SNS COLLEGE OF TECHNOLOGY

Coimbatore-35
An Autonomous Institution

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DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

VQAR-VERBAL QUANTITATIVE APTITUDE REASONING

IIYEAR/ III SEMESTER

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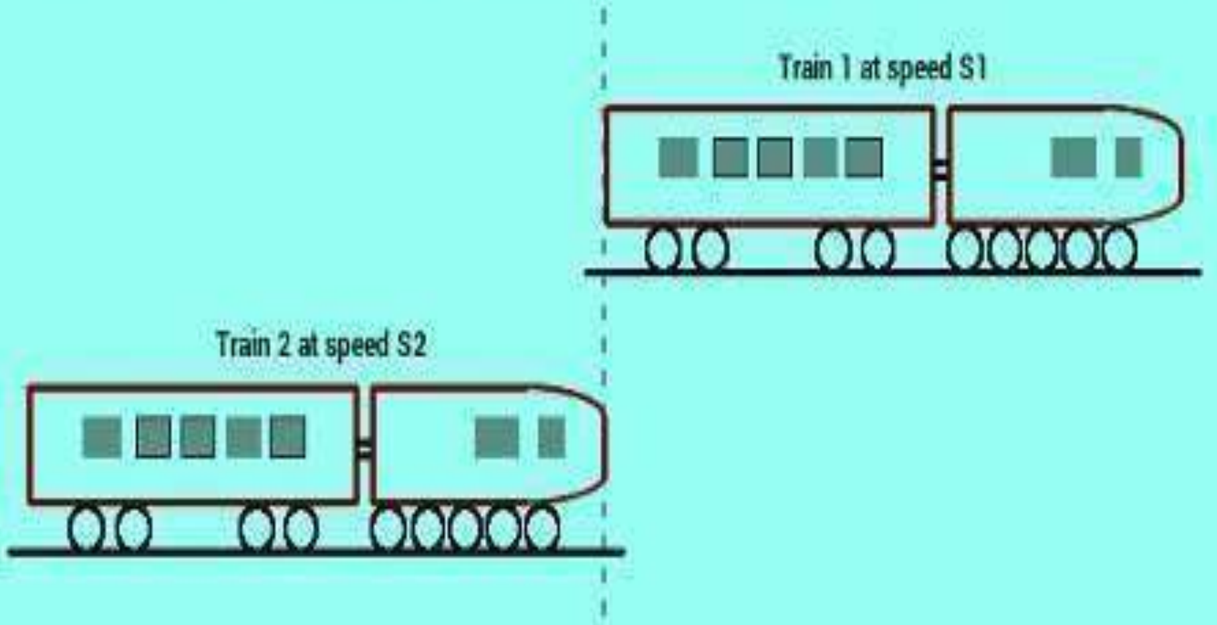
UNIT 1–QUANTITATIVE ABILITY III

TOPIC 2: AVERAGE SPEED- RELATIVE SPEED- TRAIN PROBLEMS

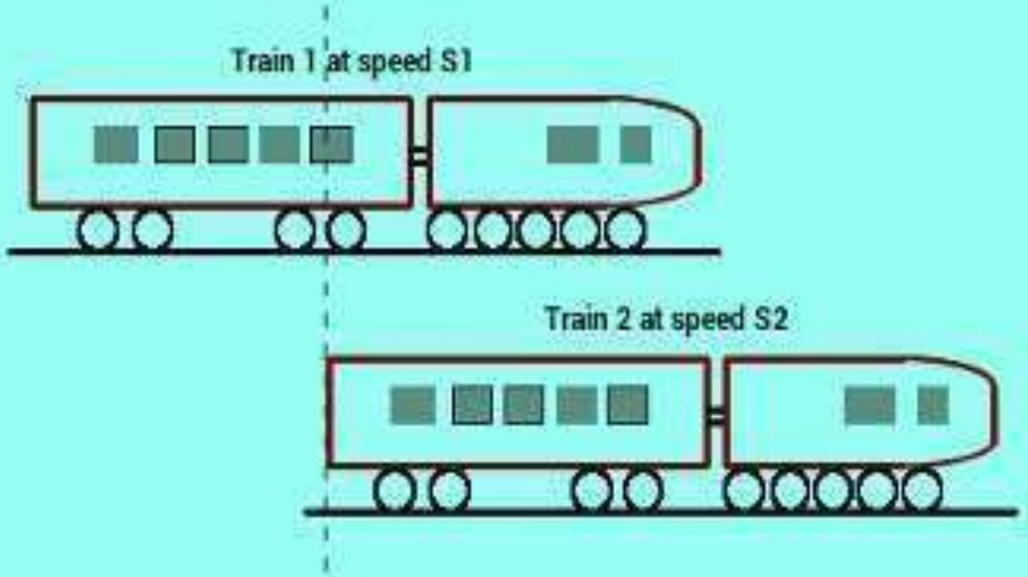

Time, Speed
and Distance
Problems
on Trains

Train 1 travelling at speed S1 passing Train 2 travelling at speed S2 (S1 > S2)



Train 1 completely passed the Train 2 at relative speed (S1 - S2)

Train 1 travelling at speed S1 passing Train 2 travelling at speed S2 (S1 > S2)



Train 1 partially passed the Train 2 at relative speed (S1 - S2)

Q.1.A train crosses a tree in 20 seconds and a man cycling at 5 kmph in the opposite direction in 18 seconds. What is the length of the train?

Sol : Option A

Explanation: Let the speed of the train be x kmph and length of train = L Km.

∴ L = 18x. Also, cycle is in opposite direction. ∴ Relative speed = x + 5

. So 18/(60x60) = L/x+5 →x+5 → 200L = 180L + 5 ∴ L=1/4km

Q.2. A train travelling at 78 km/hr crosses a girl sitting in a train of length 110 m travelling in the same direction at 42 km/hr in 20 seconds. The length of the faster train is

Sol : Option C

Explanation: Let the length of the faster train = x

$\therefore 18x/[5(78-42)] = 20 \rightarrow x=200$

$\rightarrow$ 200m

Q.3. Two trains are traveling in opposite directions at 90 kmph and 18 kmph. If the length of the faster train is 600 m, find the time taken by the faster train to cross a man standing in the slower train.

Sol : Option A

Explanation: As the faster train crosses the man in the slower train, time taken in this case = length of the faster train / Relative speed.

Thus time = 600 / 30 = 20 seconds.

Q.4.A train moving with a speed of 40 km/hr takes 2 hours 6 minutes more to cover a certain distance than a train moving at 96 km/hr. What is the distance?

Sol : Option A

Explanation: Let the distance be x $\therefore \frac{x}{40} - \frac{x}{96} = 2\frac{6}{60} \rightarrow \frac{x}{40} - \frac{x}{96} = \frac{21}{10} \therefore$ x = 144 km.

5. Two trains of lengths 120 m and 50 m are running on parallel tracks at 66 km/hr and 60 km/hr respectively. In what time will they pass each other?

Sol : Option D

Explanation: Dist to be covered is 120 + 50 = 170 m.

Relative speed is 66 – 60 = 5 km/hr = 6 × 5 / 18

= 30 / 18 m/s. So time required = 200 / (30 / 18) = 102 sec.

Q.6. The distance between two stations, Delhi and Amritsar, is 530 km. A train starts at 4 p.m. from Delhi and moves to Amritsar at an average speed of 80 km/hr. Another train starts from Amritsar at 3.20 p.m. and moves towards Delhi at an average speed of 60 km/hr. How far from Delhi will the two meet?

Sol : Option B

Explanation: Suppose the trains meet at a distance of x km from Delhi.

At 4 pm the distance that has to be covered is

530 − 60 × 2 / 3 = 490 km.

The relative speed of the trains is 80 + 60 = 140 km/h. Time required for covering the distance is 490 / 140 hours.

The train from Delhi will be 80 × 49 / 14 km away from Delhi at the point of meeting. = 40 × 49 / 7 = 280 km.

Q7.A train passes a station platform in 36 sec and a man standing on the platform in 20 sec. If the speed of the train is 54 km/hr, find the length of the platform.

Sol : Option A

Explanation: Speed of the train is 54 × 5 / 18 = 15 m/s.

Length of the train is 20 × 15 = 300 m.

Length of platform + train = 36 × 15 = 540 m.

So the length of the platform is 540 − 300 = 240 m.

(No wonder it did not stop at this station!)

Q8. Two trains of lengths 110 m and 90 m are running on parallel tracks at 45 km/hr and 50 km/hr respectively. In what time will they pass each other?

Sol : Option D

Explanation: Distance to be covered is 110 + 90 = 200 m. Relative speed is 50 − 45 = 5 km/hr = 5 × 5/18 = 25/18 m/s. So time required = 200/(25/18) = 144 sec.

Q9.A train running at 54 km/hr crosses a telegraph pole in 18 seconds less time than it takes to cross a platform. Find the length of the platform.

Sol : Option C

Explanation: : Speed is 54×5/18 = 15 m/s. Let the time required for crossing the pole be t. Length of the train is 15×t. Length of the train + length of the platform

= 15 × (t + 18). So length of the platform = 15 × (t + 18) − 15 × t = 15 × 18 = 270 m.

Q10.A train crosses a platform at 54 km/hr in 20 seconds. Another train is 150 m shorter than the former and is running at 36 km/hr. Find the time the second train will take to cross the same platform.

Sol : Option C

Explanation: Speed of the first train is 54 × 5/18 = 15 m/s.

(Length of the platform + length of the train) is =20 × 15

= 300 m. If the second train is 150 m shorter, then the length of the platform + length of the second train is 300 − 150 = 150 m.

That train is running at 36 km/hr = 36 × 5/18 = 10 m/s.

So it will take 150 / 10 = 15 seconds to cross the platform.

Formulas and Quick Tricks for Train Problems

1. Time taken by a train x metres long in passing a signal post or a pole or a standing man is equal to the time taken by the train to cover x metres.
2. Time taken by a train x metres long in passing a stationary object of length y metres is equal to the time taken by the train to cover x+y metres.
3. Suppose two trains are moving in the same direction at u kmph and v kmph such that u>v, then their relative speed = u-v kmph.
4. If two trains of length x km and y km are moving in the same direction at u kmph and v kmph, where u>v, then time taken by the faster train to cross the slower train = (x+y)/(u-v) hours.
5. Suppose two trains are moving in opposite directions at u kmph and v kmph. Then, their relative speed = (u+v) kmph.
6. If two trains of length x km and y km are moving in the opposite directions at u kmph and v kmph, then time taken by the trains to cross each other = (x+y)/(u+v) hours.
7. If two trains start at the same time from two points A and B towards each other and after crossing they take a and b hours in reaching B and A respectively, then A's speed : B's speed = ($\sqrt{b}$: $\sqrt{a}$)


THANK
YOU!