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# GENERAL APTITUDE

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# Time & Distance(Poll)

**Q.** Two trains run on parallel tracks in the same direction with speeds of 42 km/hr & 60 km/hr. A person sitting in the faster train crossed the slower train completely in 1.2 min. Find the length of the slower train.

A. 240 m

B. 360 m

C. 420 m

D. 480 m

**Ans: B**

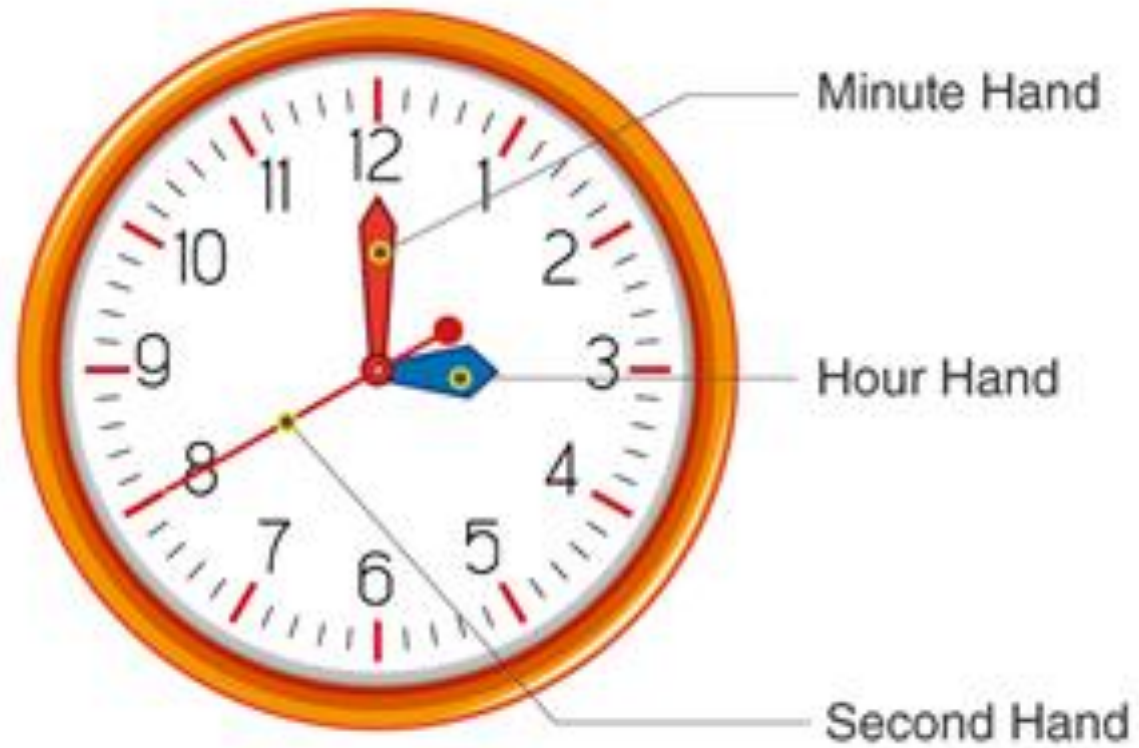
**Note – Man in the train has same speed as train but no length**

Using case 3 from trains → Moving object without length

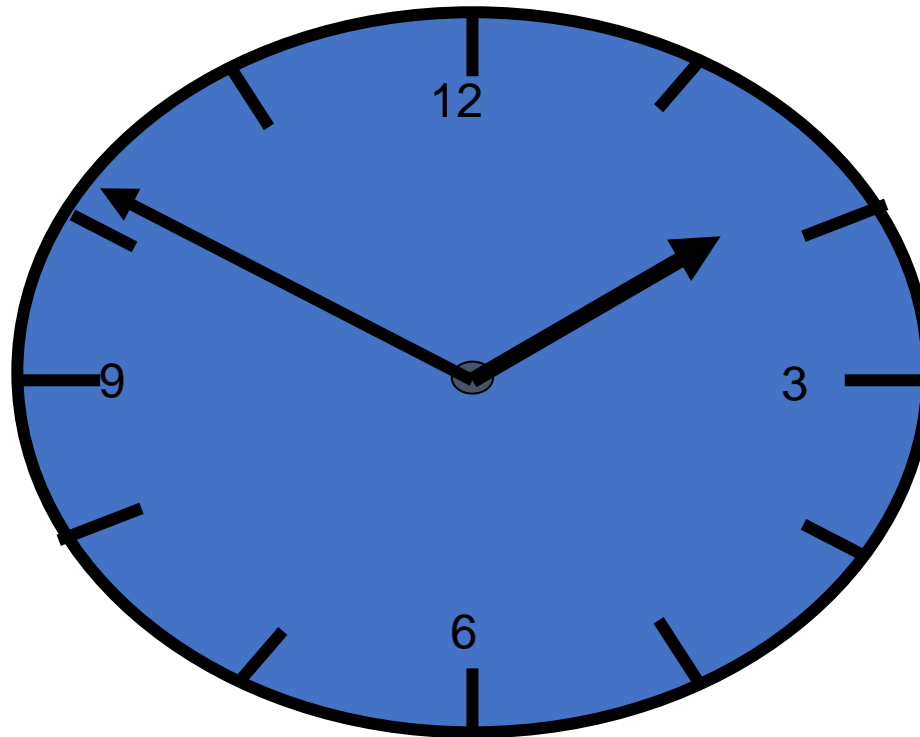
$$L_1 = (S_1 - S_2) \times t$$



# Clocks



# Clocks



- →  $360^\circ$
- → 60 minute spaces of  $6^\circ$  each
- → 12 Hours space of  $30^\circ$  each



# Clocks

- The Face or dial of a watch is a circle whose circumference is divided into 60
- equal parts, called ***minute spaces***.
- A clock has two hands, the smaller one is called ***the hour hand or short hand***
- while the larger one is called the ***minute hand or long hand..***
- i) In 60 minutes, the minute hand gains 55 minutes on the hour hand.
- ii) In every hour, both the hands coincide once.
- iii) The hands are in the same straight line when they are coincident or opposite to each other.
- iv) When the two hands are at right angles, they are 15 minute spaces apart.
- v) When the hands are in opposite directions, they are 30 minute spaces apart.
- vi) Angle traced by hour hand in 12 hrs =  $360^\circ$ .
- vii) Angle traced by minute hand in 60 min. =  $360^\circ$ .



# Clocks

- $12 \text{ hr} \times 30^\circ = 360^\circ$
- At night 12, day starts , both hands are at same place.
- Every hour they coincide once **but between 11-12 it coincides at 12**, so its 11 times only.
- The two hands coincide -
  - 11 times in 12 hours
  - 22 times in 24 hours
- The two hand are in opposite direction –
  - 11 times in 12 hours
  - 22 times in 24 hours
  - **Between 5-7 it happens only once at 6 o'clock.**
- The two hand make right angles –
  - 22 times in 12 hours
  - 44 times in 24 hours



# Clocks

- The hands of a clock coincide 11 times in every 12 hours (Since between 11 and 1, they coincide only once, *i.e.*, at 12 o'clock).

**AM**

**PM**

12:00

12:00

1:05

1:05

2:11

2:11

3:16

3:16

4:22

4:22

5:27

5:27

6:33

6:33

7:38

7:38

8:44

8:44

9:49

9:49

10:55

10:55

The hands overlap about every 65 minutes, not every 60 minutes.

∴ The hands coincide 22 times in a day.



# Clocks

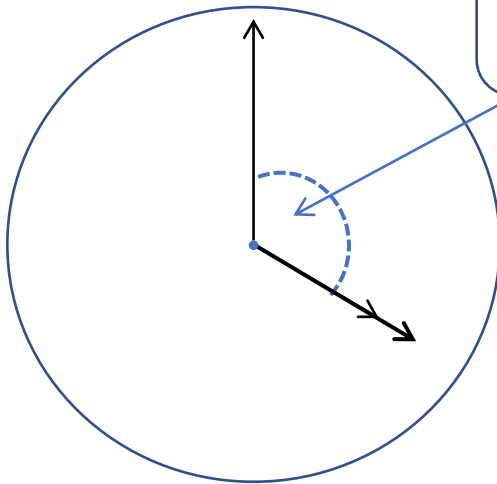
Q. At what time between 4 and 5 o'clock will the hands of a watch be together/coincide?

A.  $10 \frac{9}{11}$  min past 4    B.  $21 \frac{10}{11}$  min past 4    C.  $11 \frac{10}{11}$  min past 4    D.  $21 \frac{9}{11}$  min past 4

Soln:

• **Ans: D**

• Draw diagram of clock here



Distance travelled by minute hand is 20min-spaces.  
So  $D = 20$

$$\begin{aligned} T &= \frac{D}{S} \\ &= \frac{20}{11/12} \\ &= \frac{20 \times 12}{11} \\ &= \frac{240}{11} \\ &= 21 \frac{9}{11} \text{ mins. past 4} \end{aligned}$$





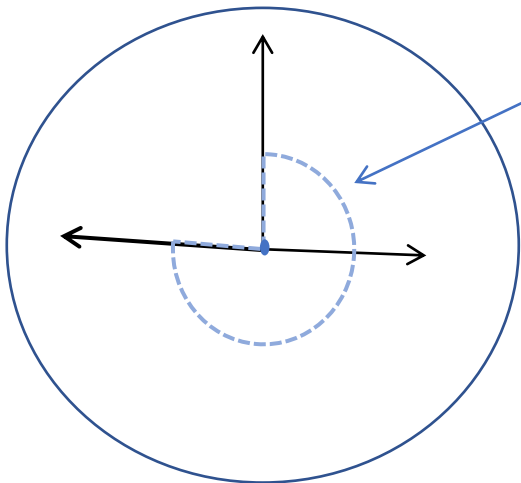
# Clocks

Q. At what time between 3 & 4 o'clock will the hands of the clock be in the opposite direction.

- A.  $40 \frac{9}{11}$  min past 3    B.  $30 \frac{10}{11}$  min past 3  
C.  $49 \frac{1}{11}$  min past 3    D.  $41 \frac{9}{11}$  min past 3

**Ans : C**

- Draw diagram of clock here



Distance travelled by minute hand is 45min-spaces.  
So  $D = 45$

$$\begin{aligned} T &= D/S \\ &= \frac{45}{11/12} \\ &= \frac{45 \times 12}{11} \\ &= \frac{540}{11} \\ &= 49 \frac{1}{11} \text{ mins. past 3} \end{aligned}$$



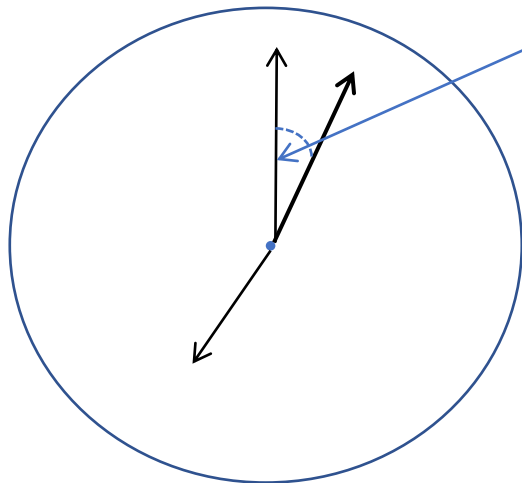
# Clocks

Q. At what time between 7 and 8 o'clock will the hands of a clock be in the same straight line but, not together? ← means in opposite direction

A. 5 min. past 7      B.  $5\frac{2}{11}$  min. past 7      C.  $5\frac{3}{11}$  min. past 7      D.  $5\frac{5}{11}$  min. past 7

**Soln:**

- **Ans: D**
- Draw diagram of clock here



Distance travelled by minute hand is 5 min-spaces.  
So  $D = 5$

$$\begin{aligned} T &= D/S \\ &= \frac{5}{11/12} \\ &= \frac{5 \times 12}{11} \\ &= \frac{60}{11} \\ &= 5\frac{5}{11} \text{ mins. past 7} \end{aligned}$$



# Clocks

Q. What is the angle between the hands of a clock at 7:23 am?

A.  $90^\circ$     B.  $85.5^\circ$     C.  $83.5^\circ$     D.  $81.5^\circ$

**Soln:**

$$\begin{aligned}\text{Angle } \theta &= 30H - 11/2 M \\ &= 30 \times 7 - \frac{11}{2} \times 23 \\ &= 210 - 253/2 \\ &= 210 - 126.5 \\ &= 83.5^\circ\end{aligned}$$

**Ans : C**



# Clocks

Find the reflex angle between 2 hands of a clock at 10:25

A.  $187.5^\circ$     B.  $192.5^\circ$     C.  $197.5^\circ$     D.  $207.5^\circ$

**Soln:**

$$\begin{aligned}\theta &= |30H - 11/2 M| \quad \text{OR } |30H - 5.5 M| \\ &= 30 \times 10 - 11/2 \times 25 \\ &= 300 - 275/2 \\ &= 300 - 137.5 \\ &= 162.5^\circ\end{aligned}$$

But reflex angle is greater than  $180^\circ$  and less than  $360^\circ$

$$360 - 162.5 = 197.5^\circ$$

• **Ans: C**



# Clocks

Q. Find non reflex angle between 2 hands of a clock at 10:10

**Soln:**

$$\begin{aligned}\theta &= |30H - 11/2 M| \quad \text{OR } |30H - 5.5 M| \\ &= 30 \times 10 - 11/2 \times 10 \\ &= 300 - 55 \\ &= 245^\circ \quad \text{----} > \text{its a reflex angle} > 180^\circ\end{aligned}$$

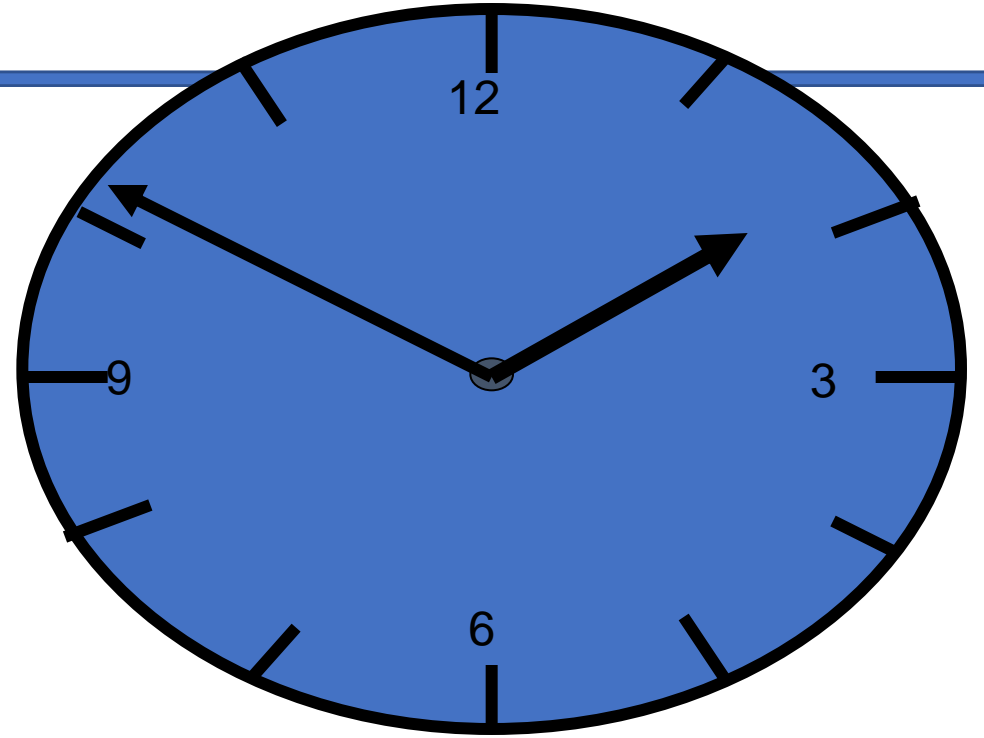
But reflex angle is greater than  $180^\circ$  and less than  $360^\circ$

$$360 - 245 = 115^\circ \text{ ----} \rightarrow \text{non reflex angle}$$



# Clocks

Please remember ,  
In a clock that runs correctly,  
hands overlap every **720/11 mins.** =  $65\frac{5}{11}$  mins



# Clocks - Method1

- The minute hands of a clock meet at intervals of 70 mins. How much does the clock gain or lose in one day?
- A.  $90 \frac{10}{77}$  min    B.  $93 \frac{39}{77}$  min    C.  $93 \frac{35}{143}$  min    D. None of these
- **Soln:**
- In a clock that runs correctly, hands overlap every  $720/11$  mins.
- In this clock hands are together after every 70 mins.
- So gain in 70 mins =  $720/11 - 70$  mins =  $(720-770)/11 = -50/11$
- 70 min  $\rightarrow 50/11$  min loss
- $24 \times 60$  min  $\rightarrow x$
- So gain in one day =  $(\frac{50}{11} \times 24 \times 60) / 70 = 93 \frac{39}{77}$  min
- **Ans: B**



# Clocks – Method2

Q. The minute hands of a clock meet at intervals of 70 mins. How much does the clock gain or lose in one day?

- A.  $90 \frac{10}{77}$  min    B.  $93 \frac{39}{77}$  min    C.  $93 \frac{35}{143}$  min    D. None of these

• **Soln:**

- The minute hand of a clock overtakes the hour hand at intervals of M minutes of correct time.

- The clock gains or loses in a day by  $= (720/11 - M)(60 \times 24/M)$  minutes.

- Here  $M = 70$ .

- The clock gains or losses in a day by-

- Gain/loss  $= (720/11 - M)(60 \times 24/M)$

$$= (720/11 - 70)(60 \times 24/70)$$

$$= \left( \frac{720 - 770}{11} \right) \left( \frac{6 \times 24}{7} \right)$$

$$= \left( \frac{-50}{11} \right) \left( \frac{144}{7} \right) = \frac{-7200}{77}$$

$$= 93 \frac{39}{77} \text{ min}$$





# Clock

Q. A clock is set at 4am. It loses 16 minutes in 24 hours. What will be the correct time when the clock indicates 9pm on the 4th day?

- A. 8pm      B. 7pm      C. 10pm      D. 11pm

• **Ans C**

- Time from 4am on a day to 9pm on the 4<sup>th</sup> day = 89 hours
- 23 hrs 44 minutes of this clock = 24 hours of the correct clock as this clock loses 16 minutes in 24 hours.
- $23 \text{ hrs } 44 \text{ minutes} = 23 \frac{44}{60} = 23 \frac{11}{15} = \frac{356}{15} \text{ hrs}$
- Now,  $\frac{356}{15} \text{ hrs of this clock} = 24 \text{ hours of correct clock}$
- 89 hours of this clock = ?
- $\frac{24 \times 11}{356} * 89 = 90 \text{ hours of the correct clock, i.e. the correct clock gains one hour over the incorrect clock.}$
- The correct time on the fourth day will be 10pm.



# Clocks(Assignment)

Q. An accurate clock shows 8 o'clock in the morning. Through how many degrees will the hour hand rotate when the clock shows 2 o'clock in the afternoon?

- A.  $144^\circ$       B.  $150^\circ$       C.  $168^\circ$       D.  $180^\circ$

- Soln:
- In one hour ----- the hour hand rotates  $30^\circ$
- In 6 hours ----- the hour hand rotates  $180^\circ$
- OR
- Number of hours from 8am till 2pm = 6hrs  
The rotation of an hour hand in one hour =  $30^\circ$   
Total degree of rotation =  $360^\circ$

Therefore, the Angle traced by the hour hand in 6 hours is =  $(360/12) \times 6 = 180^\circ$

- **Ans: D**



# Clocks(Assignment)

Q. What is the angle between the hands of a clock at 7:20 ?

- A.  $100^\circ$       B.  $192\frac{1}{2}^\circ$       C.  $195^\circ$       D.  $197\frac{1}{2}^\circ$

**Ans : A**

What is the angle between the hands of a clock at 2:30 ?

- A.  $144^\circ$       B.  $150^\circ$       C.  $105^\circ$       D.  $180^\circ$

**Ans : C**

What is the angle between the hands of a clock at 3:30 ?

- A.  $144^\circ$       B.  $150^\circ$       C.  $105^\circ$       D.  $75^\circ$

**Ans : D**



# Clocks(Assignment)

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

- A.  $10\frac{10}{143}$  min      B.  $10\frac{21}{143}$  min      C.  $10\frac{100}{143}$  min      D. None of these

**Ans: A**



# Clocks(Assignment)

Q. 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. West

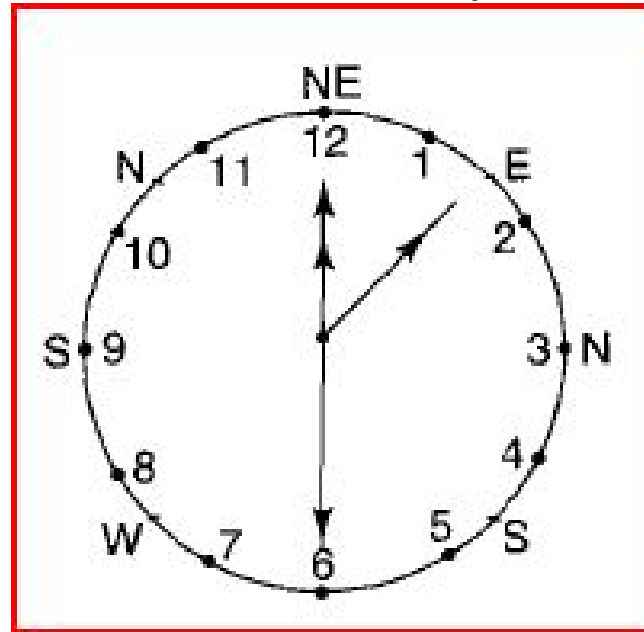
B. East

C. North

D. South

**Ans: B**

Diagram is shown as per the conditions in the question. Clearly at 1.30 p.m hour hand shall point - East.



# Permutation & Combination

- What is permutation?
- It is the number of ways a group of things can be arranged.

E.g: Consider 3 letters A,B,C . In how many ways they can be arranged?

- A B C
  - A C B
  - B A C
  - B C A
  - C A B
  - C B A
- 6 ways to arrange these 3 letters

- For 3 letter / 4 letter words its possible but for more number of letters we need a formula-
- $nPr = \frac{n!}{(n-r)!}$



# Permutation & Combination

Q. Consider 4 letters A,B,C,D and arrange them in 3 spaces

- - - 3 spaces

No . Of letters = 4

No of spaces = 3

$$nPr = 4P_3 = \frac{4!}{(4-3)!} = \frac{4!}{1!} = 4! = 4 \times 3 \times 2 \times 1 = 24 \text{ ways it can be arranged}$$

Q. Arrange 7 letters A,B,C,D,E,F,G in 4 spaces

- - - - 4 spaces

$$nPr = 7P_4 = \frac{7!}{(7-4)!} = \frac{7!}{3!} = \frac{5040}{6} = 840$$



# Permutation & Combination - Remember

$$0! = 1$$

$$1! = 1$$

$$2! = 2 \times 1 = 2$$

$$3! = 3 \times 2 \times 1 = 6$$

$$4! = 4 \times 3 \times 2 \times 1 = 24$$

$$5! = 5 \times 4 \times 3 \times 2 \times 1 = 120$$

$$6! = 6 \times 5 \times 4 \times 3 \times 2 \times 1 = 720$$

$$7! = 7 \times 6 \times 5 \times 4 \times 3 \times 2 \times 1 = 5040$$





# Difference between permutation and combination

## Combination ( order does not matter)

***"My fruit salad is a combination of apples, grapes and bananas"*** We don't care what order the fruits are in, they could also be "bananas, grapes and apples" or "grapes, apples and bananas", its the same fruit salad.



## Permutation (When the order does matter )

***"The combination to the safe is 472"***. Now we **do** care about the order. "724" won't work, nor will "247". It has to be exactly **4-7-2**.



# Difference between permutation and combination

## What is permutation?

**Permutation:** The various ways of arranging a given number of things by taking some or all at a time are all called as permutations.

Permutation includes word formation, number formation, circular permutation, etc. **In permutation, objects are to be arranged in particular order.** It is denoted by  ${}^n P_r$  or  $P(n, r)$ .

**Example:** Arrange the given 3 numbers 1, 2, 3 by taking two at a time.

Now these numbers can be arranged in 6 different ways: **(12, 21, 13, 31, 23, 32).**

Here,

12 and 21, 13 and 31 or 23 and 32 do not mean the same, because here order of numbers is important.



# Difference between permutation and combination

- **What is combination?**

**Combination:** Each of different groups or selections formed by taking some or all number of objects is called a combination.

Combination is used in different cases which include team/group/committee.

**In combination, objects are selected randomly and here order of objects doesn't matter.** It is denoted by  ${}^n C_r$  or  $C(n, r)$  or  ${}^n C_r = {}^n C_{(n-r)}$ .

**Example:** If we have to select two girls out of 3 girls X, Y, Z, then find the number of combinations possible.

Now only two girls are to be selected and arranged. Hence, this is possible in 3 different ways: **(XY, YZ, XZ,).**

Here,  
You cannot make a combination as XY and YX, because these combinations mean the same.



# Permutation & Combination

Q. Out of 100 balls we choose 98 balls

Note – if no. of ball we need to choose is less (instead of reducing 98 times we just subtract 100-98)

$${}^{100}C_{98} = 100 - 98 = 2$$

$${}^{100}C_2 = \frac{100 \times 99}{1 \times 2} = 4950$$

Q. Out of 200 balls we choose 197 balls

$${}^{200}C_{197} = 200 - 197 = 3$$

$${}^{200}C_3 = \frac{200 \times 199 \times 198}{1 \times 2 \times 3} = 1313400$$



# Permutation & Combination

Q. In how many ways can the letters of the word 'LEADER' be arranged?

A. 72                      B. 144                      C. 360                      D. 720                      E. None of these

**Soln:**

The word LEADER has 6 letters. So it can be arranged in  $6!$  ways.

Out of these 6 letters, 2 letters are repeated (letter E repeated twice)

So we write it as -  $\frac{6!}{2!}$

$6!$  ways to arrange letters in the word LEADER

$2!$  In the denominator as letter E is repeated twice

$$= \frac{6 \times 5 \times 4 \times 3 \times 2 \times 1}{2 \times 1}$$

$$= 360 \text{ ways}$$

**Ans : C**



# Permutation & Combination

Q. 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                      E. None of these

**Soln:**

L E A D I N G  $\longrightarrow$  vowels in this word are E, A, I

Remaining letters(consonants) are - L D N G

now we can arrange the vowels together in the remaining spaces as

\_ L \_ D \_ N \_ G \_ in 5! ways and vowels be rearranged in those spaces in 3! ways

$$5! \times 3! = 720 \text{ ways}$$

**Ans : C**



# Permutation & Combination

Q. In how many different ways can the letters of the word 'CORPORATION' be arranged so that the vowels always come together?

- A. 810                      B. 1440                      C. 2880                      D. 50400                      E. 5760

**Soln:**

C O R P O R A T I O N----- vowels in this word are O,O,A,I,O

Remaining letters(consonants) are - C R P R T N

now we can arrange the vowels together in the remaining spaces as

\_C\_R\_P\_R\_T\_N\_ in 7! ways and vowels be rearranged in those spaces in 5! Ways

But the repeated letters are 2R in consonants and 3O in vowels

$$\frac{7!}{2!} \times \frac{5!}{3!} = 50400 \text{ ways}$$

**Ans : D**



# Permutation & Combination

Q. Out of 7 consonants and 4 vowels, how many words of 3 consonants and 2 vowels can be formed?

- A. 210                      B. 1050                      C. 25200                      D. 21400                      E. None of these

**Soln:**

we need to form a 5 letter word with 3 consonants & 2 vowels = C C C V V

Ways to select, (3 consonants out of 7) AND (2 vowels out of 4)

$= 7C_3 \times 4C_2 \times 5!$   $\leftarrow$  each group has 5 letters and they can be arranged in 5! ways

$$= \frac{7 \times 6 \times 5}{3 \times 2 \times 1} \times \frac{4 \times 3}{2 \times 1} \times 5!$$

$$= 35 \times 6 \times 120$$

$$= 25200 \text{ ways}$$

**Ans : C**





# Permutation & Combination

Q. In how many different ways can the letters of the word 'DETAIL' be arranged in such a way that the vowels occupy only the odd positions?

A. 32                      B. 48                      C. 36                      D. 60                      E. 120

**Ans: C**



# Permutation & Combination

Q. 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                      E. None of these

**Soln:**

We may have (3 men and 2 women) or (4 men and 1 woman) or (5 men only).

Required number of ways =  $(7C3 \times 6C2) + (7C4 \times 6C1) + (7C5)$

$$\begin{aligned} &= \left( \frac{7 \times 6 \times 5}{3 \times 2 \times 1} \times \frac{6 \times 5}{2 \times 1} \right) + (7C3 \times 6C1) + (7C2) \rightarrow [\text{using } {}^nC_r = {}^nC_{(n-r)}] \\ &= 525 + \left( \frac{7 \times 6 \times 5}{3 \times 2 \times 1} \times \frac{6}{1} \right) + \left( \frac{7 \times 6}{2 \times 1} \right) \\ &= 525 + 210 + 21 \\ &= 756 \end{aligned}$$

**Ans: D**



# Permutation & Combination(Assignment)

Q. In a group of 6 boys and 4 girls, four children are to be selected. In how many different ways can they be selected such that at least one boy should be there?

- A. 159                      B. 194                      C. 205                      D. 209                      E. None of these

**Soln:**

(1 boy and 3 girls) or (2 boys and 2 girls) or (3 boys and 1 girl) or (4 boys).

$$= ({}^6C_1 \times {}^4C_3) + ({}^6C_2 \times {}^4C_2) + ({}^6C_3 \times {}^4C_1) + ({}^6C_4)$$

$$= ({}^6C_1 \times {}^4C_1) + ({}^6C_2 \times {}^4C_2) + ({}^6C_3 \times {}^4C_1) + ({}^6C_2) \quad \rightarrow \text{using } {}^nC_r = {}^nC_{(n-r)} \text{ (to reduce calculation)}$$

$$= (6 \times 4) + \left( \frac{6 \times 5}{2 \times 1} \times \frac{4 \times 3}{2 \times 1} \right) + \left( \frac{6 \times 5 \times 4}{3 \times 2 \times 1} \times 4 \right) + \frac{6 \times 5}{2 \times 1}$$

$$= (24 + 90 + 80 + 15)$$

$$= 209$$

**Ans: D**



# Permutation & Combination(Assignment)

Q. How many 4-letter words with or without meaning, can be formed out of the letters of the word, 'LOGARITHMS', if repetition of letters is not allowed?

- A. 40
- B. 400
- C. 5040
- D. 2520

**Ans: C**



# Permutation & Combination(Assignment)

Q. 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

**Ans: C**



# Permutation & Combination(Assignment)

Q. In how many different ways can the letters of the word 'OPTICAL' be arranged so that the vowels always come together?

- A. 120
- B. 720
- C. 4320
- D. 2160
- E. None of these

**Ans: B**



# Permutation & Combination(Assignment)

Q. How many Permutations of the letters of the word APPLE are there?

A.600                  B.120                  C.240                  D.60

**Ans: D**



# Permutation & Combination(Assignment)

Q. How many different words can be formed using all the letters of the word ALLAHABAD?

A.7560

B.7890

C.7650

D. None of these

**Ans: A**





# Permutation & Combination(Assignment)

Q. Find the value of  ${}^{50}P_2$

- A. 4500
- B. 3260
- C. 2450
- D. 1470

**Ans : C**



# Permutation & Combination(Assignment)

Q. How many words can be formed by using letters of the word 'DELHI'?

- a. 50
- b. 72
- c. 85
- d. 120

**Ans : D**



# Permutation & Combination(Assignment)

Q. Find the number of ways the letters of the word 'RUBBER' can be arranged?

- A. 450
- B. 362
- C. 250
- D. 180

**Ans: D**



# Permutation & Combination(Assignment)

Q. Out of 5 consonants and 4 vowels, how many words of 3 consonants and 2 vowels can be formed?

- A. 60
- B. 200
- C. 5230
- D. 7200

**Ans : D**



# Permutation & Combination(Assignment)

Q. In how many ways can a group of 5 men and 2 women be made out of a total of 7 men and 3 women?

- A. 63
- B. 90
- C. 126
- D. 45
- E. 135

**Ans: A**



# IMPORTANT FORMULAE

- **I.1.**Area of a rectangle=(length x breadth)
- Therefore length = (area/breadth) and breadth=(area/length)
- **2.**Perimeter of a rectangle = 2 x (length + breadth)
  
- **II.**Area of a square = (side)<sup>2</sup> =1/2(diagonal)<sup>2</sup>
- **III** Area of four walls of a room = 2\*(length + breadth)\*(height)
  
- **IV** 1.Area of the triangle=1/2(base\*height)
- 2. Area of a triangle = (s\*(s-a)(s-b)(s-c))<sup>(1/2)</sup>, where a,b,c are the sides of a triangle & s= ½(a+b+c)
- 3.Area of the equilateral triangle =((3<sup>1/2</sup>)/4)\*(side)<sup>2</sup>



# IMPORTANT FORMULAE

- **V.1.**Area of the parellogram =(base \*height)
- 2.Area of the rhombus= $1/2$ (product of the diagonals)
- 3.Area of the trapezium= $1/2$ (size of parallel sides)\*distance between them.
  
- **VI** 1.Area of a circle = $\pi r^2$ ,where r is the radius
- 2. Circumference of a circle =  $2\pi R$ .
- 3. Length of an arc =  $2\pi R\theta/(360)$  where  $\theta$  is the central angle
- 4. Area of a sector =  $(1/2) (\text{arc} \times R) = \pi R^2 \theta / 360$ .
  
- **VII.** 1. Area of a semi-circle =  $(\pi) R^2$ .
- 2. Circumference of a semi-circle =  $(\pi) R$ .
- where,  **$\pi$**  = 3.142



# VOLUME AND SURFACE AREA – IMPORTANT FORMULAE

- **I. CUBOID**

- Let length = l, breadth = b and height = h units. Then,
- **1. Volume** = (l x b x h) cubic.units.
- **2. Surface area** =  $2(lb + bh + lh)$  sq.units.
- **3. Diagonal** =  $\sqrt{l^2 + b^2 + h^2}$  units

- **II. CUBE**

- Let each edge of a cube be of length a. Then,
- **1. Volume** =  $a^3$  cubic units.
- **2. Surface area** =  $6a^2$  sq. units.
- **3. Diagonal** =  $\sqrt{3} a$  units.

- **III. CYLINDER**

- Let radius of base = r and Height (or length) = h. Then,
- **1. Volume** = ( $\pi r^2 h$ ) cubic units.
- **2. Curved surface area** = ( $2\pi rh$ ). units.
- **3. Total surface area** =  $2\pi r (h+r)$  sq. units





# VOLUME AND SURFACE AREA – IMPORTANT FORMULAE

- **IV. CONE**

- Let radius of base =  $r$  and Height =  $h$ . Then,
- **1. Slant height,  $l = \sqrt{h^2 + r^2}$**
- **2. Volume** =  $(1/3) \pi r^2 h$  cubic units.
- **3. Curved surface area** =  $(\pi rl)$  sq. units.
- **4. Total surface area** =  $(\pi rl + \pi r^2)$  sq. units.

- **V. SPHERE**

- Let the radius of the sphere be  $r$ . Then,
- **1. Volume** =  $(4/3) \pi r^3$  cubic units.
- **2. Surface area** =  $(4 \pi r^2)$  sq. units.

- **VI. HEMISPHERE**

- Let the radius of a hemisphere be  $r$ . Then,
- **1. Volume** =  $(2/3) \pi r^3$  cubic units.
- **2. Curved surface area** =  $(2 \pi r^2)$  sq. units.
- **3. Total surface area** =  $(3 \pi r^2)$  units.



