

Speed, Velocity & Acceleration

ANSWER KEY



1. An airplane traveled 300 km northeast in 2.5 hours. Find the velocity of the plane.
 $v = d/t \rightarrow v = 300 \text{ km NE} / 2.5 \text{ h} \rightarrow 120 \text{ km/h NE}$
2. Riding your skateboard, it takes 12 seconds to speed up from 2 m/s to 8 m/s. Find the acceleration.
 $a = (s_f - s_i)/t \rightarrow a = (8 \text{ m/s} - 2 \text{ m/s}) / 12 \text{ s} \rightarrow a = 0.5 \text{ m/s}^2$
3. In a skateboarding marathon, the winner covered 435 km in 36.75 h. What was the winner's average speed?
 $s = d/t \rightarrow s = 435 \text{ km} / 36.75 \text{ h} \rightarrow 11.8 \text{ km/h}$
4. A hockey puck slides on the ice for 3 seconds before crossing the goal line 6 meters away. What was the average speed of the puck?
 $s = d/t \rightarrow s = 6 \text{ m} / 3 \text{ s} \rightarrow 2 \text{ m/s}$
5. As a roller coaster starts down a hill, its speed is 10 m/s. Three seconds later, its speed is 32 m/s at the bottom of the hill. What is the roller coaster's acceleration?
 $a = (s_f - s_i)/t \rightarrow a = (32 \text{ m/s} - 10 \text{ m/s}) / 3 \text{ s} \rightarrow a = 7.3 \text{ m/s}^2$
6. A cyclist leaves home and rides for a distance of 45 km. She returns home on the same bike path. If the entire trip takes 4 h, what is her average speed?
 $s = d/t \rightarrow s = (45 \text{ km} \times 2) / 4 \text{ h} \rightarrow 22.5 \text{ km/h}$
7. A swimmer speeds up from 1.1 m/s to 1.3 m/s during the last 20 s of the workout. What is the acceleration during this interval?
 $a = (s_f - s_i)/t \rightarrow a = (1.3 \text{ m/s} - 1.1 \text{ m/s}) / 20 \text{ s} \rightarrow a = 0.01 \text{ m/s}^2$
8. A cyclist must travel 800 km. How many days will the trip take if the cyclist travels 8 h per day at an average speed of 16 km/h?
 $s = d/t \rightarrow \text{per day distance} = st \rightarrow \text{distance/day} = 16 \text{ km/h} \times 8 \text{ h} \rightarrow \text{distance/day} = 128 \text{ km} \rightarrow \text{trip time} = \text{total distance} / \text{distance per day} \rightarrow \text{trip time} = 800 \text{ km} / 128 \text{ km/d} \rightarrow \text{trip time} = 6.25 \text{ days}$
9. A satellite's original speed is 10 000 m/s. After one minute, it is 5000 m/s. What is the satellite's acceleration? (Hint: Convert minutes to seconds!)
 $a = (s_f - s_i)/t \rightarrow a = (5000 \text{ m/s} - 10,000 \text{ m/s}) / 60 \text{ s} \rightarrow a = -83.3 \text{ m/s}^2$
10. The world's fastest passenger elevator operates at an average speed of about 10 m/s. If the 60th floor is 219 m above the first floor, how long does it take the elevator to go from the first floor to the 60th floor?
 $s = d/t \rightarrow 10 \text{ m/s} = 219 \text{ m} / t \rightarrow t = 219 \text{ m} / 10 \text{ m/s} \rightarrow t = 21.9 \text{ s}$

TEACHER NOTE: Students should be able to use calculators.