Science 10 Name: key

Calculating Average Velocity

1. Using Formulas to calculate average velocity, time and displacement:

a) average velocity

$$\Delta \vec{v} = \frac{\Delta \vec{d}}{t}$$

b) displacement

$$\Delta \vec{d} = \Delta \vec{v} \cdot t$$

c) time

$$t = \frac{\Delta \vec{d}}{\Delta \vec{v}}$$

2. Complete the following table. Use the motion formula to calculate the missing quantities. Show all your work and use the correct units.

Displacement	Time	Average Velocity	Formula Used and Calculation Shown
15.6 m	3 s	5.2 m/s	
357.5 km	6.5 h	$55 \frac{km}{h}$	$v = \frac{d}{t} = \frac{357.5 km}{6.5 h}$
22.6 m	4 s	5.65 m/s	$t = \frac{d}{v} = \frac{22.6 m}{5.65 \frac{m}{s}}$
243.75 km	3.25 h	75 km/h	$d = v \cdot t = \left(75 \frac{km}{h}\right)(3.25 h)$
12.6 m	3.15 s	$4 \frac{m}{s}$	$v = \frac{d}{t} = \frac{12.6 m}{3.15 s}$
24 km	.75 h	32 km/h	$t = \frac{d}{v} = \frac{24 km}{32 km/h}$
480 m	8 s	60 m/s	$d = v \cdot t = \left(60 \frac{m}{s}\right)(8 s)$

$v = \frac{d}{t}$ $t = \frac{d}{v}$ N (+) $d = v \cdot t$

3. How long will it take for a person walking at 3.8 m/s north to move 125 m?

$v = 3.8 \frac{m}{s}$
$d = 125\ m$
$t = ?$

$t = \frac{d}{v} = \frac{125\ m}{3.8 \frac{m}{s}} = 32.9\ s$

4. A single-engine airplane leaves an airport and flies to another airport 850 km north. It takes 4.0 h to complete the flight. What is the velocity of the airplane?

$v =$
$d = 850\ km$
$t = 4.0\ h$

$v = \frac{d}{t} = \frac{850\ km}{4\ h} = 212.5 \frac{km}{h}$

5. A bus travels from City X due east toward City Y. If the bus travels at an average velocity of 90 km/h [E], what will be the displacement of the bus 4.5 h later?

$v = 90\ km/h$
$d =$
$t = 4.5\ h$

$d = v \cdot t$
$= (90\ km/h)(4.5\ h) = 405\ km$

5. The circumference of Earth at the equator is approximately 40 000 km. A supersonic jet can fly at an average speed of 1500 km/h. How long will it take the aircraft to travel around the equator, assuming it has enough fuel?

$v = 1500\ km/h$
$d = 40\ 000\ km$
$t =$

$t = \frac{d}{v} = \frac{40\ 000\ km}{1500\ km/h}$
$= 26.7\ h$

6. How long would it take a dog to walk 550 m [W] if its average velocity was 1.5 m/s [W]?

$v = -1.5 \frac{m}{s}$
$d = -550\ m$
$t =$

$t = \frac{d}{v} = \frac{-550\ m}{-1.5 \frac{m}{s}}$
$= 366.7\ s$

7. **True or False:** Beside each statement below, write the letter T or F. If you think the statement is false, write the correct sentence in the space provided.

a. F Scalar quantities have both magnitude ~~and direction.~~

b. T Velocity can be determined by calculating the slope of a position-time graph.

c. F If a trip takes you back to where you started, your ~~distance~~ displacement is zero.

d. F Distance is always ~~less~~ greater than or equal to the displacement.

e. T If an athlete runs once around a track, back to the starting line, her average velocity is zero.

f. F A straight horizontal line on a position-time graph indicates ~~uniform forward motion.~~ 0 m/s

g. T The speed of an object is always the magnitude of its velocity.