

* Problems on Train.

1. $A \text{ km/h} = [A \times 5/18] \text{ m/sec.}$

2. $A \text{ m/s} = [A \times 18/5] \text{ kmph}$

3. Time taken by a train of length 'l' met. to pass a pole or a standing man or a signal post = Time taken by train to cover 'l' metres.

4. Time taken by a train of length 'l' met. to pass a stationary obj. of length 'b' m. is the time taken by the train to cover $(l+b)$ meters.

5. Suppose 2 trains or 2 bodies are moving in the same direction at ' u ' m/s & ' v ' m/s, where u is greater than v , then the relative speed = $(u - v)$ m/s

6. Suppose 2 trains or 2 bodies are moving in the opp. direction at ' u ' m/s & ' v ' m/s, where u is greater than v then the relative speed = $(u + v)$ m/s

7. If the two trains of length ' A ' m & ' B ' m are moving in opp. direction at ' u ' m/s & ' v ' m/s, then the time taken by the train to cross each other = $\left[\frac{(A+B)}{(u+v)} \right]$ sec

8. If two trains of length ' a ' m & ' b ' m are moving in the same direction at ' u ' m/s & ' v ' m/s then the time taken by the faster train to cross the slower train = $\left[\frac{a+b}{u-v} \right]$ sec.

9. If 2 trains/bodies start at the same time from point A & B towards each other & after crossing the time taken by the faster train to cross the slower train

they take a & b sec in reaching B
of A resp. then

$$(A's \text{ speed}) : (B's \text{ speed}) = (\sqrt{b} : \sqrt{a}).$$

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Q. A train is moving at a speed of 132 km/h. If a length of train is 110 m, how long will it take to cross a railway platform 165 m long.

$$\text{Speed} = 132 \text{ kmph} = 132 \times \frac{5}{18} = \frac{110}{3} \text{ m/s.}$$

$$\text{Distance} = 110 + 165 = 275$$

$$T = \frac{D}{S} = \frac{275}{110/3} = \frac{275 \times 3}{110} = \frac{825}{110} = \frac{15}{2} = 7.5 = 7\frac{1}{2}$$

Q. A 160 m long train crosses a 160 m long platform, in 16 sec. Find the speed of the train.

$$D = 160 + 160 = 320 \text{ m.}$$

$$T = 16 \text{ sec.}$$

$$S = \frac{D}{T} = \frac{320}{16} = 20 \text{ m/s} = \frac{20 \times 18}{5} = 72 \text{ kmph}$$

Q. A person standing on a railway platform notice that a train took 21 sec to completely pass through the platform which was 84 m long & it took 9 sec

in passing him. find the speed of the train in km/h.

$$x \text{ m} \rightarrow 9 \text{ sec}$$

$$(x+84) \text{ m} \rightarrow 21 \text{ sec.}$$

$$\begin{aligned} \text{length of train} &= 84 - 21 \\ &= 63 \text{ mtr.} \end{aligned}$$

$$\text{speed} = \frac{D}{T} = \frac{63}{9} = 7 \text{ m/s.}$$

$$7 \times \frac{18}{5} = \underline{25.2 \text{ kmph.}}$$

Q. 150m long train is running with a speed of 68kmph, in what ^{time} will it pass a man who is running at 8kmph in the same direction in which the train is going.

$$u - v = 68 - 8$$

$$= \underline{60 \text{ kmph.}} = \frac{60 \times 5}{18} = \underline{\underline{\frac{50}{3}}}$$

$$\text{Time} = \frac{D}{S} = \frac{150 \text{ m}}{60 \text{ kmph}} = \frac{150}{50/3}$$

$$= \frac{150 \times 3}{50} = \underline{\underline{9 \text{ sec.}}}$$

Q. A 220 m long train with a speed of 59 kmph. In what time will it pass a man who is running at 7 kmph in the direction opposite to that in which train is going.

$$u + v = 59 + 7 = 66 \text{ kmph} = \frac{66 \times 5}{18} = \frac{55}{3}$$

$$\text{Time} = \frac{D}{S} = \frac{220}{\frac{55}{3}} \times 3 = \underline{\underline{12 \text{ sec}}}$$

Q. Two trains 240m & 270m in length are running towards each other on parallel lines, one at the rate of 60 kmph & another at 48 kmph. How much time will they take to cross each.

$$\begin{aligned} & (u + v) \text{ m/s} \\ & = 240 + 270 = 510 \text{ m/s} \\ & \left[\frac{(A+B)}{(u+v)} \right] = \frac{240 + 270}{60 + 48} = \frac{510}{108} \end{aligned}$$

$$= 4.72$$

$$\frac{108 \times 5}{18} = 30$$

$$\frac{510}{30} = \underline{\underline{17 \text{ sec}}}$$

Q. Two trains of 100m & 120m long are running in the same direction with a speed of 72 kmph & 54 kmph.

$$\frac{a+b}{u-v} = \frac{100+120}{72+54} = \frac{220}{126} = \frac{110}{63}$$

$$\begin{array}{r} 54 \\ 25 \times 5 \\ 126 \\ 18 \times 3 \\ 54 \\ 217 \end{array}$$

Q. A train running at the speed of 60 kmph cross a pole in 9 sec. What is the length the train.

$$\frac{60}{3.6} \times \frac{5}{18 \times 3} = \frac{50}{3} \times 93 = 150 \text{ m.}$$

$$\boxed{\text{length} = \text{Speed} \times \text{time}}$$