

Determine the slope of the line to the right using TWO different methods.

Using graph

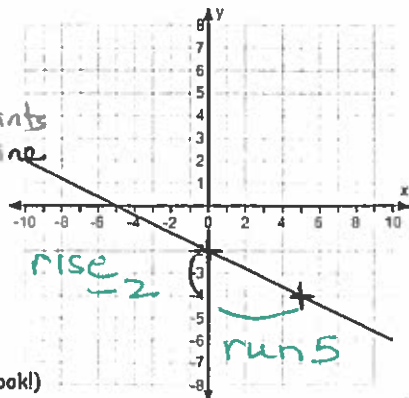
$$m = \frac{\text{rise}}{\text{run}}$$

$$m = \frac{-2}{5}$$

Using Algebra

$(0, -2), (5, -4)$ ← any two nice points from the line
 x_1, y_1, x_2, y_2

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{-4 - (-2)}{5 - 0} = \frac{-2}{5}$$



Unit 5: Linear Relations I (Chapter 5 in textbook!)

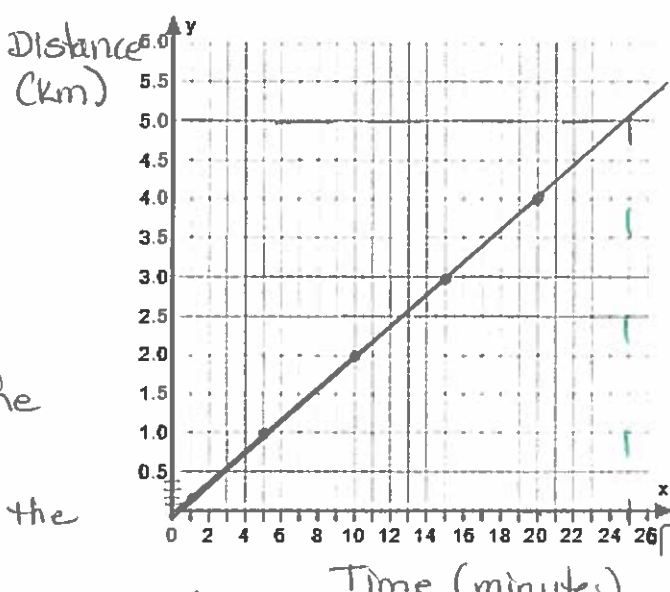
Day 4 - Direct Variation

Ex. 1 The following table shows the relation between the distance and the time on a bike ride.

$$\frac{\Delta y}{\Delta x} = \frac{0.8}{4} = \frac{1}{5}$$

Time (min)	Distance (km)
4	0.2
5	1
10	2
15	3
20	4

Graphing Hint:
 Since the DISTANCE depends on the TIME, Distance is the dependent variable.



- a) Draw the graph
- b) Is the bike going at a constant speed?

Yes, the graph is linear so the speed is constant.

- c) What speed is the bike going?
 ↳ rate of change so find the slope

* see table above *

$$m = \frac{\Delta y}{\Delta x}$$

$m = \frac{1}{5}$ so speed is 0.2 km/min.
 $m = 0.2$

- d) What equation models this bike ride?

$d = 0.2t$, where d is the distance in km, t is the time in minutes.

- e) How long will it take to ride 5 km?

from graph about 25 minutes.

using algebra $d = 5$, find t
 $0.2t = 5$
 $\frac{0.2t}{0.2} = \frac{5}{0.2}$ ∴ it will take 25 minutes

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 origin.

The line goes through $(0, 0)$.

* textbook often uses 'k' as the constant of variation instead of 'm'.

Ex. 2: 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) Find the equation that relates her wages (w) with the number of hours worked (h).

$$w = mh$$

$$w = 8h$$

$$m = \frac{\Delta y}{\Delta x} = \frac{120-0}{15-0} = 8$$

b) How much does Paula earn for 22 h of work?

$$h=22$$

$$w = 8(22)$$

$$w = 176 \quad \therefore \text{she earned } \$176.$$

c) How many hours does Paula need to work to earn \$76?

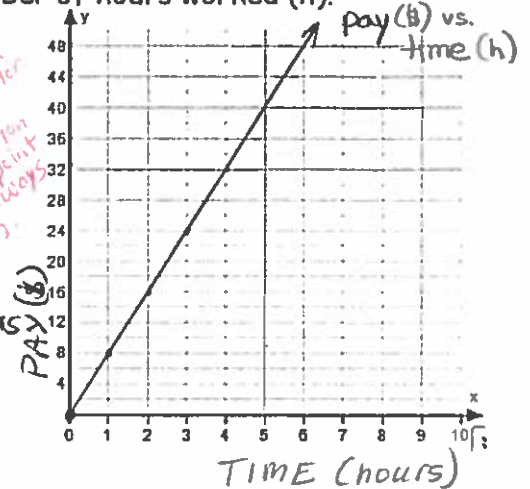
$$w = \$76, \text{ find } h.$$

$$8h = 76$$

$$h = 9.5$$

$$\therefore \text{she worked } 9\frac{1}{2} \text{ hours}$$

d) Graph the relation.

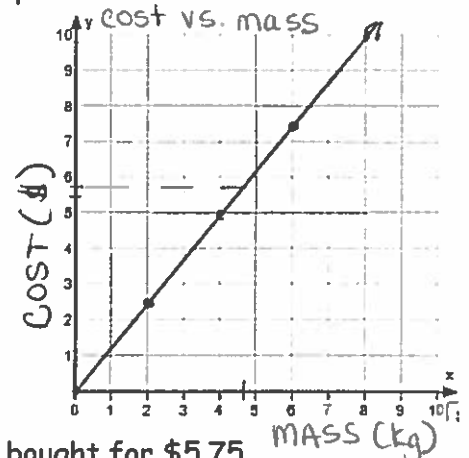


Ex. 3 The cost of bananas varies directly with the mass in kg. If bananas cost \$1.25/kg,

a) Make a table of values.

Mass (kg)	Cost (\$)
0	0
2	2.50
4	5.00
6	7.50
8	10.00

b) Graph the Relation



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

$$y = 1.25x$$

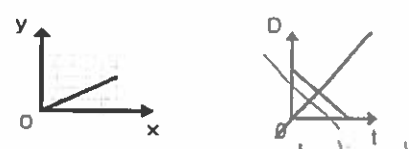
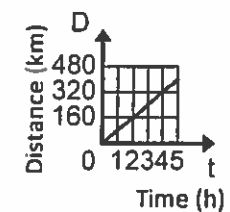
d) Use the graph to estimate how many kgs of bananas could be bought for \$5.75.

About $4\frac{2}{3}$ kg of bananas can be purchased for \$5.75

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

$$1.25x = 5.75 \rightarrow x = \frac{5.75}{1.25} \rightarrow x = 4.6 \quad \therefore 4.6 \text{ kg of bananas can be purchased.}$$

Summarizing Direct Variation:

	Looks Like...	Example
Equation	$y = mx$ where m is the <u>constant</u> multiple (m is a number)	$C = 3.20g$ $D = 80t$
Graph	- a line that goes through the origin 	

not direct variation - does not go through (0,0).