3. Equations and their Graphs

3.1 Use the Rectangular Coordinate System
3.1 Exercise Set, page 312 (294): 1, 5, 7, 11, 15, 19, 25
3.2 Graph Linear Equations in Two Variables
3.2 Exercise Set, page 346 (328): 1, 3, 21, 25, 27, 33

2.4

6. Solve the formula $2x + 3y = 12$ for y
   a. when $x = 3$
   b. in general

(a) $(2)(3) + 3y = 12$

$6 + 3y = 12$

$3y = 6$

$\boxed{y = 2}$

check $(2)(3) + (3)(2) \stackrel{?}{=} 12$

$6 + 6 \stackrel{?}{=} 12$

$12 = 12$ ✓

(b) $2x + 3y = 12$

$3y = 12 - 2x$

$\boxed{y = \frac{12 - 2x}{3}}$

$y = \frac{12}{3} - \frac{2x}{3}$

$\boxed{y = 4 - \frac{2x}{3}}$

Let $x = 3$

Let $x = 3$

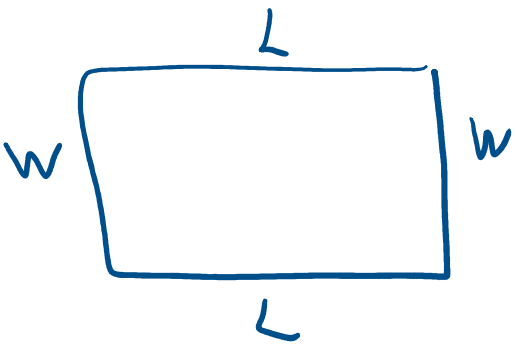
$\Rightarrow y = 4 - \frac{2(3)}{3}$

$y = 4 - 2$

$y = 2$

In the following exercises, solve using a geometry formula.

24. The perimeter of a rectangle of 150 feet. The length of the rectangle is twice the width. Find the length and width of the rectangle.



Let L = length of rectangle

Let W = width " "

$2(L + W) = 150$ ft

$L = 2W$

$2(2W + W) = 150$ ft

Find L, W

$2(3W) = 150$ ft

$6W = 150$ ft

$W = \left(\frac{150}{6}\right)$ ft

$W = 25$ ft

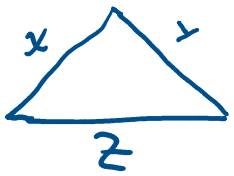
$L = 2(25$ ft$)$

$L = 2(25\ ft)$

$\boxed{L = 50\ ft}$

The length of the rectangle is 50 feet, and the width of the rectangle is 25 feet.

26. The perimeter of a triangle is 39 feet. One side of the triangle is one foot longer than the second side. The third side is two feet longer than the second side. Find the length of each side.



Let x = one side of triangle

Let y = the 2nd side

Let z = the 3rd side

Find x, y, z

P = side 1 + side 2 + side 3

$x + y + z = 39\ ft$

$x = y + 1\ ft$

$z = y + 2\ ft$

$(y + 1\ ft) + y + (y + 2\ ft) = 39\ ft$

$y + 1\ ft + y + y + 2\ ft = 39\ ft$

$3y + 3\ ft = 39\ ft$

$3y = 36\ ft$

$\boxed{y = 12\ ft}$

$x = 12\ ft + 1\ ft$

$\boxed{x = 13\ ft}$

$z = 12\ ft + 2\ ft$

$\boxed{z = 14\ ft}$

The lengths of the sides of the triangle are 12 feet, 13 feet, and 14 feet

2.4

32. Marta is taking the bus from Abbotsford to Cranbrook. The distance is 774 km and the bus travels at a steady rate of 86 miles per hour. How long will the bus ride be?

32. Marta is taking the bus from Abbotsford to Cranbrook. The distance is 774 km and the bus travels at a steady rate of 86 miles per hour. How long will the bus ride be?

Let d = distance of bus ride
r = bus driving rate (speed)
t = time duration of the bus ride

$d = rt$

$\boxed{t = \frac{d}{r}}$

$d = 774$ km

$r = 86 \frac{mi}{hr}$

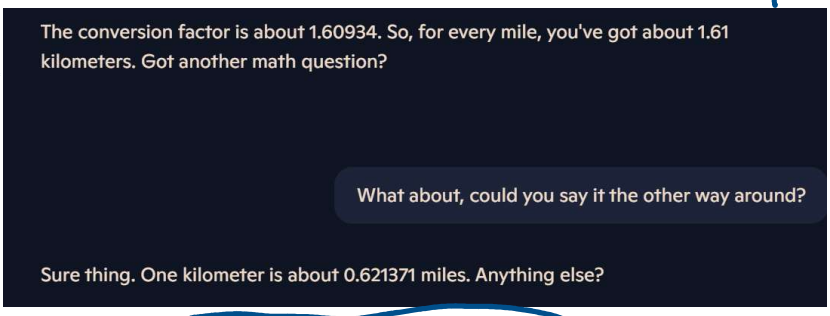
$t = \frac{774 \text{ km}}{86 \frac{mi}{hr}}$

$t = \frac{774}{86}\left(\frac{km \cdot hr}{mi}\right)$

$\frac{\frac{a}{b}}{\frac{c}{d}} = \left(\frac{a}{b}\right)\left(\frac{d}{c}\right) = \frac{ad}{bc}$

$\frac{\frac{1}{1}}{\frac{mi}{hr}} = \left(\frac{1}{1}\right)\left(\frac{hr}{mi}\right) = \frac{hr}{mi}$

supplied



$\boxed{1 \text{ mi} \approx 1.61 \text{ km}}$

$1 \text{ km} \approx 0.621371 \text{ mi}$

5/8=0.625

$$t = \left(\frac{774}{86}\right)\left(\frac{km}{1{,}61\ km}\right) hr$$

774/(86*1.61)=5.5901

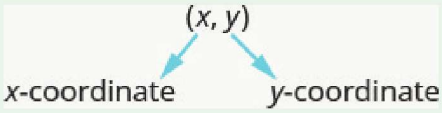
$$t \approx 5.6\ hr$$

The bus ride lasted about 5.6 hours

3.1
Memorize

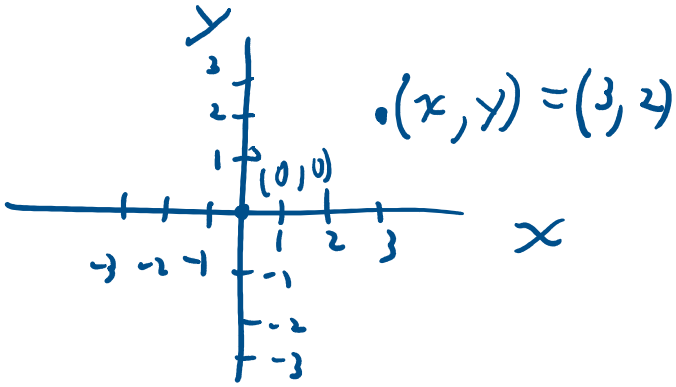
Ordered pair

An ordered pair, (x, y), gives the coordinates of a point in a rectangular coordinate system.



The first number is the x-coordinate.

The second number is the y-coordinate.



Memorize

The origin

The point $(0, 0)$ is called the origin. It is the point where the *x*-axis and *y*-axis intersect.

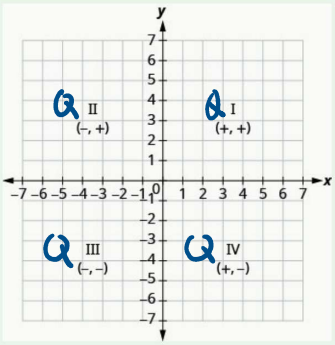
memorize

Quadrants

Quadrants

We can summarize sign patterns of the quadrants in this way.

Quadrant I	Quadrant II	Quadrant III	Quadrant IV
(x, y)	(x, y)	(x, y)	(x, y)
$(+, +)$	$(-, +)$	$(-, -)$	$(+, -)$



Memorize

Linear equation

An equation of the form $Ax + By = C$, where A and B are not both zero, is called a linear equation **in two variables**.

Memorize

Standard Form of Linear Equation

A linear equation is in standard form when it is written $Ax + By = C$.

Solution of a Linear Equation in Two Variables

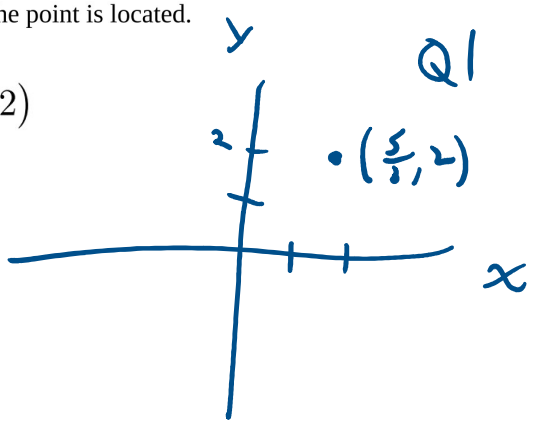
An ordered pair (x, y) is a **solution** of the linear equation $Ax + By = C$, if the equation is a true statement when the *x*– and *y*-values of the ordered pair are substituted into the equation.

3.1

3.1 Exercise Set.

In the following exercises, plot each point in a rectangular coordinate system and identify the quadrant in which the point is located.

E. $\left(\frac{5}{3}, 2\right)$



$\frac{5}{3} = \frac{3+2}{3}$

$= \frac{3}{3} + \frac{2}{3}$

$= 1 + \frac{2}{3}$

3.2

Memorize

Graph of a linear equation

The graph of a linear equation $Ax + By = C$ is a line.

- Every point on the line is a solution of the equation.
- Every solution of this equation is a point on this line.

Memorize

Vertical line

A vertical line is the graph of an equation of the form $x = a$.

The line passes through the *x*-axis at $(a, 0)$.

Note: y can take on any value.

Memorize

Horizontal line

A horizontal line is the graph of an equation of the form $y = b$.

The line passes through the *y*-axis at $(0, b)$.

Note: x can take any value