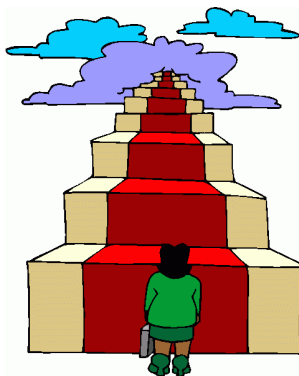


Unit 4

Modelling Equations

(Chapter 5 in textbook!)

Day 1 - Direct Variation



Definition of DIRECT VARIATION:

A relationship between two variables in which
one variable is a constant multiple of the other.

The equation is in the form of $y = mx$
where m is the constant multiple (or constant of variation).

The line goes through the origin.

**** NOTE: The textbook uses $y = kx$, where k is the constant multiple! ****

Ex. 1 Paula works as a lifeguard. Her total earnings vary directly with the number of hours she works. She earned \$120 for 15 hours of work last week.

a) What is the constant multiple(m) in this example

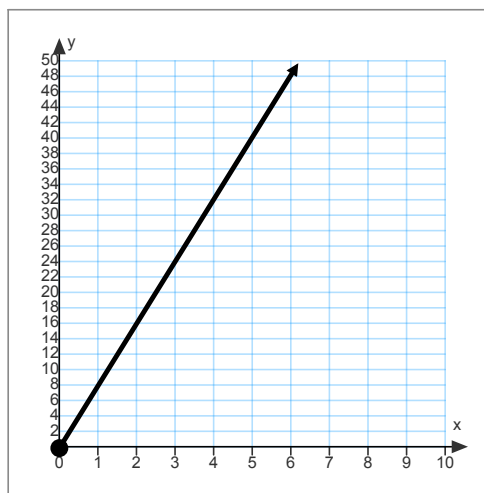
the constant multiple is $\$120/15 \text{ h} = \$8/\text{h}$

therefore $m=8$

b) Find the equation that relates her wages (w) with the number of hours worked (h).

$$w = 8h$$

c) Graph the relation.



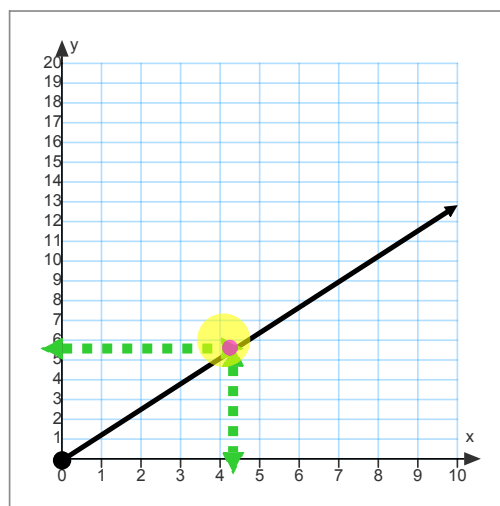
d) Is this a direct variation?

yes this is a direct variation because the wage varies directly with the hours worked. The graph passes through $(0, 0)$, the origin.

Ex. 2 The cost of bananas varies directly with the mass in kg.
If bananas cost \$1.25/kg,

a) Make a table of values.

Mass (kg.)	Cost (\$)
0	0
1	1.25
2	2.5
3	3.75
4	5



b) Is this a direct variation?

yes this is a direct variation because the cost varies directly with the mass. the table starts at (0, 0).

c) Write an equation in the form of $y = mx$

$$y = 1.25x$$

d) Use the graph to estimate how many kgs of bananas could be bought for \$5.75.

at \$5.75 the mass is approx 4.25

e) Use the equation to estimate how many kgs of bananas could be bought for \$5.75.

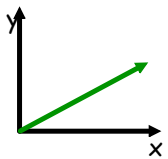
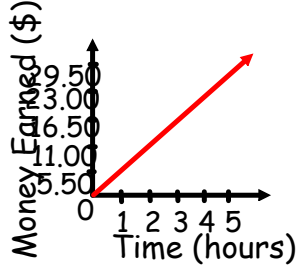
$$5.75 = 1.25x$$

$$5.75/1.25=x$$

$$4.6=x$$

therefore you can but 4.6Kg of bananas for \$5.75

Summarizing Direct Variation:

	Looks Like...	Example
Equation	$y=mx$	$C = 3.20g$
Graph	<p>- passes through the origin</p> 	

PARTIAL VARIATION

Ex. 3 A medium pizza costs \$7 plus \$1.50 per topping.

a) Identify the fixed cost and the variable cost.

fixed cost doesn't change this would be the base cost = \$7

the variable cost changes with extra toppings = \$1.50/topping

b) Determine the equation relating cost, C , in dollars and the number of toppings, n .

$$\text{Cost} = (\text{rate/topping})(\# \text{ of toppings}) + \text{base cost}$$

$$C = 1.5n + 7$$

c) Use the equation to determine the cost of a medium pizza with 6 toppings.

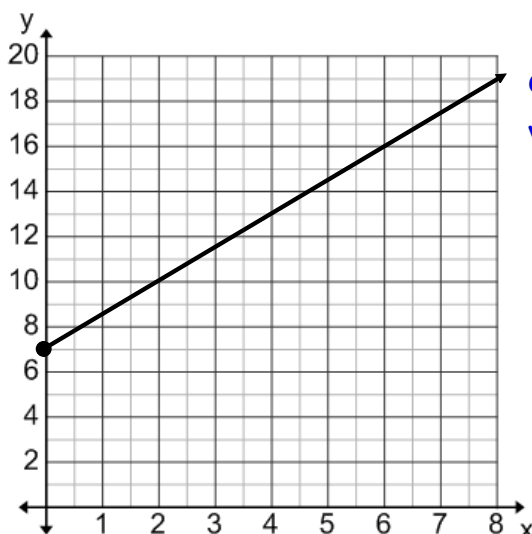
$$C = 1.5n + 7$$

$$C = 1.5(6) + 7$$

$$C = 16$$

Therefore the cost for 6 toppings is \$16.

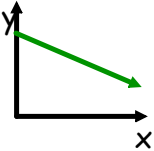
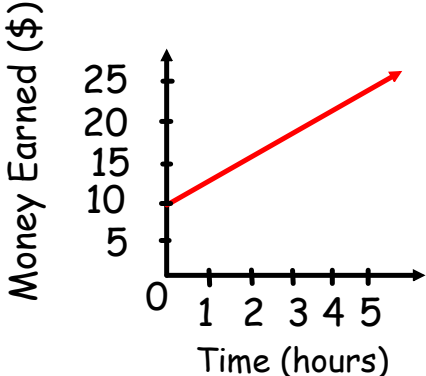
d) Graph this partial variation relation.



d) Is this direct variation?

No this is a partial variation because the Cost varies partially with the base cost and partially with the # of toppings. The graph does not pass through (0, 0)

Summarizing Partial Variation:

	Looks Like...	Example
Equation	$y = mx + b$ <p>where b is the fixed value & m is the constant multiple</p>	$C = 3.20g + 10$
Graph	<p>- does NOT pass through the origin</p> 	

Understanding the Difference - Examples
 sort the following under the appropriate heading

Partial

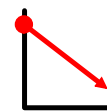
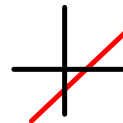
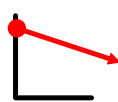
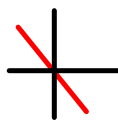
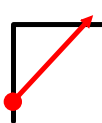
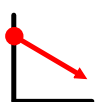
Neither

Direct

$y = 5x$
 Dan earns \$9.00/hour.
 $y = -2x + 7$

Budget Rentals charges
 \$0.10/km plus a \$100
 deposit.

A catering company charges
 \$200 and \$25 per person.
 $C = 1 + 0.25g$ $D = 80t$



Understanding the Difference - Answers

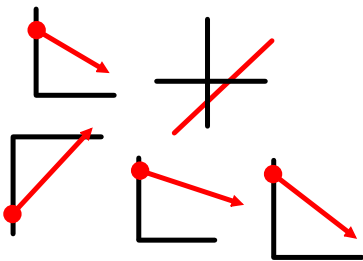
Partial

A catering company charges \$200 and \$25 per person.

Budget Rentals charges \$0.10/km plus a \$100 deposit.

$$y = -2x + 7$$

$$C = 1 + 0.25g$$



Neither

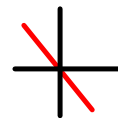


Direct

$$y = 5x$$

Dan earns \$9.00/hour.

$$D = 80t$$



Today's Practice Questions:

Pg 242 - 244 # 1, 3, 7, 10, 12, 14

Pg 250 - 253 # 1, 3, 5, 9, 12