Warm Up:

$$y = mx + b$$

Given R = 50p, determine:

a) constant of variation   50

b) fixed value   0

c) slope of the line   50

If R represents the money raised at a fundraising event, and p represents the number of people, determine how many people came if $6500 was raised.
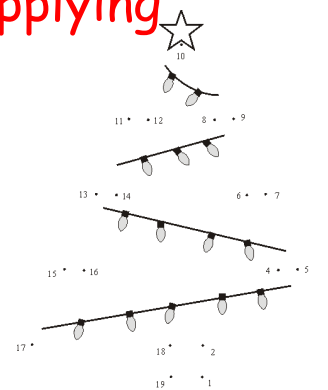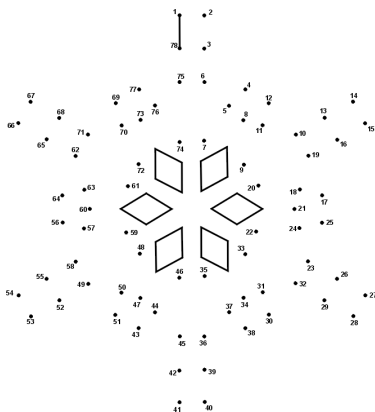
$$R = 50p$$

$$\frac{6500}{50} = \frac{50p}{50}$$

$$130 = p$$

Unit 4
Modelling Equations
(Chapter 5 in textbook!)
Day 5 - Connecting and Applying

So far, we have learned how to identify a linear relation from a(n):

1. Graph

2. Equation
   - $y = mx$ — Direct
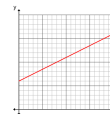   - $y = mx + b$ — partial

3. Table of values

AND

- we can tell if a linear relation is direct or partial by the graph or by the form of the equation

Direct Var.
$$y = mx$$

Partial Var.
$$y = mx + b$$

- we can calculate slope of a line
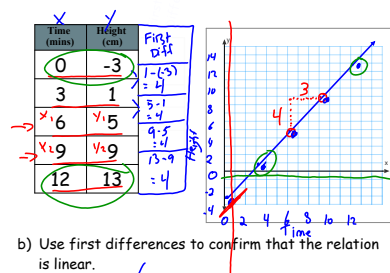
(1)
$$m = \frac{rise}{run}$$

(2)
$$m = \frac{\text{change in } y}{\text{change in } x}$$

(3)
$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

Now, let's tie it all together!!!

Ex. 1 The following table shows the height above the ground of a snail as it crawls up a pipe.

a) Graph this relation. Is it partial or direct variation?

Time (mins)	Height (cm)	First Diff
0	-3	1-(-3) = 4
3	1	5-1 = 4
6	5	9-5 = 4
9	9	13-9 = 4
12	13	= 4

b) Use first differences to confirm that the relation is linear. ✓

c) Calculate the slope.

$$m = \frac{Rise}{Run} = \frac{4}{3}$$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

① $(6,5)$
② $(9,9)$

$$\frac{9-5}{9-6}$$
$$= \frac{4}{3}$$

d) What is the initial height of the snail?

-3
- below ground line

e) Write the equation of the line.

$$y = mx + b$$
$$y = \frac{4}{3}x - 3$$

$$y = 1$$
$$x = 3$$
$$m = \frac{4}{3}$$
$$b =$$

$$y = mx + b$$
$$1 = \frac{4}{3}(3) + b$$

Ex. 2 y varies partially with x. When x = 0, y = 3 and when x = 6, y = 8.

① $(0, 3)$ ② $(6, 8)$

          x y   x y

a) Find the slope and the <u>vertical intercept</u> (y intercept) of the line.

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{8 - 3}{6 - 0} = \frac{5}{6} \rightarrow m$$
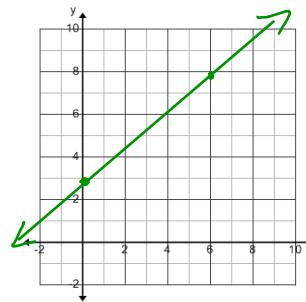
$(0, 3)$

y intercept → x = 0

→ = 3

$b = 3$

b) Write an equation to represent this partial variation.

$$y = mx + b$$

$$y = \frac{5}{6}x + 3$$

c) Graph the relation.

Ex. 3 A company tests heavy duty elastic bands by measuring how much they stretch when supporting various masses.

Mass (kg)	0	2	4	6	8
Length (cm)	6.2	9.6	13.0	16.4	19.8

a) Determine if this relation is linear.

mass	Length	First Diff
① 0	6.2	9.6-6.2 = 3.4
② 2	9.6	13-9.6 = 3.4
4	13	16.4-13 = 3.4
6	16.4	19.8-16.4 = 3.4
8	19.8	

∴ linear

b) What does the point (0, 6.2) represent?

how long the rubber band is originally

c) Calculate the slope. What does it represent?

$$\frac{3.4}{2}$$

d) Write an equation in the form of y = mx + b.

e) Predict how long the elastic band would be when it is supporting 10 kg.

Today's Practice Questions

Pg 284 – 287 # 1, 5, 7, 9, 10, 13, 16