

Speed, Velocity & Acceleration

Show all work on a separate sheet of paper!

1. An airplane traveled 300 km northeast in 2.5 hours. Find the velocity of the plane.
2. Riding your skateboard, it takes 12 seconds to speed up from 2 m/s to 8 m/s. Find the acceleration.
3. In a skateboarding marathon, the winner covered 435 km in 36.75 h. What was the winner's average speed?
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?
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?
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?
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?
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?
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!)
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?

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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.