

6.1 Representing Patterns

1. a) Describe the following pattern $\frac{1 \ 2 \ 3 \ 4}{7, 4, 1, -2 \dots}$ -3
- b) Find an equation that represents the pattern and use it to find the 25th number.

$$C = -3n + 10$$

$$C = -3(25) + 10$$

$$= -75 + 10$$

2. a) Draw the next two figures in this series. $= -65$

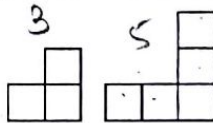


Figure 1 Figure 2

- b) Create a table of values comparing the number of squares and the figure number.

Figure	1	2	3	4
Squares	3	5	7	9

- c) Describe the pattern:

add 2 squares each time

- d) Write the equation that represents this pattern:

$$S = 2f + 1$$

- e) How many squares are in Figure 20?

$$S = 2(20) + 1$$

$$S = 41 \text{ squares}$$

- f) Which figure number has 69 squares?

$$69 = 2f + 1$$

$$68 = 2f$$

$$f = 34 \text{ Figure 34}$$

3. A number pattern starts at 1.5. Each number after that is four more than the number before.

t Term	1	2	3	4	5
V Value	1.5	5.5	9.5	13.5	17.5

- a) Make a table of values for the first five terms.

- b) Develop an equation that can be used to determine the value of each term in the pattern:

$$V = 4t - 2.5$$

- c) What is the value of the 95th term?

$$V = 4(95) - 2.5$$

$$= 377.5$$

- d) Which term has a value of 237.5?

$$237.5 = 4t - 2.5$$

$$\frac{240}{4} = \frac{4t}{4}$$

60th term.

$$t = 60$$

4. What linear equation models the relationship between the values in each table?

a)

n	0	1	2	3
C	11	16	21	26

$$C = 5n + 11$$

b)

x	1	2	3	4
y	-2.1	-0.6	0.9	2.4

$$y = 1.5x - 3.6$$

c)

t	0	1	2	3
d	20	15	10	5

$$d = -5t + 20$$

d)

e	1	2	3	4
r	$\frac{6}{5}$	$\frac{7}{5}$	$\frac{8}{5}$	$\frac{9}{5}$

$$r = \frac{1}{5}e + 1$$

5. On top of the \$45 monthly fee, Sam's cell phone plan charges \$0.15 for every text message he sends or receives.

a) Develop an equation to calculate the monthly bill.

$$C = 0.15m + 45$$

b) Complete a table of values comparing the number of text messages and the monthly cost.

m Messages	1	2	3	4	5
C Cost	45.15	45.3	45.45	45.6	45.75

c) What would Sam's bill be if there were 20 text messages in a month?

$$C = 0.15(20) + 45$$

$$C = 48$$

d) If Sam budgets \$80 a month for his cell phone, how many text messages can he send or receive each month? Explain.

$$80 = 0.15m + 45$$

$$\frac{35}{0.15} = m$$

233 msgs

6. A smaller tanker is driving at a speed of 30 km/h. When it puts on the breaks it takes a while to slow down. The equation $s = -3t + 30$, where s is speed in km/h and t is time in min, models stopping the small tanker.

a) What would be the speed of the tanker be at 7 min after the breaks are put on?

$$s = -3(7) + 30$$

$$s = -21 + 30$$

$$s = 9 \text{ km/h}$$

b) How much time would it take the tanker to stop?

$$0 = -3t + 30$$

$$-30 = -3t$$

$$t = 10 \text{ min}$$

6.2 Interpreting Graphs

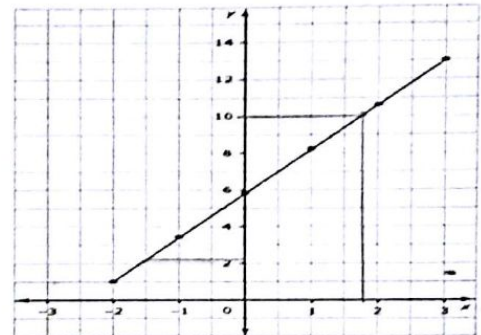
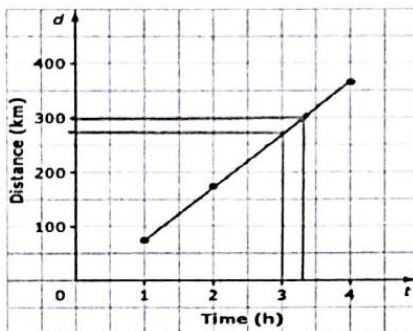
Warm up:

1. For the graph below (left)

a) What is the approximate value of d when $t = 3$? 275 Explain the method you used.

Interpolation

b) What is the approximate value of t when $d = 300$? 3.5



2. For the graph above (right)

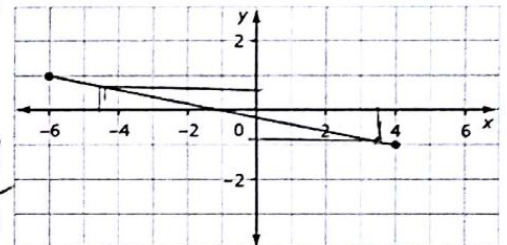
a) What is the approximate value of y when $x = -1.5$? 2.1

b) What is the approximate value of x when $y = 10$? 1.75

3. For the graph below

a) What is the approximate value of y when $x = 3.5$? -0.9

b) What is the approximate value of x when $y = 0.5$? -4.5



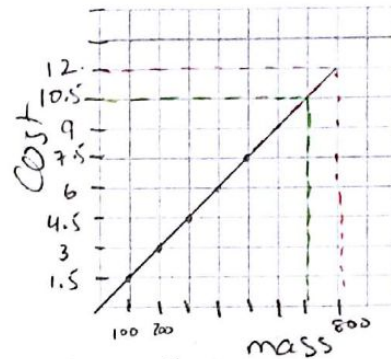
Literacy Link: On the graph, the line joining the points shows that the data are *continuous*. This means that is reasonable to have values between given data points

- *Interpolate* means estimating a value between two given values. *Interpolation* should be used only when it make sense to have values between given values. For example, 5.4 people do not make sense.
- *Extrapolate* means estimating a value beyond a given set of values. *Extrapolation* should be used only when it make sense to have values beyond given values.

4. In the deli section of a grocery store, Greek salad costs \$1.50 per 100 g. Plot the data on a graph.

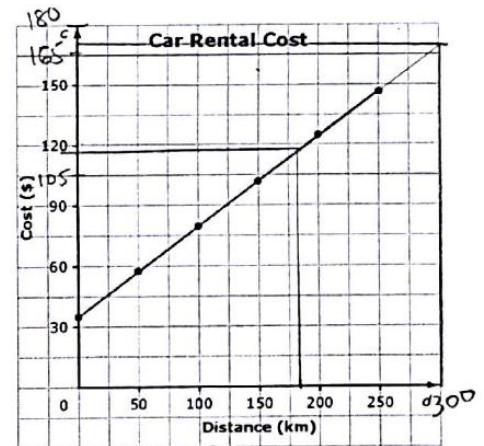
Mass of Greek Salad, m (g)	100	200	300	400	500
Cost, C (\$)	1.50	3.00	4.50	6.00	7.50

- a) From the graph, determine the cost of 800 g of Greek salad. 12



- b) From the graph, determine how much salad you get for \$10.50. 700g

5. A car rental company charges a flat rate of \$35.00 plus \$0.45 per kilometre for renting a car. The graph shows the cost of renting a car based on the number of kilometres driven.



- a) Is it reasonable to *interpolate* or *extrapolate* values on this graph? YES NO Explain.

- b) What is the rental cost after driving 300 km? \$172

- c) Approximately how many kilometres can be driven for a rental cost of \$115? 180km

6.3 Graphing Linear Relations

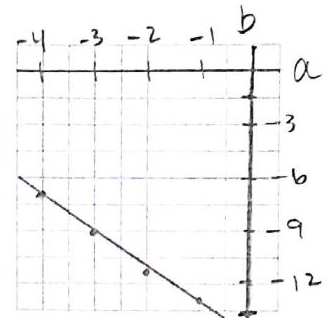
Step by Step procedure to graph a linear relation represented by a linear equation:

- Use the equation to make a table of value
- Graph using the coordinate pairs in the table. The graph of a linear relation forms a straight line
- The graph can be used to solve problems by *interpolating or extrapolating* values

1. For each linear equation, create a table of values and a graph.

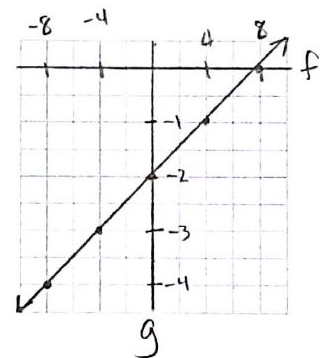
a) $b = -2a - 15$

a	0	-1	-2	-3	-4
b	-15	-13	-11	-9	-7



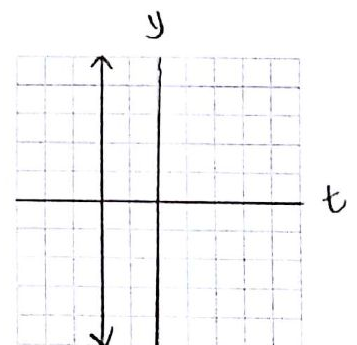
b) $g = \frac{f}{4} - 2$

f	-4	0	4	8	-8
g	-3	-2	-1	0	-4



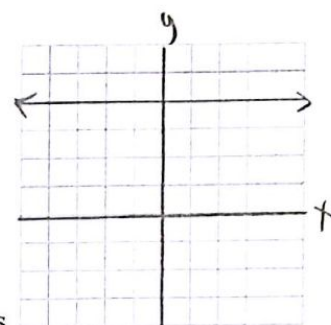
c) $t = -2$

t	-2	-2	-2	-2	-2
y	0	1	2	3	4



2.

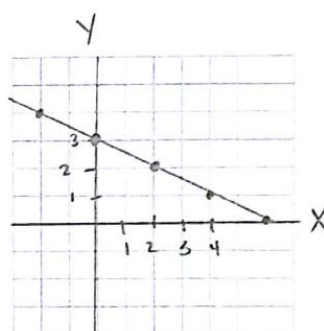
$$y = 4$$



a) Create a graph and a linear equation to represent each table of values

x	-2	-1	0	1	2
y	4	4	4	4	4

$$y = 0.5x + 3$$



b)

x	10	11	12	13	14
y	8	8.5	9	9.5	10

3. The graph shows the relationship between the fuel consumption, f , in litres (L), and the distance driven, d , in kilometres (km).

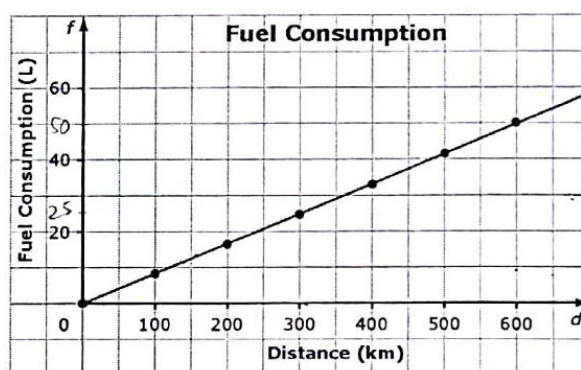
a) What is the linear equation?

$$f = \frac{1}{12}d$$

b) How far could you drive with 34 L of gas?

$$12(34) = \left(\frac{1}{12}d\right)12$$

$$d = 408$$



c) Is it appropriate to interpolate or extrapolate values on this graph? What assumption is being made? Explain.

Yes. You can extrapolate assuming you never run out of fuel.