# Chapter 14: The Nature of Speed

## Section 14.1 - 14.3 (pgs. 250 - 263)

# Velocity

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

where v = velocity/speed (m/s)
d = distance (m)
t = time (s)

- **Distance:** a change in position
- **Time:** change in position over an interval of time
- **Velocity:** the distance travelled during a specific time interval

**ex)** vehicles travelling at 100km/h will cover 100 km in one hour

Example (pg. 255 #1)

It is 10 meters from the back of the pool hall to the front door. If you travel that distance in 30 seconds, how fast are you travelling in m/s?

$d = 10\,m$

$t = 30\,s$

$v = ?$

$$v = \frac{d}{t} = \frac{10\,m}{30\,s} \doteq 0.33\,m/s$$

$$\doteq 1.2\,\frac{km}{h}$$

Example (pg. 255 #2)

In a long shot to finish the game, the cue ball is two metres from the 8-ball. It takes half a second (0.5 s) for the cue ball to travel that distance. What is its velocity?

$d = 2\,m$

$t = 0.5\,s$

$v = ?$

$$v = \frac{d}{t} = \frac{2\,m}{0.5\,s} = 4\,m/s$$

Example (pg. 255 #3)

To get home you drive 25 km in half an hour. At what velocity are you travelling? (km/h)

$d = 25\,km$

$t = \frac{30\,min}{60\,\frac{min}{h}} = 0.5\,h$

$V = ?$

$V = \frac{d}{t}$

$= \frac{25\,km}{0.5\,h}$

$= 50\,\frac{km}{h}$

Example (pg. 255 #4)

At what velocity would you have to drive to travel 20 km in 15 minutes (1/4 hr or 0.25h)?

$d = 20\,km$

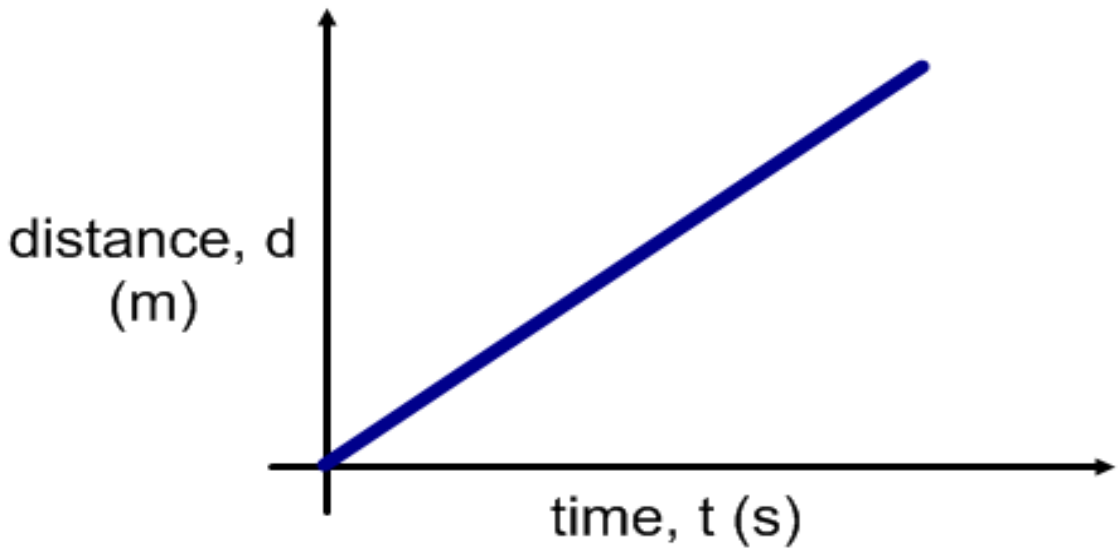
$t = \frac{15\,min}{60\,\frac{min}{h}} = 0.25h$

$V = \frac{d}{t}$

$V = \frac{20\,km}{0.25h}$

$= 80\,\frac{km}{h}$

# Graphing




velocity = $\frac{\text{rise}}{\text{run}}$

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

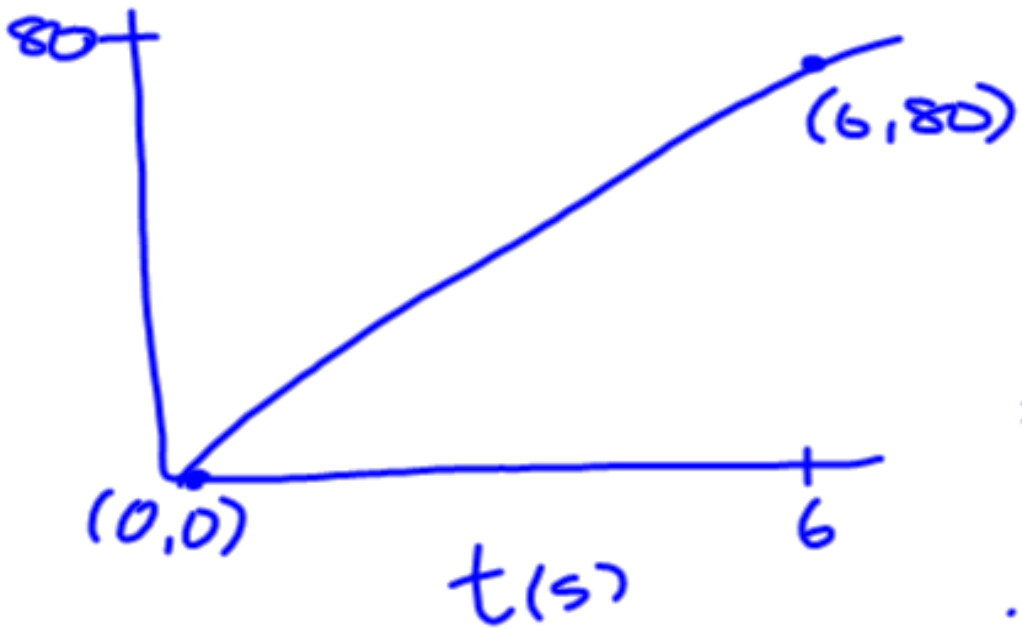
** slope of the line is velocity

Properties of the Graph

- **manipulated variable** on the x-axis
- **responding variable** on the y-axis
- **variables** are the factors that change during the event

Example (pg. 261 #1)

Calculate the velocity of the go-kart by calculating the slope of the graph in Figure B. Show all your steps.




$$\text{slope} = \frac{\text{rise}}{\text{run}}$$

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

$$= \frac{80\text{m} - 0\text{m}}{6\text{s} - 0\text{s}}$$

$$\doteq 13.3\ \text{m/s} \overset{\times 3.6}{\doteq} 48\ \frac{\text{km}}{\text{h}}$$

Example (pg. 263 #1)

What distance will you travel in 2.3 h at an average of 56 km/h?

$t = 2.3\text{h}$

$v = 56\frac{\text{km}}{\text{h}}$

$d = ?$

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

$\boxed{d = vt}$

$= 56\frac{\text{km}}{\text{h}}(2.3\text{h})$

$\doteq 128.8\text{km}$

Example (pg. 263 #2)

Imagine you are going on a trip with many stops. Calculate and fill in the missing information for the distance/time chart for Alberta.

| | Distance | Time | Speed |
|---|---|---|---|
| Edmonton - Red Deer | | 1.35 h | 110 km/h |
| Red Deer - Calgary | | 1.33 h | 110 km/h |
| Calgary - Banff | 159 km | 1.76 h | |
| Banff - Lake Louise | 56 km | 0.62 h | |
| Lake Louise - Jasper | 289 km | 3.2 h | |
| Jasper - Hinton | | 0.66 h | 100 km/h |
| Hinton - Edmonton | | 2.48 h | 110 km/h |

(p244) #1-2 (p247) #1-3

**To Do**

Read Section 14.1 (pgs.252 - 255)
Do Check Your Understanding (pgs. 255) #1 - 4

Read Section 14.2 (pgs. 256 - 261)
Do Find Out Activity: What are you Plotting (pg. 257)
Do Check Your Understanding (pg. 261) #1 - 4

Read Section 14.3 (pgs. 262 - 263)
Do Check Your Understanding (pg. 263) #1 - 4