GENERAL APTITUDE

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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-

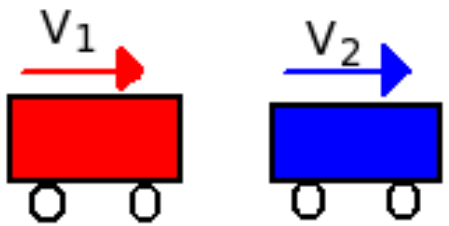
$$Sa = \frac{(D1 + D2 + D3)}{\left(\frac{D1}{S1} + \frac{D2}{S2} + \frac{D3}{S3}\right)}$$

- 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.
- $Sa = \frac{(10+ 30 + 20)}{\left(\frac{10}{5} + \frac{30}{7} + \frac{20}{15}\right)}$ = 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)**

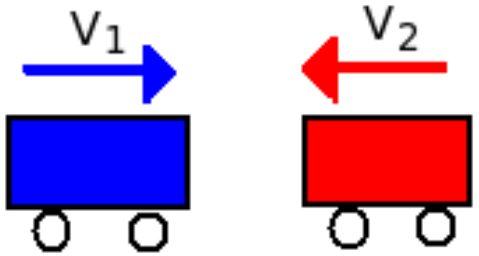
Relative Speed-



Objects Moving in Same direction

Relative Speed = $V_1 - V_2$

Relative Speed = $V_2 - V_1$



Objects Moving in Opposite Direction

Relative Speed = $V_1 + V_2$

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 → Sc = d÷t**
- **Motorcycle covers dist d/2 in time 2t→ Sm = d/2÷2t**
- **→ Sm = d/4t**
- **→ Sm : Sc = d/4t : d/t = 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

Q. A boy rides his bicycle 10km at an average speed of 12km/hr and again travels 12km at an average speed of 10km/hr. His average speed for the entire trip is approaximately

A. 10.4km/hr B. 10.8 km/hr C. 11 km/hr D. 12.2km/hr

Soln:

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

Ans: B

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

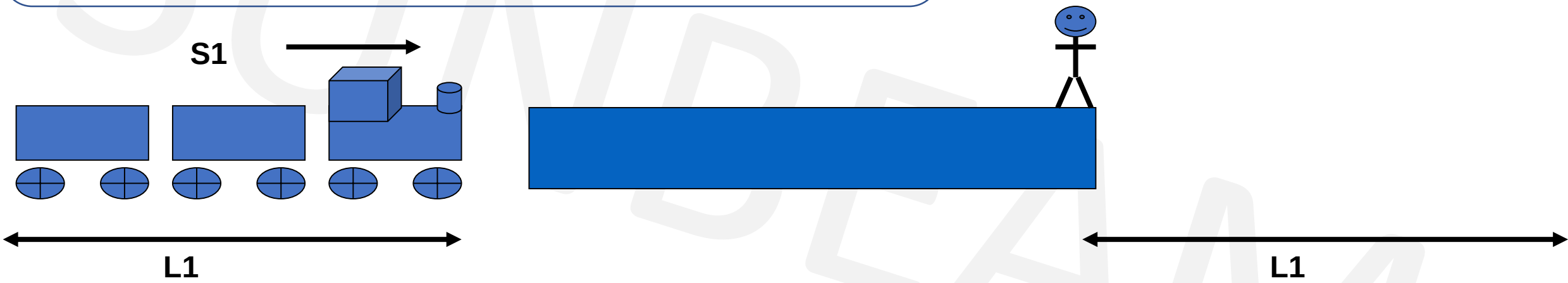
Case A : Stationary object without considerable length

L1 = S1x t

Trains

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 = S1x t

= 60x5/18 x 9

=150m

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

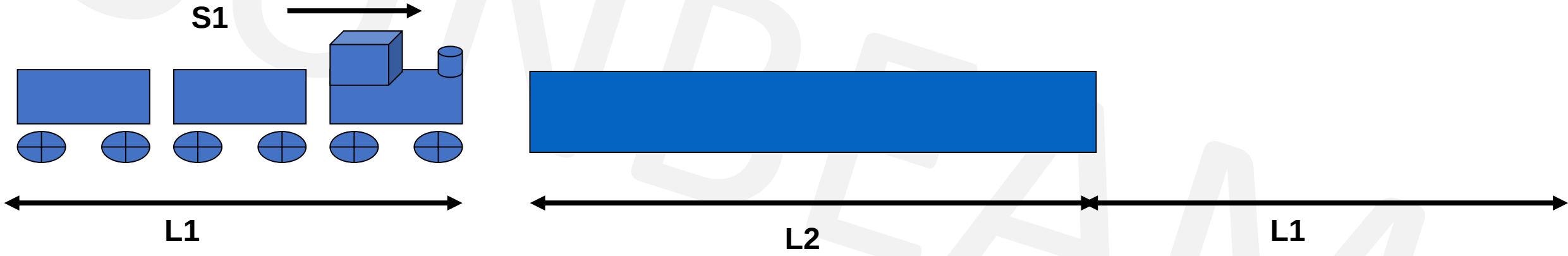
Case B : Stationary object with considerable length

L1+L2 = S1x t

Trains

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

- **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

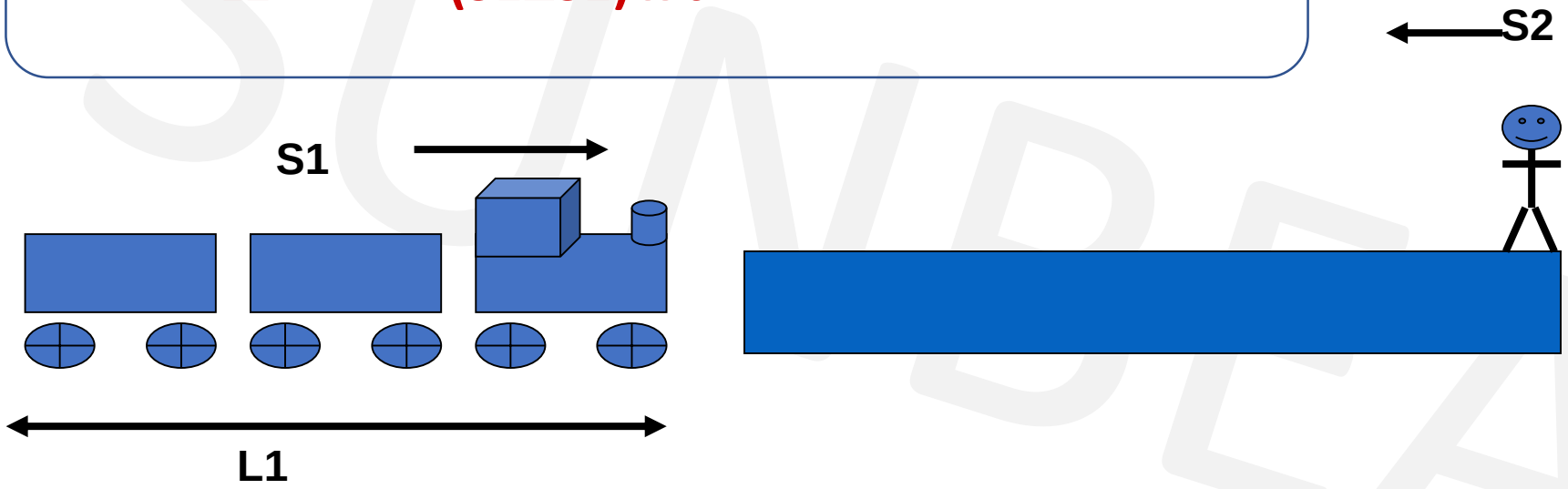
Case C : Moving object without considerable length

L1 = (S1±S2) x t

Trains

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

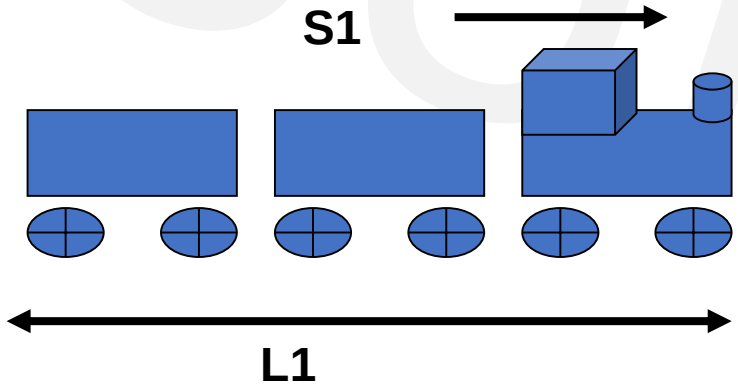
Case D : Moving Object with considerable length

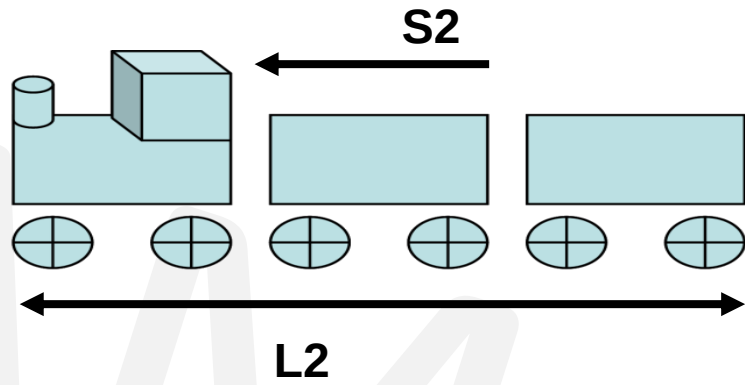
L1+L2 = (S1±S2) x t

Trains

Case D : Moving Object with considerable length

$$L1+L2 = (S1 \pm S2) \times t$$





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 : **L1 = S1x t** (Trains passing the pole)

L1 = S1 x 12 → S1 = L1/12

L1 = S2 x 20 → S2 = L1/20

Case B : **L1+L2 = (S1±S2) x t** (Train passing other train)

2L1 = (L1/12 –L1/20) x t

2 = (1/12 – 1/20) x t

2 = 1/30 x t → 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

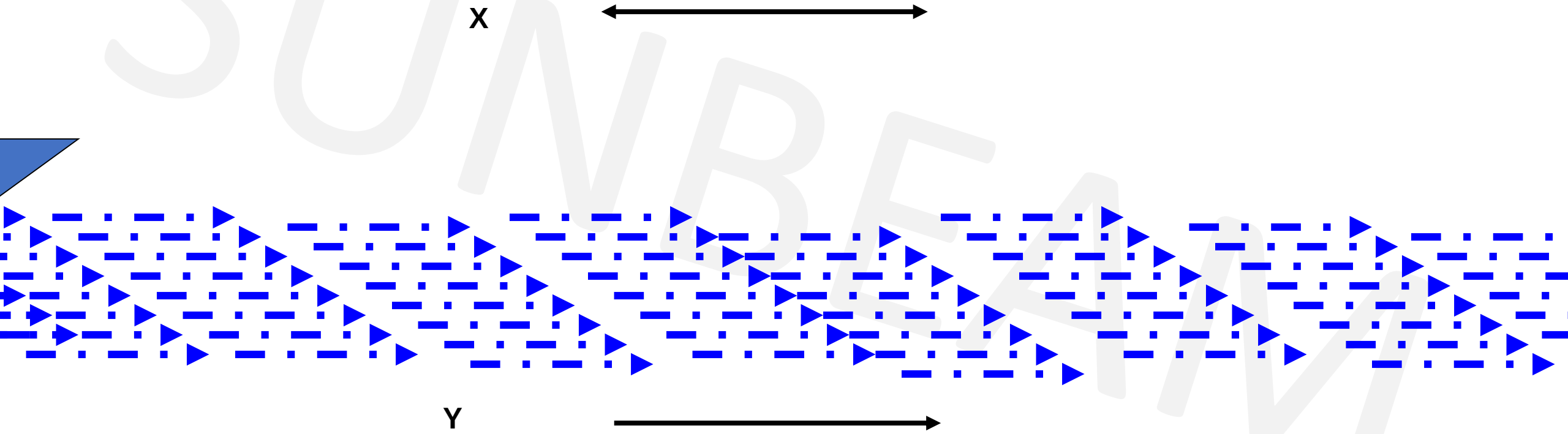
Time & Distance

- **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



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

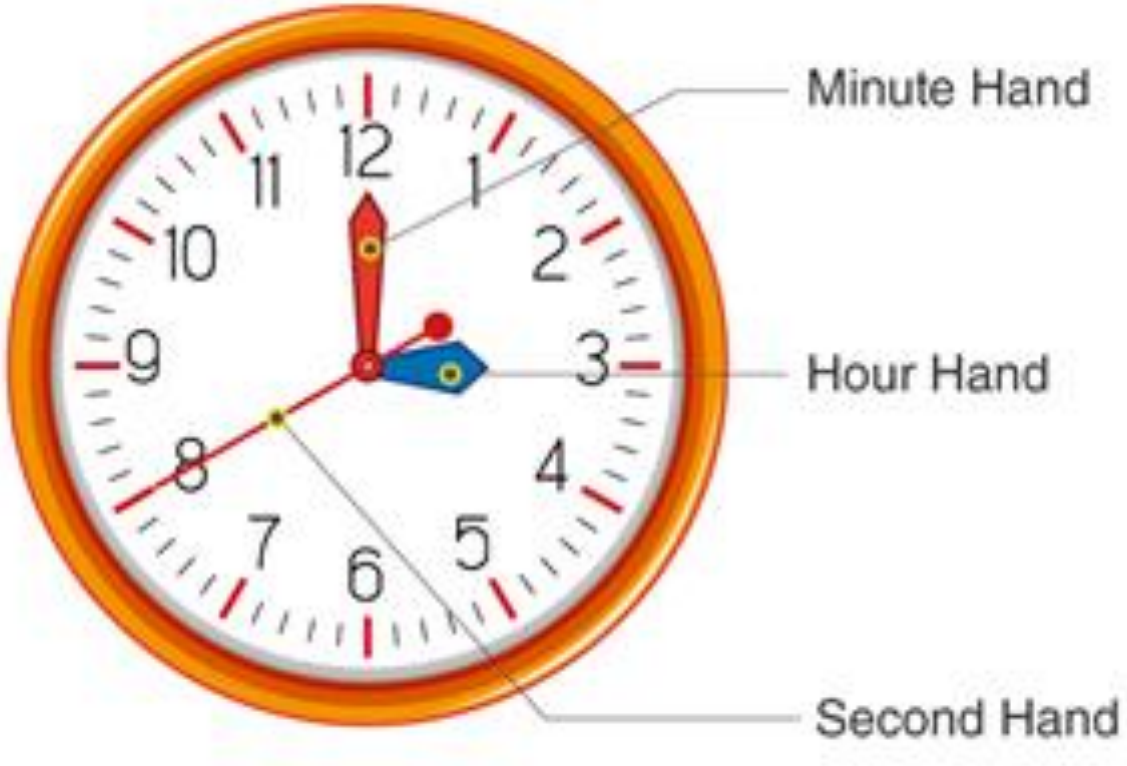
Boats & Streams(Assignment)

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?

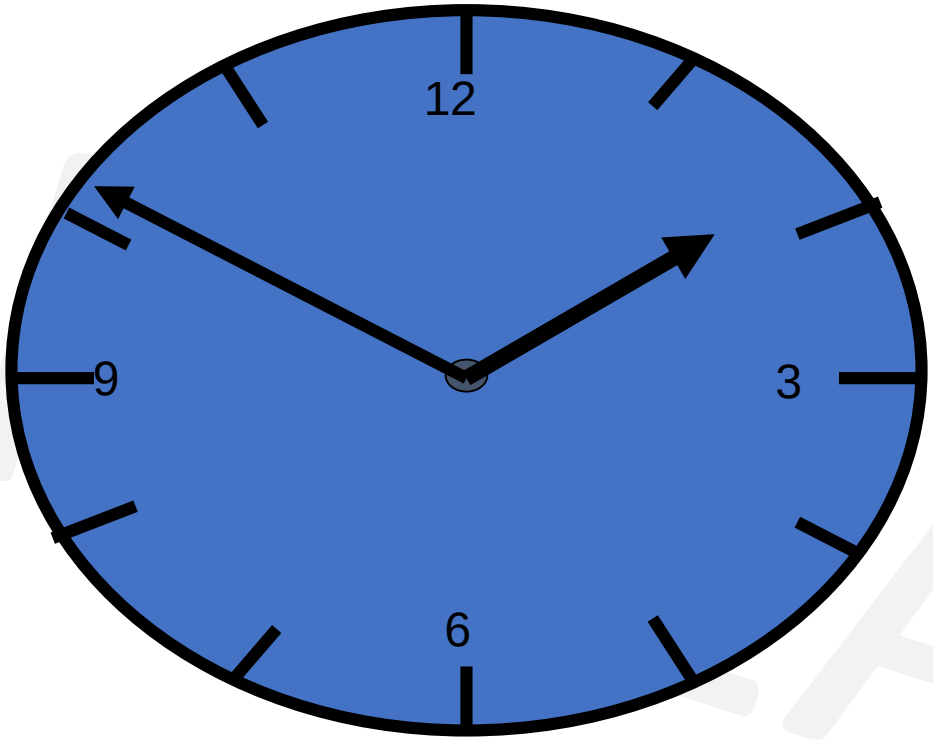
A. 22 kmph B. 25 kmph C. 27 Kmph D. 30 kmph

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	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.

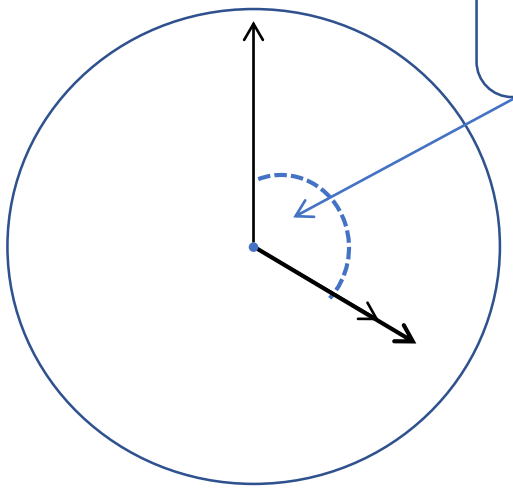
Clocks

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

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

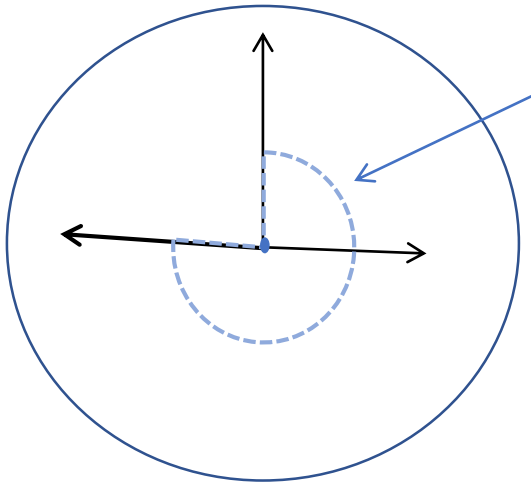
Q. At what time between 3 & 4 o'clock will the hands of the clock be in the opposite direction.

A. $40\ ^{9}/_{11}$ min past 3 B. $30\ ^{10}/_{11}$ min past 3

C. $49\ ^{1}/_{11}$ min past 3 D. $41\ ^{9}/_{11}$ min past 3

Ans : C

- Draw diagram of clock here



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

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

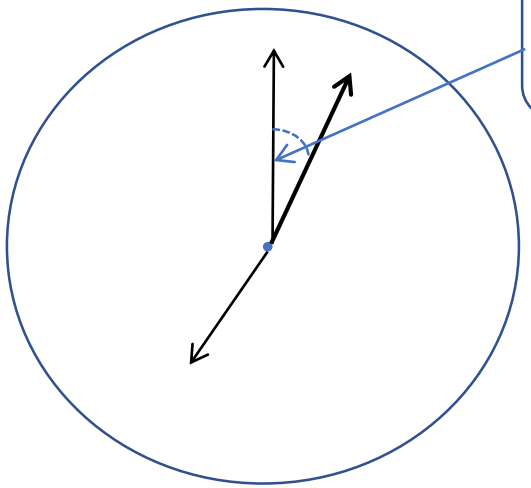
Clocks

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 x 7 – $\frac{11}{2}$ x 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 °

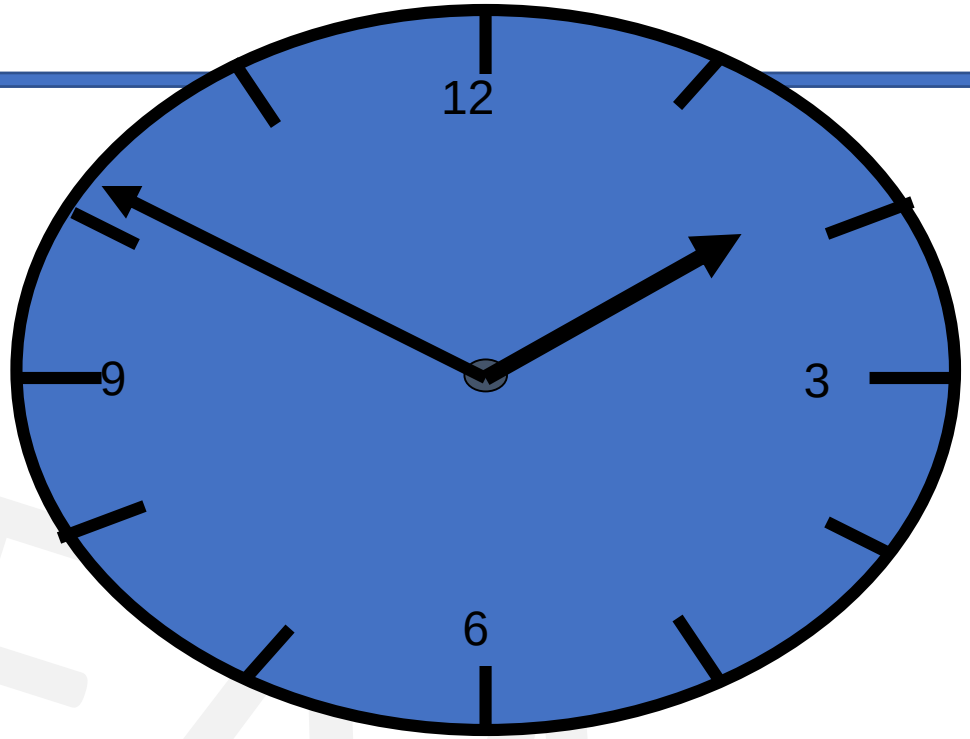
360 -245 = 115° ----→ non reflex angle

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. $90\ ^{10}/_{77}$ min B. $93\ ^{39}/_{77}$ min C. $93\ ^{35}/_{143}$ 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 → 50/11 min loss
- 24 x 60 min → x
- So loss in one day = $(^{50}/_{11} \times 24 \times 60) / 70 = 93\ ^{39}/_{77}$ 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)(60×24/70)

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

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

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

Clock(Assignment)

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^{th} 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 = ?
- $\frac{24\times11}{356}$ * 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. 144º B. 150º C. 168º D. 180º

- 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. $10\ ^{10}/_{143}$ min B. $10\ ^{21}/_{143}$ min C. $10\ ^{100}/_{143}$ min D. None of these

Ans: A

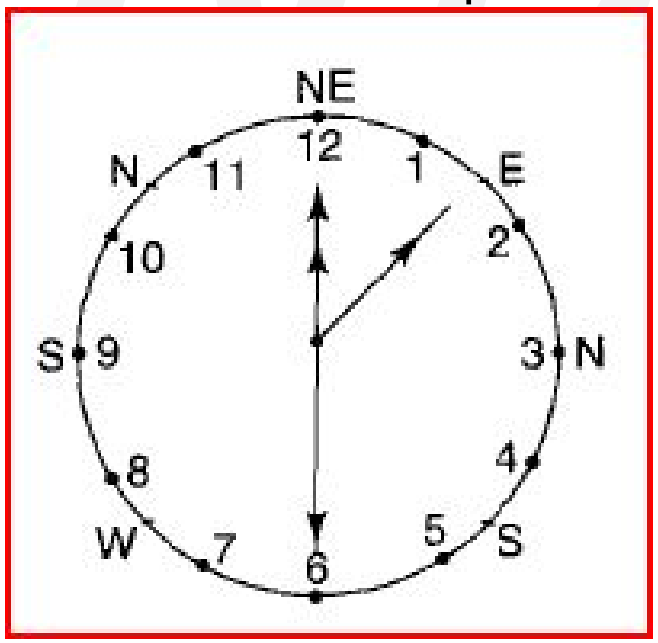
Clocks(Assignment)

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.

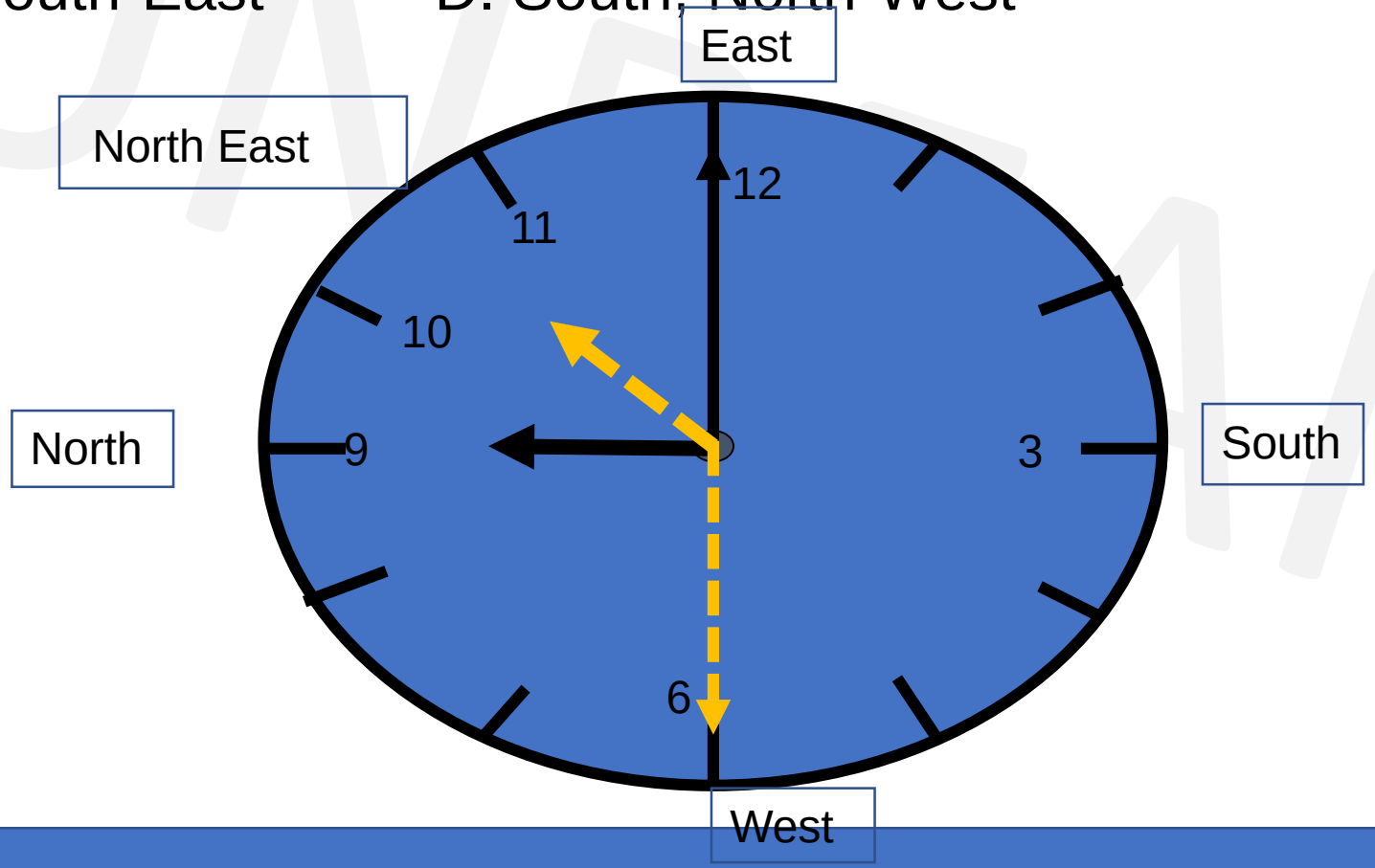


Clock(Assignment)

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



Calendar

- In Non Leap year –
  - 365 days
  - 1 year = 52 weeks + 1 odd day(extra day)
  - 28th February
- In Leap year –
  - 366 days
  - 1 year = 52 weeks + 2 odd days
  - 29th February
- A **century leap year** is a **year** that is exactly divisible by 400
  - **years** 1600 and 2000 were **century leap years**; (400,800,1200,1600,2000 – century leap years till date)
  - **years** 1700, 1800, and 1900 were not **century leap years**.
- To find the day of a week on a given date we use the concept of "**odd days**".
- 01/01/0001 A.D(Anno Domini) was a Monday and 1st day of week so 1st January 0001 was a Monday.

Calendar

- In a century,
  - 24 leap year
  - 76 non leap years

100 years

Leap year → 24x2 = $\frac{48}{7}$ → 6

non leap year → 76 x 1 = $\frac{76}{7}$ → 6

remainder

6 + 6 = 12 ÷ 7 = 5 ← remainder

5 extra(odd) days in a century (100 years)

100 years = 5 odd days ← remainder

200 years = 10 ÷ 7 = 3 odd days

300 years = 15 ÷ 7 = 1 odd days

400 years = 0 odd days (as century leap year)

Calendar

Years	No. of odd
Ordinary year	1
Leap year	2
100 years	5
200 years	3
300 years	1
400 years	0

Calendar

Day of week	No. of odd
Sunday	0
Monday	1
Tuesday	2
Wednesday	3
Thursday	4
Friday	5
Saturday	6

Calendar

Month		Remainder
January	31 ÷ 7	3
February	28 ÷7 or 29 ÷ 7	0(non leap) or 1(leap)
March	31 ÷ 7	3
April	30 ÷ 7	2
May	31 ÷ 7	3
June	30 ÷ 7	2
July	31 ÷ 7	3
August	31 ÷ 7	3
September	30 ÷ 7	2
October	31 ÷ 7	3
November	30 ÷ 7	2
December	31 ÷ 7	3

Calendar

Q. What was the day of the week on 15th August, 1947?

Soln:

Completed till 1946

1946

$\frac{1900}{400}$ = 300 $\frac{46}{4}$ = 11(quotient)

1 odd day 46 + 11 = 57 $\frac{57}{7}$ = 1(remainder)

In 1946, odd days are,

1900 46

1 + 1 = 2 odd days

1946 month date

Total odd days = 2 + 2 + 1 = 5 odd days

As per table for days of a week , 5 ⟷ Friday

As month is August, go till July as per table,

J F M A M J J

3 + 0 + 3 + 2 + 3 + 2 + 3 = 16

Now, $\frac{16}{7}$ = 2 (remainder)

For date ,

$\frac{15}{7}$ = 1 (remainder)

Calendar

For Months -

J	F	M	A	M	J	J	A	S	O	N	D
0	3	3	6	1	4	6	2	5	0	3	5

For years -

1600 – 1699	6
1700 – 1799	4
1800 – 1899	2
1900 – 1999	0
2000 – 2099	6

Calendar

Q. What was the day of the week on 26th January, 1947?

Soln:

1. Last 2 digits of the year → 47
2. Divide by 4 (47 ÷ 4) = 11(quotient)
3. Take the date → 26
4. Take the no. of month → 0 (from table)
5. Take the no. of year → 0 (from table)

84 (add)

6. Divide by 7 → $\frac{84}{7}$ = 0 (remainder)

Check table for day of the week

0 ⟷ Sunday

Calendar

Q. What was the day of the week on 29th February, 2012?

Soln:

1. Last 2 digits of the year → 12
2. Divide by 4 (12 ÷ 4) = 03(quotient)
3. Take the date → 29
4. Take the no. of month → 03 (from table)
5. Take the no. of year → 06 (from table)

53 (add)

6. Divide by 7 → $\frac{53}{7}$ = 4 (remainder)

subtract 1 from remainder

In this case for all dates of **January & February** in a leap year , 4 -1 =3

Check table for day of the week

3 ⟷ Wednesday

Calendar

Q. Today is Monday. Which day will be on 61st day?

Soln:

1 week = 7 days. Taking the multiple of 7

56 - Monday	or	63 - Monday
57 – Tuesday		62 - Sunday
58 – Wednesday		61 - Saturday
59 – Thursday		
60 – Friday		
61 - Saturday		
56 + 5 = 61 days		63 – 61 = 2 days
(add 5 days)	or	(subtract 2 days)

Calendar

Q. What dates of May 2002 did Monday fall on?

Soln:

Lets take date = 1st May 2002

1. Last 2 digits of the year → 02
2. Divide by 4 (02 ÷ 4) = 00(quotient)
3. Take the date → 01
4. Take the no. of month → 01 (from table)
5. Take the no. of year → 06 (from table)

   10 (add)

6. Divide by 7 → $\frac{10}{7}$ = 3 (remainder)

Check table for day of the week

3 ⟷ Wednesday

1st May 2002 falls on Wednesday

1	2	3	4	5	6
W	Th	F	Sa	Su	M

↑ first Monday

Now add 7 to it to find remaining Mondays

Dates on which Monday falls are -
6 , 13 , 20, 27

Calendar

Q. If we have preserved the calendar of 2017. Find the next immediate year in which we can reuse.

A. 2027 B.2023 C. 2025 D. 2029

Soln:

x/4 (x = given year)

$\frac{2017}{4}$ = 1 (remainder)

For any year divide by 4, the possibility of remainder is 0,1,2,3

If remainder = 0 → x + 28

If remainder = 1 → x + 6

If remainder = 2/3 → x + 11

So, $\frac{2017}{4}$ = 1(remainder)

2017 + 6 = 2023 **Ans: B**

Calendar

Q. Which of the following days can never be the last day of a century?

A. Sunday B. Monday C. Tuesday D. Wednesday

- **Soln**:
- The last day of century can be only
- 1 odd day(Monday)
- 3 odd days (Wednesday)
- 5 odd days (Friday)
- 7 or 0 odd days (Sunday)
- So, century can never end in **Tuesday** , **Thursday** or **Saturday**.
- **Ans: C**

Calendar

- Q. The day on 5th April of a year will be the same day on 5th of which month of the same year?
- A. 5th July B. 5th August C. 5th June D. 5th October

- **Ans A**

- April & July for all years have the same calendar. So, a day on any date of April will be the same day on the corresponding date in July.
- The same day will fall on 5th July of the same year.

Calendar(Assignment)

Q. What was the day of the week on your birthdate?

Q. 13th October 2019 is a Sunday. Find the day on 13th October 1989?

A. Sunday B. Monday C. Friday D. Wednesday

Ans: C

Q. 1st March 2006 falls on a Wednesday .What day does 1st March 2010 fall on?

A. Tuesday B. Monday C. Friday D. Wednesday

Ans: B

Q. Today is Monday. Which day will be after 64 days?

A. Tuesday B. Monday C. Friday D. Wednesday

Ans: A

Q. Today is Monday. After 30 days it will be?

A. Tuesday B. Monday C. Friday D. Wednesday

B. Ans: D

Calendar(Assignment)

Q. 15th August 1947 was a Friday. Find the day on 15th August 1977?

- Soln:

  1977
- 1947
  ---
  30 years

Leap years between 1947 to 1977

1948	1964
1952	1968
1956	1972
1960	1976

8 years

30 + 8 = 38

total years leap

$\frac{38}{7}$ = 3 (remainder)

As 15th August 1947 was a Friday ,

So, Friday + 3 days = **Monday**

Calendar(Assignment)

Q. 4th January 2016 falls on Monday. What day of the week does 4th January 2017 lies?

A. Wednesday B. Thursday C. Tuesday D. Monday

Soln:

Normal year = 1 odd day

Leap year = 2 odd days

Jan 4, 2016 → Monday

\+ 2 (as leap year)

Jan 4,2017 → Wednesday

Ans: A

Calendar(Assignment)

Q. Wednesday falls on 5th of a month .So which day will fall 5 days after 22nd of the same month?

A. Tuesday B. Friday C. Thursday D. Wednesday

Ans: B

5th = Wednesday

+7

12th = Wednesday

+7

19th = Wednesday

22nd = Saturday

+5

27th = Thursday

5 days after 22nd will be **Friday**

Calendar(Assignment)

Q. On what dates of April, 2001 did Wednesday fall?

A. 1^{st}, 8^{th}, 15^{th}, 22^{nd}, 29^{th} B. 2^{nd}, 9^{th}, 16^{th}, 23^{rd}, 30^{th} C. 3^{rd}, 10^{th}, 17^{th}, 24^{th}

D. 4^{th}, 11^{th}, 18^{th}, 25^{th}

Ans: D

Calendar(Assignment)

Q. What is the day on 22 April 2222?

A. Monday B. Tuesday C. Saturday D. Sunday

Ans: A

Calendar(Assignment)

Which of the following is not a leap year?

A. 700 B. 800 C. 1200 D. 2000

Ans: A

The century divisible by 400 is a leap year.
The year 700 is not a leap year.

Calendar(Assignment)

It was Sunday on Jan 1, 2006. What was the day of the week Jan 1, 2010?

A. Sunday B. Saturday C. Friday D. Wednesday

Ans: C

On 31st December, 2005 it was Saturday.
Number of odd days from the year 2006 to the year 2009 = (1 + 1 + 2 + 1) = 5 days.
On 31st December 2009, it was Thursday.
on 1st Jan, 2010 it is Friday.

Calendar(Assignment)

Q. January 1, 2007 was Monday. What day of the week lies on Jan. 1, 2008?

A. Monday

B. Tuesday

C. Wednesday

D. Sunday

Ans: B


THANK
YOU!