Aptitude - Time and Distance

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https://rtpnotes.vercel.app

Reference Playlist

https://youtube.com/playlist?list=PL8p2I9GklV454LdGfDOw0KkNazKuA-6B2&feature=shared

Formula used

$$Distance = Speed * Time$$

Question 1

If a student walks from his house to school at 5km/hr , he is late by 30 minutes. However if he walks at 6 km/h, he is late by 5 mins only. What is the distance between his house and school

Case 1 (Late by 30 minutes)

- Speed = 5km/hr
- Time = t
- Distance d1 = Speed x Time = 5t

Case 2 (Late by 5 minutes)

- Speed = 6km/hr
- Time = t - 25/60
  - 25 minutes faster than case 1
  - Divided by 60 to convert from minutes to hour (Since the unit is km/h)
- Distance d2 = Speed x Time = 6(t - 25/60)

Calculating distance

- d1 = d2
- $5t = 6(t - 25/60)$
- Solving for t we get t = 2.5
- d1 = 5t = 5x2.5 = 12.5
- **Distance = 12.5 km**

Question 2

There are 5 tyres in a sedan(four road tires and 1 spare) which is to be used equally in a journey to travel 40,000km. The no of km of use of each tire was?

- Total tyres = 5
- Total distance = 40,000km
- Since car is always using 4 tyres at any given time to travel 40,000 km, the total tyre kilometre is **4 x 40000km = 160,000 tyre kilometres**

- Since there are 5 tyres and we want each to be used equally, we divide the total tyre kilometres by number of tyres
- $160000/5 = 32,000km$
- No of km used for each tyre = 32,000 km

Question 3

Ram walks 36 km partly at a speed of 3km/h and partly at 4km/hr. If he had walked at a speed of 3km/hr when he had walked at 4 and 4km/hr when he had walked at 3, he would have walked only 34 km. The time (in hours) spent by Ram in walking was?

- Convert it into 2 equations, let x and y be hours spent
- 36 km partly at a speed of 3km/hr and partly at 4km/hr
  - 3x + 4y = 36
- 34 km walked at speed of 4km/hr and partly at 3km/hr
  - 4x + 3y = 34
- Adding both equations
  - 7x + 7y = 70
  - x + y =10
- **The total time taken is 10 hours**

Question 4

An old man takes 30 minutes and a young man takes 20 minutes to walk from apartment to office. If one day the old man started at 10:00 AM and the young man at 10:05 am from the apartment to office, when will they meet?

- Old mans speed = x / 30
- Young mans speed = x / 20
- Distance travelled by old and young man is the same (for them to meet).
  - Let the time taken by the old man be t
  - Let the time taken by the young man be t -5
    - Old man 10:00 AM -> 10:30 AM

        - Young man 10:05 AM -> 10:25AM (Young man is 5 minutes faster)
    - $x/30(t) = x/20(t-5)$
    - Solving for t, t = 15 minutes
- **t = 15 minutes**
- 10:00 AM + 15 minutes = 10:15AM
- **They meet at 10:15AM**

Question 5

A man cycles from city A to city B at 18 km/hr and returns back from B to A at 12 km/hr. Find his average speed over the whole journey. (HINT - Average speed = Total Distance / Total Time)

1. **Calculate the whole distance**
    1. Total Distance=d+d=2d
2. Calculate the total time
    1. The speed from A to B is 18 km/hr. So, the time taken to travel from A to B is:
    2. Time AB = d/18 hours
    3. Time BA = d/12 hours
3. Average speed is Total distance/Total time
    1. Total distance = 2d
    2. Total time = d/18 + d/12 = 5d / 36
    3. Average speed = 2d / (5d/36) = 14.4 km/hr
4. Average speed = 14.4 km/hr

Question 6

John is faster than Peter. John and Peter each walk 24 km. Sum of the speeds of John and Peter is 7 km/h. Sum of time taken by them is 14 hours. Find John's speed

a) 4 km/h

b) 5 km/h

c) 3 km/h

d) 7 km/h

- We know that John’s speed is greater than Peter’s speed and the sum of there speed is 7
- So the combinations are = (6, 1), (5, 2), (4, 3)
- Now checking from the options if John’s speed is equal to 4, then Peter’s speed is 3, or, the time taken by them = 24/4 + 24/3 = 14 hours.
- **Answer: 4km/hr**

Question 7

A student walks from his house at 2.5 km/hr and reaches his school late by 6 minutes. Next day he increases his speed by 1 km/hr and reaches 6 minutes before school time. How far is the school from his house?

- Let the time taken for the student to reach school at normal speed be x
- When the student walks at 2.5km/hr
  - Time taken = (x + 6/60) hours
  - Distance = Speed x Time
  - Distance = 2.5 x (x+0.1) - (1)
- When student walks at 3.5km/hr
  - He reaches in (x - 6/60) hours
  - Distance = 3.5 x (x-0.1) - (2)
- Solving for x from (1) and (2)
  - x= 0.60
- Subbing x in equation 1
  - 2.5 x (0.6 + 0.1) = 2.5 x 0.7 = 1.75 km
- **Distance = 1.75 km**

Question 8

One day, Ramesh started 30 minutes late from home and, driving at 25% slower than the usual speed, reached the market 50 minutes late. How much time in minutes does

Ramesh usually take to reach the market from home?

1. 20
2. 40
3. 60
4. 80

- Let the time taken be t minutes
- Let the usual speed be u
- Case: When ramesh started 30 minutes late and 25% slower driving
  - Time taken to reach market = 50 - 30 = 20 minutes
  - Speed = 75% of u = 0.75u
  - Time taken = t+20
- t x u = (t+20) x 0.75u
- Solving for t we get t = 60
- **Usual time taken = 60**

Question 9

A thief is spotted by a policeman from a distance of 100m. When the policeman starts the chase, the thief also starts running. If the speed of the thief was 8 km/hr and that of the policeman 10 km/hr, how far would the thief have run before he was overtaken?

- Initial distance between theif and police
  - 100m = 100/1000 km
- Let time = x
- Distance travelled by thief = 8x
- Distance travelled by police = 10x = 0.1 + 8x
- Solving for x
  - 2x = 0.1
  - x = 0.1/2 = 0.05
- Distance = Speed x time = 8 x 0.05 = 0.4km = 400m

- **Distance travelled = 400m**