyam sits to the immediate left of Vardhan



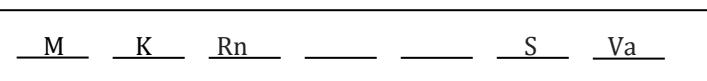
5 places.

II. Mantra → extreme left

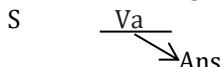
Mantra Kishan neighbour.



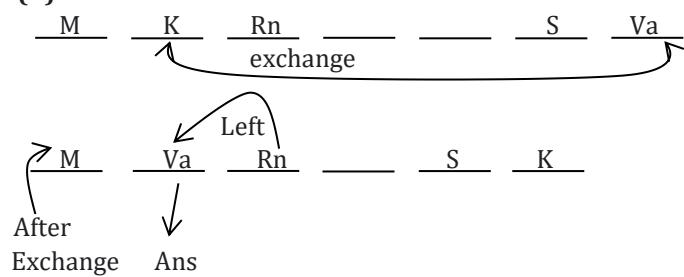
Combine the 2 data now,



**Solution(i)** Immediate right of S.

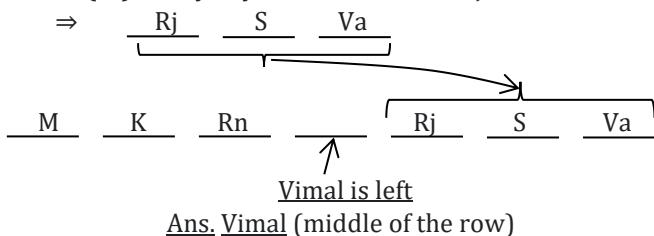


**Solution(ii)**

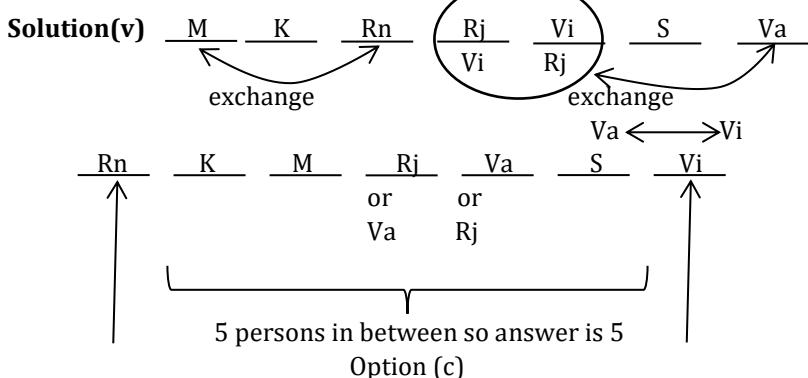
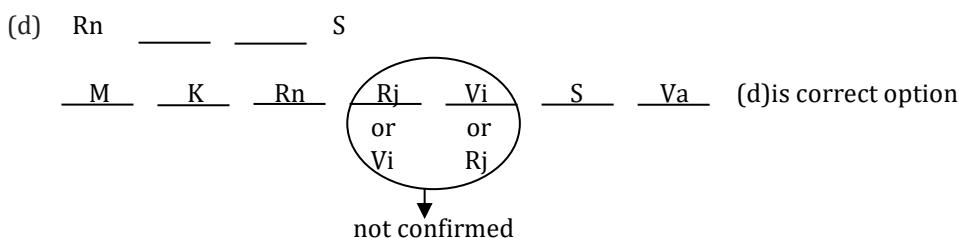
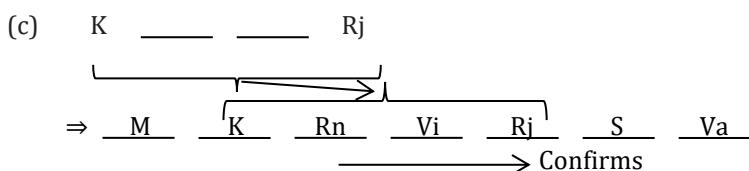
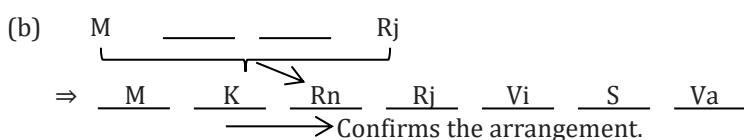
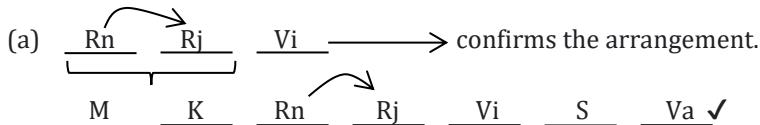


## Topic 21: SEATING ARRANGEMENT

**Solution(iii)** Only Shyam sits between Raj & Vardhan



**Solution(iv)** M K Rn               S Va



3. Question: - Four persons A, B, C and D arrive to attend a meeting. D arrives 10 minutes after B and 20 minutes before A, who arrives 10 minutes before C. Who is the first person to arrive at the meeting?

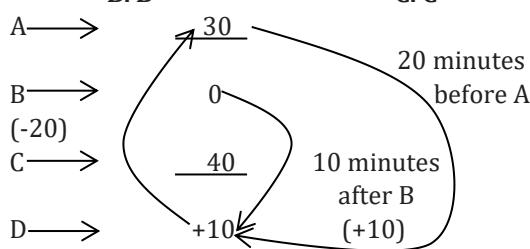
A. A

**Solution**

B. B

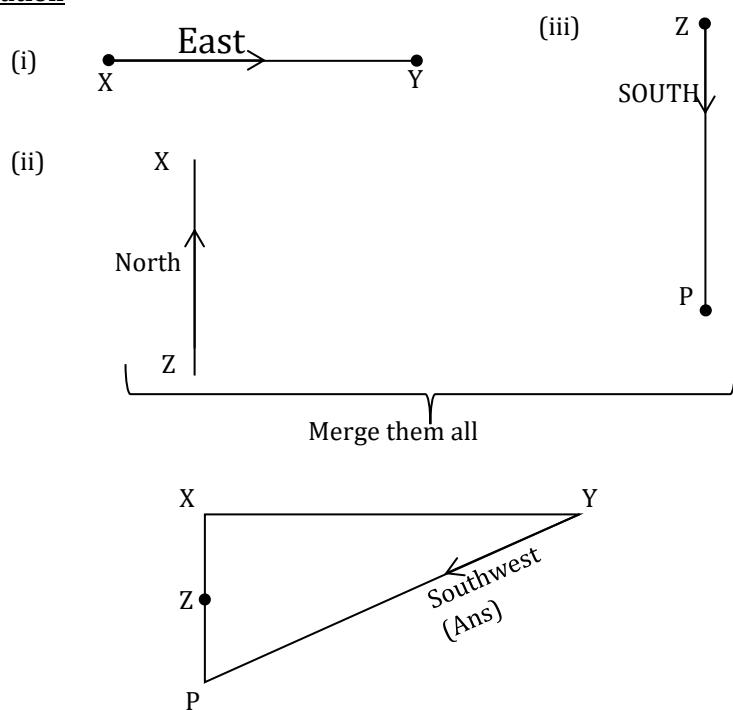
C. C

D. D



$\Rightarrow$  B reaches first

4. Y is in the East of X which is in the North of Z. If P is in the South of Z, then in which direction of Y, is P?  
 A. North                      B. South                      C. South-East                      D. None of these
- Solution



&lt;/DIY/&gt;

1. 6 people A, B, C, D, E and F sit around a table for dinner. Since A does not like C, he doesn't sit either opposite or beside C. B and F always like to sit opposite each other.  
 If A is beside F, then who are the two neighbours of B?
- A. E and C                      B. D and C  
 C. D and E                      D. Either (a) or (b)
2. 6 people A, B, C, D, E and F sit around a table for dinner. Since A does not like C, he doesn't sit either opposite or beside C. B and F always like to sit opposite each other.  
 If D is adjacent to F, then who is adjacent to C?  
 A. E and B                      B. D and A  
 C. D and B                      D. either (a) or (c)

# TOPIC 22

## TRUTH AND LIE BASED PROBLEMS

1. The CBI rounded up Tushar, Manikant and Gaurav as one of them was suspected of robbing a bank in broad daylight. The 3 suspects gave following statements after intensive questioning:

Tushar: I am innocent.

Manikant: I am innocent.

Gaurav: Manikant is the robber.

Who robbed the bank among the three persons, if only one of the statements is true?

- A. Manikant      B. Tushar      C. Gaurav      D. None of these

**Solution**

**Option B**

Let's assume Manikant as the robber. So, with this assumption, we can see that the statement of Gaurav will be considered as Truth, the statement of Tushar will be considered as Truth, statement of Manikant will be considered as lie. So, here 2 statements are Truth which is contradicting the condition of the question that only one statement is true.

It means our assumption is wrong and Manikant is definitely not the robber and therefore, we can conclude that Gaurav is definitely lying.

Now, start with a second assumption.

Assume Tushar is the robber. So, with this assumption, we can see that the statement of Gaurav will be considered as Lie, the statement of Tushar will be considered as Lie, statement of Manikant will be considered as Truth.

We observe that there is no contradiction whatsoever with this assumption. So, **Tushar is definitely the robber.**

If we assume Gaurav as the robber, then also statements of Tushar and Manikant will be considered as truth which is a contradiction.

2. In a hostel, there are three different types of football fans - Barcelona, Chelsea and Manchester United fans.

Barcelona fan always tell the truth, Chelsea fan always lie and Manchester united fan tell the truth and lie alternating (they can tell truth first or lie first). Three persons (of different following) from this hostel gave the following statements.

**GAURAV:** BHAVYA is a Barcelona fan; I am Manchester united fan.

**NIKHIL:** GAURAV is a Chelsea fan; I am a Barcelona fan.

**BHAVYA:** NIKHIL is a Chelsea fan; I am a Manchester united fan.

**GAURAV** is a fan of which Football club?

- A. Barcelona fan      B. Chelsea fan  
C. Manchester united fan      D. Either 1 or 3

**Solution**

**Option B**

Let's assume that Gaurav is a Barcelona fan. It means Gaurav is a Truth teller. It means both of his statements should be considered as Truth. But his statements cannot be true as Gaurav cannot be both Barcelona fan and Manchester united fan and both Bhavya and Gaurav cannot be Barcelona fans.

Therefore, our assumption is wrong. That means Gaurav is definitely not a Barcelona fan.

Now, take the second assumption that Nikhil is a Barcelona fan. It means Nikhil is a Truth teller. It means both of his statements should be considered as Truth. There is no contradiction in Nikhil's statements if we consider it as True. Now, as per Nikhil, Gaurav is Chelsea fan (a liar) and therefore, BHAVYA should be a MANCHESTER UNITED FAN (an alternator).

If Gaurav is a Chelsea fan, both of his statements should be lie. If we consider both the statements as lie, again there is no contradiction.

If BHAVYA is a Manchester united fan, he must be an alternator. That means one of his statements should come out as truth. We can check that his first statement is a Lie and second is a Truth. So, there is no contradiction overall. It means that our assumption is correct.

Therefore, we can conclude that Gaurav is a Chelsea fan.

</DIY/>

**Chandan, Manikant and Tarun participated in a Cricket game and one of them won the match.**

**They follow three different IPL clubs - CSK, MI and RCB.**

**CSK fan always speaks the truth.**

**MI fan always lie.**

**RCB fan tell the truth and lie alternatively. (Each of Chandan, Manikant and Tarun follow only one Cricket club.)**

**After the game, they gave the statements as given below.**

**Chandan:**

If Tarun had not disturbed me on the last ball, I would have won the match.

Tarun always speaks the truth.

**Manikant:**

Chandan won the match.

Tarun is not a MI fan.

**Tarun:**

I hadn't disturbed Chandan on the last ball.

Manikant won the match.

**Using the information from above question solve the following problems.**

1. Tarun follows which Cricket club?  
A. CSK      B. MI      C. RCB      D. Either B or C
  
2. Who won the Match?  
A. Manikant    B. Tarun    C. Chandan    D. Data Inadequate

# TOPIC 23

## PERMUTATION & COMBINATION

- Find the number of 4 letter words, with or without meaning, which can be formed out of the letters of the word R O S E, provided repetition of letters is NOT allowed.

Solution

R O S E

4 letter words → \_\_\_\_\_

- The first place can be filled in 4 different ways. (by any of the 4 letters)
- For every choice at the first place, we have remaining 3 choices at the second place.  
So, 2<sup>nd</sup> place can be filled in 3 ways.
- For every choice at first & 2<sup>nd</sup> place, we have remaining 2 choices at the 3<sup>rd</sup> place.  
So, 3<sup>rd</sup> place can be filled in 2 ways.
- For every choice at 1<sup>st</sup>, 2<sup>nd</sup> & 3<sup>rd</sup> place, we have the remaining 1 choice to fill the 4<sup>th</sup> place.  
So, 4<sup>th</sup> place can be filled in 1 way.

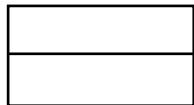
$$\Rightarrow \text{Total ways} = 4 \times 3 \times 2 \times 1$$

If Repetition is allowed.

$$4 \text{ ways} \times 4 \text{ ways} \times 4 \text{ ways} \times 4 \text{ ways} = 256 \text{ ways.}$$

- Given 4 flags of different colors, how many different signals can be generated, if a signal requires the use of 2 flags, one above the other?

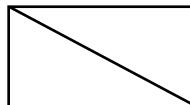
Solution



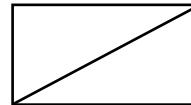
Flag 1



Flag 2

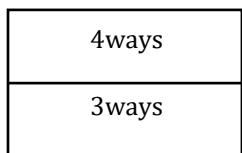


Flag 3



Flag 4

SIGNAL



Top place can have any of the 4 flags  
⇒ 4 choices.

For every choice of top flag, we have  
remaining 3 choices to take for bottom space.  
⇒ Total signals =  $4 \times 3 = 12$  ways

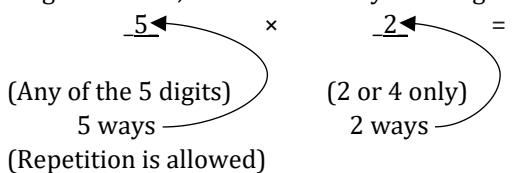
- How many 2-digit even number can be formed from the digits 1, 2, 3, 4, and 5 if the digits can be repeated?

Solution

1            2            3            4            5

Two-digit even number

To get even no., we can have only even digits at unit place. (i.e. 2 & 4 only)

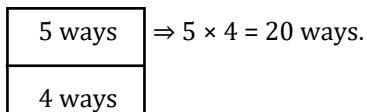


4. Find the no. of different signals that can be generated by arranging at least 2 flags (one below the other) on a vertical staff, if five different flags are available.

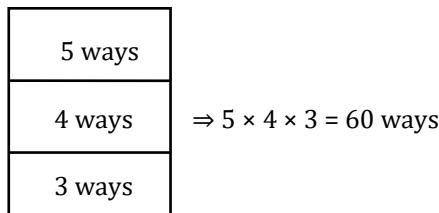
**Solution**

5 flags  $\longrightarrow$  flag 1, 2, 3, 4, 5

Case 1: Signal type I (exactly 2 flags)



Case 2: Signal type II (exactly 3 flags)



Case 3: Signal type III (exactly 4 flags)

$$\Rightarrow 5 \times 4 \times 3 \times 2 = 120 \text{ ways}$$

Case 4: Signal type IV (exactly 5 flags)

$$\Rightarrow 5 \times 4 \times 3 \times 2 \times 1 = 120 \text{ ways}$$

Total =  $20 + 60 + 120 + 120 = 320$  different signals.

5. Find number of permutations of the letters of the word A L L A H A B A D

**Solution**

$$\begin{array}{cccc} \text{A} & \text{A} & \text{A} & \text{A} \\ & 4 & & \\ \text{L} & \text{L} & & \\ & 2 & & \\ \text{H} & \text{B} & \text{D} & \\ & & & \end{array} \longrightarrow 9 \text{ letters (4 of one kind and 2 of other)}$$

$$\text{Permutations} = \frac{9!}{4! \times 2!}$$

6. Find number of permutations of the letters of the word I N S T I T U T E.

**Solution**

$$\begin{array}{ccccc} \text{I} & \text{I} & \text{T} & \text{T} & \text{T} \\ & 2 & 3 & & \\ \text{N} & \text{S} & \text{U} & \text{E} & \\ & & & & \end{array} \longrightarrow 9 \text{ letters (2 of one kind and 3 of other)}$$

$$\text{Permutations} = \frac{9!}{3! \times 2!}$$

7. How many 4 digits numbers can be formed by using the digits 1 to 9 if repetition of digits is not allowed?

**Solution**

$$9 \times 8 \times 7 \times 6 \quad \text{Or} \quad {}^9P_4 = \frac{9!}{(9-4)!} = 3024$$

8. How many numbers lying between 100 and 1000 can be formed with the digits 0, 1, 2, 3, 4, 5, if repetition of the digits is not allowed?

**Solution**

Numbers lying between 100 and 1000 are all 3-digit numbers.

6  $\times$  5  $\times$  4  $\Rightarrow$  Permutations of 6 digits taken 3 at a time =  $6P3$

But this is not the correct count.

Because in this count, you are also counting 3-digit numbers starting with 0 [ex. 012, 023, 045, 053, etc] which are not 3-digit numbers technically.

So, we must subtract those numbers from this count.

Permutations possible with 0 at first place.

$$\begin{array}{cccc} 0 & & & \\ \swarrow & \searrow & & \\ 5 \text{ ways} & \times & 4 \text{ ways} & = 20 \text{ ways.} \\ \Rightarrow \text{Correct count} & = & 6 \times 5 \times 4 - 20 & = 100 \end{array}$$

## Topic 23: PERMUTATION AND COMBINATION

9. Find the number of different 8 letter arrangements that can be made from the letters of the word D A U G H T E R so that
- I. All vowels are together

D A U G H T E R ←————— 8 letters

A U E D G H T R ←————— 6 objects

(Think that all the vowels are together inside a block box and you can move the box in making an arrangement. Count this box as 1 object)

Permutations of 6 distinct objects = 6!

[Now, take permutation or rearrangement of vowels also] -> each of 6! permutations give you 3! arrangements of vowels

Permutations keeping vowels together =  $6! \times 3! = 4320$

### II. All vowels do not occur together.

Required count = Total permutations of 8 distinct letters - permutations with all vowels together  
=  $8! - 6! \times 3! = 36000$

10. Find the number of arrangements of the letters of the word INDEPENDENCE.

In how many of these arrangements,

#### I. do the words start with P?

E E E E      N N N      D D      I P C  
4                3                2

P \_\_\_\_\_  
11 places (to be filled by E E E E    N N N    D D I C)  
4                3                2

$$\Rightarrow \frac{11!}{4! 3! 2!}$$

#### II. all vowels occur together

Vowels: [E E E E I] Think all the vowels packed inside a black box.

[E E E E I]      N N N      D D      P C }  $\frac{8!}{3! 2!}$   
Count as 1            3                2

But this is not the correct count because we can also internally arrange E & I in the box itself while keeping them together.

$$\text{Correct Count} = \frac{8!}{3! 2!} \times \frac{5!}{4!}$$

#### III. All vowels never occur together

= Total arrangements - Total arrangements keeping all vowels together

$$= \frac{12!}{4! 3! 2!} - \frac{8!}{3! 2!} \times \frac{5!}{4!}$$

#### IV. do the words begin with I and end with P

I \_\_\_\_\_ P  
\_\_\_\_\_ 10!  
3! 4! 2!

**RANK of a Word**

To find the rank of a given word basically means finding out the position of the word when all the possible words have been formed (using all the letters exactly once) and then arranging them as in a dictionary.

Ex. P O I N T ← find the rank

**Step 1:** Arrange the letters in alphabetical order.

i.e., I N O P T

**Step 2:** We want P at first place.

So, all the permutations starting with I, N and O will come before the word POINT

i. P at first place

$$\begin{array}{l} \text{I } \underline{\quad} \underline{\quad} \underline{\quad} \underline{\quad} = 24 \text{ words.} \\ 4 \times 3 \times 2 \times 1 \end{array} \quad (\text{COUNT ALL})$$

ii. N at first place

$$\begin{array}{l} \text{N } \underline{\quad} \underline{\quad} \underline{\quad} \underline{\quad} = 4! = 24 \text{ words.} \\ 4 \times 3 \times 2 \times 1 \end{array} \quad (\text{COUNT ALL})$$

iii. O at first place

$$\text{O } \underline{\quad} \underline{\quad} \underline{\quad} \underline{\quad} = 4! = 24 \text{ words.} \quad (\text{COUNT ALL})$$

iv. P at first place

$\left. \begin{array}{l} \text{P } \underline{\quad} \underline{\quad} \underline{\quad} \underline{\quad} \\ \text{P } \underline{\quad} \underline{\quad} \underline{\quad} \end{array} \right\} \begin{array}{l} (\text{DON'T COUNT ALL}) \\ (\text{as the given word will come in between somewhere}) \end{array}$

**Step 3:**

Fix P at first place & move on to next place.

I N O P T      P  $\underline{\quad} \underline{\quad} \underline{\quad} \underline{\quad}$

P I  $\underline{\quad} \underline{\quad} \underline{\quad}$        $\left\{ \begin{array}{l} \text{COUNT ALL} \\ \rightarrow 3! = 6 \text{ words.} \end{array} \right.$

P N  $\underline{\quad} \underline{\quad} \underline{\quad}$        $\left\{ \begin{array}{l} \text{COUNT ALL} \\ \rightarrow 3! = 6 \text{ words.} \end{array} \right.$

P O  $\underline{\quad} \underline{\quad} \underline{\quad}$        $\left\{ \begin{array}{l} \text{DON'T COUNT ALL as POINT will come in P O } \underline{\quad} \underline{\quad} \underline{\quad} \\ \text{series of arrangements.} \end{array} \right.$

**Step 4:**

Fix P O and move on to next position

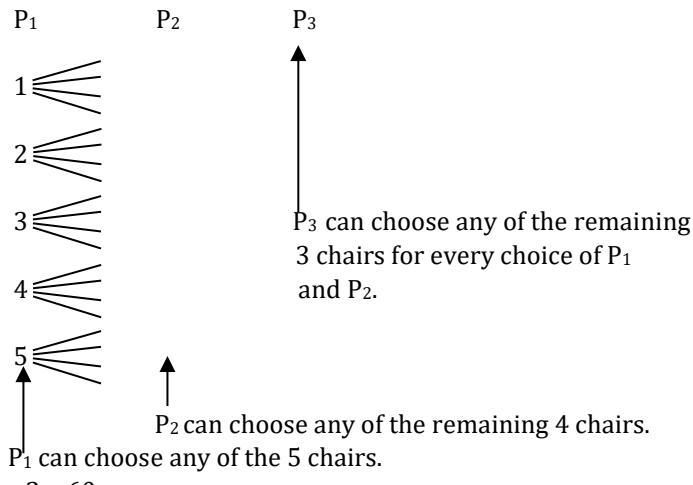
I N Q R T

P O  $\underline{\quad} \underline{\quad} \underline{\quad}$   
 P O I  $\underline{\quad} \underline{\quad} \underline{\quad}$        $\left\{ \begin{array}{l} \text{P O I N T} \leftarrow \text{required position} \\ \text{P O I T N} \\ \text{then} \end{array} \right.$   
 Rank of given word =  $24 + 24 + 24 + 6 + \text{Next (+1)}$   
 $= 84 + \text{Next (+1)} = 85^{\text{th}}$  word is POINT

## Topic 23: PERMUTATION AND COMBINATION

### 11. In how many ways can three persons be seated in 5 chairs?

Solution



$$5 \times 4 \times 3 = 60 \text{ ways.}$$

# Each person can take exactly one chair at a time & therefore it is a question of arrangements (without repetition)

OR

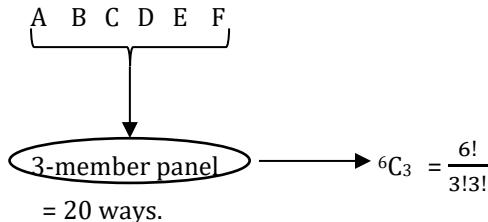
3 chairs can be selected from 5 chairs in  ${}^5C_3$  ways and then for every selection, the 3 persons can be arranged in  $3!$  ways.

$$\Rightarrow {}^5C_3 \times 3! = \frac{5!}{3!2!} \times 3! = 60 \text{ ways.}$$

### 12. Athletics club has 6 coaches, viz A, B, C, D, E & F. A panel of coaches comprising of 3 members has to be formed.

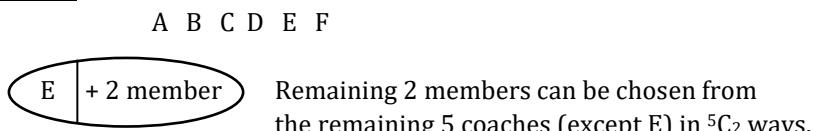
#### I. In how many ways can the panel be formed?

Solution



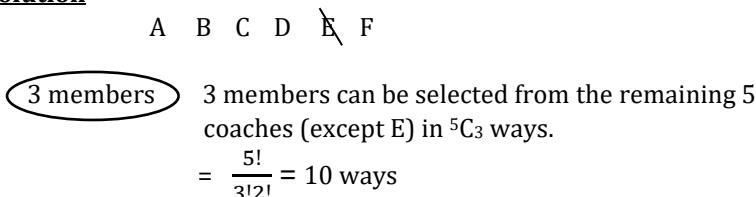
#### II. In how many ways can the panel be formed if coach E has to be definitely included?

Solution



#### III. In how many ways can the panel be formed if each E has to be definitely excluded?

Solution



- IV. In how many ways can the panel be formed if coach C and F should be there together if at all any one of them is there on the panel?**

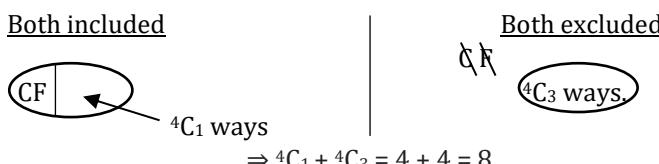
**Solution**

Possible cases:

i. If C is included, F will also be there ( $\Rightarrow$  Both C & F included)

ii. If F is included, C will also be there (Both C & F included, i.e., same as first one)

ii. If C is not included, F cannot be on panel also because otherwise the given condition would violate.  
(Both C & F excluded)



- V. In how many ways can the panel be formed if each E and coach B cannot be together on the panel?**

**Solution**

Method I

$$\begin{aligned} \text{Total no. of ways} &= 20 \\ &\quad - \left[ \begin{array}{c} \text{E B} \\ \text{E B together on panel} \end{array} \right] \\ &= 20 - 4C_1 = 16 \text{ ways.} \end{aligned}$$

Method II

Possible cases

i. If E is on panel, B will not be.



ii. If B is on panel, E will not be.

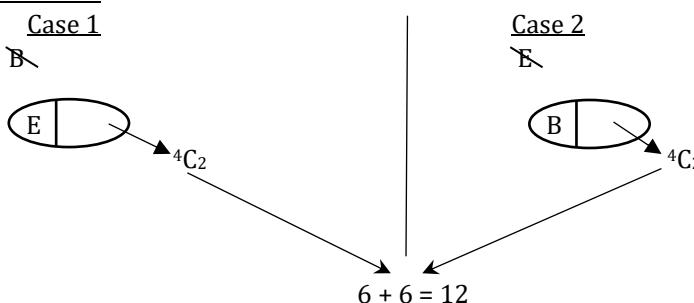


iii. If B is not on panel, E can also not be. The question says they cannot be together ON THE PANEL. This means they can be together outside but not inside.

$$\begin{aligned} &\text{E B} \\ &\text{3 members} \rightarrow 4C_3 = 4 \\ &\Rightarrow 4C_2 + 4C_2 + 4C_3 = 6 + 6 + 4 = 16 \text{ ways.} \end{aligned}$$

- VI. In how many ways can the panel be formed if exactly one among B and E should be included?**

**Solution**



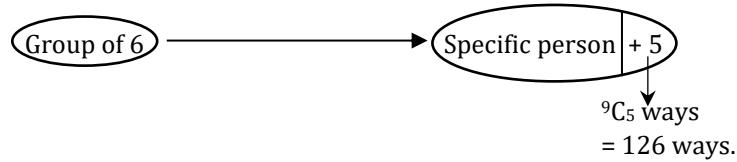
## Topic 23: PERMUTATION AND COMBINATION

13. 10 persons are waiting in a queue. In how many ways can a selection of 6 be made so that

I. A specific person is always included?

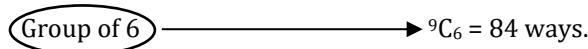
Solution

Specific person + 9 others



II. A specific person is always excluded?

Specific person + 9 others



14. A cultural committee of 8 persons is to be formed from 9 Asians and 5 Africans. In how many ways can it be done when the committee consists of

I. Exactly 3 Africans



3 Africans out of 5 can be chosen in  ${}^5C_3$  ways following which 5 Asians out of 9 can be chosen in  ${}^9C_5$  ways.

By fundamental principle of counting,

$${}^5C_3 \times {}^9C_5 = 1260 \text{ ways.}$$

II. At least 3 Africans

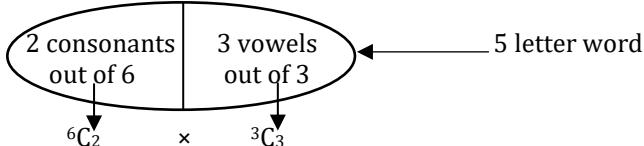
$$\Rightarrow \text{exactly 3 Africans} + \text{Exactly 4} + \text{Exactly 5}$$

 ${}^5C_3 \times {}^9C_5$ 1260	 ${}^5C_4 \times {}^9C_4$ 630	 ${}^5C_5 \times {}^9C_3$ 84
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$= 1974 \text{ ways.}$

15. Out of 6 consonants and 3 vowels, how many words can be made so that each word contains 2 consonants & 3 vowels?

Solution



The question is about permutations not combinations. So, 5 letters can be arranged in  $5!$  ways.

Hence,

$$\text{No. of words possible} = {}^6C_2 \times {}^3C_3 \times 5!$$

$$= 1800$$

**16. Find the number of ways in which a selection of 4 letters can be made from the word DISTILLATIONS.****Solution**

D I S T I L L A T I O N S  
 I I I      S S      T T      L L      A O N D  
 Triplet      Pair      Single

Note points:

- There are 8 distinct letters in the word DISTILLATIONS.
- The question is about selections. This means we have to think like:
  - I can be selected 3 times (or less)
  - S, T, L can be chosen 2 times (or less)
  - A, O, N, D can be chosen only 1 time (or less)

To find the number of selections in this situation, we will have to make cases. The possible cases are:

**Case 1**

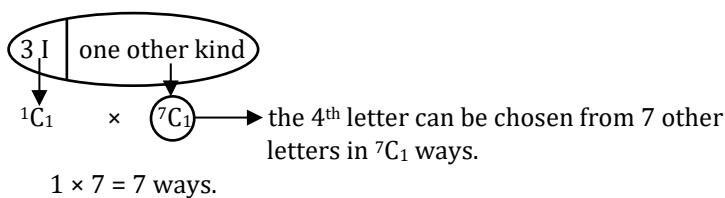
- (a) All the 4 letters selected are distinct from each other.

4 distinct letters can be chosen from 8 distinct letters in  
 ${}^8C_4$  ways = 70 ways.

**Case 2**

- (b) 3 letters are of same kind and more different

3 letters are of same kind. Only I can be chosen 3 times.

**Case 3**

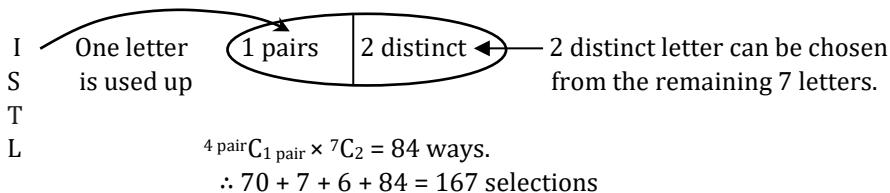
- (c) 2 letters are of same kind & other 2 also same but of other kind

Only I, S, T, L can be chosen two times.

From I, S, T, L, we have to choose any 2 pairs.

$$\Rightarrow {}^4 \text{ pairs } C_2 \text{ pairs} = 6 \text{ ways.}$$

- (d) 2 letters are of same kind & 2 other distinct.

**Extending the question.****How many permutations (or arrangements) of 4 letters can be made?**

- Now the question is on permutations. Therefore, the order in which the letters occur is also of significance.

So, we will have to take this into our counting & make the necessary changes in all the 4 cases.

<b>Case 1</b>	<u>All distinct</u> <u>Previously</u> ${}^8C_4 = 70$	<u>Now</u> ${}^8C_4 \times (4!)$ → All distinct
<b>Case 2</b> <u>3 of same kind &amp; one different</u>	7 ways	<u>Now</u> $7 \times \frac{4!}{(3!)}$ → 3 are of same kind.
<b>Case 3</b> <u>2 same &amp; other 2</u> also, same but of other kind. ${}^4C_2 = 6$ ways.		<u>Now</u> ${}^4C_2 \times \frac{4!}{(2!2!)} = 36$ ways.
<b>Case 4</b> <u>2 of same kind and other 2 distinct</u>	${}^4C_1 \times {}^7C_2$ $= 84$ ways.	$84 \times \frac{4!}{(2!)} = 24$ ways.

</DIY/>

1. When 3 dice are simultaneously thrown, which of the following would be obtained?  
A. Result 1: A 5, a 3 and a 6.      B. Result 2: A 5 three times.  
C. Result 3: A 5 twice and A 3.      D. All three results are equally likely.
  
2. How many factors does 6400 have?  
A. 24      B. 25      C. 26      D. 27
  
3. In how many different ways can the letters of the word 'LEADING' be arranged in such a way that the vowels always come together?  
A. 360      B. 480      C. 720      D. 5040
  
4. From a group of 7 men and 6 women, five persons are to be selected to form a committee so that at least 3 men are there on the committee. In how many ways can it be done?  
A. 564      B. 645      C. 735      D. 756
  
5. In how many different ways can the letters of the word 'MATHEMATICS' be arranged so that the vowels always come together?  
A. 10080      B. 4989600      C. 120960      D. None of these
  
6. How many arrangements will start and end with a vowel for TOGETHER?  
A. 1060      B. 1080      C. 2024      D. 1050
  
7. In how many ways can an animal trainer arrange 5 lions and 4 tigers in a row so that no two lions are together?  
A. 2880      B. 1440      C. 5760      D. None of these
  
8. If a man is given 5 numeric digits and 4 alphabets, how many alphanumeric words can be formed using exactly 2 digits and 3 alphabets?  
A. 40      B. 120      C. 3600      D. 4800
  
9. How many positive integers less than 500 can be formed using the digits 1, 2, 3 and 5, each digit being used only once.  
A. 52      B. 68      C. 66      D. 34
  
10. How many integers in the given below set do not contain the digit 7.  
1000, 1001, 1002, ..... , 9998, 9999  
A. 5832      B. 2888      C. 1444      D. 6746
  
11. How many 6-digit even numbers can be formed from the digits 1, 2, 3, 4, 5, 6 and 7 so that the digits should not repeat and the second last digit is even?  
A. 320      B. 6480      C. 2160      D. 720
  
12. How many three-digit numbers 'abc' are formed where at least two of the three digits are same.  
A. 250      B. 252      C. 300      D. 280
  
13. How many 3-digit numbers can be formed from the digits 2, 3, 5, 6, 7 and 9, which are divisible by 5 and none of the digits is repeated?  
A. 5      B. 10      C. 15      D. 20
  
14. 23 people are there and they are shaking hands together. How many handshakes are possible, if they are in pairs of cyclic sequence.  
A. 23      B. 20      C. 22      D. 1
  
15. The number of factors common to  $30^{11}$  and  $70^{13}$  is  
A. 144      B. 156      C. 168      D. 136
  
16. In a cycle race, there are 5 persons named as J, K, L, M and N participating for 5 positions. In how many ways can M finish before N?  
A. 55      B. 50      C. 60      D. 36

# TOPIC 24

## PROBABILITY

1. A ball is picked at random from one of the two boxes. It turns out to be black. Find the probability that it is from box 1.

Solution

	Box1	Box 2	10 Balls
White	3	1	
Black	2	4	

$$\text{Probability } \left( \frac{\text{Box 1}}{\text{Black}} \right) = \frac{P(\text{Box1} \cap \text{Black})}{P(\text{Black})} = \frac{\left[ \frac{2}{10} \right]}{\left[ \frac{2+4}{10} \right]} = \frac{2}{6} = \frac{1}{3}$$

OR

$$P \left( \frac{\text{Box 1}}{\text{Black}} \right) = \frac{\text{Black balls from Box1}}{\text{No of black balls}} = \frac{2}{2+4} = \frac{1}{3}$$

↓  
 favourable  
 conditional sample space

2. If 2 dice are thrown simultaneously, what is the probability that the one die shows up 2 and the other shows up 5?

Solution

Sample space = 36

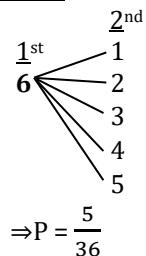
$$1 \iff 2 \iff 3 \iff 4 \iff 5 \iff 6 \quad \frac{(1-6)}{6\text{ways}} \times \frac{(1-6)}{6\text{ways}}$$

Favourable: (2,5) & (5,2) = 2 outcomes favourable

$$P = \frac{2}{36} = \frac{1}{18}$$

3. If two dice are thrown simultaneously, what is the probability that 1<sup>st</sup> dice shows up 6 and the second dice does not show up 6?

Solution



$$\Rightarrow P = \frac{5}{36} \quad \# \text{ Based on the language used, (6,1) is favourable outcome but (1,6) is not.}$$

4. When two dice are thrown simultaneously, what is the probability that the sum obtained is less than 9?

Solution

Sum  $\geq 9$

$\Sigma = 9$	$\Sigma = 10$	$\Sigma = 11$	$\Sigma = 12$
(6,3)	(6,4)	(6,5)	(6,6)
(3,6)	(4,6)	(5,6)	
(4,5)	(5,5)		
(5,4)			

$$P (\Sigma \geq 9) = \frac{10}{36} = \frac{5}{18}$$

$$P (\Sigma < 9) = \frac{36-10}{36} = \frac{26}{36} = \frac{13}{18} \text{ or } 1 - \frac{5}{18} = \frac{13}{18}$$

## Topic 24: PROBABILITY

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5. When three dice are thrown simultaneously, what is the probability that 1<sup>st</sup> dice shows up a prime number and the second dice shows up an odd number & third die shows an odd prime number?

Solution

I	II	III
<u>Prime no</u> (2,3,5)	<u>Odd number</u> (1,3,5)	<u>Odd prime</u> (3,5)
$P(\text{Prime}) = \frac{3}{6} = \frac{1}{2}$	$P(\text{odd no}) = \frac{3}{6} = \frac{1}{2}$	$P(\text{odd prime}) = \frac{2}{6} = \frac{1}{3}$

$$\text{Required probability} = \frac{1}{2} \times \frac{1}{2} \times \frac{1}{3} = \frac{1}{12}$$

OR

$$P = \frac{3 \text{ ways} \times 3 \text{ ways} \times 2 \text{ ways}}{6 \times 6 \times 6} \text{ (Fundamental principle of counting)}$$

6. If four dice are thrown simultaneously, what is the probability that the sum of the numbers is exactly 20?

Solution

Sample space =  $6^4$  or 1296

Favourable (Sum = 20)

Case I = Three 6

$$(6,6,6,2) \longrightarrow \frac{4!}{3!} = 4$$

Case II = Two 6

$$(6,6,5,3) \longrightarrow \frac{4!}{2!} = 12$$

$$(6,6,4,4) \longrightarrow \frac{4!}{2!2!} = 6$$

Case III = One 6

$$(6,5,5,4) \longrightarrow \frac{4!}{2!} = 12$$

Case IV = Zero 6

$$(5,5,5,5) \longrightarrow \frac{4!}{4!} = 1$$

$$\Rightarrow P = \frac{35}{1296}$$

7. If 5 coins are tossed simultaneously, what is the probability of getting exactly 2H.

Solution

Sample space =  $2^5$  or 32 ways

Favourable Outcomes

Exactly 2 H  $\Rightarrow$  2 H & 3 T

H            H            T            T            T

$$\text{Permutations} = \frac{5!}{2! 3!} = 10$$

$$P = \frac{\text{favourable count}}{\text{sample space}} = \frac{10}{32} = \frac{5}{16} \text{ OR, } P = {}^5C_2 / 2^5 = \frac{5}{16} \text{ (formula wise)}$$

8. If 4 coins are tossed simultaneously, what is the probability of getting at least 2T.

Solution

$$P(\text{At least 2 tails}) = P = n(\text{exactly 2T} + \text{exactly 3T} + \text{exactly 4T}) / 2^4$$

$$= \frac{\text{favourable count}}{\text{sample space}} = {}^4C_2 + {}^4C_3 + {}^4C_4 / 2^4 = \frac{11}{16}$$

9. A card is drawn at random from a well shuffled pack of cards. Find the probability that it is,

(a) a king

$$P = \frac{\text{favourable count}}{\text{sample space}} = \frac{4}{52} [{}^4C_1 / {}^{52}C_1] = \frac{11}{16}$$

(b) a black card

$$P = \frac{26}{52} = \frac{1}{2} [\text{ or } {}^{26}C_1 / {}^{52}C_1]$$

**(c) a numbered card**

$$P = \frac{9 \times 4}{52} = \frac{9}{13} \quad [\text{or } {}^{36}C_1 / {}^{52}C_1]$$

**(d) a diamond**

$$P = \frac{13}{52} = \frac{1}{4} \quad [\text{or } {}^{13}C_1 / {}^{52}C_1]$$

**(e) a black honour**

$$P = \frac{4+4}{52} = \frac{1}{2} \quad [\text{or } {}^8C_1 / {}^{52}C_1]$$

**10. If two cards are drawn simultaneously. Find the probability of both being****(a) kings**

$$P = {}^4C_2 / {}^{52}C_2$$

**(b) blacks**

$$P = {}^{26}C_2 / {}^{52}C_2$$

**(c) both numbered card**

$$P = {}^{36}C_2 / {}^{52}C_2$$

**(d) both diamond**

$$P = {}^{13}C_2 / {}^{52}C_2$$

**(e) both black honour**

$$P = {}^8C_2 / {}^{52}C_2$$

**11. If two cards are drawn at random from a pack of cards, what is the probability that****(a) one of these is a diamond & the other is a heart?**

$$P = \frac{\text{favourable count}}{\text{sample space}} = {}^{13}C_1(\text{Diamond}) \times {}^{13}C_1(\text{Heart}) / {}^{52}C_2$$

**(b) one of these is a queen and the other is a king?**

$$P = {}^4C_1(\text{Queen}) \times {}^4C_1(\text{King}) / {}^{52}C_2$$

**(c) one is an honour and the other is a numbered card**

$$P = {}^{16}C_1(\text{Honour}) \times {}^{36}C_1(\text{Numbered card}) / {}^{52}C_2$$

**(d) both are hearts or both are diamonds**

$P = {}^{13}C_2(\text{Both heart}) + {}^{13}C_2(\text{Both diamond}) / {}^{52}C_2$  } This is correct answer by chance as the events "both Hearts" and "both Diamonds" have nothing in common.

Let Both Hearts = A, both Diamond = B

$$\begin{aligned} P(A \cup B) &= P(A) + P(B) - P(A \cap B) \longrightarrow (\text{a heart cannot be diamond \& vice versa}) \\ &= {}^{13}C_2 / {}^{52}C_2 + {}^{13}C_2 / {}^{52}C_2 - 0 \end{aligned}$$

**(e) both are kings or both are blacks.**

$$P = {}^4C_2 + {}^{26}C_2 / {}^{52}C_2 \longrightarrow \text{incorrect}$$

$$\begin{aligned} P(A \cup B) &= P(A) + P(B) - P(A \cap B) \longrightarrow (\text{Black king}) \\ &= {}^4C_2 / {}^{52}C_2 + {}^{26}C_2 / {}^{52}C_2 - {}^2C_2 / {}^{52}C_2 \end{aligned}$$

**12. When three cards are drawn simultaneously from a pack of cards, what is the probability that one of them is a heart, another a diamond and the rest one a club.****Solution**

$$P = \frac{\text{favourable count}}{\text{sample space}} = {}^{13}C_1(\text{Diamond}) \times {}^{13}C_1(\text{Heart}) \times {}^{13}C_1(\text{Club}) / {}^{52}C_3$$

13. If two balls are drawn simultaneously from a box containing 6 green, 2 blue and 7 black balls, what is the probability that

(a) one is a green & other is a black

$$P = {}^6C_1 \times {}^7C_1 / {}^{15}C_2$$

(b) both are of same colour

$$P = \text{Both green or both black or both white} / {}^{15}C_2$$

$$P = {}^6C_2 + {}^7C_2 + {}^2C_2 - 0 / {}^{15}C_2$$

(c) both are of different colour

$$P = \text{Green blue or Green Black or black blue} / {}^{15}C_2$$

$$P = ({}^6C_1 \times {}^2C_1 + {}^6C_1 \times {}^7C_1 + {}^2C_1 \times {}^7C_1) / {}^{15}C_2$$

14. When 2 balls are drawn in succession with replacement from a box consisting of 6 white & 8 black balls, find the probability that

(a) both are whites

$$P(\text{Both white}) = P(W_{1\text{st}} \cap W_{2\text{nd}}) = P(W_{1\text{st}}) \times P(W_{2\text{nd}}/ W_{1\text{st}})$$

$$= ({}^6C_1 / {}^{14}C_1) \times ({}^6C_1 / {}^{14}C_1)$$

(b) both are blacks

$$P(\text{Both blacks}) = P(\text{Black in 1<sup>st</sup> draw} \cap \text{Black in 2<sup>nd</sup> draw})$$

$$= P(B_1) \times P(B_2/ B_1)$$

$$= P(B_1) \times P(B_2) \text{ (as } B_1 \text{ & } B_2 \text{ are Independent)} P(B_2/ B_1) = P(B_2) = ({}^8C_1 / {}^{14}C_1) \times ({}^8C_1 / {}^{14}C_1)$$

(c) The first is a white & second is a black

$$P = (W_1 \cap B_2) = P(W_1) \times P(B_2)$$

$$= ({}^6C_1 / {}^{14}C_1) \times ({}^8C_1 / {}^{14}C_1)$$

</DIY/>

1. A bag contains 4 white, 5 red and 6 blue balls. Three balls are drawn at random from the bag. The probability that all of them are red is:  
A. 1/22      B. 3/22      C. 2/91      D. 2/77
2. In a class, there are 15 boys and 10 girls. Three students are selected at random. The probability that 1 girl and 2 boys are selected, is:  
A. 21/46      B. 15/46      C. 25/46      D. 22/46
3. A bag contains 2 red, 3 green and 2 blue balls. Two balls are drawn at random. What is the probability that none of the balls drawn is blue?  
A. 10/21      B. 11/21      C. 2/7      D. 5/7
4. 10 men and 10 women are there, they dance with each other. Is there a possibility that 2 men are dancing with same women and vice versa?  
A. 1      B. 1/2      C. 2/3      D. Never      E. None of these
5. For the FIFA world cup, Paul the octopus has been predicting the winner of each match with amazing success. It is rumoured that in a match between 2 teams A and B, Paul picks A with the same probability as A's chances of winning. Let's assume such rumours to be true and that in a match between Ghana and Bolivia, Ghana the stronger team has a probability of 2/3 of winning the game. What is the probability that Paul will correctly pick the winner of the Ghana-Bolivia game?  
A. 1/9      B. 4/9      C. 5/9      D. 2/3
6. After the typist writes 12 letters and addresses 12 envelopes, she inserts the letters randomly into the envelopes (1 letter per envelope). What is the probability that exactly 1 letter is inserted in an improper envelope?  
A. 1/12      B. 0      C. 12/212      D. 11/12

7. In a lottery, there are 10 prizes and 25 blanks. A lottery is drawn at random. What is the probability of getting a prize?  
A.  $1/10$       B.  $2/5$       C.  $2/7$       D.  $5/7$
8. A 5-digit number is formed by the digits 2,4,5,6,8 (each digit used exactly once). What is the probability that the number formed is divisible by 4?  
A.  $1/5$       B. 2      C. 3      D.  $2/5$
9. Aniket and Kumari are a married couple. They have two kids, one of them is a girl. Assume safely that the probability of each gender is  $1/2$ . What is the probability that the other kid is also a girl?  
A.  $1/2$       B.  $1/3$       C.  $2/3$       D. None of these
10. A man speaks truth 3 out of 4 times. He throws a die and reports it to be a 6. What is the probability of it being a 6?  
A.  $3/8$       B.  $1/8$       C.  $1/4$       D.  $1/2$
11. 2 containers labelled A and B are filled with red and blue marbles in given quantities: -  

Container	RED	BLUE
A	6	4
B	60	40

  
Each container is shaken vigorously. After choosing 1 of the containers, without looking, draw out a marble. From which container you have the max probability of choosing a blue marble?  
A. Container A (6 red, 4 blue)  
B. Container B (60 red, 40 blue)  
C. Equal chances from each container  
D. None of these

# TOPIC 25

## MISSING NUMBER

Find the missing number in the following problems:

1.  $\begin{array}{ccc} 4 & 8 & 20 \\ 9 & 3 & 15 \\ 6 & 6 & ? \end{array}$
- A. 22      B. 18      C. 16      D. 20

Solution

$$4 + 8 \times 2 = 20, 9 + 3 \times 2 = 15$$

$$\text{Therefore, } ? = 6 + 6 \times 2 = 18$$

2.  $\begin{array}{ccc} 18 & 16 & 7 \\ 35 & 25 & ? \\ 7 & 23 & 58 \\ 24 & 32 & 65 \end{array}$
- A. 17      B. 15      C. 13      D. 14

Solution

$$35 + 7 - 18 = 24, 25 + 23 - 16 = 32$$

$$\text{Therefore, } ? + 58 - 7 = 65 \text{ which gives } ? = 14$$

3.  $\begin{array}{ccc} 2 & 4 & 6 \\ 6 & 2 & 4 \\ 4 & ? & 2 \end{array}$
- A. 2      B. 4      C. 6      D. 8

Solution

The sum of all the elements of each row is 12. Therefore  $? = 6$

4.  $\begin{array}{ccc} 15 & 225 & 30 \\ 7 & 70 & 20 \\ 3 & ? & 8 \end{array}$
- A. 12      B. 24      C. 16      D. 70

Solution

If we observe row-wise-

$$15 \times 30 / 2 = 225$$

$$7 \times 20 / 2 = 70$$

$$3 \times 8 / 2 = 12$$

5.  $\begin{array}{ccc} 7 & 6 & 8 \\ 5 & 4 & 9 \\ 3 & 2 & 1 \\ 83 & 56 & ? \end{array}$
- A. 128      B. 146      C. 148      D. 136

Solution

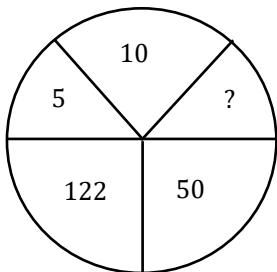
$$7^2 + 5^2 + 3^2 = 83, 6^2 + 4^2 + 2^2 = 56, 8^2 + 9^2 + 1^2 = 146$$

- 6.
- |     |   |   |
|-----|---|---|
| 874 |   |   |
| 1   | 3 | 5 |
| 2   | 4 | 6 |
| 3   | 1 | 9 |
| 1   | 7 | ? |
- A. 4      B. 6      C. 8      D. 2

Solution

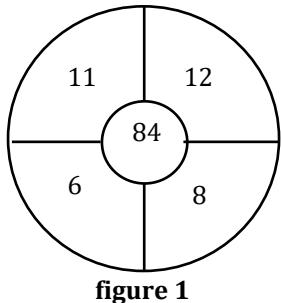
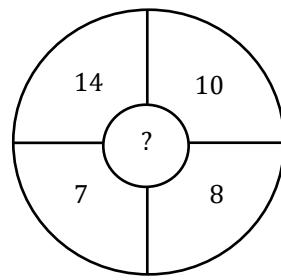
$$135 + 246 + 319 + 17? = 874 \text{ gives } ? = 4$$

7.

**A. 26  
Solution****B. 27****C. 25****D. 23**

In clock-wise direction, we observe,  
 $5 = 2^2 + 1$ ,  $10 = 3^2 + 1$ ,  $? = 5^2 + 1$ ,  $50 = 7^2 + 1$ ,  $122 = 11^2 + 1$ .  
 It is a series of prime numbers 2, 3, 5, 7 and 11.  
 Therefore,  $? = 5^2 + 1 = 26$ .

8.

**figure 1****A. 84****B. 74****C. 94****figure 2****D. 104****Solution**

In figure 1, we observe,  
 $11 \times 12 - 6 \times 8 = 84$

Similarly, in figure 2,  
 $? = 14 \times 10 - 7 \times 8 = 84$

&lt;/DIY/&gt;

**Find the missing number in the following problems:**

1.  $\begin{array}{ccc} 4 & 7 & 9 \\ 8 & 6 & 8 \\ 3 & 7 & 9 \\ 35 & 49 & ? \end{array}$
- A. 89      B. 81      C. 64      D. 63**

2.  $\begin{array}{ccc} 4 & 5 & 6 \\ 2 & 3 & 7 \\ 1 & 8 & 3 \\ 21 & 98 & ? \end{array}$
- A. 73      B. 16      C. 94      D. 76**

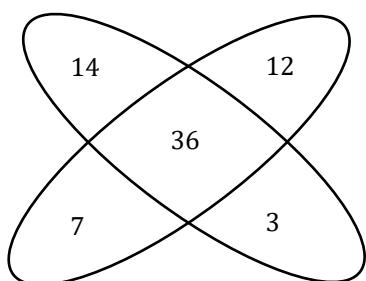
3.  $\begin{array}{ccc} 36 & 25 & 64 \\ 16 & 9 & 36 \\ 4 & 1 & ? \end{array}$
- A. 49      B. 16      C. 64      D. 25**

- 4.
- 
- A. 1321      B. 1331 C      C. 1231      D. 1332**

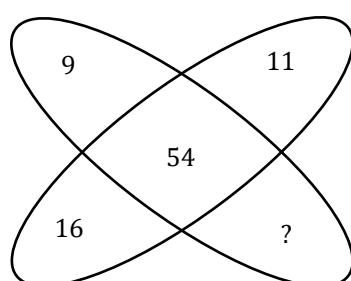
**Topic 25: MISSING NUMBER**

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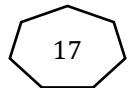
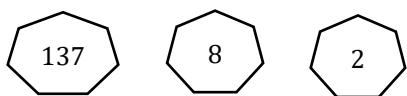
5.



- A. 16      B. 12      C. 17      D. 18 C



6.



- A. 907      B. 1097      C. 97      D. 9107

# TOPIC 26

## NON-VERBAL REASONING

**Find the mirror and water image**

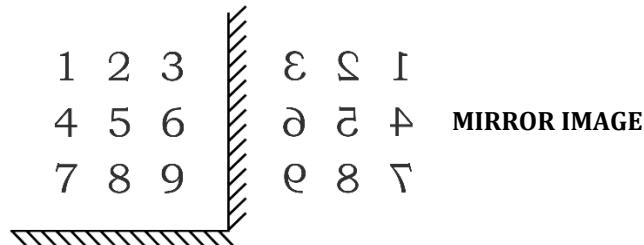
1.



Σ  
Ω Λ Ζ Χ Υ  
β ζ Κ Τ Σ  
Κ Γ Μ Ι Ο  
Ε Σ Η Ι  
Λ Β Ζ Ε

**WATER IMAGE**

2.



ʌ 8 ə  
ɪ ɔ ɛ  
ʊ ɔ ɔ

**WATER IMAGE**

3.

- KODNEST
- |         |   |
|---------|---|
| KODNEST | <b>A) KODNEST</b><br><b>B) TSENDOK</b><br><b>C) T KODNEST ✓</b><br><b>D) TS KODNEST</b> |
|---------|---|

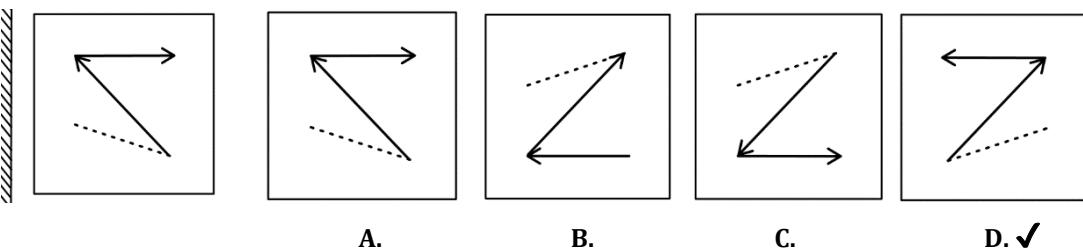
**MIRROR IMAGE**

4.

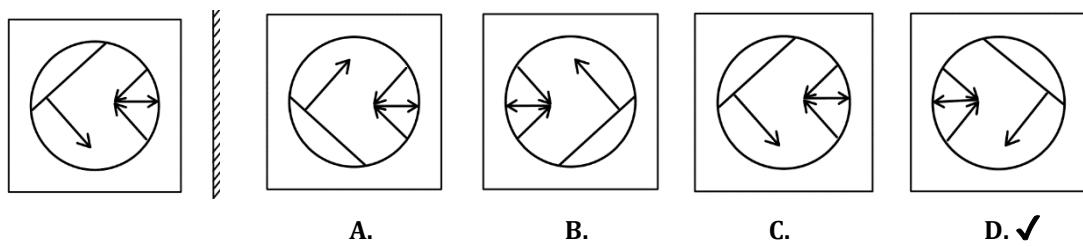
- A) 997325460**
- B) 064523799**
- C) 064523799**
- D) 064523799 ✓**

MIRROR IMAGE

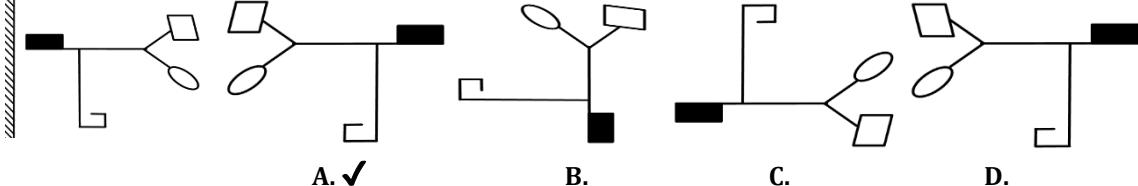
5.



6.

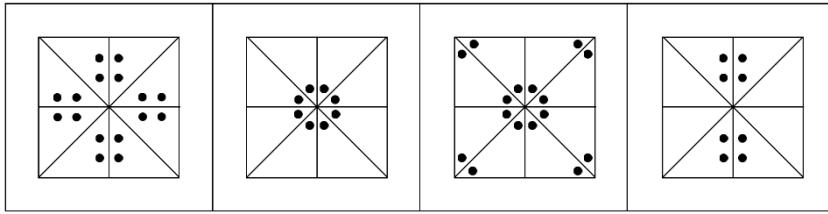
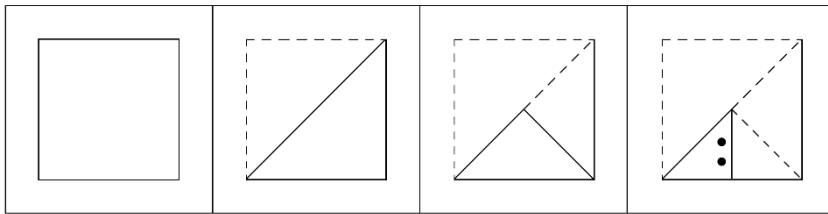


7.



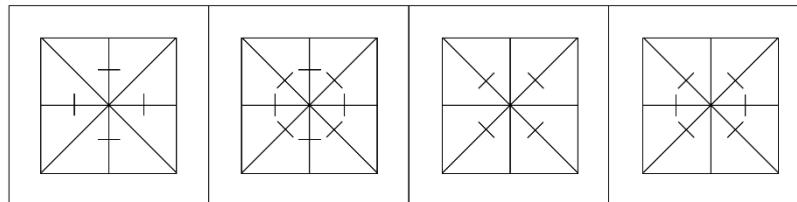
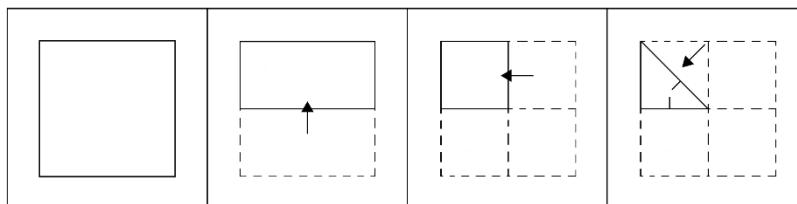
A transparent sheet of paper is folded as shown in the given figures and some markings are made. When the paper is unfolded how will the mark appear? Choose the correct option.

1.



✓

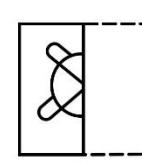
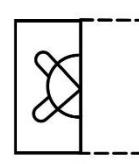
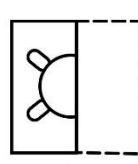
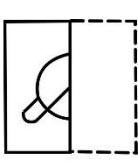
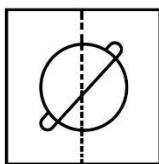
2.



A ✓ C D

Find the correct option among the given choices as to how the pattern would appear when the transparent sheet of paper is folded along the dotted line.

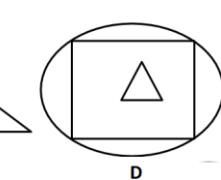
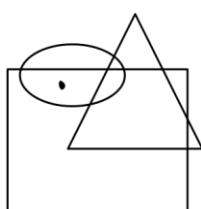
3.



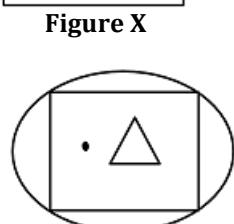
✓

Identify the figure which satisfies the same conditions of dot placements as in the figure X.

1.

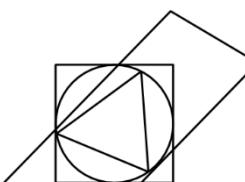
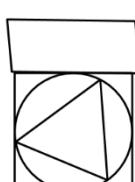
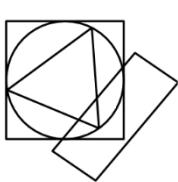
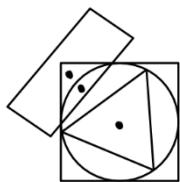


D



**Answer Figure: D**

2.



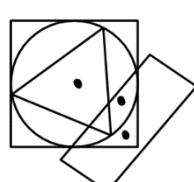
**Figure X**

**A**

**B**

**C**

**D**



**Answer Figure: A**

Find out the correct figure which contains figure X as its part.

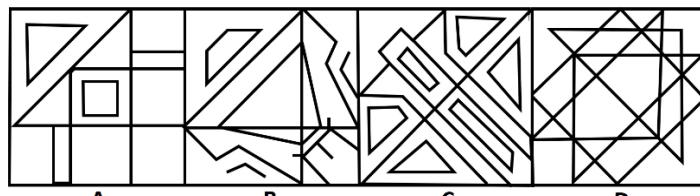
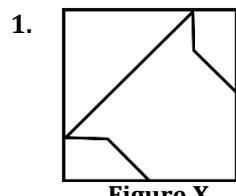
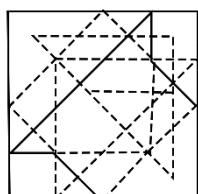


Figure X



Answer Figure: D

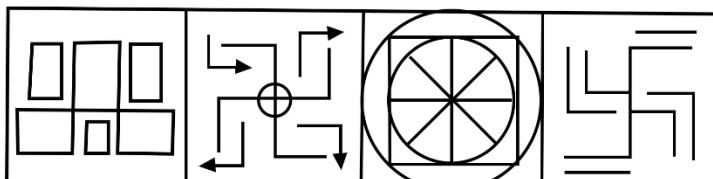
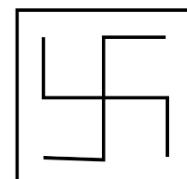
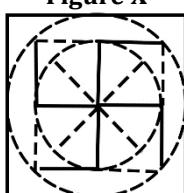


Figure X



Answer Figure: C

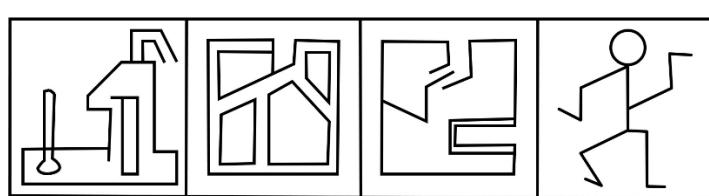
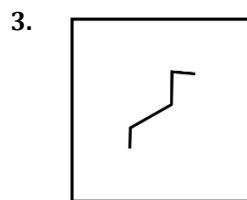
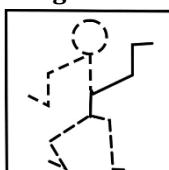


Figure X



Answer Figure: D

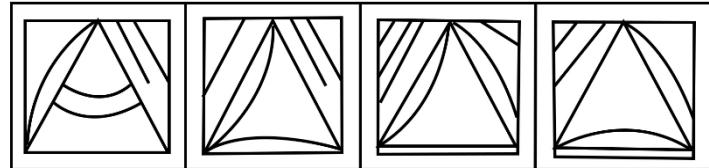
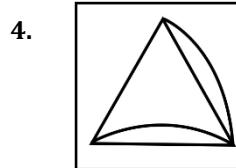
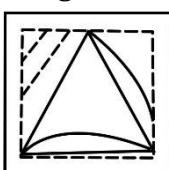
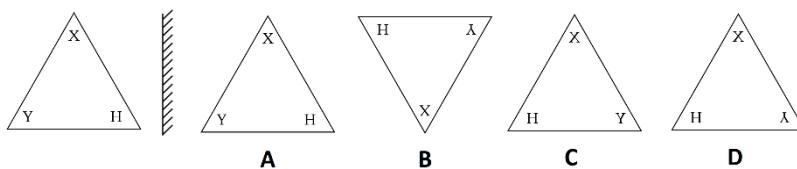
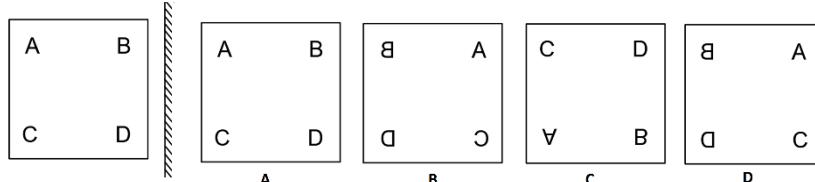
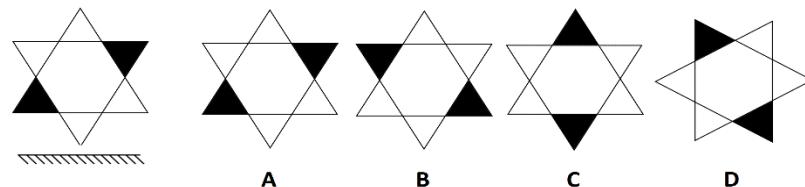
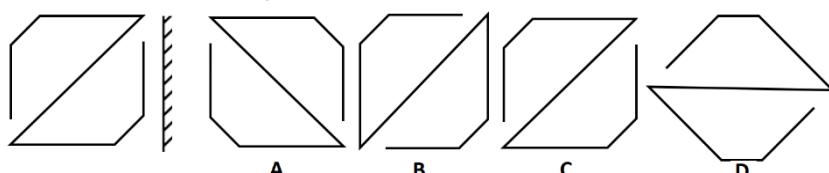
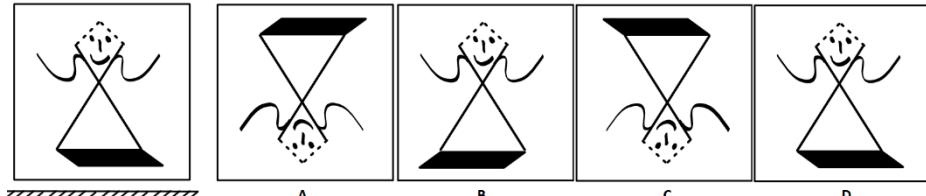


Figure X

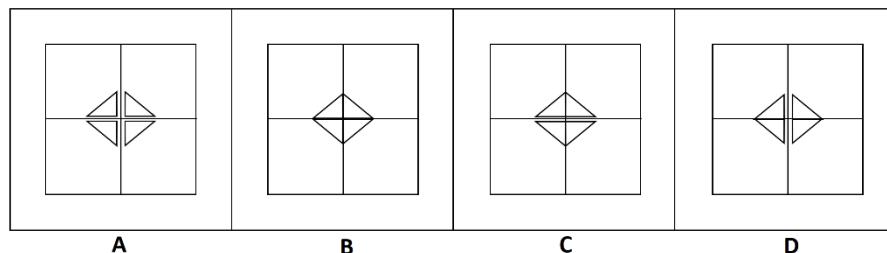
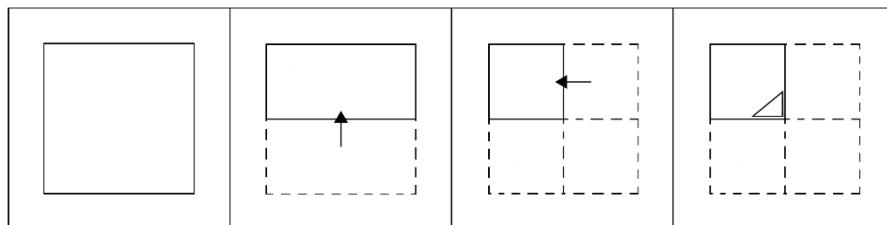


Answer Figure: D

&lt;/DIY/&gt;

**Find the mirror and water image.****1.****2.****3.****4.****5.**

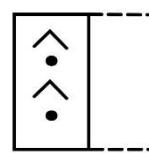
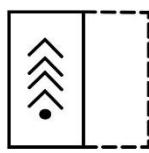
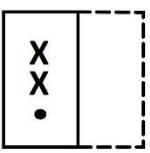
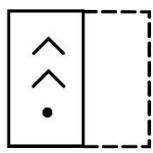
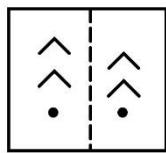
**A transparent sheet of paper is folded as shown in the given figures and some markings are made. When the paper is unfolded how will the mark appear? Choose the correct option.**

**6.**

## Topic 26: NON-VERBAL REASONING

Find the correct option among the given choices as to how the pattern would appear when the transparent sheet of paper is folded along the dotted line.

7.



Identify the figure which satisfies the same conditions of dot placements as in the figure X.

8.

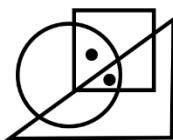
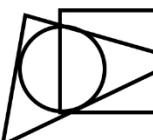
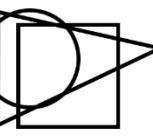


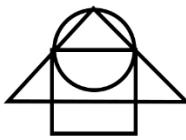
Figure X



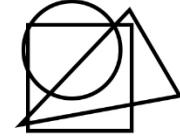
A



B



C



D

9.

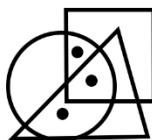
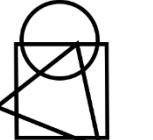


Figure X



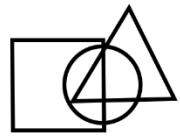
A



B



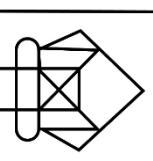
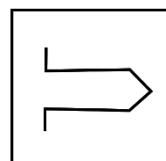
C



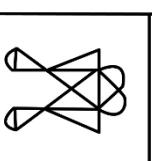
D

Find out the correct figure which contains figure X as its part.

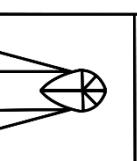
10.



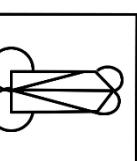
A



B

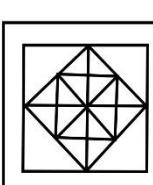
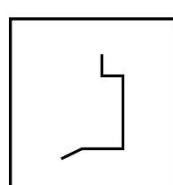


C

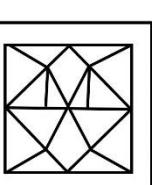


D

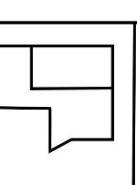
11.



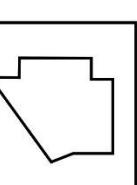
A



B



C



D

# TOPIC 27

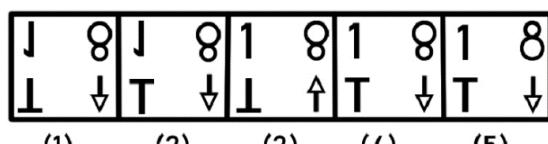
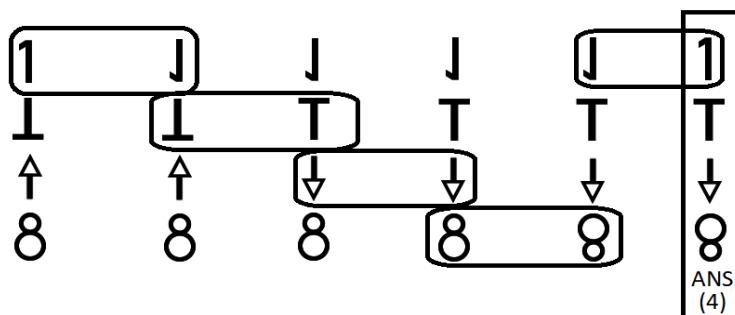
## FIGURE PATTERNS

1.

Problem Figures:

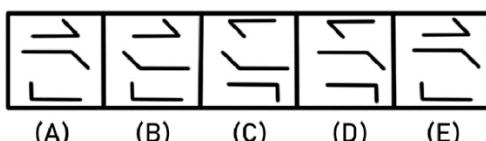


Answer Figures:

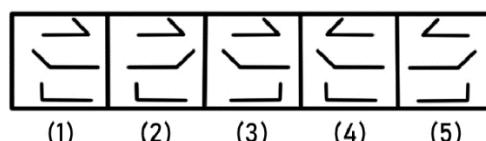
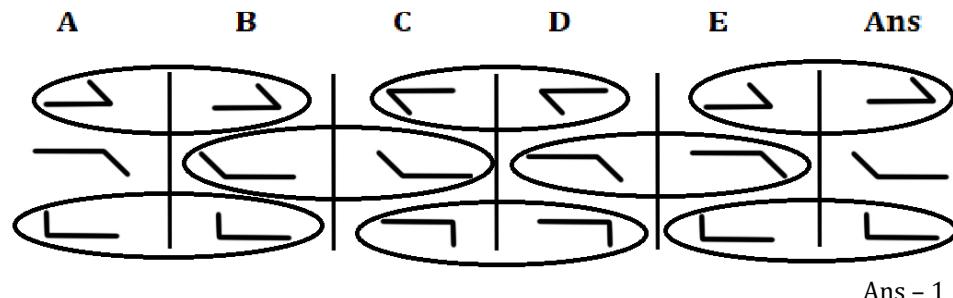
Solution

2.

Problem Figures:

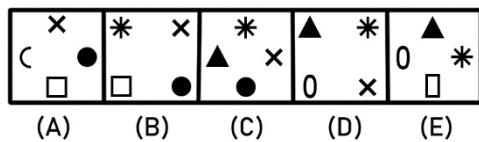


Answer Figures:

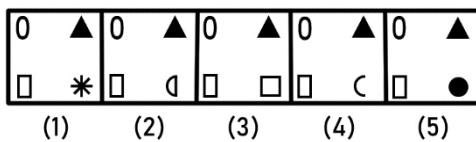
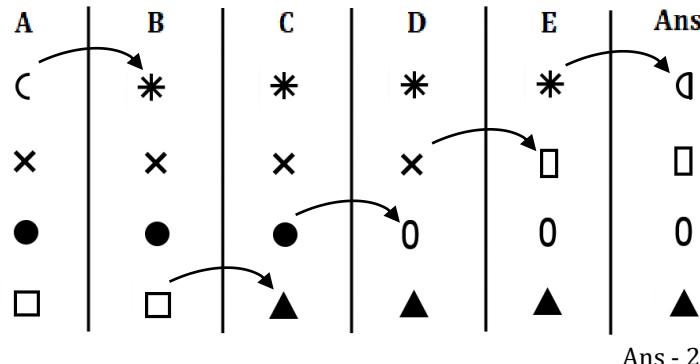
Solution

3.

Problem Figures:



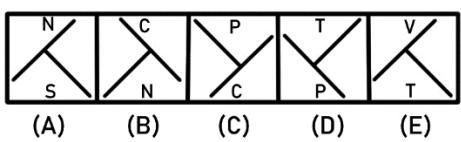
Answer Figures:

Solution

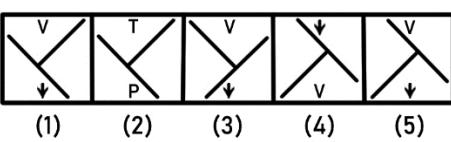
## Topic 27: FIGURE PATTERNS

### Problem Figures:

4.

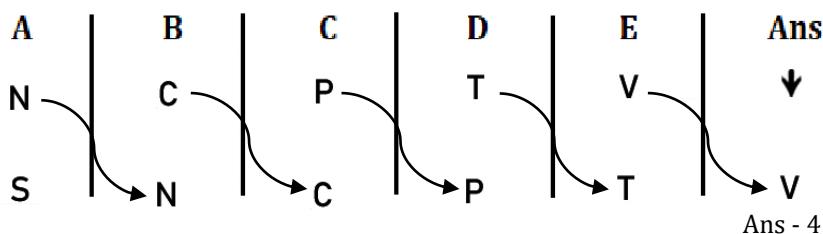
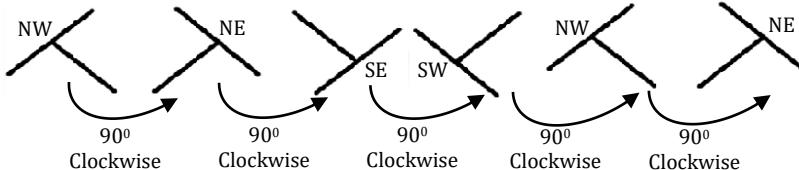


### Answer Figures:



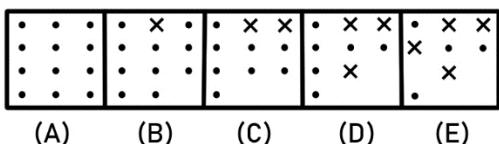
### Solution

**A** → **B** → **C** → **D** → **E** → **Ans**

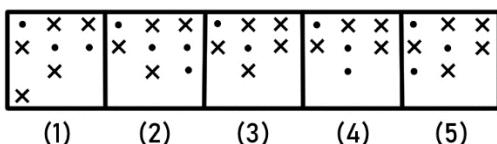


5.

### Problem Figures:



### Answer Figures:



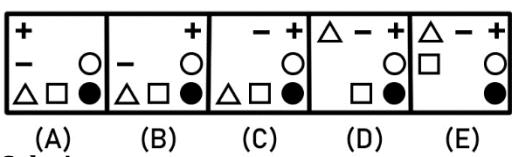
### Solution

Pattern: Dots are decreasing by 2 and cross are increasing by 1. So, from fig. E to Ans, number of dots will become  $4-2 = 2$  and crosses will become  $4+1 = 5$

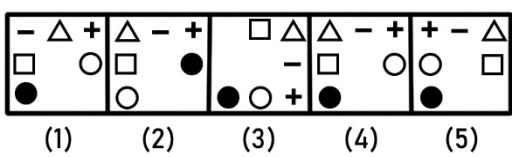
So, Ans - fig. 3

6.

### Problem Figures:



### Answer Figures:



### Solution

The last symbol in clockwise sense is becoming the last symbol in anti-clockwise sense in the next figure.  
So, the answer figure will be

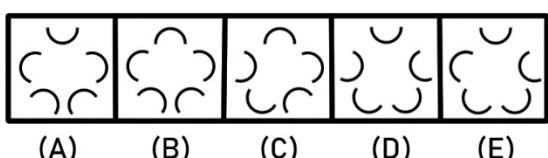


Ans - 4.

&lt;/DIY/&gt;

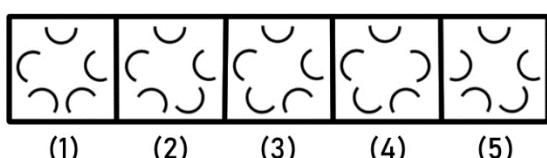
1.

Problem Figures:



(A) (B) (C) (D) (E)

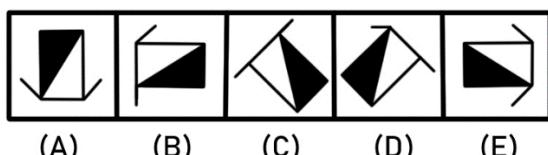
Answer Figures:



(1) (2) (3) (4) (5)

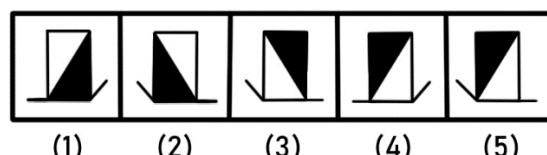
2.

Problem Figures:



(A) (B) (C) (D) (E)

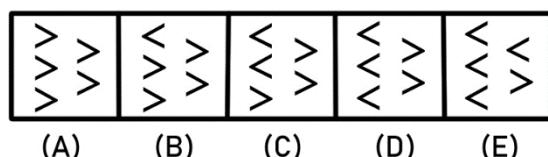
Answer Figures:



(1) (2) (3) (4) (5)

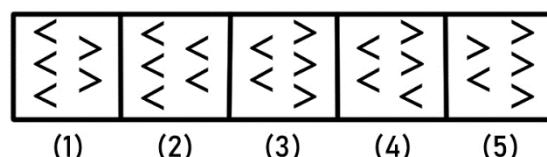
3.

Problem Figures:



(A) (B) (C) (D) (E)

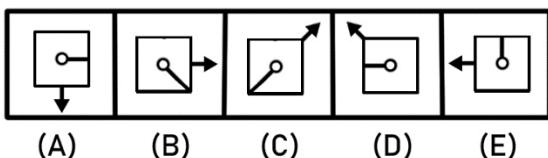
Answer Figures:



(1) (2) (3) (4) (5)

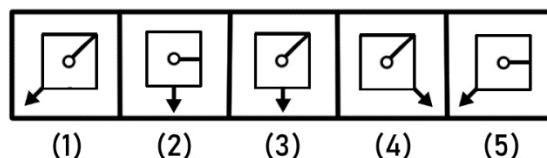
4.

Problem Figures:



(A) (B) (C) (D) (E)

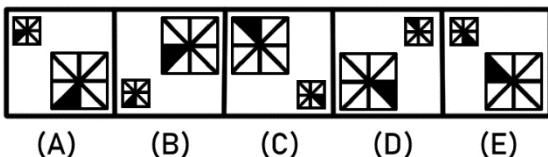
Answer Figures:



(1) (2) (3) (4) (5)

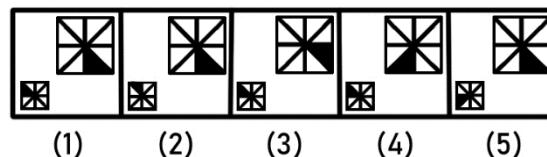
5.

Problem Figures:



(A) (B) (C) (D) (E)

Answer Figures:



(1) (2) (3) (4) (5)

# TOPIC 28

## BLOOD RELATION

1. A man pointing to a photograph says, "The lady in the photograph is my nephew's maternal grandmother". How is the lady in the photograph related to the man's sister who has no other sister and no brother?

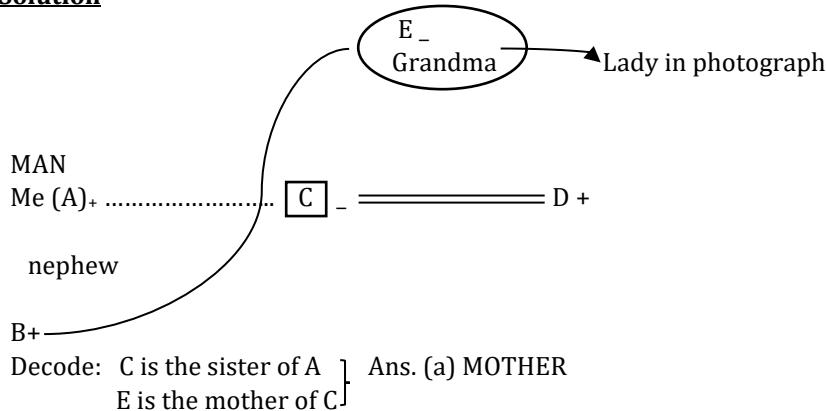
A. Mother

B. Cousin

C. Mother-in-law

D. Sister-in -law

Solution



2. Pointing to a lady, a person said, "The son of her only brother is the brother of my wife." How is the lady related to the person?

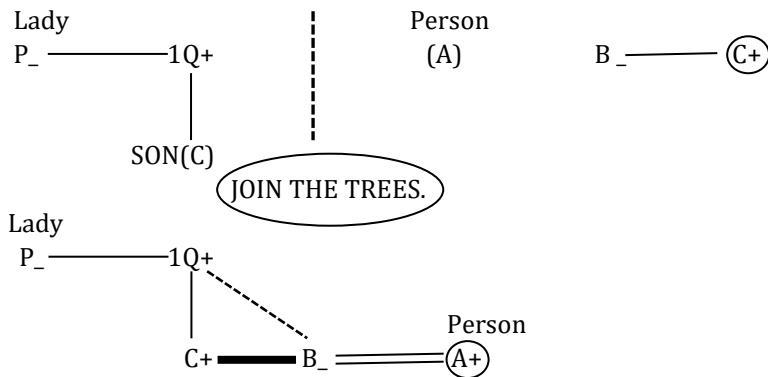
A. Maternal aunt

B. Grandmother

C. Sister of Father-in-law

D. None of these

Solution



Q is Father-in-law of A. [ option (c)  
P is sister of father-in-law of A ]

3. Pointing to a photograph Anjali said, "He is the son of the only son of my grandfather." How is the man in the photograph related to Anjali?

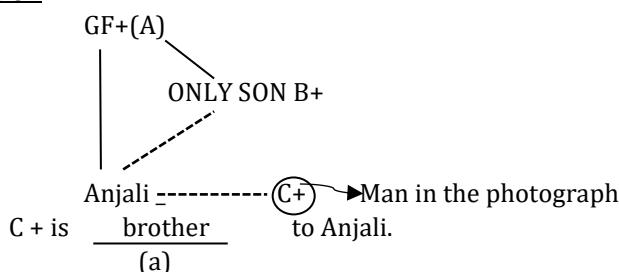
A. Brother

B. Uncle

C. Son

D. Data is inadequate

Solution



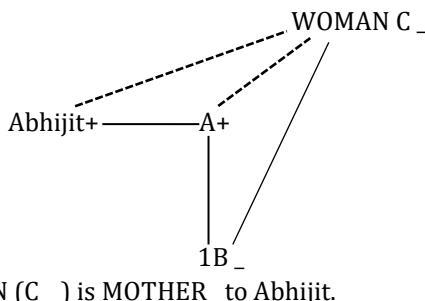
4. Pointing to a woman, Abhijit said, "Her granddaughter is the only daughter of my brother." How is the woman related to Abhijit?

A. Sister  
Solution

B. Grandmother

C. Mother-in-law

D. Mother



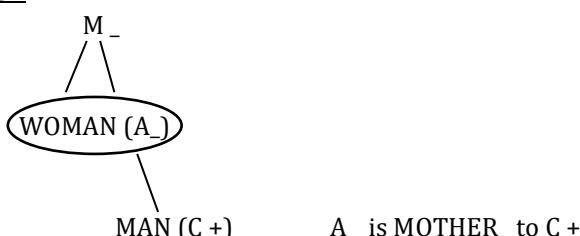
5. Pointing towards a man, a woman said, "His mother is the only daughter of my mother." How is the woman related to the man?

A. Mother  
Solution

B. Grandmother

C. Sister

D. Daughter



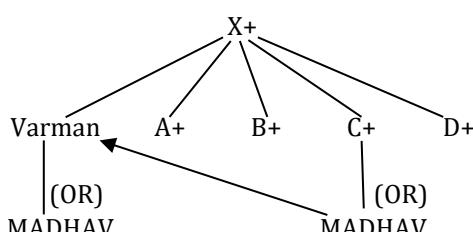
6. Pointing to Varman, Madhav said, "I am the only son of one of the sons of his father." How is Varman related to Madhav?

A. Nephew  
Solution

B. Uncle

C. Father or Uncle

D. Father



7. Introducing a woman, Shashank said, "She is the mother of the only daughter of my son." How is that woman related to Shashank?

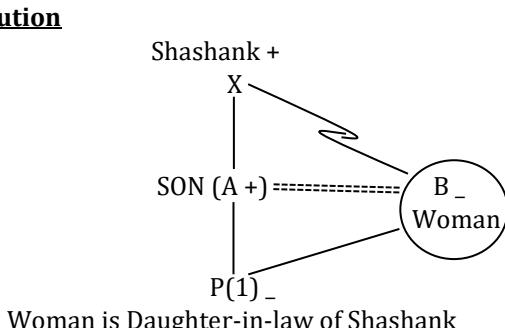
A. Daughter

B. Sister-in-law

C. Wife

D. Daughter-in-law

Solution

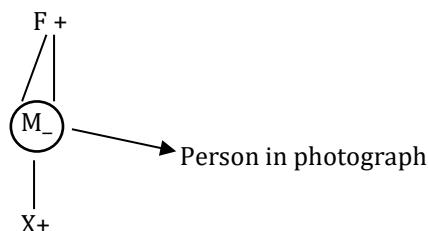


## Topic 28: BLOOD RELATION

8. Pointing to a photograph, X said to his friend Y, "She is the only daughter of the father of my mother." How X is related to the person of photograph?

A. Daughter      B. Son      C. Nephew      D. Cannot be decided

Solution

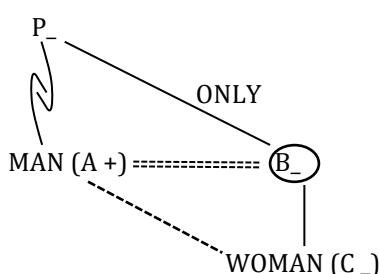


X is SON to M - ⇒ option (b) SON

9. Pointing to a woman, a man says, "Her mother is the only daughter of my mother-in-law". How is the woman related to the man?

A. Sister      B. Daughter      C. Aunt  
D. Data is insufficient      E. None of these

Solution

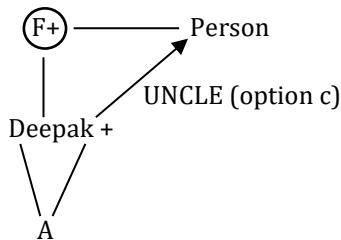


C is Daughter of A.

10. Pointing to a person, Deepak said, "His only brother is the father of my daughter's father". How is the person related to Deepak?

A. Father      B. Grandfather      C. Uncle      D. Brother-in-law

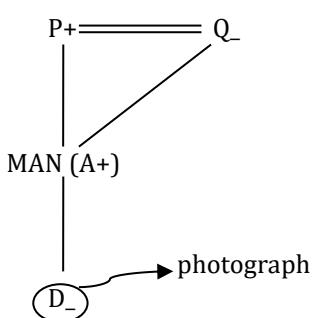
Solution



11. Pointing out to a photograph, a man tells his friend, "She is the daughter of the only son of my father's wife". How is the girl in photograph related to the man?

A. Niece      B. Daughter      C. Mother      D. None of these

Solution



D \_ is Daughter to A+

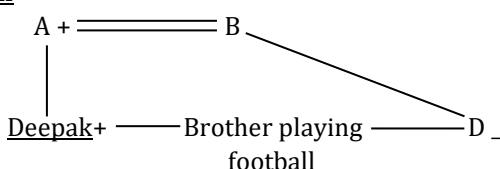
12. Deepak said to Nitin, "That boy playing with the football is the younger of the two brothers of the daughter of my father's wife. How is the boy playing football related to Deepak?

A. Son

B. Brother

C. Cousin

D. Brother-in-law

**Solution**

The boy playing football is brother of Deepak.

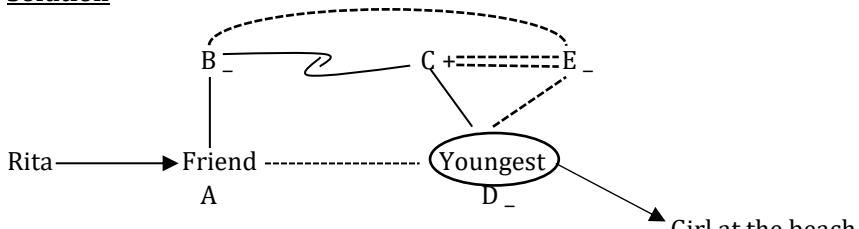
13. Rita told Mani, "The girl I met yesterday at the beach was the youngest daughter of the brother-in-law of my friend's mother. How is the girl related to Rita's friend?

A. Daughter

B. Niece

C. Friend

D. Cousin

**Solution**

A & D are children of real sisters B and E, and therefore they are cousins.

D is cousin of Rita's friend(A)

14. Aditya is Bhavi's brother; Bharat is Jayant's father. Ella is Bhavi's mother. Aditya and Jayant are brothers. What is Ella's relationship with Bharat?

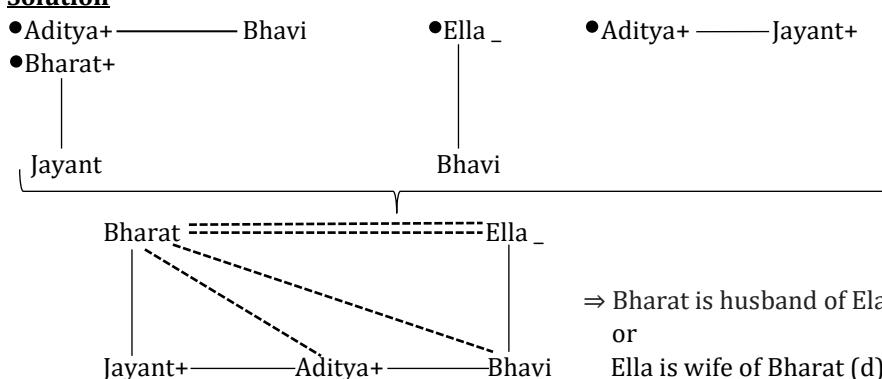
A. Sister

B. Mother

C. Daughter

D. Wife

E. None of these

**Solution**

⇒ Bharat is husband of Ella.

or

Ella is wife of Bharat (d)

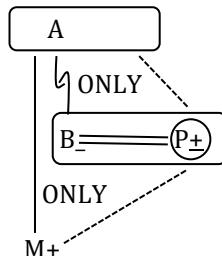
15. B is the only daughter-in-law of A. M is the only grandson of A. P is M's father. How is P related to B?

A. Husband

B. Son-in-law

C. Son

D. Wife

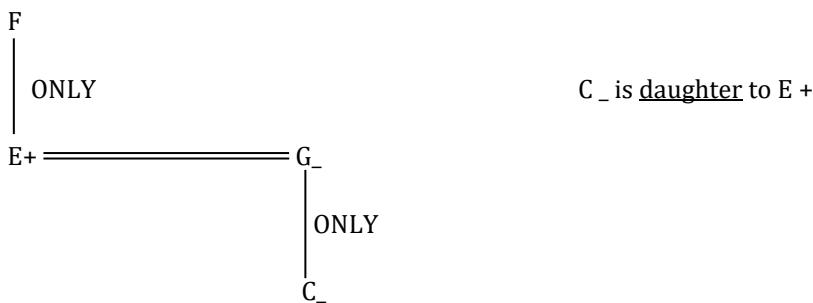
**Solution**

P is husband of B.

16. E is the only son of F. E is married to G and C is the only daughter of G. How C is related to E?

- A. Granddaughter
- B. Daughter
- C. Sister
- D. Son

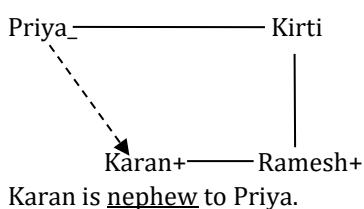
Solution



17. Priya is the sister of Kirti. Ramesh is the son of Kirti. Karan is the brother of Ramesh. How is Karan related to Priya?

- A. Nephew
- B. Brother
- C. Son
- D. Cannot determine

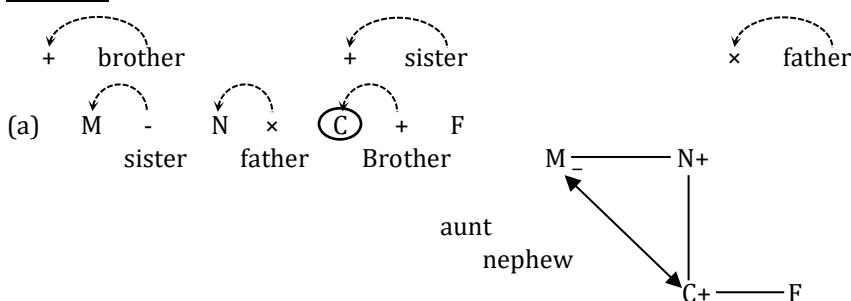
Solution



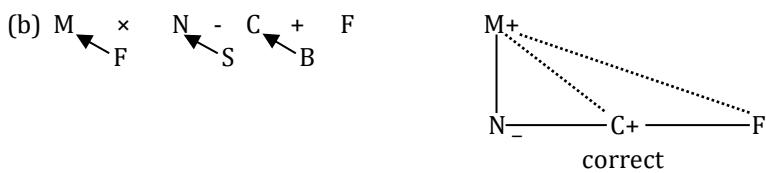
18. If A + B means A is the brother of B; A - B means A is the sister of B and A x B means A is the father of B. Which of the following means that C is the son of M?

- A. M - N x C + F
- B. M x N - C + F
- C. F - C + N x M
- D. N + M - F x C

Solution

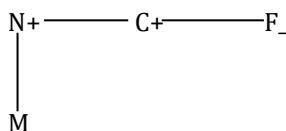


Here, C is nephew of M.



Here, C is the son of M. So, this option is correct

$$(c) F - C + N x M$$



Here, C is uncle of M

$$(d) N+ + M- - F+ x \textcircled{C}$$

We cannot confirm the gender of C even if we draw the diagram. So, C is son cannot be confirmed from this.

&lt;/DIY/&gt;

1. A man pointing to a photograph says, "The lady in the photograph is my nephew's maternal grandmother". How is the lady in the photograph related to the man's sister who has no other sister and no brother?  
 A. Mother      B. Cousin      C. Mother-in-law      D. Sister-in-law
  
2. Pointing to a photograph, Aanchal said, "He is the son of the only son of my grandfather." How is Aanchal related to the man in the photograph?  
 A. Sister      B. Uncle      C. Son      D. Data is inadequate
  
3. Pointing a photograph, Kushal said to his friend Atul, "She is the only daughter of the father of my mother." How is Kushal related to the person of photograph?  
 A. Daughter      B. Son      C. Nephew      D. Cannot be decided
  
4. Pointing to a Uday, Shivani said, his mother is the only daughter of my mother. How is Shivani related to Uday?  
 A. Mother      B. Daughter      C. Sister      D. Grand Mother
  
5. Pointing to a woman, a man says, "Her mother is the only daughter of my mother-in-law". How is the woman related to the man?  
 A. Sister      B. Daughter      C. Aunt      D. Data is insufficient      E. None of these
  
6. Akash said to Vikaram, "That boy watching TV is the younger of the two brothers of the daughter of my father's wife." How is the boy watching TV related to Akash?  
 A. Son      B. Brother      C. Cousin      D. Brother-in-law
  
7. Rachna told Megha, "The girl we met yesterday was the youngest daughter of the brother-in-law of my friend's mother". How is the girl related to Rachna's friend?  
 A. Daughter      B. Niece      C. Friend      D. Cousin
  
8. When I met Mr. Harish at a wedding, he pointed out to a person and said, "Kiran is your mother's only sister's son's wife". How is Kiran related to me?  
 A. Nice      B. Aunt      C. Cousin      D. Sister-in-law
  
9. If X is the brother of the son of Y's son, how is X related to Y?  
 A. Son      B. Cousin      C. Grandson      D. Brother
  
10. How is my father's wife's grandfather's only child's sons is related to me?  
 A. Brother      B. Uncle      C. Cousin      D. Nephew
  
11. X's father's wife's father's granddaughter uncle will be related to X as  
 A. Son      B. Nephew      C. Uncle      D. Grandfather
  
12. Aditya is Bhavi's brother, Bharat is Jayant's father. Ella is Bhavi's mother. Aditya and Jayant are brothers. What is Ella's relationship with Bharat?  
 A. Sister      B. Mother      C. Daughter      D. Wife      E. None of these
  
13. If A + B means A is the brother of B; A - B means A is the sister of B and A x B means A is the father of B. Which of the following means that C is the son of M?  
 A. M - N x C + F      B. M x N - C + F      C. F - C + N x M      D. N + M - F x C

# TOPIC 29

## DIRECTION SENSE

1. A person travels 6km towards West, then travels 5km towards North, then finally travels 6km towards West. Where is he, with respect to his starting position?

A. 13km North-east      B. 13km East      C. 13km North-west      D. 13km West

Solution

Journey: 6 km West  
5 km North  
6 km West

12km West  
5km North

$$\sqrt{12^2 + 5^2} = 13\text{km North-west}$$

2. Manish goes 7 km towards South-East from his house, then he goes 14 km turning to West. After this, he goes 7 km towards North-West and in the end, he goes 9 km towards East. How far is he from his house?

A. 5 km      B. 2 km      C. 7 km      D. 14 km      E. None of these

Solution

Journey: 7 km South-East  
14 km West  
7 km North-West

14km West

3. Laxman went 15 kms to the west from his house, then turned left and walked 20 kms. He then turned East and walked 25 kms and finally turning left covered 20kms. How far was he from his house?

A. 10 kms.      B. 5 kms      C. 40 kms.      D. 80 kms.      E. None of these

Solution

Journey: 15 km West  
Left 20 km South  
25 km East  
Left 20km North

10km East

4. Shiva walked 10m towards West from his house. Then, he walked 5m turning to his left. After this, he walked 10m turning to his left and in the end, he walked 10m turning to his left. In what direction is he now, from his starting point?

A. South      B. North      C. East      D. West      E. None of these

Solution

Journey: 10m West  
5m Left (South)  
10m Left (East)  
10m Left (North)

5km North

5. A man walks 30 metres towards South. Then, turning to his right, he walks 30 metres. Then turning to his left, he walks 20 metres, again, he turns to his left and walks 30 metres. How far is he from his initial position?

A. 20 metres      B. 30 metres      C. 60 metres      D. 80 metres

E. None of these

Solution

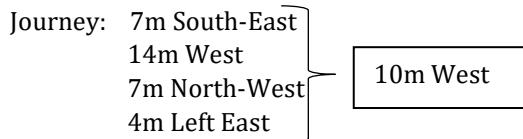
Journey: 30m South  
30m Right (West)  
20m Left (South)  
30m Left (East)

50km South

6. Radha moves towards South-east, a distance of 7m, then she moves towards West and travels a distance of 14m. From here, she moves towards North-West, a distance of 7m, and finally, she moves a distance of 4m towards East and stood at that point. How far is the starting point from where she stood?

A. 3 m      B. 4 m      C. 10 m      D. 11 m

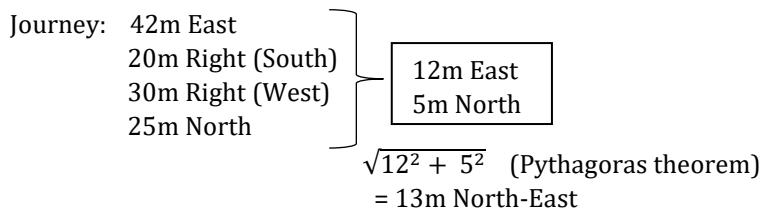
**Solution**



7. A child was looking for his father. He went 42 metres in the East before turning to his right. He went 20 metres before turning to his right again to look for his father at his uncle's place 30 metres from this point. His father was not there. From here, he went 25 metres to the North before meeting his father in a street. How far did the son meet his father from the starting point?

A. 7      B. 25      C. 13      D. 11

**Solution**

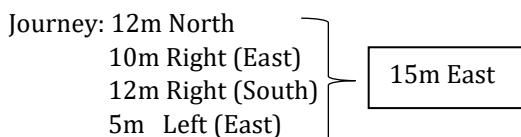


8. In the following question, select the right option to depict the correct direction / distance.

Starting from a point, Raju walked 12 metres towards North, he turned right and walked 10 metres, he again turned right and walked 12 metres, then he turned left and walked 5 metres. How far is he now and in which direction from the starting point?

A. 27 metres towards East      B. 5 metres towards East  
C. 10 metres towards West      D. 15 metres towards East      E. None of these

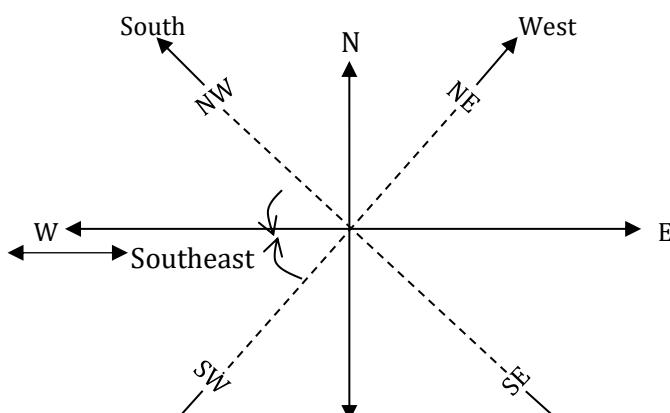
**Solution**



9. If South-East becomes North, North-East becomes West and so on. What will West become?

A. North-East      B. North-West      C. South-East      D. South-West

**Solution**



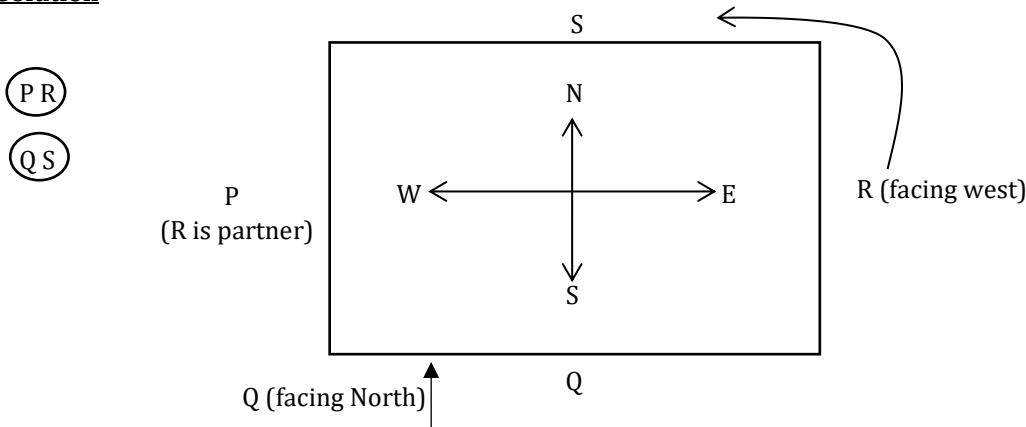
West will become South-East

## Topic 29: DIRECTION SENSE

10. P, Q, R and S are playing a game of carrom. P, R, and S, Q are partners. S is to the right of R who is facing west. Then Q is facing?

A. North    B. South    C. East    D. West    E. None of these

Solution



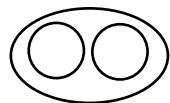
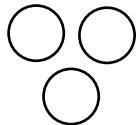
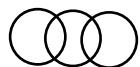
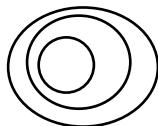
</DIY/>

1. Shiva goes 7 km towards South-East from his house, then he goes 14 km turning to his West. After this, he goes 7 km towards North-West and in the end, he goes 9 km towards East. How far is he from his house?  
A. 5 km    B. 2 km    C. 7 km    D. 14 km    E. None of these
2. Shiva walked 10 m towards West from his house. Then, he walked 5 m turning to his left. After this, he walked 10 m turning to his left and in the end, he walked 10 m turning to his left. In what direction is he now, from his starting point?  
A. South    B. North    C. East    D. West    E. None of these
3. A man is facing North-west. He turns 90 degree in the clockwise direction, then 180 degree in the anti-clockwise direction and then another 90 degree in the same direction. Which direction is he facing now?  
A. South    B. South-west    C. West    D. South-east
4. Rachana moves towards South-east, a distance of 7 km, then she moves towards West and travels a distance of 14 m. From here, she moves towards North-West, a distance of 7 m, and finally, she moves a distance of 4 m towards East and stood at that point. How far is the starting point from where she stood?  
A. 3 m    B. 4 m    C. 10 m    D. 11 m
5. A dog runs 20 metre towards East and turns right, runs 10 metre and turns to right, runs 9 metre and again turns to left, runs 5 metre and then turns to left, runs 12 metre and finally turns to left and runs 6 metre. Now which direction dog is facing?  
A. East    B. North    C. West    D. South
6. Gaurav walks 20 metres towards North. He then turns left and walks 40 metres. He again turns left and walks 20 metres. Further, he moves 20 metres after turning to the right. How far is he from his original position?  
A. 40 metres    B. 50 metres    C. 60 metres    D. 70 metres
7. A person travels 12 km in the southward direction and then travels 5km to the right and then travels 15km toward the right and finally travels 5km towards the East. How far is he, from his starting place?  
A. 5.5 kms    B. 3 km    C. 13 km    D. 6.4 km
8. Kailash faces towards North. Turning to his right, he walks 25 m. He then turns to his left and walks 30 m. Next, he moves 25 m to his right. He then turns to his right again and walks 55 m. Finally, he turns to the right and moves 40 m. In which direction is he now from his starting point?  
A. South-West    B. South    C. North-West    D. South-East    E. None of these

# TOPIC 30

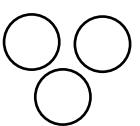
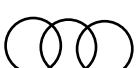
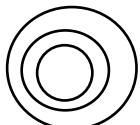
## VENN DIAGRAM

1. Draw Venn diagram which best describes the relationship between CAT, DOG and PET?



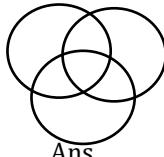
Ans

2. Draw Venn diagram which best describes the relationship between WOMEN, WIVES and MOTHERS?



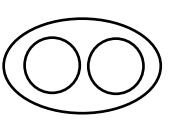
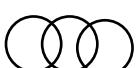
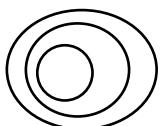
Ans

3. Draw Venn diagram which best describes the relationship between ENGINEER, TEACHER and WOMEN?



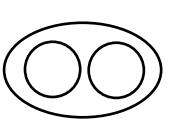
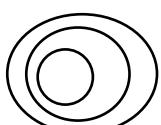
Ans

4. Draw Venn diagram which best describes the relationship between SUN, EARTH and MOON?



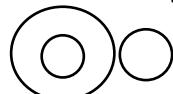
Ans

5. Draw Venn diagram which best describes the relationship between RAIN, LAKE and WATER?



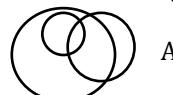
Ans

6. Draw Venn diagram which best describes the relationship between SUN, STAR and MOON?



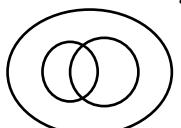
Ans

7. Draw Venn diagram which best describes the relationship between UNCLE, RICH and RELATIVES?



Ans

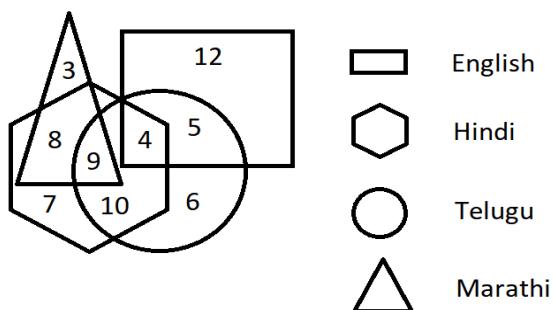
8. Draw Venn diagram which best describes the relationship between BROTHER, HUSBAND and MAN?



Ans

## Topic 30: VENN DIAGRAM

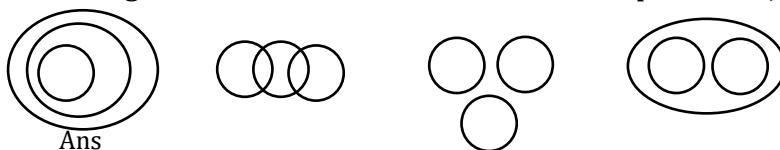
9. In the following figure, Square represents the persons who can speak English, Triangle for those who know Marathi, Hexagon for those who know Telugu and circle for those who know Hindi. Analyse the different sections in the figure carefully and answer the questions that follow-



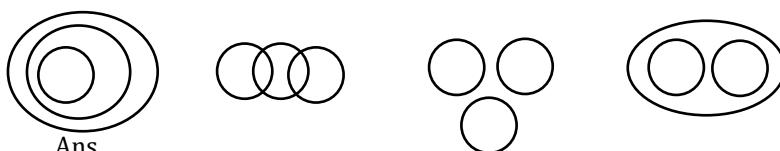
- a) How many persons can speak only English and Hindi?  
Ans 0
- b) How many persons can speak both Marathi and Telugu?  
Ans 9
- c) How many persons can speak only English?  
Ans 12
- d) How many persons can speak only Hindi?  
Ans 7
- e) How many persons can speak only Marathi?  
Ans 3
- f) How many persons can speak only Telugu?  
Ans 6
- g) How many persons can speak only English and Telugu?  
Ans 5
- h) How many persons can speak only Marathi and Hindi?  
Ans 8
- i) How many persons can speak both Marathi and Hindi?  
Ans  $8+9=17$
- j) How many persons can speak English, Hindi and Telugu?  
Ans 4
- k) How many persons can speak English, Hindi and Marathi?  
Ans 0
- l) How many persons can speak all the languages?  
Ans 0

&lt;/DIY/&gt;

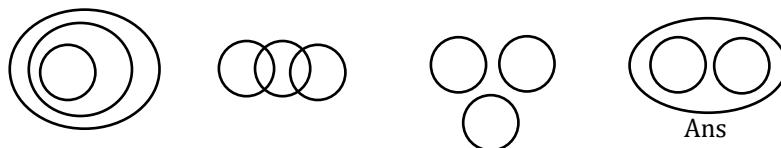
1. Draw Venn diagram which best describes the relationship between JAIPUR, INDIA and RAJASTHAN?



2. Draw Venn diagram which best describes the relationship between PILOT, PLANE and SKY?



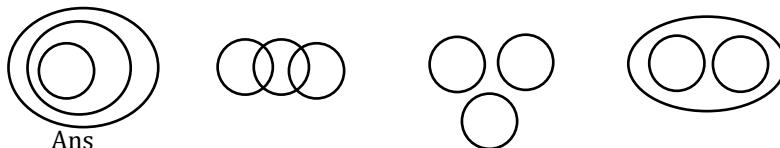
3. Draw Venn diagram which best describes the relationship between GRAIN, PULSE and WHEAT?



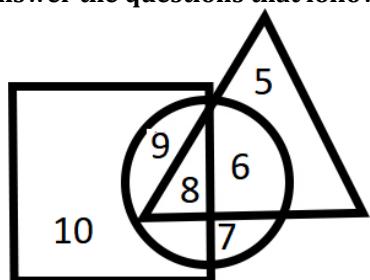
4. Draw Venn diagram which best describes the relationship between FEMALE, SISTER and ENGINEER?



5. Draw Venn diagram which best describes the relationship between RHOMBUS, QUADRILATERAL and POLYGON?



6. In the following figure, Square represents the persons who can speak English, Triangle for those who know Marathi and circle for those who know Hindi. Analyse the different sections in the figure carefully and answer the questions that follow-



- How many persons can speak only English and Hindi?  
Ans 9
- How many persons can speak both Marathi and Hindi?  
Ans  $8+6=14$
- How many persons can speak only English?  
Ans 10
- How many persons can speak only Hindi?  
Ans 7
- How many persons can speak only Marathi?  
Ans 5
- How many persons can speak only Marathi and Hindi?  
Ans 6
- How many persons can speak both Marathi and Hindi?  
Ans  $8+6=14$
- How many persons can speak all the languages?  
Ans 8

# TOPIC 31

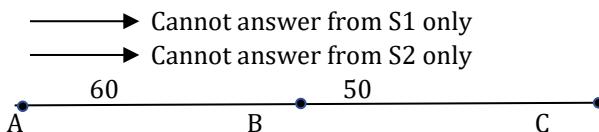
## DATA SUFFICIENCY

1. What is the distance from city A to city C?

S1: Distance from city A to B is 60km

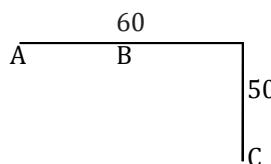
S2: Distance from city B to C is 50km

Solution



We cannot answer using both S1 & S2

∴ No conclusion even if they are combined



2. First day of a month is Thursday. How many days are there in that month?

S1: 25<sup>th</sup> of a month is Sunday.

S2: 5<sup>th</sup> Saturday of a month is last day.

A. S1 alone is sufficient

B. S2 alone is sufficient

C. S1 & S2 combined is sufficient D. Either s1 or s2 is sufficient

E. No conclusion even if they are taken together.

Solution

Using S1:

If 25<sup>th</sup> of a month is Sunday, we cannot surely say the number of days in that month.

Using S2:

1st day is Thursday. Therefore, 1st Saturday will fall on 3rd day of that month. Second Saturday will fall on 10th day. Third, fourth and fifth Saturday will fall on 17th, 24th and 31st day respectively. Hence there will be 31 days in the month.

⇒ S2 alone is sufficient to answer.

3. 3XY5 is a 4-digit no, then XY is?

S1: XY is divisible by 23

S2: 3XY5 is divisible by 25

Solution

S1: XY is divisible by 23 → XY: 23, 46, 69, 92

Using S1 alone, we cannot answer.

S2: 3XY5 is divisible by 25 →  $\frac{3XY5}{25}$

Y = 2, Y = 7 (2 values for Y) & X can be anything.

Using S2 alone, we cannot answer.

∴ S1 alone is not sufficient.

S2 alone is not sufficient.

Using S1 & S2:

Common value of Y is 2 and X is 2, 4, 6 and 9.

⇒ Both S1 & S2 together are sufficient

**4. Is  $a > 0$ ?****S1:**  $(a + b)^2 < (a - b)^2$ **S2:**  $2a + 2b < 2a - 2b$ **Solution**USING S1:  $a^2 + b^2 + 2ab < a^2 + b^2 - 2ab$ 

$$\Rightarrow 4ab < 0$$

$$\Rightarrow ab < 0$$

$$\Rightarrow a < 0, b > 0 \text{ or } a > 0, b < 0$$

 $\therefore$  S1 alone is not sufficient.USING S2:  $2a + 2b < 2a - 2b$ 

$$\Rightarrow 4b < 0$$

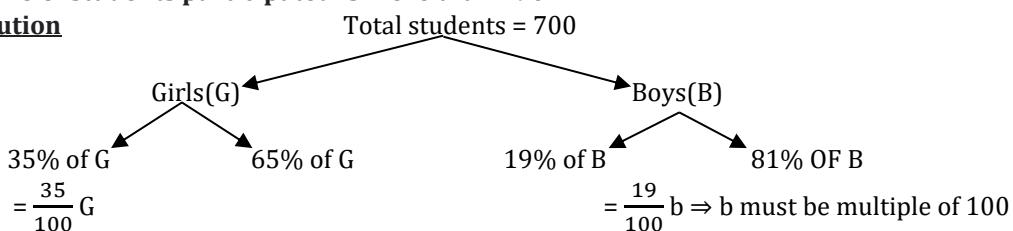
$$\Rightarrow b < 0$$

 $\therefore$  S2 alone is not sufficient.

Using S1 and S2,

Common solution is  $b < 0$  and  $a > 0$ 

Together, the statements are sufficient to answer the questions.

**5. In a school, 35% girls and 19% boys participated in singing. Number of students in school is 700. How many boys are in school?****S1:** No of boys are more than 200**S2:** No of students participated is more than 190.**Solution**Using S1:  $B > 200 \Rightarrow B = 300, 400, 500, 600 \text{ but not } 700$ 

G: 400 300 200 100

S1 alone is not sufficient

**Using S2**

Students participating &gt; 190

B	100	200	300	400	500	600
G	19	38	57	76	95	114
B	600	500	400	300	200	100
G	210	175	140	105	70	35
B	>190	>190	>190	<190 X	<190 X	<190 X

S2 alone is not sufficient

Using S1 and S2

 $\Rightarrow$  Only B = 300 satisfies S1 and S2. $\Rightarrow B = 300, G = 400$ **6. What is the rate of interest per annum?****S1:** A sum doubles under SI in 4 years.**S2:** The difference between SI & CI on an amount of 10000 in 2 years is 625 Rs.**Solution**

Using S1:

By using simple interest formula, we can calculate interest.

Using S2:

Using the formula,

 $(r/100)^2 P = (CI - SI)_{2 \text{ years}}$ , we can calculate interest.

Therefore, either of the statements is sufficient to answer the given question.

</DIY/>

- Each problem consists of a problem followed by two statements. Decide whether the data in the statements are sufficient to answer the question. Select your answer according to whether:
    - (a) statement I alone is sufficient, but statement II alone is not sufficient to answer the question
    - (b) statement II alone is sufficient, but statement I alone is not sufficient to answer the question
    - (c) both statements taken together are sufficient to answer the question, but neither statement alone is sufficient
    - (d) each statement alone is sufficient
    - (e) statements I and II together are not sufficient, and additional data is needed to answer the question
1. How much money do Vivek and Suman have together?
    - I) Suman has 20 rupees less than what Tarun has.
    - II) Vivek has 30 rupees more than what Tarun has.
  2. What is the value of Y?
    - I)  $Y^2 - 25 = 0$
    - II)  $Y < 6$ .
  3. What is the cost of each pen?
    - I) 4 pens and pencils together cost 24Rs.
    - II) If the cost of each pen is reduced by 50 percent then 16 pens and 10 pencils will together cost Rs 50.
  4. A sum invested at R percent per annum simple interest. Find R?
    - I) the sum tripled itself in 16 years.
    - II) The sum yielded an interest of Rs 750 in the first 6 years.
- Given below is the question followed by two statements, I and II each containing some information. Decide which if the statement(s) is/are sufficient to answer the question.
5. Five persons - A, B, C, D and E sit around a circular table, facing the centre not necessarily in that order. Who sits second to the right of D?
    - I) A sits the immediate right of E, who is not a neighbour of D.
    - II) B is to the immediate left of D.

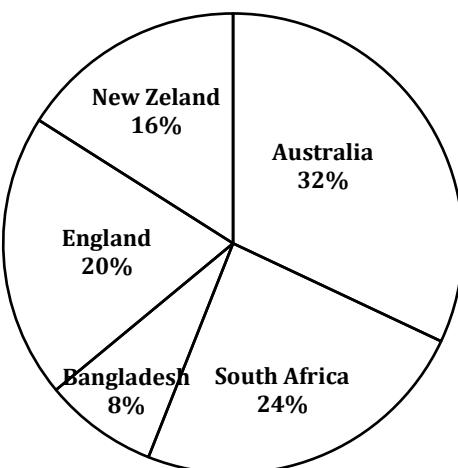
A. If only statement II is sufficient to answer the question.  
B. If the data in both the statement I and II together are necessary to answer the question. CORRECT  
C. If the data either in statement, I alone or in statement II alone is sufficient to answer the question.  
D. If only statement I is sufficient to answer the question.
  6. In a IPL match played between CSK and KKR, the total runs made by the CSK team were 200. 160 runs out of 200 runs were made by spinners.
    - I) 80% of the team consists of spinners.
    - II) The opening batsmen were spinners.

A. Only Conclusion I is true  
B. Only Conclusion II is true  
C. Both Conclusion I and II are true  
D. Neither Conclusion I nor II is true correct  
D. Either Conclusion I or II is true

# TOPIC 32

## DATA INTERPRETATION

The pie chart given below shows the runs scored by Virat Kohli against teams of different countries:



1. The runs scored by Kohli against South Africa is more than runs scored against Bangladesh by what percent?

A. 100%      B. 150%      C. 200%      D. 250%

Solution

$$\begin{array}{ccc}
 \text{South Africa} & & \text{Bangladesh} \\
 24\% & : & 8\% \\
 \Rightarrow 3 & : & 1 \\
 & 2 &
 \end{array}$$

$$\Rightarrow \% \text{ more} = \frac{2}{1} \times 100 = 200\%$$

2. If Kohli scored 1875 runs in total, then what is the difference between runs scored against South Africa and against NZ?

A. 150      B. 175      C. 200      D. 250

Solution

$$\begin{aligned}
 \text{SA - NZ} \\
 &= (24\% - 16\%) \text{ of total runs} = 8\% \text{ of } 1875 = \frac{8}{100} \times 1875 = 150 \text{ runs}
 \end{aligned}$$

3. What is the sectorial angle (in degrees) made by the runs scored against Australia in the given pie chart?

A. 106.8      B. 109.6      C. 112.4      D. 115.2

Solution

$$\begin{array}{l}
 \begin{array}{ll}
 100\% & \rightarrow 360^\circ \\
 10\% & \rightarrow 36^\circ \\
 30\% & \rightarrow 36 \times 3 = 108^\circ \\
 + & + \\
 2\% & \rightarrow \frac{36}{5} = 7.2^\circ \\
 32\% & \rightarrow 115.2^\circ
 \end{array}
 \end{array}$$

**DIRECTIONS (4 - 9)**

The following pie chart shows the monthly expenditure of a family on a various item. If the family spent 825 Rs on clothing, answer the follow questions:



4. What is the total monthly income of the family?

A. 8025      B. Rs8250      C. Rs8520      D. Rs8052 Rs

**Solution**

$$36^{\circ} \longrightarrow \text{Rs } 825$$

$$360^{\circ} \longrightarrow \text{Rs } 8250$$

$$\Rightarrow \text{Total income} = \text{Rs } 8250$$

5. What percent of total income does family save?

A. 15%      B. 50%      C. 10%      D. 25%

**Solution**

$$\% \text{ savings} = \frac{54}{360} \times 100 = 15 \%$$

6. What is the ratio of expenses on food and miscellaneous?

A. 3:4      B. 3:2      C. 2:3      D. 2:5

**Solution**

Food      Misc

108      :      72°

3      :      2

7. What is the average of expenses on clothing and rent?

A. 1443.75      B. 1344.57      C. 1574.34      D. 1734.45

**Solution**

Clothing      Rent

36°      90°

$$\text{Average} = \frac{36+90}{2} = \frac{126}{2} = 63^{\circ} = 7 \times 9^{\circ} = 7 \times \frac{9 \times 4 \text{ degrees}}{4} = 7 \times \frac{36 \text{ degrees}}{4}$$

$$= 7 \times \frac{825}{4} = 1443.75 \text{ Rs}$$

8. The ratio of average of expenses on food, clothing, and miscellaneous to the average of expenses on rent and savings is:

A. 3:2      B. 2:1      C. 1:3      D. 1:1

**Solution**

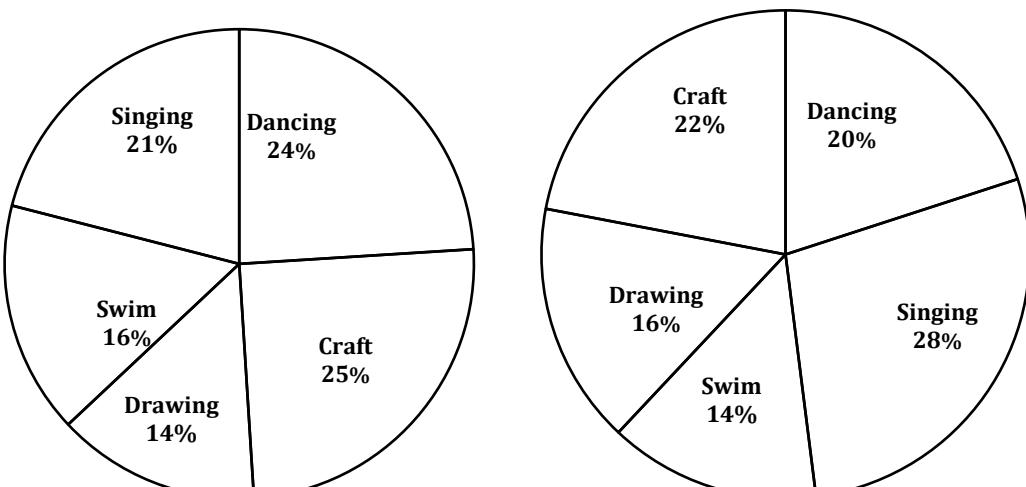
Food      Clothing      Misc      Rent      Savings

108°      36°      72°      90°      54°

$$\text{Ratio} = \frac{108+36+72}{90+54} = \frac{12}{8} = 4 : 4$$

$$= 1 : 1$$

There are two Pie charts given below. First one shows the participation of all the students in various extra-curricular activities. Second one shows the participation of all the girls in various extra-curricular activities. Interpret them and answer the questions.



9. The numbers of girls enrolled in dancing forms what % of total no of students in the school?
- A. 12.35      B. 14.12      C. 10.08      D. 11.67

**Solution**

$$\text{Required \%} = \frac{20\% \text{ of } 1750}{3000} \times 100 \\ = \frac{350}{30} = \frac{35}{3}\% = 11\frac{2}{3}\% = 11.67\%$$

10. What is the ratio of girls enrolled in swimming to the boys into swimming?
- A. 47:49      B. 23:29      C. 29:23      D. 49:47

**Solution**

Girls into swim	:	Boys into swim
14% of 1750	:	16% of 3000 – 14% of 1750
49	:	96 – 49
49	:	47

11. How many boys are enrolled in singing & craft together?
- A. 505      B. 610      C. 485      D. 420

**Solution**

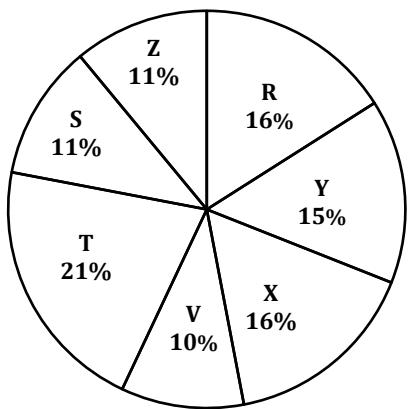
$$\text{Boys into singing + craft} = \text{total students into singing and craft} - \text{Girls into singing and craft} \\ = (25\% + 21\%) \text{ of } 3000 - (28\% + 22\%) \text{ of } 1750 \\ = 4(300) + 6(30) - 875 \\ = 1200 + 180 - 875 \\ = 505$$

12. What is the total number of girls enrolled in swimming and drawing together?
- A. 480      B. 525      C. 505      D. 495

**Solution**

$$\text{Girls into swimming + drawing} \\ (14\% + 16\%) \text{ of } 1750 \\ = 30\% \text{ of } 1750 = 3 \times 175 = 525$$

**Given below is a Survey of 7 villages.** The pie chart shows what percent of total people surveyed belong to a certain village. The table shows what percent of population of a village is below poverty line. Based on this, answer the questions that follows.



Village	% Below poverty line
X	38%
Y	52%
Z	42%
R	51%
S	49%
T	46%
V	58%

13. If the below poverty line population of village X is 12160, then the population of village S is:

A. 18500      B. 20500      C. 22000      D. 20000

**Solution**

$$BPL_X = 12160$$

$$38\% \text{ of Population of } X = 12160$$

$$\Rightarrow 38\% \text{ of } (16\% \text{ of total people surveyed}) = 12160$$

$$\Rightarrow 16 \left[ 38\% \text{ of } (11\% \text{ of total}) = 12160 \times 11 \right]$$

$$\Rightarrow 16 \times \frac{38}{100} \times \text{Pop. Of } S = 12160 \times 11$$

$$\text{Pop. Of } S = 22000$$

14. The ratio of the below poverty line population of village T and below poverty population of village Z is:

A. 11:23      B. 13:11      C. 23:11      D. 11:13

**Solution**

$$\frac{\text{BPL of village T}}{\text{BPL of village Z}} = \frac{46\% \text{ of Pop. of T}}{42\% \text{ of Pop. of Z}}$$

$$= \frac{46\% \text{ of } (21\% \text{ of total pop})}{42\% \text{ of } (11\% \text{ of total pop})}$$

$$= \frac{23}{11} = 23:11$$

15. If the population of village R is 32000, then below poverty line population of village Y is:

A. 14100      B. 15600      C. 16500      D. 17000

**Solution**

$$\text{Pop. Of } R = 32000$$

$$16\% \text{ of total population} = 32000$$

$$\Rightarrow 1\% \text{ of total population} = 2000$$

$$\Rightarrow \text{Pop. Of } Y = 15\% \text{ of total population} = 30000$$

$$\Rightarrow \text{BPL of village } Y = 52\% \text{ of Pop. Of } Y = 52\% \text{ of } 30000$$

$$= 15000 + 2(300)$$

$$= 15600$$

&lt;/DIY/&gt;

- Study the following table and answer the questions based on it-

YEAR	ITEM OF EXPENDITURE				
	SALARY	FUEL AND TRANSPORT	BONUS	INTEREST ON LOANS	TAXES
1998	288	98	3.00	23.4	83
1999	342	112	2.52	32.5	108
2000	324	101	3.84	41.6	74
2001	336	133	3.68	36.4	88
2002	420	142	3.96	49.4	98

1. The total expenditure of the company on these items in the year 2000 is?
 

A. Rs. 544.44 lakhs      B. Rs. 501.11 lakhs  
C. Rs. 446.46 lakhs      D. Rs. 478.87 lakhs
2. The ratio between the total expenditure on Taxes and the total expenditure on Fuel and Transport for all the given years respectively is approximately equal to?
 

A. 4:7      B. 10:13      C. 15:18      D. 5:8
3. What is the average amount of interest per year which the company had to pay during this period?
 

A. Rs. 32.43 lakhs      B. Rs. 33.72 lakhs  
C. Rs. 34.18 lakhs      D. Rs. 36.66 lakhs
4. The total amount of bonus paid by the company during the given period is approximately what percent of the total amount of salary paid in the same period?
 

A. 0.01%      B. 0.1%      C. 1%      D. 0.125%
5. Total expenditure on all these items in 1998 was approximately what percent of the total expenditure in 2002?
 

A. 61%      B. 63%      C. 69%      D. 71%

## Solutions to Practice Problems

<b>Topic 1</b>	<b>Topic 5</b>	<b>Topic 9</b>	<b>Topic 13</b>	<b>Topic 17</b>	<b>Topic 23</b>	<b>Topic 26</b>	<b>Topic 32</b>
1. A	1. B	1. D	1. B	1. C	1. D	8. D	1. A
2. A	2. A	2. B	2. D	2. B	2. D	9. D	2. B
3. A	3. A	3. B	3. D	3. D	3. C	10. B	3. D
4. A	4. C	4. A	4. D	4. A	4. D	11. D	4. C
5. A	5. C	5. E	5. B	5. C	5. C		5. C
	6. B	6. D	6. D	6. D	6. B		<b>Topic 27</b>
<b>Topic 2</b>	7. A	7. C		7. D	7. A	1. 1	
1. C	8. A	8. D	<b>Topic 14</b>	8. A	8. D	2. 3	
2. A	9. B	9. C	1. 324	9. A	9. D	3. 2	
3. B	10. A	10. D	2. C	10. A	10. A	4. 3	
4. B			3. B	11. D	11. D	5. 1	
5. A	<b>Topic 6</b>	<b>Topic 10</b>	4. B		12. B		
6. C	1. A	1. A	5. C	<b>Topic 18</b>	13. D	<b>Topic 28</b>	
7. C	2. C	2. B	6. B	1. B	14. A	1. A	
8. B	3. C	3. B	7. D	2. C	15. A	2. A	
9. B	4. B	4. C		3. D	16. C	3. B	
10. C	5. D	5. A	<b>Topic 15</b>	4. C		4. A	
	6. D	6. A	1. 17	5. D	<b>Topic 24</b>	5. B	
<b>Topic 3</b>	7. A	7. C	2. 3	6. D	1. C	6. B	
1. D	8. D	8. B	3. 486	7. C	2. A	7. D	
2. B	9. C		4. 240	8. A	3. A	8. D	
3. C	10. B	<b>Topic 11</b>	5. 47	9. B	4. D	9. C	
4. B		1. D	6. 121	10. D	5. C	10. B	
5. C	<b>Topic 7</b>	2. B	7. 217	11. B	6. B	11. C	
6. D	1. D	3. B	8. 253	12. C	7. C	12. D	
7. C	2. D	4. B	9. 481		8. D	13. B	
8. C	3. A	5. D	10. 52	<b>Topic 19</b>	9. B		
9. 16	4. D	6. C	11. 72	1. B	10. A	<b>Topic 29</b>	
10. 1	5. B	7. D	12. D	2. B	11. C	1. D	
	6. D	8. C	13. D			2. B	
<b>Topic 4</b>	7. B	9. A	14. D	<b>Topic 20</b>	<b>Topic 25</b>	3. D	
1. D	8. D	10. D	15. 50	1. B	1. B	4. C	
2. B	9. A		16. 50	2. C	2. C	5. B	
3. A	10. D	<b>Topic 12</b>	17. 80	3. B	3. B	6. C	
4. C		1. A		4. C	4. B	7. B	
5. D	<b>Topic 8</b>	2. C	<b>Topic 16</b>		5. D	8. D	
6. A	1. A	3. A	1. B	<b>Topic 21</b>	6. B		
7. B	2. C	4. C	2. D	1. C		<b>Topic 31</b>	
8. A	3. B	5. D	3. B	2. D	<b>Topic 26</b>	1. e	
9. C	4. A	6. D	4. D		1. C	2. e	
10. C	5. D	7. C	5. A	<b>Topic 22</b>	2. D	3. c	
11. B	6. B	8. A	6. C	1. C	3. B	4. a	
12. A	7. B	9. D		2. C	4. A	5. B	
13. D	8. A	10. C			5. A	6. D	
14. D	9. B				6. A		
15. A	10. D				7. C		

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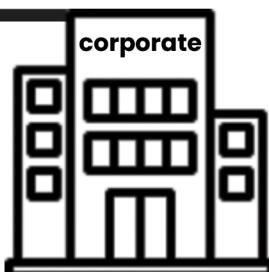
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