

Academic Physics
Velocity Problems

Name Key
Date _____

Directions: Identify each number given with a variable that stands for it. Use the information to solve for the desired quantity.

1. A caterpillar travels across the length of a 2.00-meter porch in 6.5 minutes. What is the average velocity of the caterpillar in m/s ?

$$V = \frac{\Delta x}{\Delta t} = \frac{2.0\text{ m}}{6.5\text{ min}} \times \frac{1\text{ min}}{60\text{ s}}$$

$v_{\text{ave}} = 0.00513\text{ m/s}$ or $5.13 \times 10^{-3}\text{ m/s}$

2. A hiker is at the bottom of a canyon facing the canyon wall closest to her. She is 280.5 meters from the wall and the sound of her voice travels a 340 m/s at that location. How long after she shouts will she hear her echo?

$$s = \frac{d}{t} \quad 340\text{ m/s} = \frac{280.5\text{ m}}{t} \Rightarrow 561\text{ m} \rightarrow t = 1.65\text{ s}$$

$t = 0.825\text{ s}$

Change to tell them 561m (too soon to have them do this)

3. A motorist traveling on a straight stretch of open highway sets his cruise control at 90 km/hr . How far will he travel in 15 min ?

$$d = ? \quad 15\text{ min} \times \frac{1\text{ hr}}{60\text{ min}} = 0.25\text{ hr}$$

$$v = \frac{x}{t} \quad 90\text{ km/hr} = \frac{x}{0.25\text{ hr}} \quad d = 22.5\text{ km}$$

back

4. A woman from Pasadena makes a trip to a nearby shopping mall that is located 40 miles from her home. On the trip to the mall she averages 80 mi/hr but gets a speeding ticket upon her arrival. On the return trip she averages just 40 mi/hr . What was her average speed for the entire trip?

$$\bar{s} = \frac{80\text{ mi/hr} + 40\text{ mi/hr}}{2} = 53.3\text{ mi/hr}$$

$s_{\text{ave}} = 60\text{ mi/hr}$

back

5. A cross-country race car driver sets out on a 100-mile race. At the halfway marker (50 miles) her pit crew radios that she has averaged only 50 mi/hr . How fast must she drive over the remaining distance in order to average 100 mi/hr for the entire trip?

$$\frac{50\text{ mi}}{\text{hr}} = \frac{50\text{ mi}}{\Delta t} \quad t = 1\text{ hr}$$

$$\frac{100\text{ mi}}{\text{hr}} = \frac{100\text{ mi}}{\Delta t} \quad t = 1\text{ hr}$$

$v =$ * She has already used up all of her time at the 1/2 way mark.

she wants to go 100mi/hr, but she has already used 1hr @ 1/2 way mark

④

distance	speed	Time
$d_1 = 40 \text{ mi}$	$s = 80 \text{ mi/hr}$	$t = 1/2 \text{ hr}$
$d_2 = 40 \text{ mi}$	$s = 40 \text{ mi/hr}$	$t = 1 \text{ hr}$
$d_{\text{tot}} = 80 \text{ mi}$	$s = 53.3 \text{ mi/hr}$	$t = 2.5 \text{ hr}$

$$\bar{v} = ?$$

$\bar{v} = 0 \text{ mi/hr}$ b/c start & stop @ same points

⑤

distance	speed	Time
$d_1 = \overset{50}{\cancel{100}} \text{ mi}$	$s = 50 \text{ mi/hr}$	$t = 1 \text{ hr}$
$d_2 = 50 \text{ mi}$?	?
$d_{\text{tot}} = 100 \text{ mi}$	$s = 100 \text{ mi/hr}$	$t = 1 \text{ hr}$

Total trip would take 1hr!
you used up that hr during 1st leg