

## Homework Answers

1.  $v = 20 \text{ m/s}$

4. A spaceship travels 10 m, 100 m, 500 m, and 4,200 m respectively during the first four seconds after launch. What is the average speed at the end of each second?



7.  $0.61 \text{ m/s}, 3.26 \text{ m/s}, 8.24 \text{ m/s}, 14.18 \text{ m/s}$

8.  $1.72 \text{ s}$

9.  $274,224 \text{ m}$

2. Darnley drives from Waterboro of Felixburg, a distance of 325 km, in 5 hrs. What is his average speed in m/s?



5. An electron travels 4.82 m in 0.0036 s. What is its average speed?

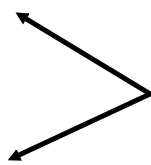


## Linear Motion Equations

So far we have studied the following equations:

$$\text{speed} = \frac{\text{distance}}{\text{time}}$$

$$\text{velocity} = \frac{\text{displacement}}{\text{time}}$$



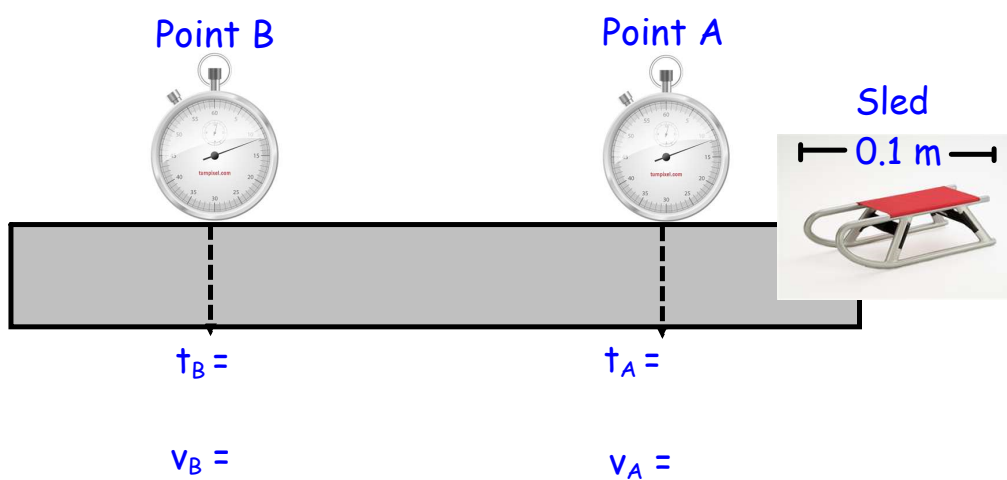
$$\bar{v} = \frac{d}{t}$$

To use ONLY  
when  $v$  is constant  
(non changing)

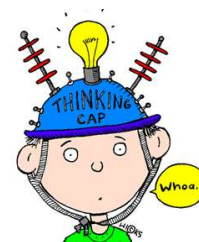
$$\text{average velocity} = \frac{v_i + v_f}{2} \longrightarrow \text{To use when } v \text{ changes}$$

By the end of this lesson, we will study four other equations that describe the motion of an object whose velocity changes

## 2. Acceleration.notebook



Average time to go from Point A to Point B:



Equation #1: Constant acceleration

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

$\Delta v$  = change in velocity Units?

t = time Units?

a = acceleration Units?

What is our sled's acceleration?...

Equation #2: Same as #1 but  
cross multiply and solve for  $v_f$



$v_f$  = Final Velocity

$v_i$  = Initial Velocity

$t$  = Time

$a$  = Acceleration

### Four Equations of Constant Acceleration

	a	v <sub>f</sub>	v <sub>i</sub>	d	t
$a = \frac{\Delta v}{t}$	✓	✓	✓		✓
$v_f = v_i + at$	✓	✓	✓		✓
$v_f^2 = v_i^2 + 2ad$	✓	✓	✓	✓	
$d = v_i t + \frac{1}{2} at^2$	✓		✓	✓	✓

## Choosing the correct linear motion equation

### Procedure:

- 1) Write the given information ( $a$ ,  $v_i$ ,  $v_f$ ,  $d$ ,  $t$ ) and the unknown
- 2) Choose an equation that contains the given and the unknown
- 3) Substitute with units
- 4) Solve with units in (m) and in (s) unless otherwise specified

### Example:

A car traveling at 15 m/s accelerates at  $4 \text{ m/s}^2$  for 3 s.  
Find its displacement.

## 2. Acceleration.notebook

- 1) A car travels from 20 m/s N to 35 m/s N in 4 s. Find its acceleration.
- 2) A motorcycle traveling at 26 m/s stops in 4s. Find its acceleration
- 3) A boat accelerates from rest at  $4 \text{ m/s}^2$ . How fast is it going after 10 meters?
- 4) A car traveling at 20 m/s accelerates at  $2 \text{ m/s}^2$ . How far does it travel in 3 seconds?