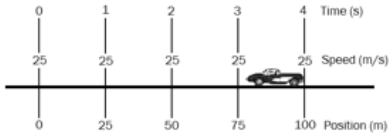
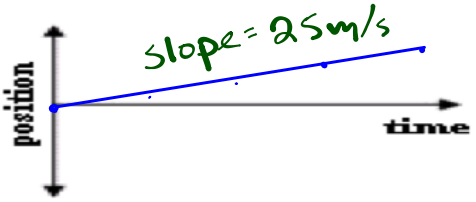
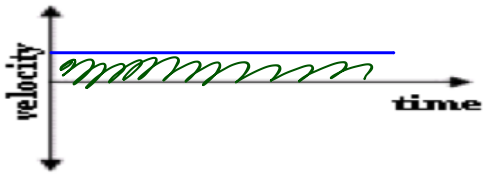
The following shows a car moving at a constant speed.



Time (s)	0	1	2	3	4
Displacement (m)	0	25	50	75	100
Velocity (m/s)	25	25	25	25	25





1. What does the slope of the position-time graph represent?

Slope = vel

$v = \frac{\Delta x}{t}$

2. What does the area under the velocity-time graph represent?

area = vel · time
= displacement

Essential idea: Some quantities have direction and magnitude, others have magnitude only, and this understanding is the key to correct manipulation of quantities

Magnitude: the value of a quantity (number and unit)

Scalar: a quantity that consists of magnitude only

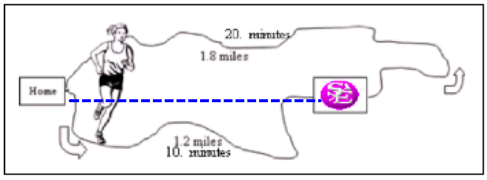
Examples of scalar quantities: mass, time, speed, distance

Vector: a quantity that consists of magnitude and direction

Examples of vector quantities:

displacement, velocity, accl., force

A student runs from home to school and back.



	Running from home to school	Round trip
Distance	1.2 mile	3.0 miles
Displacement	.8 mile	0
Speed	.12 mile/min	.10 mile/min
Velocity	.08 mile/min east	0

3. When is the distance an object travels equal to its displacement (in magnitude)?

traveling in straight line

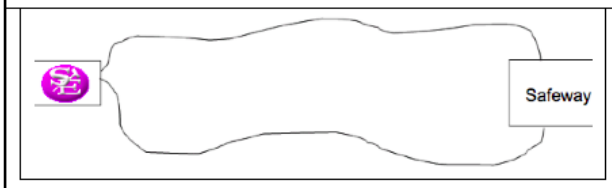
4. When is the speed of an object equal to its velocity (in magnitude)?

traveling in straight line

5. How can you drive at a constant speed but not at a constant velocity? turning

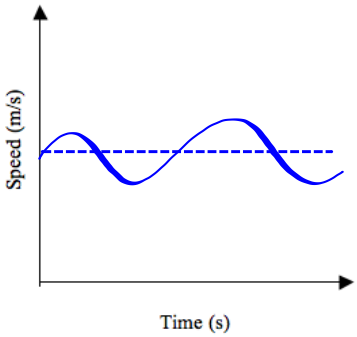
3

Average vs. Instantaneous



Calculate your speed for a trip to Safeway.

Sketch a graph of your speed for your trip.



1. Average speed (or velocity): speed or vel over some time period

2. Instantaneous speed (or velocity): speed or vel at some instant

3. Describe a trip in which a car's average speed equals its instantaneous speed for the entire time.

moving w/ constant speed

-given

Problem Solving – Smooth Form

- equation to be solved
- solve equation for unknown (with symbols)
- plug in #'s w/ units
- answer w/units

4. An airplane flies at a constant speed of 300. m/s. How long will it take the plane to fly a distance of 1.2 km?

$d = 1200\ m$ – $V_{avg} = d/t$

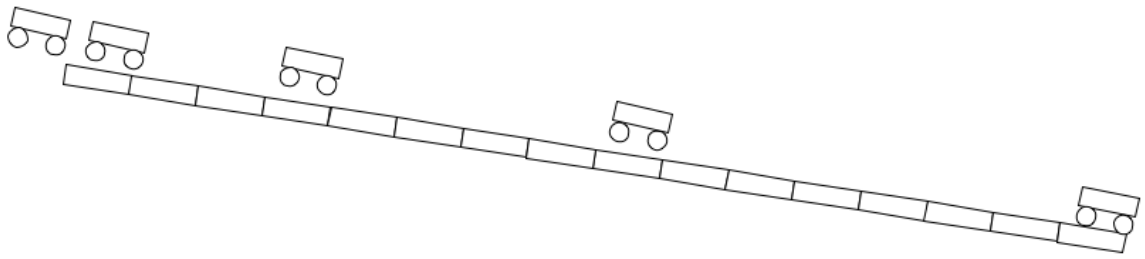
$v = 300.\ m/s$

$t = d/V_{avg} = 1200\ m / 300.\ m/s = 4.0\ s$

5. A car travels at an average speed of 30. m/s. How far will the car go in 3.0 hours? 3.3600s

Acceleration

A cart is allowed to roll freely down a ramp, as shown below. The position of the cart is marked after each second.



1. Describe the distance the cart travels each second.

2. Describe any changes in the speed and velocity of the cart as it rolls downhill.