# PROBLEM ON TRAINS

✓ Speed, Time and Distance

$$\text{Speed} = \frac{Distance}{Time} \quad \text{Time} = \frac{Distance}{Speed}$$

Distance = Speed x Time

✓ km/hr to m/sec conversion:

$$\text{a km/hr} = \text{a x } \frac{5}{18} \text{ m/sec}$$

✓ m/sec to km/hr conversion:

$$\text{a m/sec} = \text{a x } \frac{18}{5} \text{ km/hr}$$

- ✓ Time taken by a train of length l meters to pass a pole or standing man or signal post is equal to the time taken by the train to cover l meters.
- ✓ Time taken by a train of length l meters to pass a stationary object of length b meters is equal to the time taken by the train to cover ( l + b ) meters.
- ✓ Suppose two trains are moving in same direction at u m/s and v m/s, where u>v, then their relative speed will be (u - v) m/s.
- ✓ Suppose two trains are moving in opposite direction at u m/s and v m/s, then their relative speed will be (u + v) m/s.

- ✓ If two trains of length a meters and b meters are moving in opposite direction at u m/s and v m/s, then:

  Time taken by trains to cross each other = $\frac{(a+b)}{(u+v)}$ sec

- ✓ If two trains of length a meters and b meters are moving in same direction at u m/s and v m/s, then:

  Time taken by trains to cross each other = $\frac{(a+b)}{(u-v)}$ sec

- ✓ Two trains start at the same time from point A and B towards each other and after crossing each other, they

# Question

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 meters
B. 180 meters
C. 324 meters
D. 150 meters

**Answer:** Option **D**

**Explanation:**

$$\text{Speed} = \left(60 \times \frac{5}{18}\right)\text{m/sec} = \left(\frac{50}{3}\right)\text{m/sec.}$$

$$\text{Length of the train} = (\text{Speed} \times \text{Time}) = \left(\frac{50}{3} \times 9\right)\text{m} = 150 \text{ m.}$$

# Question

The length of the bridge, which a train 130 meters long and travelling at 45 km/hr can cross in 30 seconds, is:

A. 200 m
B. 225 m
C. 245 m
D. 250 m

**Answer:** Option **C**

**Explanation:**

$$\text{Speed} = \left(45 \times \frac{5}{18}\right)\text{m/sec} = \left(\frac{25}{2}\right)\text{m/sec.}$$

Time = 30 sec.

Let the length of bridge be $x$ metres.

$$\text{Then, } \frac{130 + x}{30} = \frac{25}{2}$$

$$\Rightarrow 2(130 + x) = 750$$

$$\Rightarrow x = 245 \text{ m.}$$

# Question

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

A. 120 m
B. 240 m
C. 300 m
D. None of these

**Answer:** Option **B**

**Explanation:**

Speed = $\left(54 \times \frac{5}{18}\right)$ m/sec = 15 m/sec.

Length of the train = (15 x 20)m = 300 m.

Let the length of the platform be $x$ metres.

Then, $\frac{x + 300}{36} = 15$

$\Rightarrow x + 300 = 540$

$\Rightarrow x = 240$ m.

# Question

A train 240 m long passes a pole in 24 seconds. How long will it take to pass a platform 650 m long?

A. 65 sec
B. 89 sec
C. 100 sec
D. 150 sec

**Answer:** Option **B**

**Explanation:**

$$\text{Speed} = \left(\frac{240}{24}\right)\text{m/sec} = 10\ \text{m/sec.}$$

$$\therefore\ \text{Required time} = \left(\frac{240 + 650}{10}\right)\text{sec} = 89\ \text{sec.}$$

# Question

Two trains of equal length are running on parallel lines in the same direction at 46 km/hr and 36 km/hr. The faster train passes the slower train in 36 seconds. The length of each train is:

A. 50 m
B. 72 m
C. 80 m
D. 82 m

**Answer:** Option **A**

**Explanation:**

Let the length of each train be $x$ metres.

Then, distance covered = $2x$ metres.

Relative speed = (46 - 36) km/hr

$$= \left(10 \times \frac{5}{18}\right) \text{m/sec}$$

$$= \left(\frac{25}{9}\right) \text{m/sec}$$

$$\therefore \quad \frac{2x}{36} = \frac{25}{9}$$

$$\Rightarrow 2x = 100$$

$$\Rightarrow x = 50.$$

# Question

The distance between two stations Delhi and Kolkata is 1500 km. Two trains starts at 7am from Delhi to Kolkata and from Kolkata to Delhi and moved towards each other with a speed of 60km/hr and 90km/hr respectively. At what time they will meet each other?

A. 15:00 PM

B. 17:00 AM

C. 17:00 PM

D. None of these

Answer : Option C

# Question

The distance between two stations Delhi and Amritsar is 450km. A train starts at 4 PM from Delhi and moves towards Amritsar at an average speed of 60Km/hr. Another train starts from Amritsar at 3.20pm and moves towards Delhi at an average speed of 80km/hr. The two trains meet and at what time?

A. 06:50 AM
B. 12:50 PM
C. 06:15 PM
D. 06:50 PM

Answer : Option D

Train from Delhi to Amritsar will be travelling for 2 hr 50 min @60 km/hr = 170 km

Train from Amritsar to Delhi will be travelling for 3 hr 30 min @ 80 Km/hr = 280 Km

i.e 170 + 280 = 450 Km

# Question

Two trains starts from Delhi to Patna and Patna to Delhi at the same time. They complete their journey in 9 and 16 hrs respectively. If the train from Delhi to Patna goes with a speed of 80km/hr, what is the speed of the train from Patna to Delhi?

A. 30 km/hr
B. 45 km/hr
C. 75 km/hr
D. 90 km/hr

Answer : Option B

D=T*S=9 *80=720KM

Now S=D/T=720/16=45KMPH Ans

# Question

Two trains starts from Delhi to Patna and Patna to Delhi at the same time. After Crossing each other they complete their journey in 9 and 16 hrs respectively. If the train from Delhi to Patna goes with a speed of 80km/hr, what is the speed of the train from Patna to Delhi?

A. 30 km/hr
B. 60 km/hr
C. 75 km/hr
D. 90 km/hr

# Answer Option B

it is written **after crossing each other** they complete their journey in 9 hrs and 16 hrs respectively then we must use the formula

S1/s2= square root T2 / Square root T1

i.e Speed of Train 1 / speed of train 2 = square root of Time taken by train 2 / square root of Time taken by Train 1)

80/s2 = 4 /3 S2=60 KMPH

- Or even without using formula we can solve
- Time taken by train 1 to reach the crossing point = Time taken by train 2 to reach crossing
- 16 * 60 / 80 = 9 * 80 / 60
- 9hrs@80kmph

- 16 hrs@60KMPH