

Important Concepts . . .

# Preview Review



**Mathematics    Grade 8**  
**W2 - Lesson 3: Graphing and Analyzing**  
**Linear Equations**

## Important Concepts of Grade 8 Mathematics

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W1 - Lesson 3 .....	Multiplying and Dividing Fractions
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## Materials Required

Protractor  
Ruler  
Calculator

**No Textbook  
Required**

**This is a stand-  
alone course.**

### Mathematics Grade 8

Version 6

Preview/Review W2 - Lesson 3

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# Preview/Review Concepts for Grade Eight Mathematics



*W2 - Lesson 3:*

*Graphing and Analyzing Linear  
Equations*

# OBJECTIVES

By the end of this lesson, you will be able to:

- Determine the missing value in an ordered pair
- Create a table of values
- Construct a graph for discrete data
- Describe the relationship between the variables of a given graph

## GLOSSARY

**Discrete Data** – data that contains a set of values that is distinct and separate from one another. Data located in between these values is meaningless.

**Linear Relation** – relationships between two variables (usually  $x$  and  $y$ ) that form a straight non-vertical and non-horizontal line when graphed.

**Ordered Pair** – a related pair of values that correspond to a point on a graph; an ordered pair is written in the form  $(x, y)$ .

# W2 - Lesson 3: Graphing and Analyzing Linear Equations

## Materials required:

- Paper, and Pencil

## Part 1: Creating a Table of Values

A linear relation is a relationship between two variables (usually  $x$  and  $y$ ) that form a straight non-vertical and non-horizontal line when it is graphed.

A linear relation looks like  $y = 3x + 1$ , where  $x$  is the input value and  $y$  is the output value.

Before you can graph a linear relation, you determine the ordered pairs that correspond to the given linear relation. Ordered pairs can be calculated by substituting a given value of  $x$  into the linear relation and evaluating the value of  $y$ .

### Example 1

Evaluate the linear relation  $y = 3x + 1$  when  $x = 0, 1, 2, 3,$  and  $4$ .

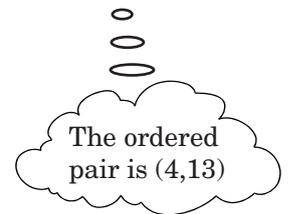
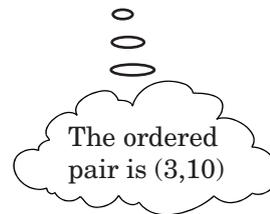
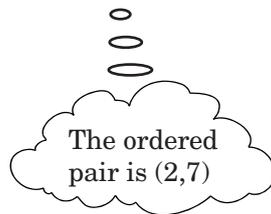
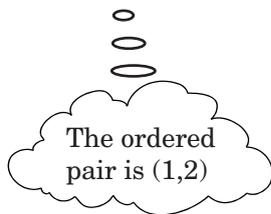
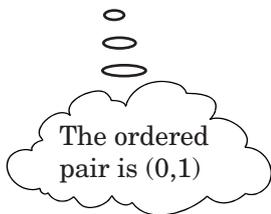
$$\begin{aligned} y &= 3x + 1 \\ &= 3(0) + 1 \\ &= 0 + 1 \\ &= 1 \end{aligned}$$

$$\begin{aligned} y &= 3x + 1 \\ &= 3(1) + 1 \\ &= 1 + 1 \\ &= 2 \end{aligned}$$

$$\begin{aligned} y &= 3x + 1 \\ &= 3(2) + 1 \\ &= 6 + 1 \\ &= 7 \end{aligned}$$

$$\begin{aligned} y &= 3x + 1 \\ &= 3(3) + 1 \\ &= 9 + 1 \\ &= 10 \end{aligned}$$

$$\begin{aligned} y &= 3x + 1 \\ &= 3(4) + 1 \\ &= 12 + 1 \\ &= 13 \end{aligned}$$



These relations can be organized neatly in a table of values. A table of values has two columns. The first column lists the x-values (input) the second column lists the corresponding y-values (output).

<b>x</b>	<b>y</b>
0	1
1	4
2	7
3	10
4	13

### Practice Questions

1. Determine the missing values in the ordered pairs given the following linear relations.

a.  $y = -5x - 1$

(2, \_\_\_)

(\_\_\_, -26)

b.  $y = 2x + 7$

$(\underline{\quad}, 25)$

$(6, \underline{\quad})$

2. Create a table of values for the following linear relations. Use  $x = 0, 1, 2, 3,$  and  $4$ .

a.  $y = -2x + 3$

b.  $y = 4x - 5$

c.  $y = -6x - 8$

## Part 2: Graphing and Analyzing a Linear Relation

In a linear relation, the value of  $y$  depends upon the input value of  $x$ . This makes  $x$  the independent variable and the  $y$ -variables the dependant variables.

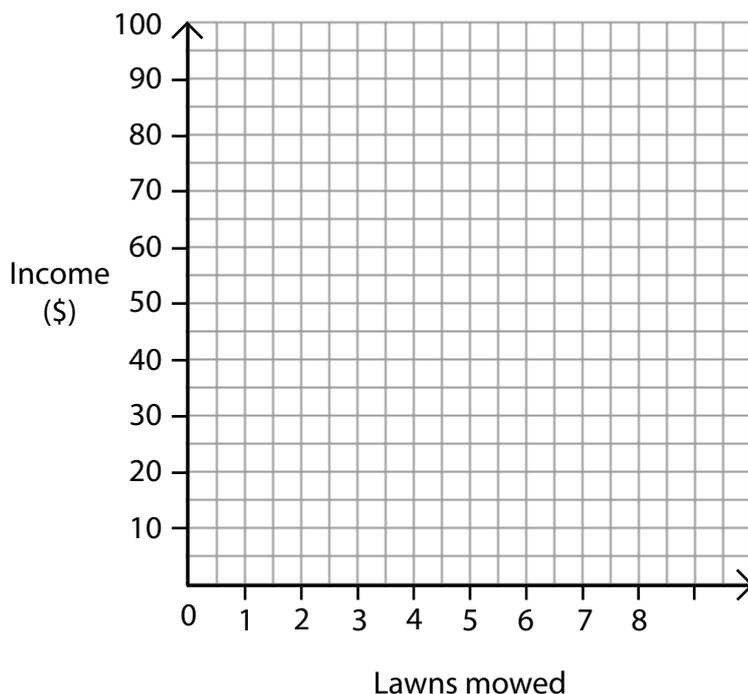
To graph a linear relation plot the set of  $x$ -values (independent variables) along the horizontal axis (the  $x$ -axis) and plot the set of  $y$ -values (dependant variables) along the vertical axis (the  $y$ -axis).

Remember the following points:

- Label the axis with a name including the units
- Label the origin with a 0 and plot the increments along the  $x$ -axis using a consistent scale. Do the same for the  $y$ -axis.
- Give the graph a title.
- Do not connect the points because the data is discrete. That means that no meaningful values exist between the numbers plotted along the  $x$ -axis.

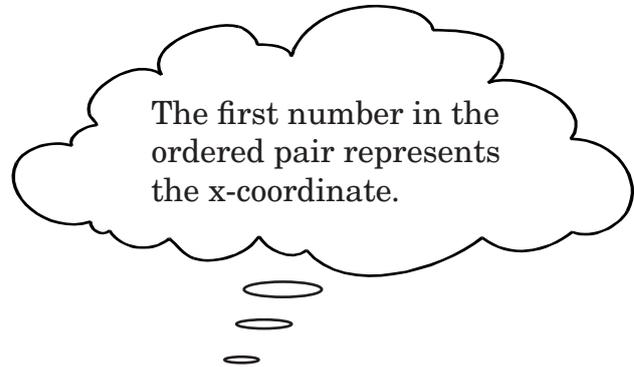
### Example 1

Dawson mows lawns for \$12.00 a lawn. Graph this relation on the following graph.

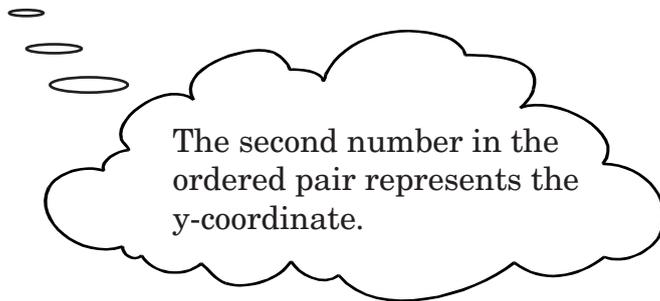


The linear relation that represents Dawson’s part-time income is  $I = 12m$ , where  $I$  represents his income and  $m$  represents the number of lawns he mows. First create a table of values to determine the ordered pairs.

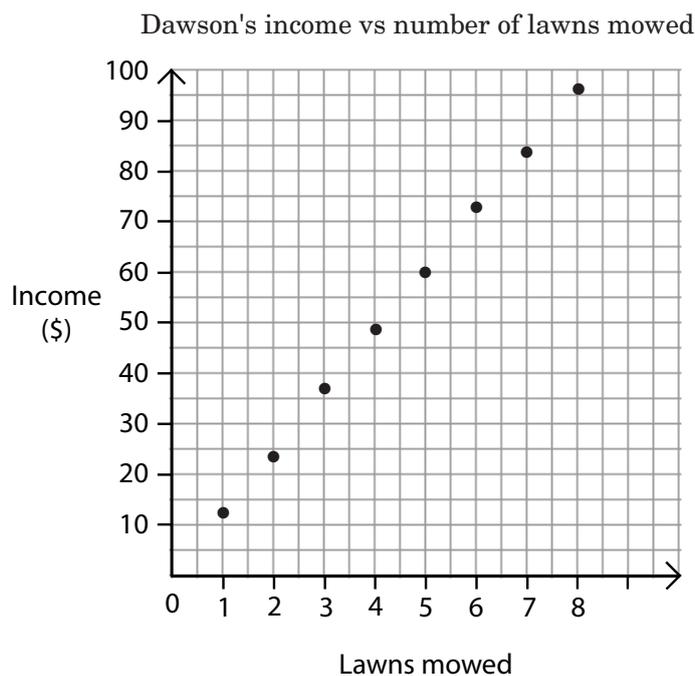
<b>m</b>		<b>I</b>
0	$12(0)$	0
1	$12(1)$	12
2	$12(2)$	24
3	$12(3)$	36
4	$12(4)$	48



The ordered pairs that correspond to the linear relation are:  $(0, 0)$ ,  $(1, 12)$ ,  $(2, 24)$ ,  $(3, 36)$ ,  $(4, 48)$ .



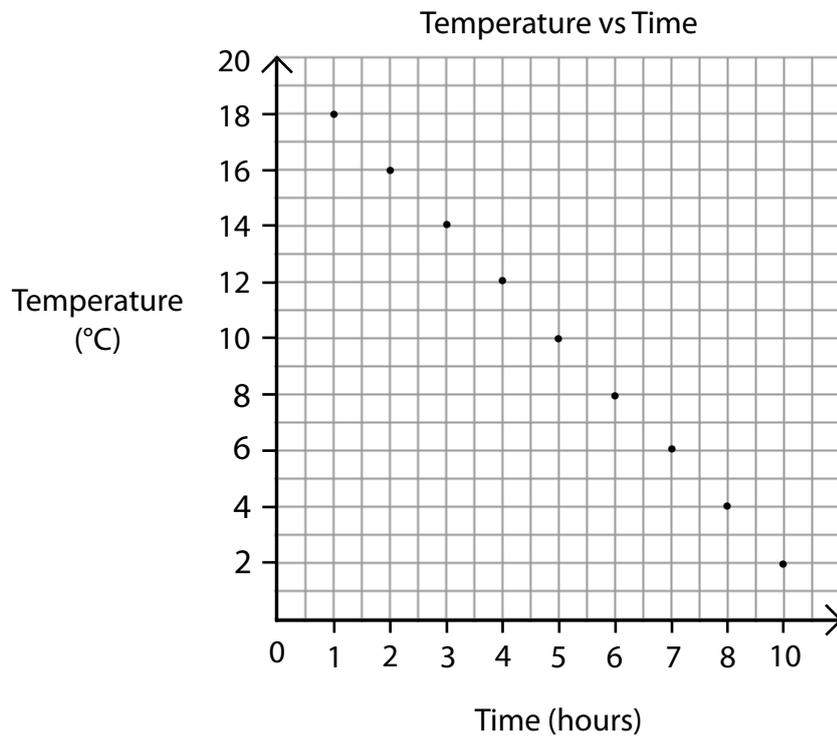
Now you can graph the linear relation using the ordered pairs as points.



When a linear relation is graphed, a relationship between the variables can be seen. In this case, it looks like the more lawns Dawson mow, the more money he will make. As the number of lawns increased by 1, Dawson's income increases by 12 dollars.

## Example 2

The temperature on a cool summer day is illustrated on the given graph. The linear relation that represent this relationship is  $T = -2t + 20$ , where  $T$  represents the temperature and  $t$  represent the time.



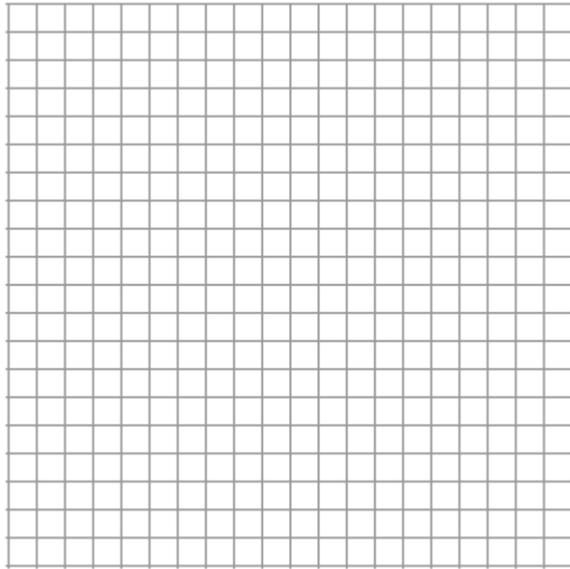
What is the relationship between the two variables?

It looks like as time increases, the temperature decreases. For every hour the time goes up, the temperature decreases by  $2^{\circ}\text{C}$ .

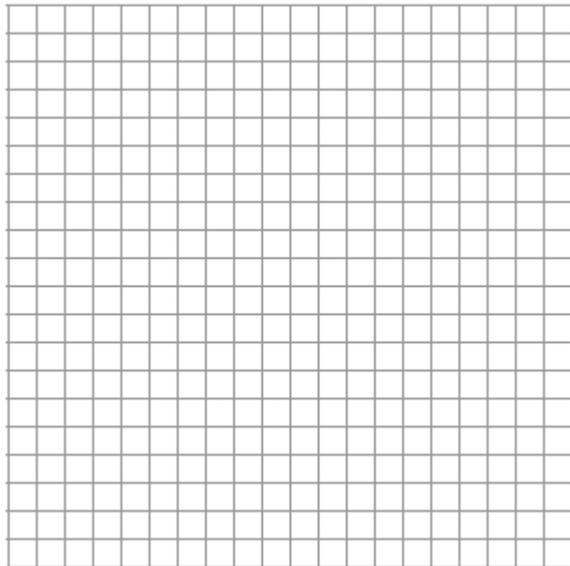
**Practice Questions**

1. Graph the following linear relations.

a.  $y = -3x + 4$

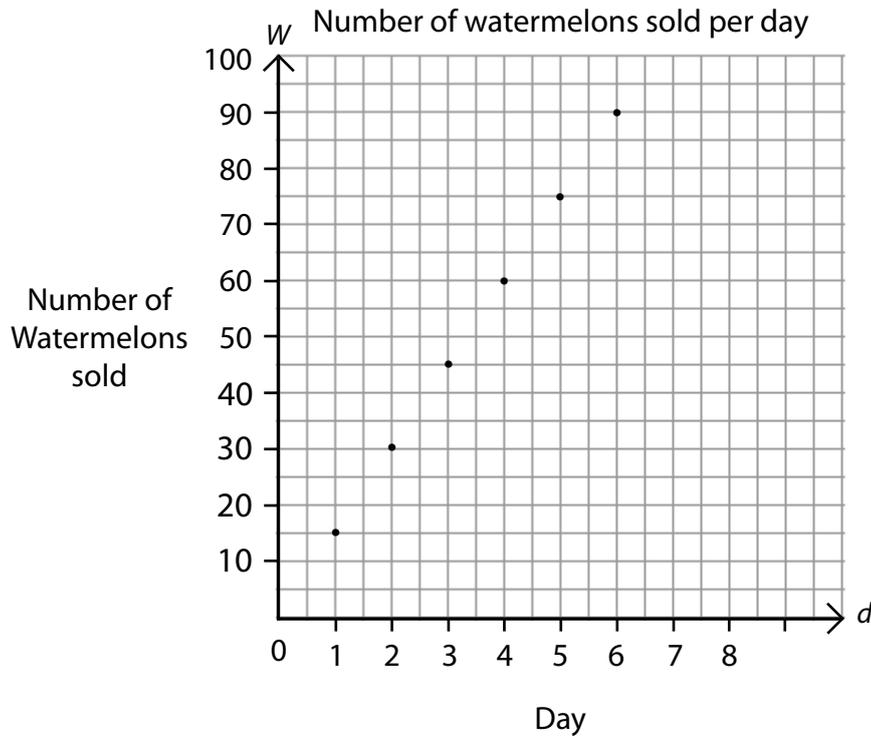


b.  $y = 5x - 10$



2. Determine the relationship between the two variables in the given graphs.

a.




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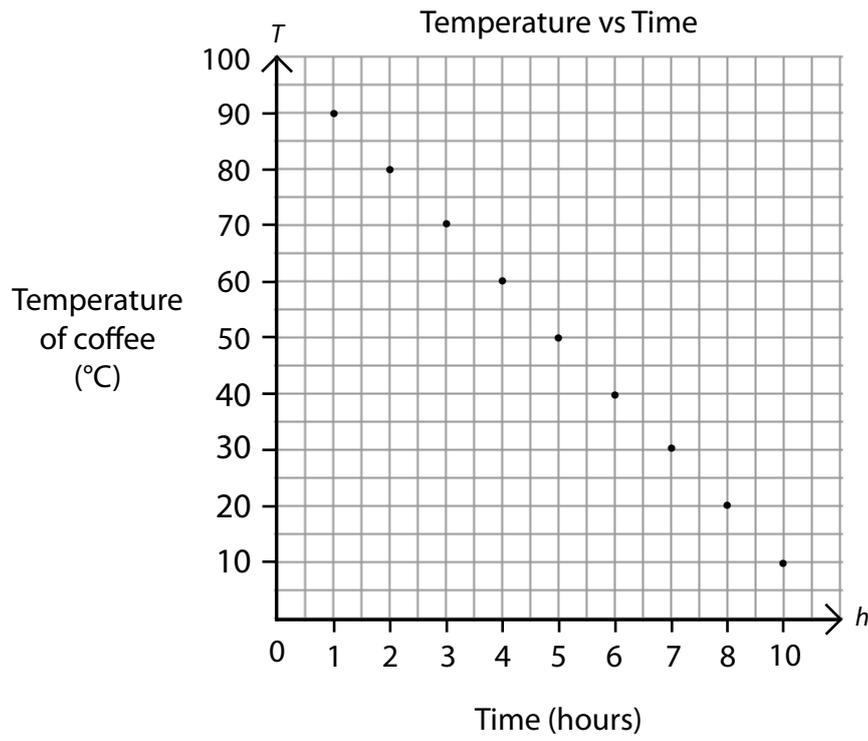


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b.



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**Lesson 8: Assignment**

Determine the missing value in the ordered pair for the given linear relations.

- $y = -6x$   
(3, \_\_\_)  
(\_\_\_, -24)

2.  $y = 7x + 8$   
(2, \_\_\_)  
(\_\_\_, 29)

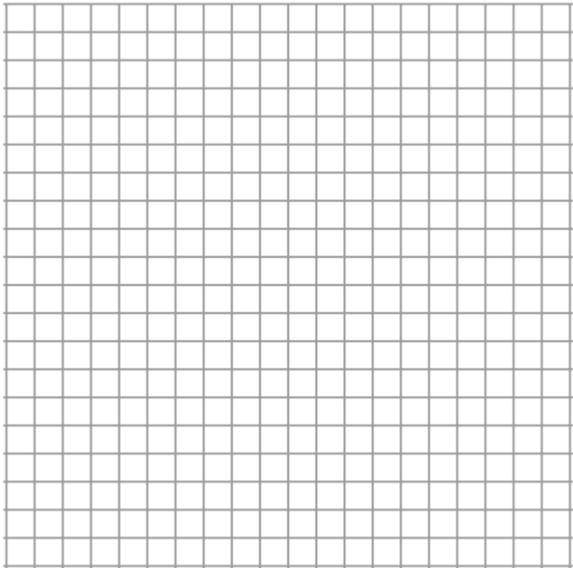
Create a table of values for the following linear relations. Use  $x = 0, 1, 2, 3,$  and  $4$ .

3.  $y = 50 - x$

4.  $y = 16x - 4$

Graph the following linear relations and determine the relationship between the two variables.

5. The cost of renting a banquet hall for a fundraiser is represented by the following linear relation  $C = 20n + 150$ , where  $C$  represents the cost of the banquet hall and  $n$  represents the number of people who attend the fundraiser. Tickets for the fundraiser are sold in packages of 15.



6. The cost of having a cell phone is represented by the following linear relation,  $C = 0.15m + 40$ , where  $C$  represents the cost of the cell phone plan, and  $m$  represents the minutes spent talking on the cell phone. The number of minutes must be pre-bought in 100 minute packages.

