GENERAL APTITUDE

Trainer : Sujata Mohite

sujata.mohite@sunbeaminfo.com

Time & Distance

- **Speed = Distance / Time**

- **Distance = Speed x Time**

- Ram travels from A to B traveling distance of 10 km in 4 hrs. His speed is

- **10/4 = 2.5 km/hr**

- Ram moves from Pune to Satara at the same speed taking 1 day & 10 hrs. The distance between Pune & Satara is

- **(24+10) x 2.5 = 34 x 2.5 = 85 km**

- Ram now wants to reach back to Pune in 17 hours So he should travel back at a speed of

- **85/17 = 5 km/hr**

Time & Distance

- If the same distance is traveled at different speeds S1 & S2 then average speed is given by-

$$Sa = \frac{(2 \times S1 \times S2)}{(S1 + S2)}$$

If the same distance is traveled at different speeds S1 ,S2 & S3 then average speed is given by-

$$Sa = \frac{(3 \times S1 \times S2 \times S3)}{(S1S2 + S2S3 + S1S3)}$$

- **Imp : Convert every term to same units**
- **1 Km/hr = 5/18 m/s & 1 m/s = 18/5 km/hr**
- If a bowler has a run up of 100 m & he runs at a speed of 36 km/hr the time he takes to complete his runup is
- **36 x 5/18 m/s = 10m/s**
- **100m ÷10 m/s = 10 s**

Time & Distance

If different distance D1,D2 & D3 travelled is at different speeds S1 ,S2 & S3 then average speed is given by-

$$Sa = \frac{(D1 + D2 + D3)}{\left(\frac{D1}{S1} + \frac{D2}{S2} + \frac{D3}{S3}\right)}$$

- Q. A man covers 10kms at a speed of 5 km/hr, 30kms at a speed of 7 km/hr abd 20kms at a speed of 15 km/hr. Find out the average speed.

- $Sa = \dfrac{(10+ 30 + 20)}{\left(\frac{10}{5} + \frac{30}{7} + \frac{20}{15}\right)}$ = 7.77 km/hr

Time & Distance

- **Speed & distance are directly proportional.**

- **S α D**

- **Distance & Time are directly proportional.**

- **D α T**

- **Speed & time are inversely proportional.**

- **S α 1/T**

- **Relative speed** is **defined** as the **speed** of a moving object with respect to another. When two objects are moving in the same direction, **relative speed** is calculated as their difference and if objects are moving in opposite direction then calculate as their sum.

- **Relative speed = X-Y (same direction)**
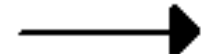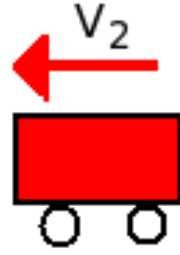
- **Relative speed = X+Y (opposite direction)**

Relative Speed-
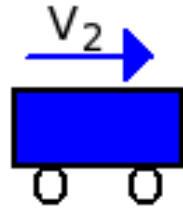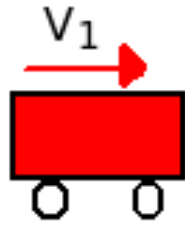
Relative Speed $= V_1 - V_2$

Objects Moving in Same direction
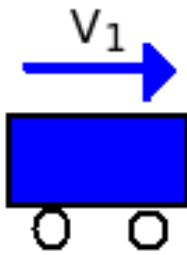
Relative Speed $= V_1 + V_2$

Objects Moving in Opposite Direction

Time & Distance

Q. A certain distance is covered by a car at a certain speed. If a motorcycle covers half the distance in double time, the ratio of the speed of the motorcycle to the car is

A. 4:1   B. 1:2   C. 1:4   D. 2:3

Soln:

- Let Car cover distance d in time t → $S_c = d \div t$

- Motorcycle covers dist d/2 in time 2t → $S_m = d/2 \div 2t$

- → $S_m = d/4t$

- → $S_m : S_c = d/t : d/4t = 1:4$

- **Ans : C**

Time & Distance

Q. A car traveled 20% of the time at 30 km/hr, 50% of the time at 40 km/hr and rest of the journey at 50 km/hr. What is the average speed of the car over the whole journey?

A. 40 km/hr   B. 35 km/hr   C. 41 km/hr   D. 45 km/hr

Soln:

Avg Speed   = total dist / total time
Assume Journey   = T hr
Total Distance   = (0.2Tx30 + 0.5Tx40 + 0.3Tx50)
                      = 6T + 20T + 15T
                      = 41T

Average Speed   = 41T/T = 41 kmph

Ans: C

$$Sa = \frac{(D1 + D2 + D3)}{(\frac{D1}{S1} + \frac{D2}{S2} + \frac{D3}{S3})}$$

$$= \frac{(20x30 + 50x40 + 30x50)}{(\frac{20x30}{30} + \frac{50x40}{40} + \frac{30x50}{50})}$$

$$= \frac{4100}{100} = 41 \text{ km/hr}$$

Time & Distance

Q. At 7:30 am two trains start from their respective stations A & B in opposite direction, 930 km apart at speeds of 60 km/hr & 90 km/hr respectively. At what time do they meet?

A. 12:30 pm   B. 1:30 pm   C. 1:42 pm   D. 1:50 am

Soln:

- Time = Distance/ Speed
- Time = 930 km / (60+90)km/hr (relative Speed adds up)
- Time = 6.20 hours = 6 hrs 12 min
- Time of meeting 1:42 pm

Ans: C

Time & Distance

Q. Walking at a speed of 4/5 of the original speed a person reaches office 8 min late (8 mins more than normal time). Find the time required usually.

A. 24 min   B. 30 min   C. 32 min   D. 44 min

Soln:

	Original	New
Speed	S	4S/5
Time	T	T+8

Speed x Time = Distance is constant

→ST   = 4S/5 x (T+8)

→T   = 4/5 x (T+8)

→5T/4 = T+8

→$\frac{5T}{4}$ - T =8

→ Normal Time T = 32 mins

Ans: C

Time & Distance(Assignment)

Q. A boy starts from his house for college at a fixed time. If he walks at the rate of 5 kmph he is late by 7 mins. If he walks at 6 kmph he is 5 min early. Find College to home distance.

A. 5 km   B. 6 km   C. 7 km   D. 6.5 km

	Original	Case1	Case2
Speed	s	5	6
Time	t	t+7	t-5

Speed x Time = Distance is constant

→ st = 5 x (t+7)/60 = 6 x (t-5)/60

→ 5t + 35 = 6t – 30

→ t = 65 mins

→ Using Case 1 Distance = 5 x (65+7)/60 = 6 km

Ans B

Time & Distance(Assignment)

Q. One day a person travels to office at 5/6 of his usual speed. He takes t minutes more than normal time. What is his normal time?

A. 2t   B. 3t   C. 4t   D. 5t

Soln:

	Original	New
Speed	S	5S/6
Time	T	T+t

Speed x Time = Distance is constant

→ST   = 5S/6 x (T+t)

→T   = 5/6 x (T+t)

→6T/5= T+t

→T/5   = t   → Normal Time T = 5t

Ans: D

Time & Distance(Assignment)

Q. A boy goes to school from home at a speed of 10km/hr and return back at 30km/hr. Find his average speed.

A. 15 km/hr   B. 14.5 km/hr   C. 10 km/hr   D. 20 km/hr

Ans: A

Time & Distance(Assignment)

Q. A person travels equal distance with speeds of 3 km/hr, 4 km/hr and 5 km/hr and taken a total time of 47 minutes. The total distance (in km) is :

A. 2 km   B. 3 km   C. 4 km   D. 5 km

Ans: B

If the same distance is traveled at different speeds S1 ,S2 & S3 then average speed is given by-

$$Sa = \frac{(3 \times S1 \times S2 \times S3)}{(S1S2 + S2S3 + S1S3)} = \frac{(3 \times 3 \times 4 \times 5)}{(3x4 + 4x5 + 3x5)} = \frac{20x9}{47}$$

Total Dist = Speed x time

$$= \frac{20x9}{47} \times \frac{47}{60}$$

$$= 3 \text{ km/hr}$$

Time & Distance(Assignment)

Q. A man covers half of his journey at 6 km/h and the remaining half at 3 km/h. His average speed is-

A. 9 km/hr   B. 4.5 km/hr   C. 4 km/hr   D. 3 km/hr

Soln:

- Average speed= $\frac{2xy}{x+y}$ = $\frac{2 \times 6 \times 3}{6+3}$ = $\frac{36}{9}$ = 4 km/hr

Ans: C

Time & Distance(Assignment)

Q. On a journey, across Delhi, a Taxi averages 30 kmph for 60% of the distance, 20 kmph for 20% of it and 10kmph for the remainder. The average speed for the whole journey is :

A. 20km/hr   B. 22.5 km/hr   C. 24.625km/hr   D. 25km/hr

Ans: A

Time & Distance(Assignment)

Q. A distance is covered by a cyclist at a certain speed. If a jogger covers half of the distance in double the time, the ratio of the speed of the jogger to that of the cyclist is :

A. 1 : 4   B. 4 : 1   C. 1 : 2   D. 2 : 1

Ans: A

Time & Distance(Assignment)

Q. Walking at a speed of 20% more than the original a person requires 6 min less than normal time. Find the time required usually

A. 24 min   B. 30 min   C. 36 min   D. 44 min

- **Ans C**

Time & Distance(Assignment)

Q. Walking at a speed of 12 km/hr a person reaches 10 min late. But if he walks at 20 km/hr he reaches 14 min early. Find the distance.

A.9 km   B. 12 km   C. 14 km   D. 15 km

Ans: B

Time & Distance(Assignment)

Q. Two cars started simultaneously travelling toward each other from town A and town B 480km apart. It took first car travelling from town A to town B and car covered the distance in 8hrs and car from town B to town A covers distance in 12hrs. Find distance from town A when they meet?

A. 288km   B. 250km   C. 380km   D. 240km

Ans: A

- Speed of first car = Distance/ time = 480 /8 = 60km/hr

- Speed of second car = Distance/ time = 480 /12 = 40km/hr

- The cars will meet in = 480 / (60+40) = 4.8 hrs   (relative Speed adds up as travelling in opposite directions)

- Dist from A where they will meet = speed of car from A x time
                                      = 60   x 4.8   = 288km

Time & Distance(Assignment)

Q. A car travels 1/3 of the distance on a straight road with a velocity of 10 km/h, next one-third with a velocity of 20 km/h and the last one-third with a velocity of 60 km/h. Then the average velocity of the car (in km/h) during the whole journey is-

A. 18km/hr   B. 24km/hr   C. 30km/hr   D. 20km/hr

Ans: A

$$\text{Time} = \frac{\text{Dist}}{\text{Speed}}$$

$$\text{Total Time} = \frac{1/3D}{10} + \frac{1/3D}{20} + \frac{1/3D}{60}$$

$$= \frac{D}{30} + \frac{D}{60} + \frac{D}{180}$$

$$= \frac{6D + 3D + 1D}{180}$$

$$= \frac{10D}{180} \text{ hrs}$$

$$\text{Avg velocity} = \frac{\text{Dist}}{\text{time}}$$

$$= \frac{D}{\frac{10D}{180}}$$

$$= \frac{180D}{10D}$$

$$= 18 \text{ km/hr}$$

Time & Distance(Assignment)

Q. A man riding his bicycle covers 150 metres in 25 seconds. What is his speed in km per hour ?

A. 25 km/hr

B. 21.6 km/hr

C. 23 km/hr

D. 20 km/hr

Ans: B

Time & Distance(Assignment)

Q. A motorist travelled the distance between two towns, which is 65 km, in 2 hours and 10 minutes. Find his speed in meter per minute.

A. 200 meters/min

B. 500 meters/min

C. 600 meters/min

D. 700 meters/min

Ans: B

Trains

- ## Trains

- Let S1 = speed of train,   S2 = Speed of Object

     L1 = length of the train, L2 = Length of the object.

       t = time taken by train to completely pass the object

Case A : Stationary object without considerable length

       L1   = S1x t

Trains

Q. 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 metres   B. 180 metres   C. 324 metres   D. 150 metres

Ans : D

Case A : Stationary object without considerable length

$$L1 = S1 \times t$$

$$= 60 \times 5/18 \times 9$$

$$= 150m$$

- ## **Trains**

- Let S1 = speed of train,   S2 = Speed of Object

    L1 = length of the train, L2 = Length of the object.

        t = time taken by train to completely pass the object

Case B : Stationary object with considerable length

L1+L2 = S1x t

Time & Distance

Q. A train of length 600 m crosses a man standing on a platform in 45 sec & the same train crosses the complete platform in 2 min. What is the length of the platform?

A. 500 m   B. 700 m   C. 900 m   D. 1000 m

- **Soln**:

- Case A : **L1   = S1x t** (Train passing the man)

-                 600   = S1 x 45
                 S1   = 600/45
                           = 40/3

- Case B : **L1+L2 = S1x t** (Train passing the platform)

- 600+L2   = 40/3 x 120

- L2   = 1600 -600

- L2   = 1000 m

- **Ans D**

- ## **Trains**

- Let S1 = speed of train,   S2 = Speed of Object

  L1 = length of the train, L2 = Length of the object.

  t = time taken by train to completely pass the object

Case C : Moving object without considerable length

L1   = (S1±S2) x t

Time & Distance

Q. A train of length 600 mt crossed a man going in the same direction at 12 km/hr in 45 sec while the same train crossed another man coming from the opposite direction on a bike in 20 sec. Find the speed of the bike.

A.24 km/hr   B. 36 km/hr   C. 40 km/hr   D. 48 km/hr

Soln:

12 km/hr = 12 x 5/18 = 10/3 m/s

Case A : **L1 = (St-Sm) x t** (Train passing man)

600   = (St-10/3) x 45

St   = 50/3 m/s

Case B : **L1 = (St+Sb) x t** (Train passing the bike)

600   = (50/3+Sb) x 20

Sb   = 40/3 m/s x 18/5 = 48 km/hr

Ans: D

Trains

- ## Trains

- Let S1 = speed of train,   S2 = Speed of Object

  L1 = length of the train, L2 = Length of the object.

  t = time taken by train to completely pass the object

Case D : Moving Object with considerable length

  L1+L2 = (S1±S2) x t

Time & Distance

Q. Two trains of same length cross an electric pole in 12 sec & 20 sec respectively. Find in how much time do they cross each other while traveling in same direction?

A. 45 sec   B. 50 sec   C. 60 sec   D. 75 sec

Soln:

Case A : **L_1 = $S_1 \times t$** (Trains passing the pole)

L_1 $= S_1 \times 12 \rightarrow S_1 = L_1/12$

L_1 $= S_2 \times 20 \rightarrow S_2 = L_1/20$

Case B : **$L_1 + L_2 = (S_1 \pm S_2) \times t$** (Train passing other train)

$2L_1$ $= (L_1/12 - L_1/20) \times t$

2 $= (1/12 - 1/20) \times t$

2 $= 1/30 \times t \rightarrow t = 60$ sec.

Ans: C

Time & Distance(Assignment)

Q. Two trains of lengths 200 mt & 400 mt cross each other completely in 15 sec & 1.25 min respectively while going in opposite & same direction. Find the speed of the slower train.

A.24 m/s   B. 16 m/s   C. 40 m/s   D. 8 m/s

Soln:

Case A : **L1+L2 = (S1+S2) x t** (Trains passing opp direction)

200+400   = (S1+ S2) x 15

S1+S2 = 40 m/s ……(1)

Case B : **L1+L2 = (S1-S2) x t** (Trains passing same direction)

200+400   = (S1-S2) x 75

S1-S2   = 8 m/s …….(2)

2S1   = 48 → S1 = 24, S2=16

Ans: B

Time & Distance(Assignment)

Q. Person crosses a 600 m long street in 5 minutes. What is his speed in km per hour?

A. 3.6   B. 7.2   C. 8.4   D. 10

Ans: B

Time & Distance(Assignment)

Q. An aeroplane covers a certain distance at a speed of 240 kmph in 5 hours. To cover the same distance in 1 2/3 hours, it must travel at a speed of:

A. 300 kmph   B. 360 kmph   C. 600 kmph   D. 720 kmph

Ans: D

Time & Distance(Assignment)

Q. The ratio between the speeds of two trains is 7 : 8. If the second train runs 400 km in 4 hours, then the speed of the first train is:

A. 70 km/hr   B. 75 km/hr   C. 84 km/hr   D. 87.5 km/hr

Ans: D

Time & Distance(Assignment)

Q. A man on tour travels first 160 km at 64 km/hr and the next 160 km at 80 km/hr. The average speed for the first 320 km of the tour is:

A. 35.55 km/hr   B. 36 km/hr   C. 71.11 km/hr   D. 71 km/hr

Ans: C

Trains(Assignment)

Q. A train 125 m long passes a man, running at 5 km/hr in the same direction in which the train is going, in 10 seconds. The speed of the train is:

A. 45 km/hr   B. 50 km/hr   C. 54 km/hr   D. 55 km/hr

Ans: B

Time & Distance(Assignment)

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

L1 = (S1 – S2) x t

Time & Distance

- ## Boats & Streams

- If Speed of boat in still water = **x kmph**

- Speed of the stream = **y kmph** then

- Speed of the boat downstream **Sd = (x+y) kmph**

- Speed of the boat upstream **Su = (x-y) kmph**

- Speed of Boat in still water **X = ½ (Sd + Su)**

- Speed of the stream **Y = ½ (Sd – Su)**

Boats & Streams

Q. A boat goes 16 km upstream & returns back to original place in 6 hrs. If the speed of water is 2 kmph. Find the speed of boat in still water.

A. 3 kmph   B. 4 kmph   C. 6 kmph   D. 8 kmph

Soln

Let speed of boat = x, Speed of water y = 2

Case A : **Su = x-2**

Case B : **Sd = x+2**

Total time   = Tu   +   Td

6            $= 16/(x-2) + 16/(x+2)$

$6(x-2)(x+2) = 16(x+2) + 16(x-2)$

$6x^2 -24 = 16(2x)$

$6x^2 - 32x -24 = 0$

$3x^2 -16x - 12 = 0$ → $3x^2 -18x + 2x -12 = 0$ → $(3x+2)(x-6)=0$

→ x= 6 kmph

   Ans: C

Boats & Streams

Q. A man notices that it takes him thrice the time to row up than to row down the same distance. Find the speed of the boat in still water if the speed of water is 5 kmph?

A. 8 kmph   B. 8.5 kmph   C. 10 kmph   D. 10.5 kmph

Soln

Td : Tu = 1 : 3 → Sd : Su = 3 : 1

Let speed of boat = x, Speed of water = 5

→Sd = x+5, Su = x-5

→Sd/Su   = (x+5)/(x-5)

→3/1   = (x+5)/(x-5)

→3(x-5)   = x+5

→3x-15   = x+5 → 2x =20 → x= 10 kmph.

Ans: C

Boats & Streams(Assignment)

Q. A person covers 200 m in 15 sec while going upstream & 5 km in 3 min while going downstream. Find the speed of boat in still water.

A. 44 m/s   B. 74 m/s   C. 74 km/hr   D. 80 km/hr

Ans: C

Boats & Streams(Assignment)

Q. A man rows at the rate of 12 kmph in still water. It takes him 4 hr 16 min to row to a place 24 km away & back. What is the speed of water?

A. 3 kmph   B. 2.5 kmph   C. 2 Kmph   D. 1.5 kmph

Ans : A

Boats & Streams(Assignment)

Q. A man notices that it takes him 5 times the time to row up than to row down the same distance. Find the speed of the boat in still water if the speed of water is 20 kmph?
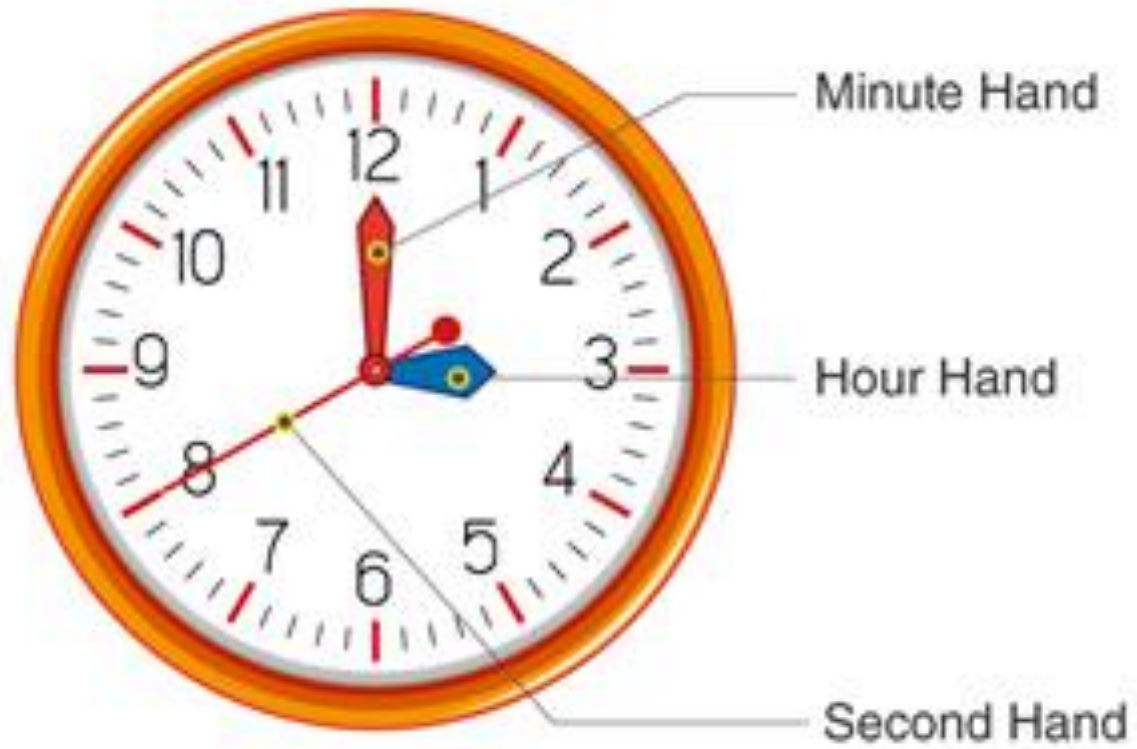
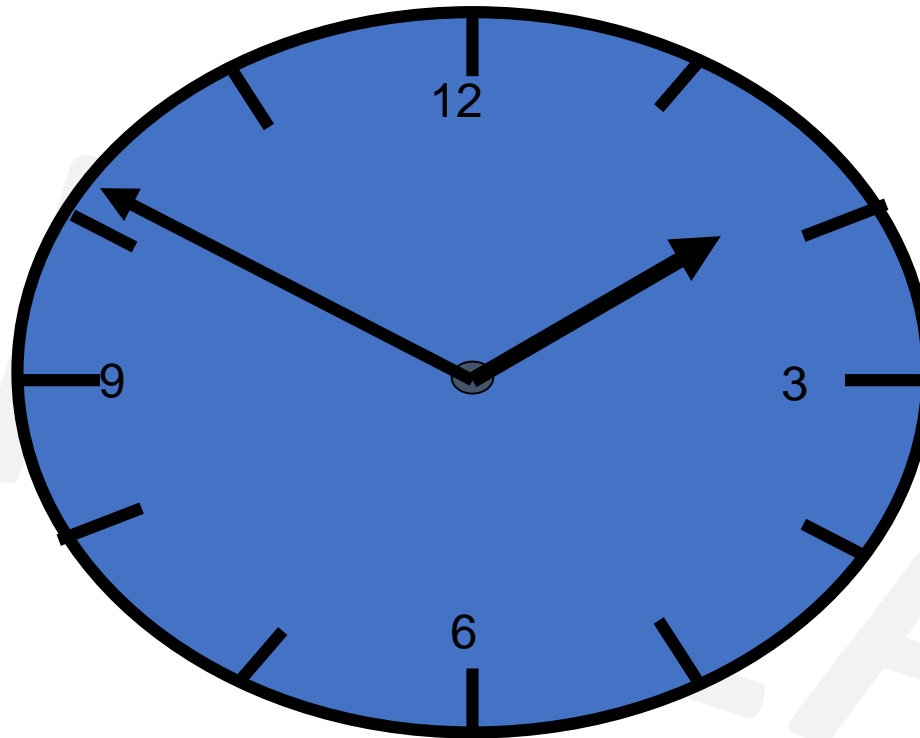A. 22 kmph   B. 25 kmph   C. 27 Kmph   D. 30 kmph

Ans: D

Clocks

Clocks

- → 360°
- → 60 minute spaces of 6° each
- → 12 Hours space of 30° 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 hand's are in opposite directions, they are 30 minute spaces apart.

- vi)Angle traced by hour hand in 12 hrs = 360°.

- vii)Angle traced by minute hand in 60 min. = 360°.

Clocks

- 12 hr x 30° = 360°

- 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
12:00
1:05
2:11
3:16
4:22
5:27
6:33
7:38
8:44
9:49
10:55

PM
12:00
1:05
2:11
3:16
4:22
5:27
6:33
7:38
8:44
9:49
10:55

The hands overlap about every 65 minutes, not every 60 minutes.
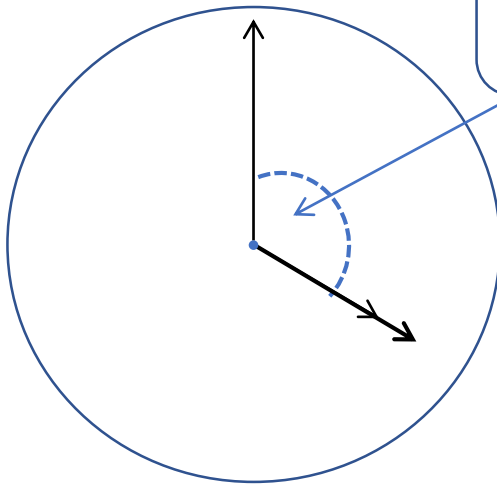
∴ The hands coincide 22 times in a day.

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

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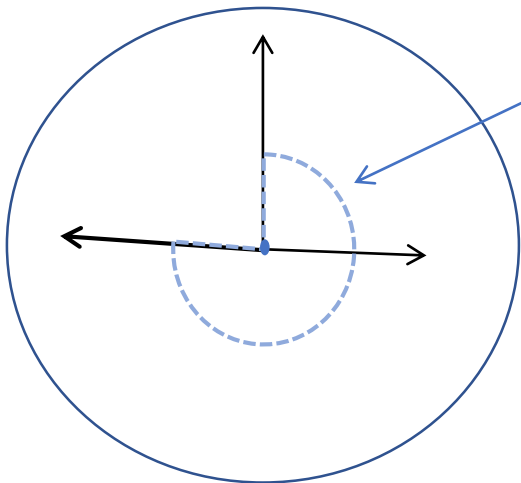$$= 21 \frac{9}{11} \text{ mins. past 4}$$

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

$$T = D/S$$

$$= \frac{45}{11/12}$$

$$= \frac{45 \times 12}{11}$$

$$= \frac{540}{11}$$

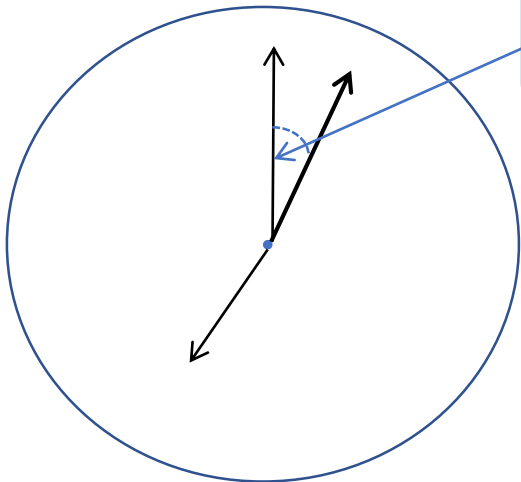$$= 49 \frac{1}{11} \text{ mins. past 3}$$

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 5min-spaces.
So D = 5

$$T = D/S$$

$$= \frac{5}{11/12}$$

$$= \frac{5 \times 12}{11}$$

$$= \frac{60}{11}$$

$$= 5\frac{5}{11} \text{ mins. past 7}$$

Clocks

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

A. $90°$ B. $85.5°$ C. $83.5°$ D. $81.5°$

Soln:

Angle θ = 30H – 11/2 M

$$= 30 \times 7 - \frac{11}{2} \times 23$$

$$= 210 - 253/2$$

$$= 210 - 126.5$$

$$= 83.5°$$

Ans : C

Clocks

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

A. 187.5°   B. 192.5°   C. 197.5°   D. 207.5°

Soln:

θ = | 30H -11/2 M | OR |30H – 5.5 M|

        = 30 x 10 - 11/2 x 25

        = 300 – 275/2

        = 300 – 137.5

        = 162.5 °

But reflex angle is greater than 180 ° and less than 360 °

360 – 162.5 = 197.5 °

- **Ans: C**

Clocks

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

Soln:

θ   = | 30H -11/2 M | OR |30H – 5.5 M|

       = 30 x 10 - 11/2 x 10

       = 300 – 55

       = 245°   ---- > its a reflex angle > 180°

But reflex angle is greater than 180 ° and less than 360 °
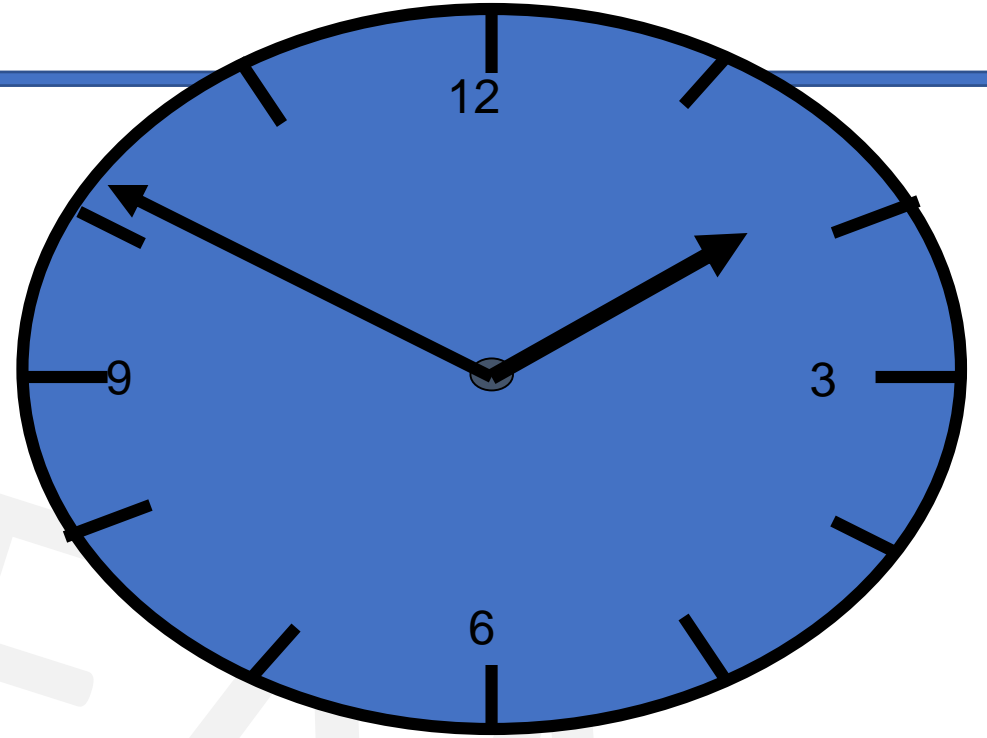
360 -245 = 115° ----→ non reflex angle

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/loss in 70 mins = 720/11 - 70 mins = (720-770)/11 = -50/11

- 70 min $\rightarrow$ 50/11 min loss

- 24 x 60 min $\rightarrow$ x

- So loss in one day = $(\frac{50}{11}$ x 24 x 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. $90\,^{10}/_{77}$ min   B. $93\,^{39}/_{77}$ min   C. $93\,^{35}/_{143}$ 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)(60×24/M) minutes.
- Here M = 70.
- The clock gains or losses in a day by-
- Gain/loss =(720/11−M)(60×24/M)

$$=(720/11-70)(60\times24/70)$$

$$=\left(\frac{720-770}{11}\right)\left(\frac{6\times24}{7}\right)$$

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

$$=93\,^{39}/_{77}\ \text{min}$$

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 4th 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 hrs 44 minutes = 23 $\frac{44}{60}$ = 23 $\frac{11}{15}$ = $\frac{356}{15}$ hrs

- Now, $\frac{356}{15}$ hrs of this clock = 24 hours of correct clock

- 89 hours of this clock = ?

- $\frac{24 \times 11}{356}$ * 89 = 90 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. 144⁰   B. 150⁰   C. 168⁰   D. 180⁰

- Soln:

- In one hour ----- the hour hand rotates 30°

- In 6 hours ------ the hour hand rotates 180°

- **OR**

- Number of hours from 8am till 2pm= 6hrs
  The rotation of an hour hand in one hour= 30°
  Total degree of rotation= 360°

  Therefore, the Angle traced by the hour hand in 6 hours is= (360/12)x6 = **180°**

- **Ans: D**

Clocks(Assignment)

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

A. 100°   B. 1921/2°   C. 195°   D. 197 1/2°

Ans : A

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

A. 144°   B. 150°   C. 105°   D. 180°

Ans : C

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

A. 144°   B. 150°   C. 105°   D. 75°

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 ?
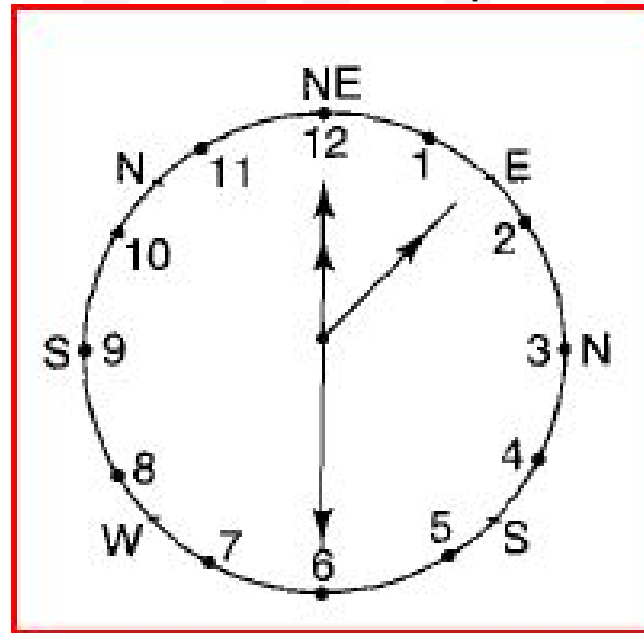
A. West   B. East   C. North   D. South

Ans: B

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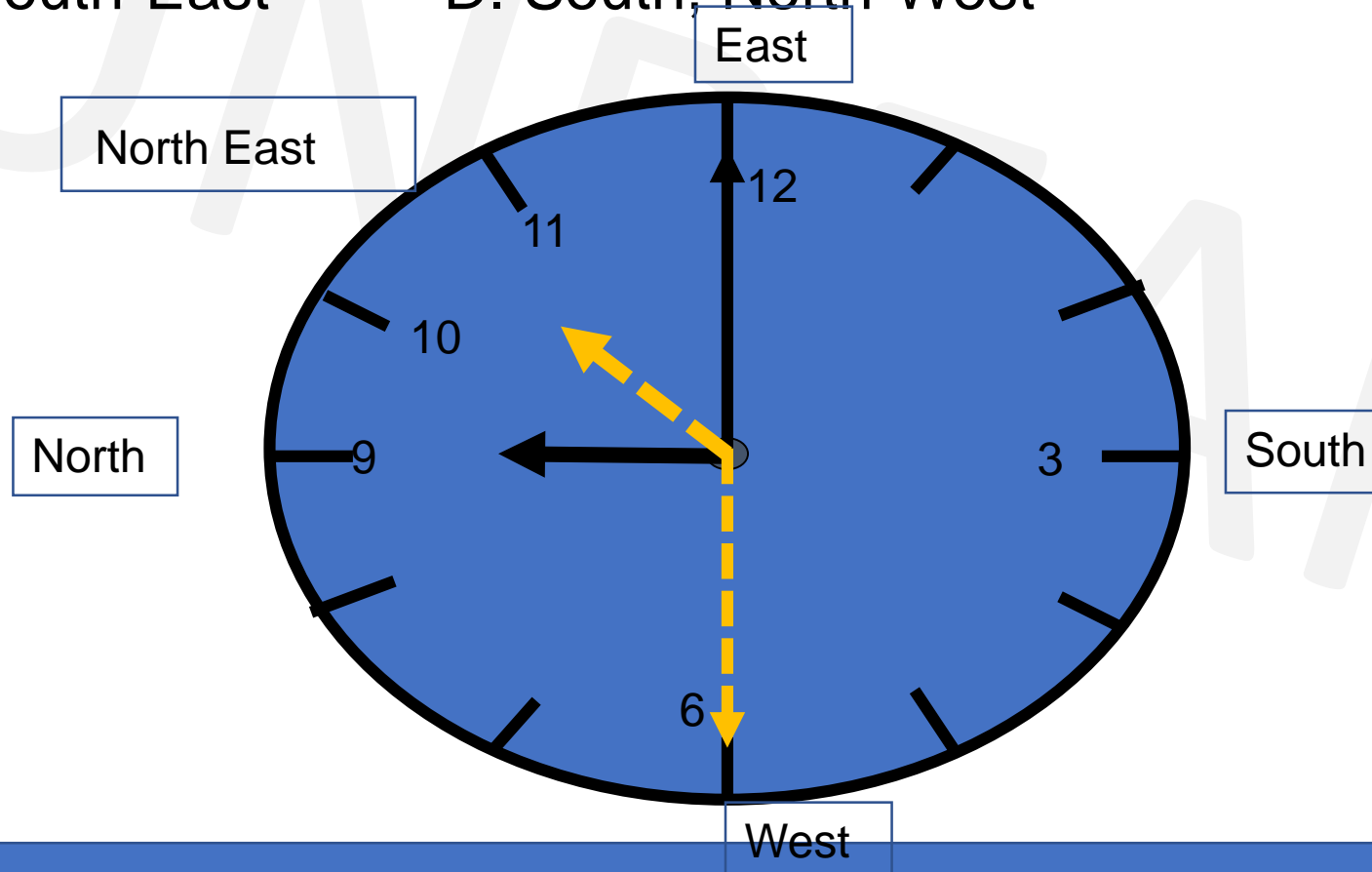
Clock(Assignment)

Q. Time piece kept in home is such that hour hand points to North at 9am..In which direction minute hand and hour hand point respectively at 10:30am?

A. West, North-East   B. East, North-West
        C. North, South-East   D. South, North-West

Ans: A

Races

Races

- A contest of speed in running, riding, driving, sailing or rowing is called a race.

- If in a race Ram is at starting point & Shyam starts from 20 mts ahead, then it is said that Ram has given Shyam a start of 20 mts or Ram gives Shyam 20 mts.

- This means that if they start from same point Ram would beat Shyam by 20 mts.

Races

Q. In a 100 mt race A gives B a start of 25 mt & still wins by 9 sec. Find the speed of A if speed of B is 6 kmph.

A. 8 kmph   B. 9 kmph   C. 10 kmph   D. 12 kmph

Soln

!-------------------------100 m--------------------------!

A<---25--->B<-----------75m----------------------------> A=t-9, B=t

S_b = 6 kmph   = 6 x 5/18 = 5/3 m/s

T_b = D_b/S_b = 75/(5/3) = 45 sec

T_a = T_b-9   = 36 sec

S_a = D_a/T_a = 100/36 m/s

                                    = 100/36 x 18/5

                                    = 10 kmph

Ans C

Races(Assignment)

Q. In a 100 m race, A can beat B by 25 m and B can beat C by 4 m. In the same race, A can beat C by:

A. 21 m   B. 26 m   C. 28 m   D. 29 m

- **Soln**:-

A : B = 100 : 75
B : C = 100 : 96

$A:C=(\frac{A}{B}\times\frac{B}{C})=(\frac{100}{75}\times\frac{100}{96})=100:72$

A beats C by (100−72)=28 m.

Ans: C

Circular Motion

- **Use of both relative speed & LCM**

- Let   Sa, Sb = speeds of two persons.

  Sr = Their relative speed

  Distance traveled in 1 round = circumference

Case A : Both running in Same direction

Both meet again first time when → **Time = dist/Sr = Circumference/Sa-Sb**

Case B : Both running in opposite directions**(DistA+ DistB =Circumference)**

Both meet first time when → **Time = Circumference/Sa+Sb**

Case C : Both running in same/opposite directions

Both meet again at starting point at LCM of their Lap times.

Circular Motion(Races)

Q. Two friends P & Q start from same point at the same time on a circular track 336 meters long in opposite directions at 6 m/s & 8 m/s respectively. After how much time will they meet again at the starting point for the first time?

A. 56 sec   B. 112 sec   C. 168 sec   D. 214 sec

Ans : C

Step1 – find the time taken by each member /player to complete 1 round

Step2 – Calculate LCM(Lap time)

LapTm(P) = $\frac{\text{Circumference}}{\text{Sp}}$ = $\frac{336}{6}$ = 56 sec

LapTm(Q) = $\frac{\text{Circumference}}{\text{SQ}}$ = $\frac{336}{8}$ = 42 sec

LCM(42,56) = 168 sec

Circular Motion(Assignment)

Q. A, B & C start together running along a circular track of 500 m at 8 km/hr, 5 km/hr & 3 km/hr respectively. After how much time will all three meet again at the starting point for the first time?

A.   20 min   B. 24 min   C. 30 min   D. 36 min

Ans: C

Probability

- How likely an event is supposed to happen.

- Probability $= \dfrac{\text{Favourable outcome}}{\text{Total number of outcomes}}$

- AND → multiply(x) e.g:- 1green and 1 blue ball in a box

- OR → Add (+) e.g:- 1 red or 1 blue ball in a box

- 1 bag has 3 balls, what is the probability of you picking up 2 balls?

  - $3C_2 = \dfrac{3 \times 2}{1 \times 2} = 3$

Total no. of balls
the bag contains

Out of which how many balls
We need to choose
(tells number of times 3 has to be reduces)

Probability $= \dfrac{\text{Favourable outcome}}{\text{Total number of outcomes}}$

Points to Remember

- The **probability** of an event will not be less **than** 0.

- This is because 0 is impossible (sure that something will not happen).

- The **probability** of an event will not be **more than 1**. This is because **1** is certain that something will happen.

- The probability of an event is **a number** describing the chance that the event will happen.

- An event that is certain to happen has a probability of 1.

- An event that cannot possibly happen has a probability of 0.

- If there is a chance that an event will happen, then its probability is between 0 & 1.

Probability

- **Atleast** – min to max

- Eg:- 2 bags out of 3

       min   max

So various probabilities to be done is 2 and 3

- **Atmost** - max to min

- Eg:- 1 bag has 3 balls out of which probability to pick up 2 balls

            atmost 2 $\rightarrow$ max 2 , 1 , 0 (min)

Probability

Q. 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

- **Soln-**

- Total balls = 2+3+2 =7 balls in the bag

- None = blue (neglect whichever color is written after none)

- Draw =2 balls

- Probability $= \dfrac{\text{Favourable outcome}}{\text{Total number of outcomes}} = \dfrac{2R \text{ or } (1R \text{ and } 1\,G) \text{ or } 2G}{7_{C_2}} = \dfrac{2C_2 + (2C_1 \times 31) + 3C_2}{7_{C_2}} = \dfrac{10}{21}$

Ans : A

Probability

Q. In a box, there are 8 red, 7 blue and 6 green balls. One ball is picked up randomly. What is the probability that it is neither red nor green?

A. 1/3   B. ¾   C. 7/19   D. 8/21   E. 9/21

Soln:

- Total balls = 8+7+6 = 21 balls in the box

- Neither red nor green means only blue

- Draw =1 ball

- Probability $= \dfrac{\text{Favourable outcome}}{\text{Total number of outcomes}} = \dfrac{1\,blue\ out\ of\ total\ 7}{21C_1} = \dfrac{7C_1}{21C_1} = \dfrac{7}{21} = \dfrac{1}{3}$

Ans: A

Probability

Q. What is the probability of getting a sum 5 from two throws of a dice?

A. 1/9   B. 1/8   C. 1/7   D. 1/6

Soln-

Dice =6 faces = 6 possibilities

So in two throws of dice, total possibilities = **6 x 6= 36**

Sum =5,so favourable outcomes are - { (1,4), (4,1) , (2,3) , (3,2) }

Probability $= \dfrac{\text{Favourable outcome}}{\text{Total number of outcomes}} = \dfrac{4}{36} = \dfrac{1}{9}$

Ans : A

Probability

Q. Three unbiased coins are tossed. What is the probability of getting utmost two heads?

A. ¾   B. ¼   C. 3/8   D. 7/8

- **Soln-**
- Total possibilities = {TTT, TTH, THT, HTT, THH, HTH, HHT, HHH}
- Event of getting utmost 2 heads = max 2H or 1H or 0H
- Possibility of getting 2 H = {TTT, TTH,THT, HTT, THH, HTH, HHT}
- Probability = $\frac{\text{Favourable outcome}}{\text{Total number of outcomes}} = \frac{7}{8}$

Ans: D

Probability

Q. 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. 25/117   C. 1/50   D. 3/25

Soln:

• Total students = 15 + 10 =25 students in a class

• Draw =3 students

$$\text{Probability} = \frac{\text{Favourable outcome}}{\text{Total number of outcomes}} = \frac{10C_1 \times 15C_2}{25C_3} = \frac{21}{46}$$

Ans : A

Probability

- A Standard deck of playing cards consist of 52 cards, among them there are 4 subgroups/suits –

- The four suits with there names , symbols and color –

1. The suit of Hearts ♥ ⟶ 13 cards

2. The suit of Diamonds ♦ ⟶ 13 cards

3. The suit of Clubs ♣ ⟶ 13 cards
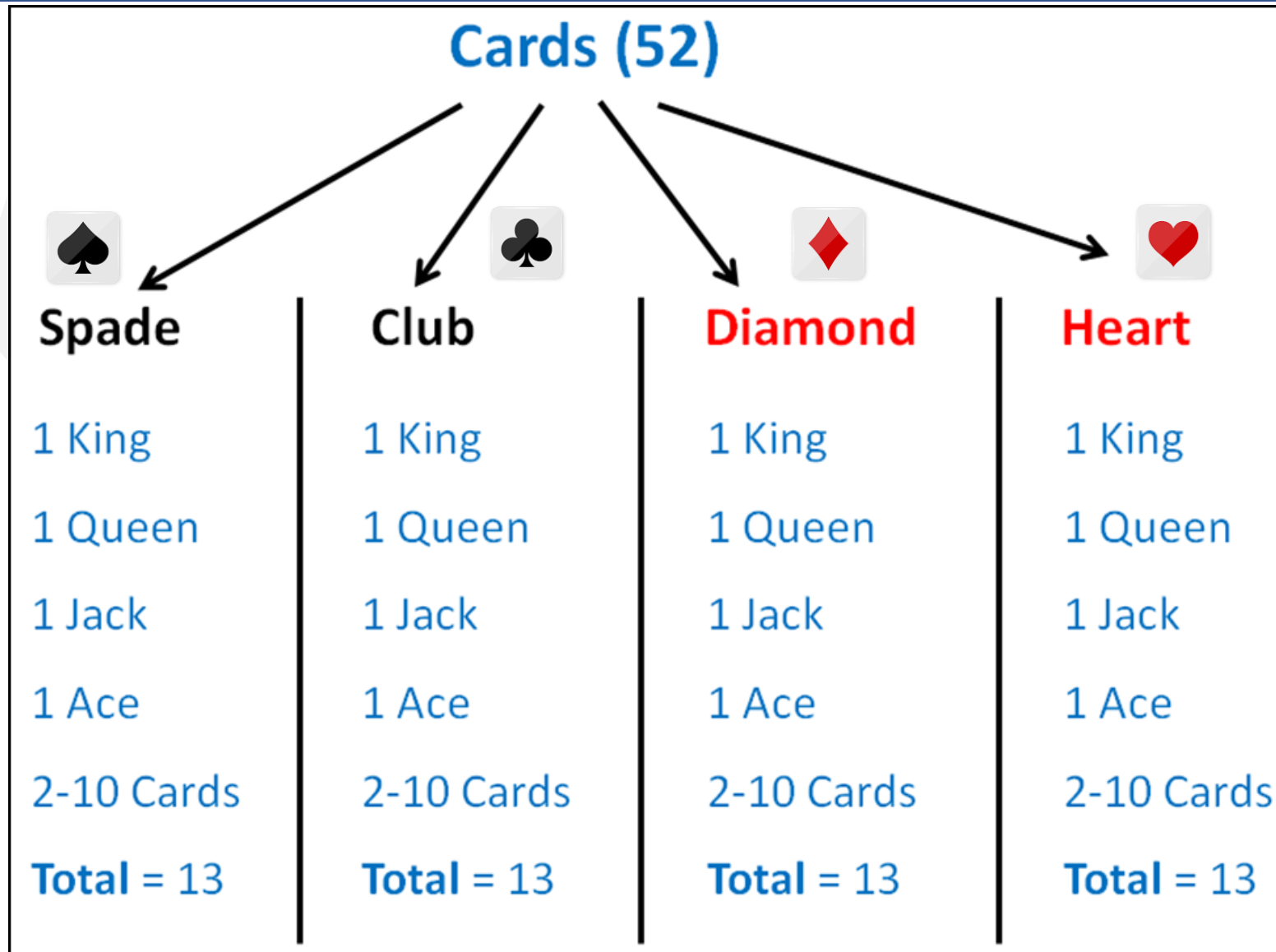
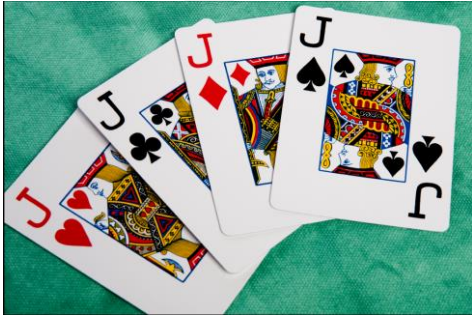4. The suit of Spades ♠ ⟶ 13 cards

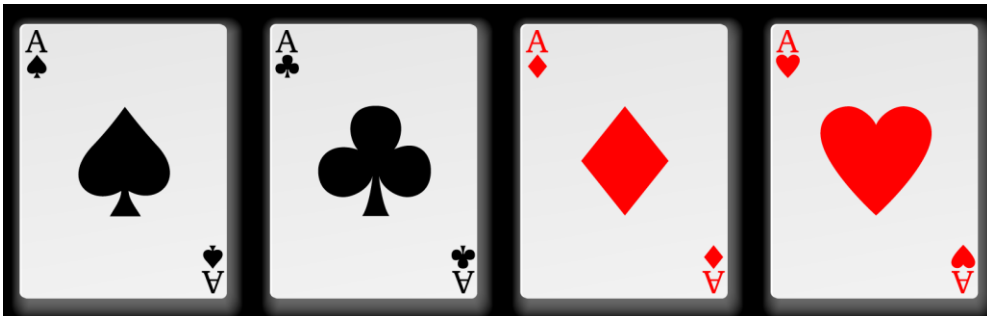26 red cards

26 black cards

Probability

Probability

- King, Queen and Jack (or Knaves) are **face cards**. So, there are **12 face cards** in the deck of 52 playing cards.

- **Jokers** are not normally considered to be **face cards**

- **Aces**

- There are 4 Aces in every deck, 1 of every suit.

Probability

Q. From a pack of 52 cards, two cards are drawn together at random. What is the probability of both the cards being kings?

A. 1/15   B. 25/57   C. 35/256   D. 1/221

- **Soln-**

- **Total cards in a pack =52**

- Total kings in a pack = 4

- Drawn =2

- Probability $= \dfrac{\text{Favourable outcome}}{\text{Total number of outcomes}} = \dfrac{4_{C_2}}{52_{C_2}} = \dfrac{1}{221}$

Ans : D

Probability

Q. Two dice are rolled. Find the probability of getting a sum of 8 or 11 on both the dices.

A. 5/36   B. 9/36   C. 7/36   D. 11/36

Ans: C

- Favorable outcomes for sum of 8 or 11 on both the dices are-
- (2,6),(3,5),(4,4),(5,3),(6,2),(5,6),(6,5)
- Number of favorable outcomes = 7
- Probability = $\frac{7}{36}$

Probability(Assignment)

A man tossed two dice. What is the probability that the total score is a prime number?

A. 5/12   B. 5/14   C. 5/20   D. 5/24

- **Soln-**

- **Dice =6 faces = 6 possibilities**

- 2 Dice = 6 x 6 = 36 possibilities

- Sum = prime number

- So favourable outcomes are - { (1,1), (1,2) , (1,4), (1,6) , (2,1) , (2,3) , (2,5) , (3,2) , (3,4) , (4,1) , (4,3) , (5,2) , (5,6) , (6,5) , (6,1) }

- Probability = $\frac{\text{Favourable outcome}}{\text{Total number of outcomes}} = \frac{15}{36} = \frac{5}{12}$

Ans : A

Probability(Assignment)

Q. A brother and sister appear for an interview against two vacant posts in an office. The probability of the brother's selection is 1/5 and that of the sister's selection is 1/3. What is the probability that one of them is selected?

A. 1/5   B. 2/5   C. 1/3   D) 2/3

Soln: -

(brother is selected and sister is not selected) OR (brother is not selected and sister is selected)

$$\text{Probability} = \frac{1}{5} \times \frac{2}{3} + \frac{4}{5} \times \frac{1}{3}$$

$$= \frac{6}{15}$$

$$= \frac{2}{5}$$

Ans: B

sister not selected = 1 – prob. of sister selected
$$= 1 - \frac{1}{3}$$
$$= \frac{2}{3}$$

brother not selected = 1 – prob. of brother selected
$$= 1 - \frac{1}{5}$$
$$= \frac{4}{5}$$

Probability(Assignment)

Q. Probability of occurrence of event A is 0.5 and that of event B is 0.2. the probability of occurrence of both A and B is 0.1. what is the probability that none of A and B occur?

A. 0.4   B. 0.5   C. 0.2   D. 0.1

Soln:

probability of sure event = 1

- Given P(A) = 0.5 and P(B) = 0.2

- P(A or B) = P(A ∪ B) = P(A) + P(B) – P(A ∩ B)

$$= 0.5 + 0.2 – 0.1 = 0.6$$

- And P(neither A nor B) = P(A' ∩ B') = 1 – P(A ∪ B) = 1 – 0.6 = 0.4.

Ans: A

- Note: P(A∪B) = P(A) + P(B) - P(A∩B)

- This is also known as the addition theorem of probability.

Probability(Assignment)

Q. 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

Ans : C

Probability(Assignment)

Q. What is the probability of getting a sum 9 from two throws of a dice?

A. 1/6   B. 1/8   C. 1/9   D. 1/12

Ans : C

Probability(Assignment)

Q. A bag contains 6 black and 8 white balls. One ball is drawn at random. What is the probability that the ball drawn is white?

A. ¾   B. 4/7   C. 1/8   D. 3/7

Ans : B

Probability(Assignment)

Q. A bag contains 6 blue balls, 3 white balls and 4 green balls. If two balls are drawn at random what is the possibility that they are not of the same color?

A. 6/13　　　　　　　　B. 7/13　　　　　　　　C. 9/13　　　　　　　　D. 10/13

- **Ans: C**

Probability(Assignment)

Q. One card is drawn at random from a pack of 52 cards. What is the probability that the card drawn is a face card (Jack, Queen and King only)?

A. 1/13   B. 1/4   C. 3/13   D. 9/52

Ans: C

Probability(Assignment)

Q. One card is drawn at random from a pack of 52 cards. What is the probability that the card drawn is not a face card (Jack, Queen and King only)?

A. 5/13   B. 10/13   C. 1/13   D. 1/26

Ans: B

Probability(Assignment)

Q. A basket contains 6 apples ,4 pears and 3 oranges. If two fruits are picked up at random, what is the probability that both are pears?

A. 4/13   B. 1/13   C. 2/13   D. 3/26

Ans: B

THANK YOU!