

1. What is the average speed of a car that travels 400.0 m in 20.0 s?

$$\begin{aligned}\text{average speed} &= \frac{\text{distance}}{\text{time}} \\ &= \frac{400}{20} \\ &= 20 \text{ m/s}\end{aligned}$$

2. You move 50.0 m west in 10.0 s. Calculate your average velocity.

$$\begin{aligned}\text{average velocity} &= \frac{\text{displacement}}{\text{time}} \\ &= \frac{50}{10} \\ &= 5 \text{ m/s west}\end{aligned}$$

3. It takes Serena 0.25 hours to drive to school. Her route is 16.0 km long. What is Serena's average speed on her drive to school, in m/s?

$$\begin{aligned}0.25 \text{ hours} \times 3600 &= 900 \text{ s} \\ 16 \text{ km} \times 1000 &= 16000 \text{ m}\end{aligned}$$

$$\begin{aligned}\text{average speed} &= \frac{\text{distance}}{\text{time}} \\ &= \frac{16000}{900} \\ &= 17.8 \text{ m/s}\end{aligned}$$

4. A racecar drives once around a 2400 m track in 54 s. What is the average speed and velocity of the racecar?

$$\begin{aligned}\text{average speed} &= \frac{\text{distance}}{\text{time}} & \text{average velocity} &= \frac{\text{displacement}}{\text{time}} \\ &= \frac{2400}{54} & &= \frac{0}{\text{time}} \\ &= 44.4 \text{ m/s} & &= 0\end{aligned}$$

* the racecar starts and ends at the same place.

5. How much time will it take for a bug to travel 5.0 meters across the floor if it is traveling at 1.00 m/s?

$$\text{average speed} = \frac{\text{distance}}{\text{time}}$$

$$1.00 = \frac{5.0}{\text{time}}$$

$$\text{time} = \frac{5.0}{1} = 5.0 \text{ s}$$

6. An athlete throws a flying disk 42.0 meters through the air. While in flight, the disk traveled at an average speed of 13.0 m/s. How long did the disk remain in the air?

$$\text{average speed} = \frac{\text{distance}}{\text{time}}$$

$$13 = \frac{42}{\text{time}}$$

$$\text{time} = \frac{42}{13} = 3.2 \text{ s}$$

7. How far do you travel if you run for 20.0 s at an average speed of 3.0 m/s?

$$\text{Average Speed} = \frac{\text{distance}}{\text{time}}$$

$$3.0 = \frac{\text{distance}}{20.0}$$

$$\text{distance} = (20.0)(3.0) = 60.0 \text{ m}$$

8. A bus travels east with an average speed of 30.0 m/s. What is the displacement of the bus after 120 s?

$$\text{average velocity} = \frac{\text{displacement}}{\text{time}}$$

$$30 = \frac{\text{displacement}}{120}$$

$$\text{displacement} = (120)(30) = 3600 \text{ m east}$$

9. A car is driving along a straight level road. The car changes its speed from 3.5 m/s to 4.5 m/s in 5.0 seconds. Calculate its acceleration.

$$\begin{aligned}\text{acceleration} &= \frac{\text{final velocity} - \text{initial velocity}}{\text{time}} \\ &= \frac{4.5 - 3.5}{5.0} \\ &= 0.2 \text{ m/s}^2\end{aligned}$$

10. A car slows down from 50.0 m/s to 20.0 m/s in 6.00 s. What is the acceleration?

$$\begin{aligned}\text{acceleration} &= \frac{\text{final velocity} - \text{initial velocity}}{\text{time}} \\ &= \frac{20 - 50}{6} \\ &= -5.0 \text{ m/s}^2\end{aligned}$$

11. A coin is dropped from the top of a bridge. It experiences an acceleration of 10 m/s² down. How long will it take before it reaches a final velocity of 50.0 m/s down?

$$\begin{aligned}\text{acceleration} &= \frac{\text{final velocity} - \text{initial velocity}}{\text{time}} \\ -10 &= \frac{-50 - 0}{\text{time}} \\ \text{time} &= \frac{-50}{-10} = 5.0 \text{ s}\end{aligned}$$

12. A car skids to a stop in 0.5 s. If the acceleration of the car was -20.0 m/s², what was the initial velocity of the car?

$$\begin{aligned}\text{acceleration} &= \frac{\text{final velocity} - \text{initial velocity}}{\text{time}} \\ -20 &= \frac{0 - \text{initial velocity}}{0.5} \\ \text{initial velocity} &= 0.5(+20) \\ &= 10.0 \text{ m/s}\end{aligned}$$