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-

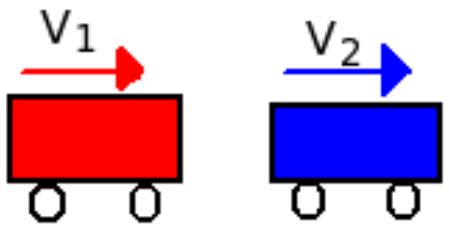
$$Sa = \frac{(D1 + D2 + D3)}{\left(\frac{D1}{S1} + \frac{D2}{S2} + \frac{D3}{S3}\right)}$$

- Q. A man covers 10kms at a speed of 5 km/hr, 30kms at a speed of 7 km/hr and 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)**

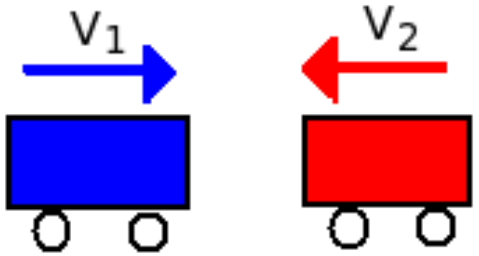
Relative Speed-



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 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

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

$$= 3 \text{ km}$$

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 = 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

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

Time & Distance

Q. A train of length 600m running at a speed of 60km/hr crossed a 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:

60 km/hr = 60 x 5/18 = 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 lengths 120 m and 180 m respectively running in opposite directions at a speed of 50 km/hr and 40 km/hr respectively. In what time will they cross each other?

A. 16 sec B. 10 sec C. 12 sec D. 14 sec

Soln:

When two trains crosses each other in opposite direction then their Distance & Relative Speeds get added.

s1 = 125/9 s2 = 100/9 s1+s2 = (125+100)/9 = 225/9

Time taken = Total Distance/Relative speed of two trains

= (120+180) / 225/9

= (300) / (225/9)

= 12 sec

Ans: C

Time & Distance(Assignment)

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

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

Interest

If P = Principal, R = Rate of interest, N = Time in years, I = Interest, A = Amount

Then **A = P + I**

Simple Interest

S.I. = (P x R x N) / 100

Basic principal remains constant.

S.I. is good example of AP(Arithmetic Progression)

Compound Interest

$A = P (1+ R/100)^T$

C.I. = A – P

T = periods of compounding,

R = rate for compounding period

Basic principal keeps on increasing as we get interest on interest.

C.I. is good example of GP(Geometric Progression)

Interest

Q. A shopkeeper with an OD facility at 18% with a bank borrowed Rs. 15000 on Jan 8, 2011 and returned the money on June 3, 2011 so as to clear the debt. The amount that he paid was -

A. Rs. 16080 B. Rs. 16280 C. Rs. 16400 D. None of these

Soln:

- P = 15000, r= 18%, T = 23(jan)+28(feb-nonleap)+31(march)+30(April)+31(may)+3(june) = 146 days
- 146/365 days = 2/5 years.
- SI = 15000 x 18 x 2/5 x 1/100 = 30x18x2 = 1080

Amount = P + SI

=15000+1080

=Rs. 16080

Ans: A

Interest

Q. A sum of money at simple interest amounts to Rs. 815 in 3 years and to Rs. 854 in 4 years. The sum is:

A. Rs. 650 B. Rs. 690 C. Rs. 698 D. Rs. 700

Soln:-

amount after 4 years = amount after 3 years + simple interest in one year

S.I. in one year = Rs. (854 - 815) = Rs. 39.

S.I. for 3 years = Rs.(39 x 3) = Rs. 117.

Principal = amount - interest

Principal = 815 - 117

= Rs. 698.

Ans: C

Interest

Q. A farmer borrowed Rs.3600 at 15% simple interest per annum. At the end of 4 years, he cleared this account by paying Rs.4000 and a donkey. The cost of the donkey is -

A. Rs. 1000 B. Rs. 1200 C. Rs. 1550 D. Rs. 1760

Soln:

SI for 4 years = Rs.(3600×0.15×4)=Rs.2160

Amount after 4 years = Rs. (3600+2160)= Rs. 5760

Cost of donkey = Rs. (5760-4000)= Rs. 1760

Ans: D

Interest

Q. P =Rs. 2000, R =10%, N =2yrs , Find A and CI

Soln:

$A = 2000(1 + \frac{10}{100})^2$

$= 2000(\frac{110}{100})^2$

$= 2000(\frac{121}{100})$

= Rs. 2420

CI = 2420 – 2000 = Rs. 420

2000 → 10% =200

10% 10%

2000 ⟶ 2200 ⟶ 2420

CI = 2420 – 2000 = 420

Interest

Q. Simple interest on a certain sum of money for 3 years at 8% per annum is half the compound interest on Rs. 4000 for 2 years at 10% per annum. The sum placed on simple interest is:

A. Rs. 1550 B. Rs. 1650 C. Rs. 1750 D. Rs. 2000

Soln:

$A = P(1+R/100)^N = 4000(1+\frac{10}{100})^2 = 4000 \times (\frac{11}{10})^2 = 4000 \times \frac{11}{10} \times \frac{11}{10} = Rs.\ 4840$

OR

$4000 \xrightarrow[1^{st}\ yr]{10\%} 4400 \xrightarrow[2^{nd}\ yr]{10\%} 4840$

CI = A – P

CI = 4840 – 4000 = Rs. 840

Ans: C

$SI = \frac{1}{2} CI$

$\frac{PNR}{100} = \frac{1}{2} \times 840$

$\frac{P \times 3 \times 8}{100} = 420$

$P(sum) = \frac{420 \times 100}{3 \times 8}$

$= Rs.\ 1750$

Interest

Q. P =Rs. 4000, R =20% per annum, N =6months.Find CI computed quarterly for given period.

Soln:

N =6months(2 quarterly)

rate(R) = 20 % per annum = 5 % quarterly

After every 3 months CI will be calculated.

by 5%=200 by 5%=210

4000 4200 4410

I = 4410 -4000

= Rs. 410

Interest

Q. Difference between Compound interest & simple interest on a sum placed at 8% p.a. compounded annually for 2 years is Rs 128. Find the Principal

- A.20000 B. 24000 C. 26000 D. 15000
- **Soln**:
- Let the principal be P = Rs. 100.
- time N = 2 years, rate of interest R = 8% per annum
- simple interest = PNR/100=$\frac{100*8*2}{100}$ =Rs. 16
- CI (for 2 years)
- 8% 8%
- 100 → 108 → 116.64
- 16.64

P	SI	CI	Diff
100	16	16.64	0.64

- 0.64 - > 100
- 128 -> ?
- $\frac{12800}{0.64}$ = Rs. 20000

Interest

Q. Difference between Compound interest & simple interest on a sum placed at 8% p.a. compounded annually for 2 years is Rs 128. Find the principal

- A.20000 B. 24000 C. 26000 D. 15000
- **Soln**:
- Let the principal be P = Rs. 100.
- time N = 2 years, rate of interest R = 8% per annum
- simple interest = PNR/100=$\frac{100*8*2}{100}$ =Rs. 16
- compound amount= P(1+R/ 100)^N
- = 100*(1+$\frac{8}{100}$) ^2 = 100 * ($\frac{108}{100}$)^2 = 100($\frac{11664}{10000}$)=$\frac{11664}{100}$ = 116.64
- compound interest = compound amount – principal
- C.I = A - P
  =116.64-100=Rs. 16.64
- the difference between the compound interest and simple interest = 16.64-16.00 = Rs. 0.64
- 0.64 - > 100
- 128 -> ?
- = $\frac{128*100}{0.64}$ = 20000
- Thus, the principal is Rs. 20000.
- **Ans : A**

Interest

- If the difference between compound and simple interest is of **two years** than,
  Difference = $P(R)^2/(100)^2$
  Where P = principal amount, R = rate of interest

- If the difference between compound and simple interest is of **three years** than,
  Difference = $3 \times P(R)^2/(100)^2 + P(R/100)^3$.
  Here also, P = principal amount, R = rate of interest

Partnership

Q.A started business with Rs. 45,000 and B joined afterwards with 30,000. If the profit at the end of a year was divided in the ratio 2 : 1 respectively, then B would have joined A for business after.

A. 1 month B. 2 months C. 3 months D. 4 months

Soln:

- Capital of A = Rs. 45,000 Capital of B = Rs. 30,000
- Ratio of P1:P2=2:1
- using formula,
- $\frac{C1T1}{C2T2} = \frac{P1}{P2}$
- In this type , the time period is 12 months i.e. one year
- $\frac{45000 \times 12}{30000 \times T2} = \frac{2}{1}$
- T2=9
- B would join business after (12 - 9) = 3 months
- **Ans: C**

Partnership

Q. If 4 (A's capital) = 6 (B's capital) = 10 (C's capital), then out of a profit of Rs. 4650, C will receive ____

A) Rs.700 B) Rs.800 C) Rs.900 D) Rs.1000

Soln:

4A = 6B = 10C

A= 10/4C = 5/2C and B = 10/6C = 5/3C

A + B + C = 4650

5/2C + 5/3C + C = 4650

C = 900

Share of C or C will receive Rs.900

Ans: C

Partnership

Q. A, B & C enter into a partnership with total of Rs 8,200. A's capital is Rs 1000 more than B's & Rs 2000 less than C's. What is B's share of annual profit of Rs 2,460?

A. Rs 1320 B. Rs 720 C. Rs 420 D. Rs 520

Ans: C

Interest(Assignment)

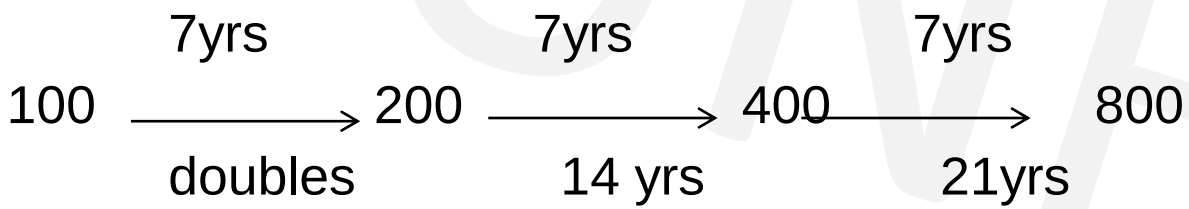
Q. A sum of money placed at compound interest doubles in 7 years. In how many years the principal becomes-

a. 4 times of itself

b. 8 times of itself

Soln:

Let initial value be 100



a. In 14yrs

b. In 21 yrs

OR

100------->200 in 7 years
200------->400 in again 7 years then,
400------->800 in 7 years again, thus
the time becomes= 7+7+7= 21 years.

Interest(Assignment)

Q. A started a business by investing Rs. 32000. After 2 months B joined him with some investments. At the end of the year the total profit was divided in the ratio 8:5. How much capital was invested by B?

A. Rs. 30,000 B. Rs. 28000 C. Rs. 24000 D.Rs. 19000

- Soln:
- using formula,
- $\frac{C1T1}{C2T2} = \frac{P1}{P2}$
- $\frac{32000 \times 12}{C2 \times 10} = \frac{8}{5}$
- C2 = Rs. 24000

Ans: C

Interest(Assignment)

Q. When annual compounding is done, a sum amounts to Rs 5000 in 6 years and 7200 in 8 years. What is the int rate?

A. 10% B. 15% C. 20% D. 25%

Soln

Let P be the principal & R the int rate

→ 5000 = P(1+R/100)^6……(1)

→ 7200 = P(1+R/100)^8……(2)

→ 36/25 = (1+R/100)^2

→ Taking square roots of both sides

→ 1+R/100 = 6/5

→ R/100 =1/5

→ R = 20%

Ans: C

Interest(Assignment)

Q. A sum fetched a total simple interest of Rs.7056 at the rate of 8 percent per year in 7 years. What is the sum?

A. Rs 12600 B) Rs 15120 C) Rs 10080 D) Rs 7560

Ans : A

Interest(Assignment)

Q. Find the compound interest on Rs. 15,625 for 9 months at 16% per annum compounded quarterly.

A. Rs. 1851 B. Rs. 1941 C. Rs. 1951 D. Rs. 1961

Ans: C

Interest(Assignment)

Q. What is the difference between the simple interest on a principal of Rs. 500 being calculated at 5% per annum for 3 years and 4% per annum for 4 years?

A.Rs. 5 B.Rs. 10 C.Rs. 20 D.Rs. 40 E. None of these

$SI_1 = P\ N_1R_1/100$

$= \frac{500x\ 3\ x\ 5}{100}$ = Rs. 75

$SI_2 = P\ N_2R_2/100$

$= \frac{500x\ 4\ x\ 4}{100}$ = Rs. 80

Difference = 80 – 75 = Rs. 5

OR

500 == 15% ↑ ⇒ 575 (1st case)
500 == 16% ↑ ⇒ 580 (2nd case)
difference = 580 -575 = Rs. 5

Ans : A

Interest(Assignment)

Q. A sum of money placed at compound interest doubles itself in 4 years. In how many years will it amount to 8 times?

A. 9 years B. 8 years C. 27 years D. 12 years

Ans: D

Interest(Assignment)

Q. Difference between Compound interest & simple interest on a sum placed at 20% per annum compounded annually for 2 years is Rs. 72. Find the sum.

A. Rs. 2400 B.Rs. 8400 C. Rs.1800 D.Rs. 900

Ans : C

Interest(Assignment)

Q. What is the simple interest on a sum of Rs. 700 if the rate of interest for the first 3 years is 8% per annum and for the last 2 years is 7.5% per annum?

A.Rs. 269.5 B.Rs. 283 C.Rs. 273 D.Rs. 280 E. None of these

Ans: C

Interest(Assignment)

Q. Rs.2100 is lent at compound interest of 5% per annum for 2 years. Find the amount after two years.

- A.Rs. 2300 B.Rs. 2315.25 C.Rs. 2310 D.Rs. 2320 E. None of these
- **Soln:**
- $A = P (1+ R/100)^T$
- $A = 2100(1+5/100)^2$
- $A=2100\times[105/100]2$
- $A= \frac{2100 \text{ x } 11025}{10000}$
- Amount, A=Rs.2315.25
- **Ans : B**

Interest(Assignment)

Q. A man borrowed total Rs 2500 at Simple interest from two money lenders. He paid interest at 12% p.a. to one and 14% p.a. to the other. The total interest paid for the year was Rs.326. How much did he borrow at 14%?

A. Rs 1000 B. Rs 1200 C. Rs 1300 D. Rs 1500

Soln:

Let, x = Principal at 12% & 2500-x = Principal at 14%

SI at Rs.x = $\frac{x \times 1 \times 12}{100} = \frac{12x}{100} = \frac{3x}{25}$

SI at Rs.2500 -x = $\frac{2500-x \times 1 \times 14}{100} = \frac{(2500-x) \times 7}{50} = \frac{17500x - 7x}{50}$

SI at x + SI at 2500-x = 326

Substitute and solving the equation gives x =Rs. 1200

We need Principal at 2500-x = 2500 – 1200 =Rs. 1300

Ans: C

Interest(Assignment)

Q.A certain sum of money amounts to Rs. 704 in two years and Rs 800 in 5 years. Find the Principal.

A. Rs. 640 B. Rs. 600 C. Rs. 550 D. Rs. 450

Ans: A

Interest(Assignment)

Q. A started a business by investing Rs. 32000. After 4 months B joined him with some investments. At the end of the year the total profit was divided in the ratio 6:5. How much capital was invested by B?

A. Rs. 30,000 B. Rs. 28000 C. Rs. 40000 D. Rs. 19000

Ans: C

Interest(Assignment)

Q. Three persons stared a placement business with a capital of Rs. 3000. B invests Rs. 600 less than A and C invests Rs. 300 less than B. What is B's share in a profit of Rs. 886 ?

A. Rs. 443

B. Rs. 354.40

C. Rs. 265.80

D. Rs. 177.20

Ans: C

Interest(Assignment)

Q. What should be the simple interest obtained on an amount of Rs 5,760 at the rate of 6% p.a. after 3 years?

A. Rs 1036.80

B. Rs 1666.80

C. Rs 1336.80

D. Rs 1063.80

E. None of these

Ans : A

Interest(Assignment)

Q. Anand and Deepak started a business investing Rs.22,500 and Rs.35,000 respectively. Out of a total profit of Rs. 13,800. Deepak's share is

A. Rs 9600 B. Rs 8500 C. Rs 8450 D. Rs 8400

Ans: D

Ratio of their shares-

= 22500 : 35000

= 9 : 14

Deepak's share = Rs.(13800×14/23)

= Rs. 8400

Interest(Assignment)

Q. A started a business with Rs. 21,000 and is joined afterwards by B with Rs. 36,000. After how many months did B join if the profits at the end of the year are divided equally?

A. 4 B. 5 C. 6 D. 7

Ans: B

- Capital of A = Rs. 21000 Capital of B = Rs. 36000
- Ratio of P1:P2=1:1
- **using formula,**
- $\frac{\mathbf{C1T1}}{\mathbf{C2T2}} = \frac{\mathbf{P1}}{\mathbf{P2}}$
- In this type , the time period is 12 months i.e. one year
- $\frac{21000\times12}{36000\times T2} = \frac{1}{1}$
- T2=7
- B would join business after (12 - 7) = 5 months

Interest(Assignment)

Q. A,B,C subscribes Rs. 50000 for a buisness. A subscribes Rs. 4000 more than B and B Rs. 5000 more than C. Out of a total profit of Rs. 35000, A receives :

A. Rs. 8400

B. Rs. 11900

C. Rs. 13600

D. Rs. 14700

Ans: D

Interest(Assignment)

Q. The simple interest on Rs.1820 from March 9, 2012 to May 21, 2012 at 7.5% rate will be

A. Rs. 22.50

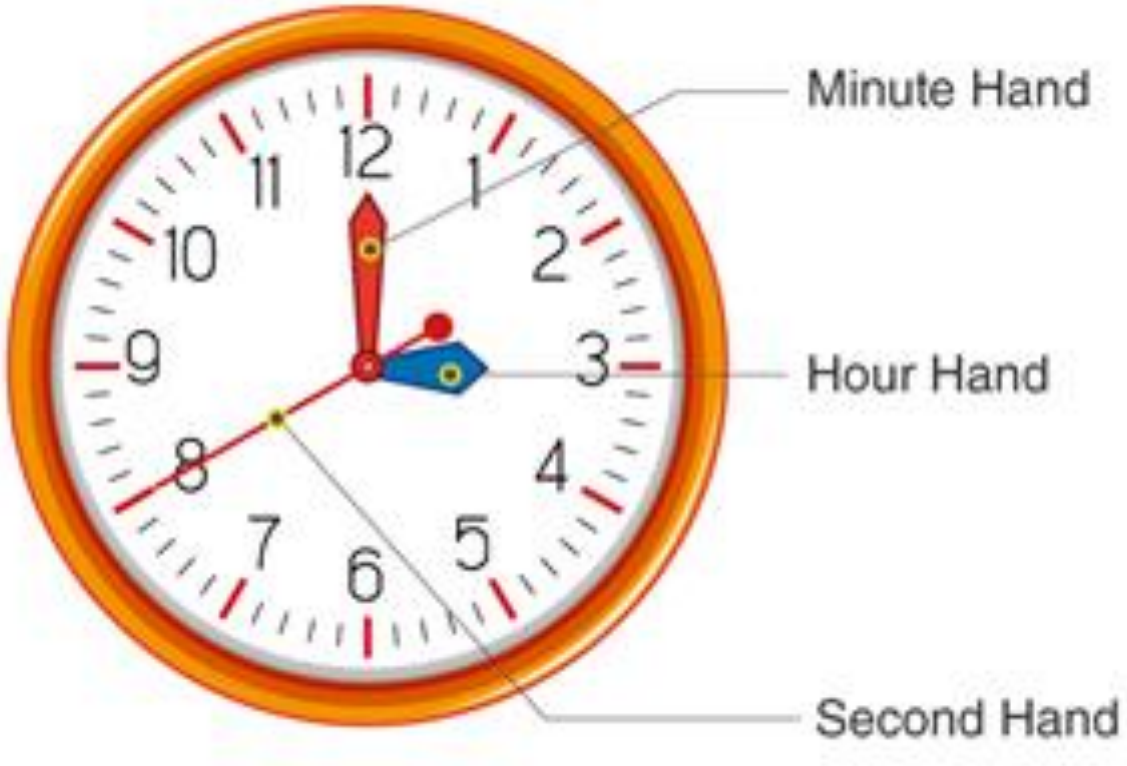
B. Rs. 27.30

C. Rs. 28.80

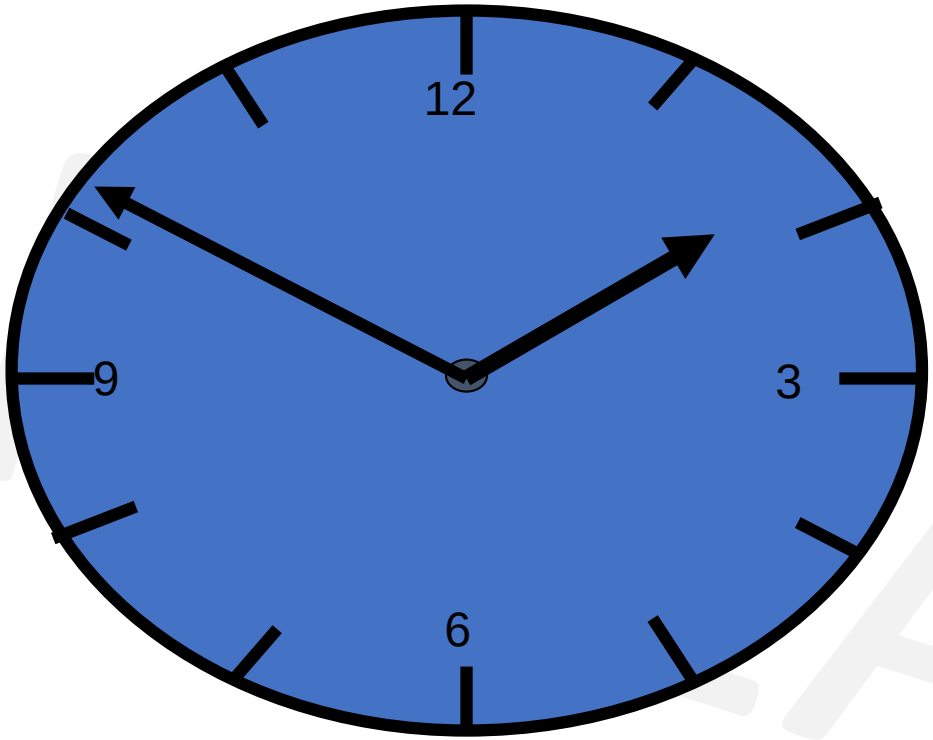
D. Rs. 29

Ans: B

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

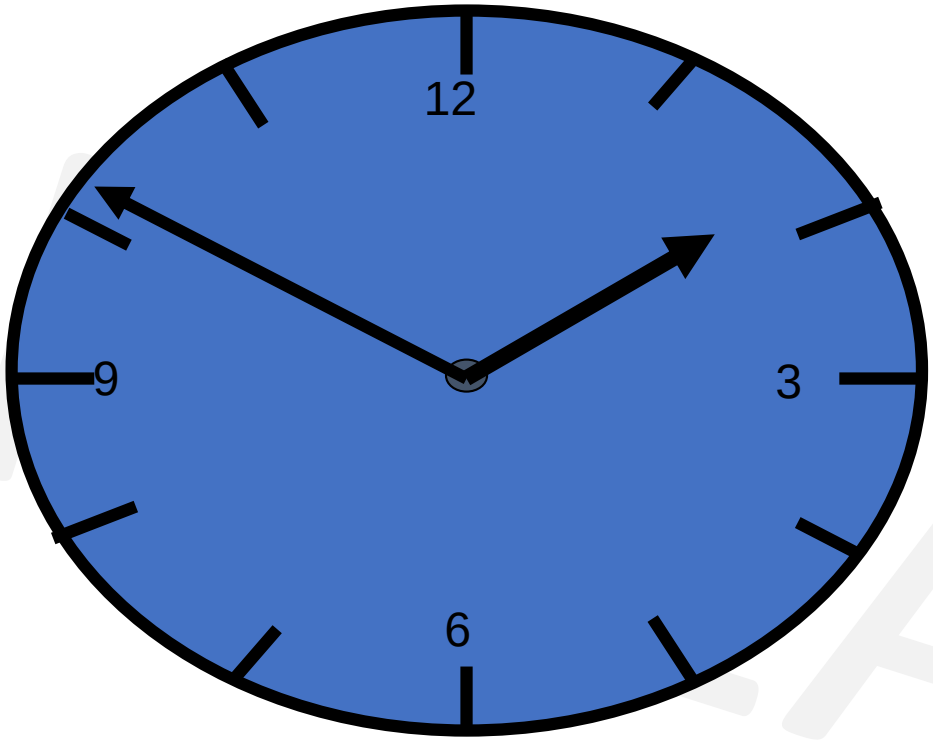
- The hands of a clock coincide 11 times in every 12 hours (Since between 11 and 1, they coincide only once, *i.e.,* at 12 o'clock).

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.

Remember



- **Relative speed of minute hand with respect to hour hand = $\frac{11}{12}$ ms/min**

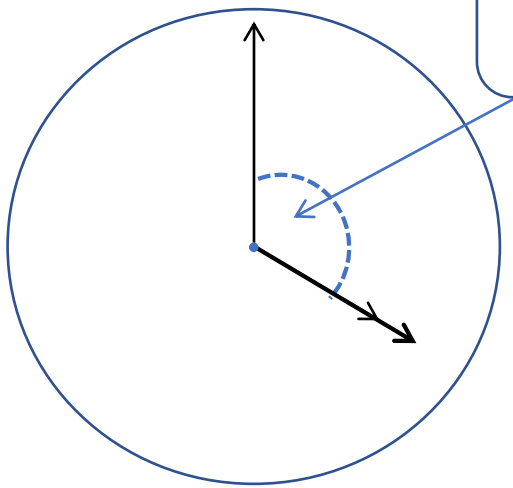
Clocks

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

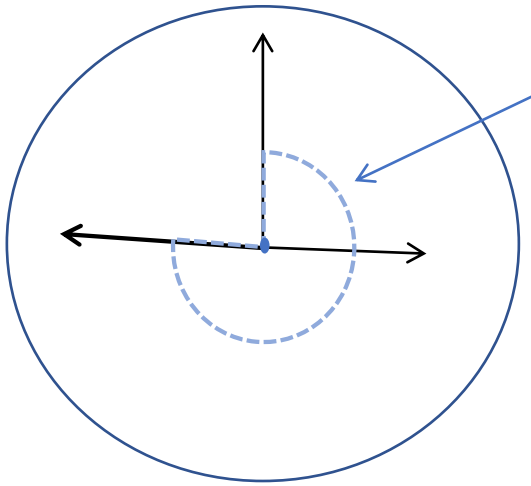
Q. At what time between 3 & 4 o'clock will the hands of the clock be in the opposite direction.

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

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

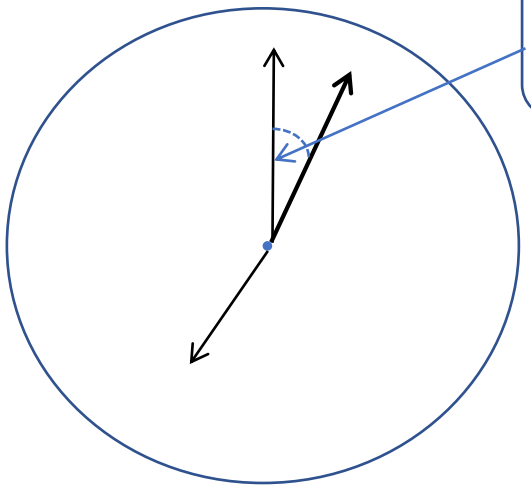
Clocks

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 °

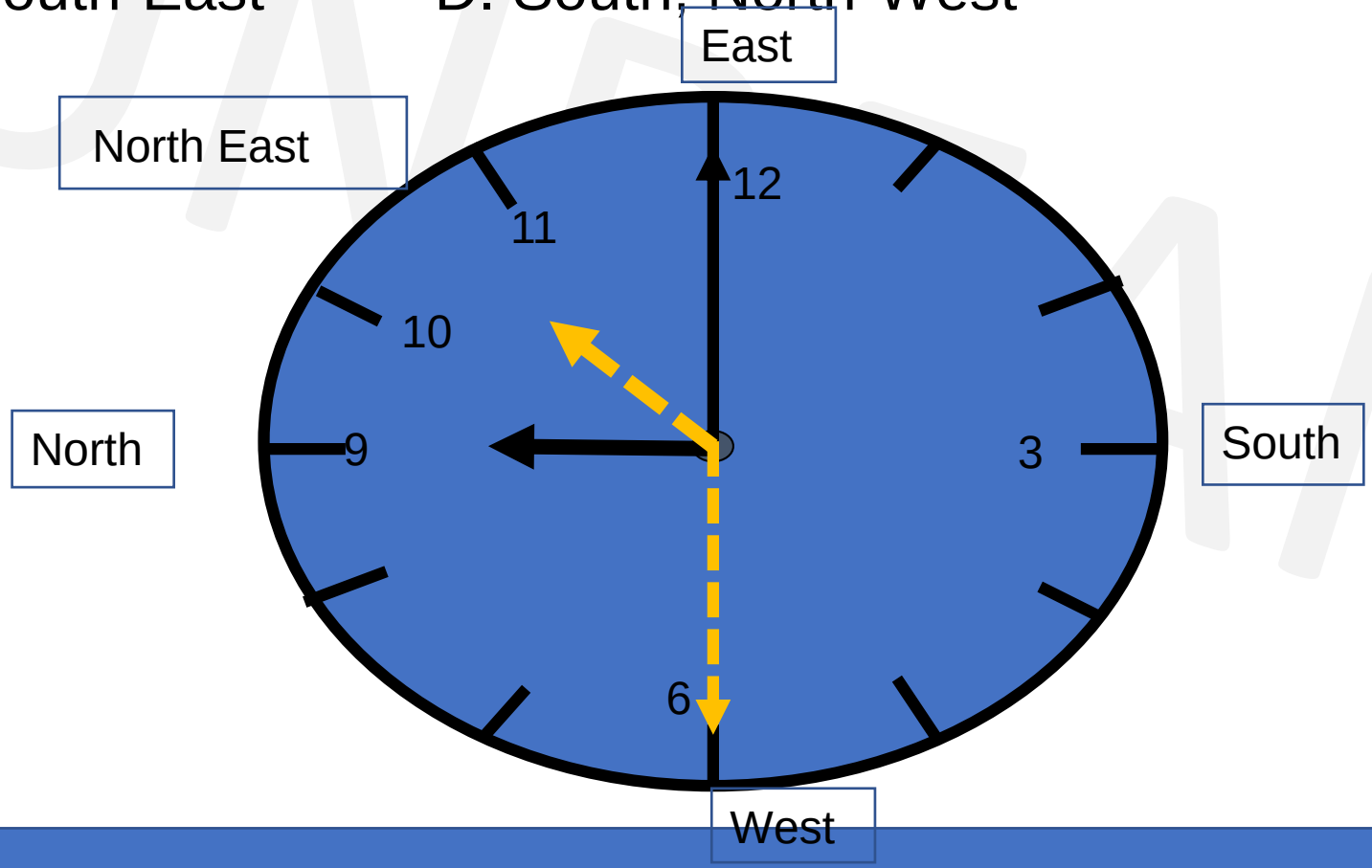
- **Ans: C**

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



Clock(Assignment)

Q. How many rotations will the hour hand of a clock complete in 72 hours?

A. 3

B. 6

C. 9

D. 12

Ans: B

Clocks - Method1(Assignment)

- 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(Assignment)

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.
- **OR**
- time from first day 4am to 4th day 9pm = 89 hours
- 16mins loss - in 24hrs
- ? - in 89hrs
- so loss = 59.33mins == 1hr
- as loss is of 1hr ,so correct clock will indicate 10pm when this clock will show 9pm

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

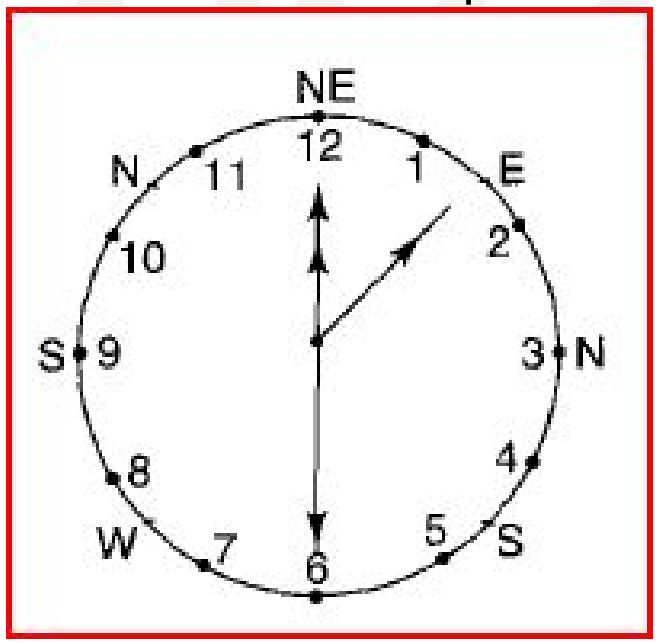
Clocks(Assignment)

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.




THANK
YOU!