

Time and Distance

Speed = Distance / Time

Conversions	
km/hr to m/sec	m/sec to km/hr
$x \text{ km/hr} = (x * 5 / 18) \text{ m/sec.}$	$x \text{ m/sec} = (x * 18 / 5) \text{ km/hr.}$

1. If the ratio of the speeds of X and Y is a : b, then the ratio of the times taken by them to cover the same distance is $1/a : 1/b$ or a:b.
2. If a person covers a certain distance at x km/hr and an equal distance at y km/hr. Then, the average speed during the whole journey is $(2xy / (x + y)) \text{ km / hr.}$

Problems with solutions

1. If a person walks at 14 km/hr instead of 10 km/hr, he would have walked 20 km more. The actual distance travelled by him is:

Solution

Let the actual distance travelled be x km.

$$\text{Then, } \frac{x}{10} = \frac{x + 20}{14}$$

$$\Rightarrow 14x = 10x + 200$$

$$\Rightarrow 4x = 200$$

$$\Rightarrow x = 50 \text{ km.}$$

2. Excluding stoppages, the speed of a bus is 54 kmph and including stoppages, it is 45 kmph. For how many minutes does the bus stop per hour?

Solution

Due to stoppages, it covers 9 km less.

$$\text{Time taken to cover 9 km} = \left(\frac{9}{54} \times 60 \right)_{\text{min}} = 10 \text{ min.}$$

3. A man complete a journey in 10 hours. He travels first half of the journey at the rate of 21 km/hr and second half at the rate of 24 km/hr. Find the total journey in km.

Solution

$$\frac{(1/2)x}{21} + \frac{(1/2)x}{24} = 10$$

$$\Rightarrow \frac{x}{21} + \frac{x}{24} = 20$$

$$\Rightarrow 15x = 168 \times 20$$

$$\Rightarrow x = \left(\frac{168 \times 20}{15} \right) = 224 \text{ km.}$$

4. 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:

Solution

Let the speed of two trains be $7x$ and $8x$ km/hr.

$$\text{Then, } 8x = \left(\frac{400}{4} \right) = 100$$

$$x = \left(\frac{100}{8} \right) = 12.5$$

∴ Speed of first train = (7×12.5) km/hr = 87.5 km/hr.

5. A farmer travelled a distance of 61 km in 9 hours. He travelled partly on foot @ 4 km/hr and partly on bicycle @ 9 km/hr. The distance travelled on foot is:

Solution

Let the distance travelled on foot be x km.

Then, distance travelled on bicycle = $(61 - x)$ km.

$$\text{So, } \frac{x}{4} + \frac{(61 - x)}{9} = 9$$

$$9x + 4(61 - x) = 9 \times 36$$

$$5x = 80$$

$$x = 16 \text{ km.}$$