Examples Linear Equations in Two Variables

Based on power point presentations by Pearson Education, Inc.
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Learning Objectives

- 1. Define independent and dependent variables.
- 2. Memorize the characteristics of the graphs of equations in two variables.
- 3. Define the general form of linear equations in two variables.
- 4. Graph linear equations in two variables by hand in the rectangular coordinate system using the *Point-by-Point Plotting Method* and the *Intercept Method*.

Example 1: Graph a Linear Equation in Two Variables (1 of 3)

Graph the linear equation 3x + y + 6 = 0 by hand.

This linear equation is in *general form*! Since we are not told which graphing method to use, let's use the *Intercept Method*.

Find the ordered pair associated with the *y*-intercept.

Let x = 0 and solve for y. 3(0) + y + 6 = 0 (this is a linear equation in one variable) y = -6

The y-intercept is -6, so the ordered pair associated with it is (0, -6).

Example 1: Graph a Linear Equation in Two Variables (2 of 3)

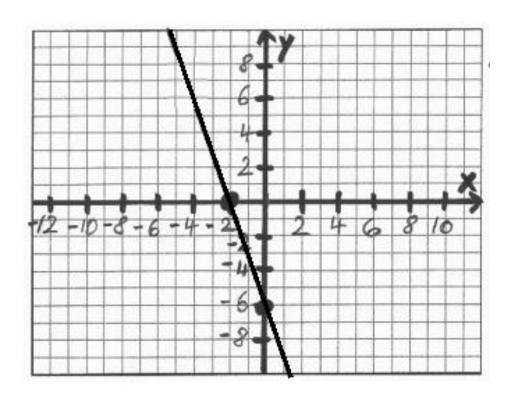
Find the ordered pair associated with the *x*-intercept.

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Let y = 0 and solve for x = 3x + 0 + 6 = 0 (this is a linear equation in one variable) x = -2
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The x-intercept is -2, so the ordered pair associated with it is (-2, 0).

Example 1: Graph a Linear Equation in Two Variables (3 of 3)

Graph the linear equation by drawing a line through the points created by the ordered pairs associated with the y- and x-intercepts.



Example 2: Graph a Linear Equation in Two Variables (1 of 4)

Graph the linear equation 2x - y = 0 by hand.

This linear equation is in *general form*! Since we are not told which graphing method to use, let's try to use the *Intercept Method*.

Find the point associated with the *y*-intercept.

```
Let x = 0 and solve for y.

2(0) - y = 0 (this is a linear equation in one variable)

y = 0
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The y-intercept is 0, so the ordered pair associated with it is (0, 0) which is the origin (the point at which the two coordinate axes intersect).

Example 2: Graph a Linear Equation in Two Variables (2 of 4)

Find the ordered pair associated with the x-intercept.

```
Let y = 0 and solve for x

2x - 0 = 0 (this is a linear equation in one variable)

x = 0 (dividing both sides by 2!)
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The x-intercept is 0, so the ordered pair associated with it is (0, 0), but we already found this.

It should be obvious that we need at least two distinct points to graph a straight line. We note that the *Intercept Method* in the given equation did not produce two distinct ordered pairs.

Example 2: Graph a Linear Equation in Two Variables (3 of 4)

When the *Intercept Method* only produces one ordered pair, we use the *Point-by-Point Plotting Method* to find one or more other ordered pairs.

We want to pick values for x that are far enough away from 0 to create an accurate graph. How about we let x equal -4 and 4?

Then, given the equation 2x - y = 0, we get the following linear equations in one variable:

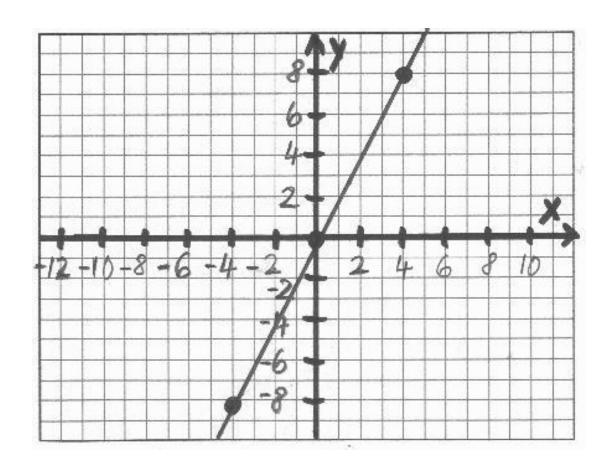
$$2(-4) - y = 0$$
 and $y = -8$

$$2(4) - y = 0$$
 and $y = 8$

Therefore, the coordinates of the additional ordered pairs are (-4, -8) and (4, 8).

Example 2: Graph a Linear Equation in Two Variables (4 of 4)

Graph the linear equation by drawing a line through the points created by the ordered pairs found in the previous steps.



Reminder:

We found the ordered pairs (-4, -8) and (4, 8).

Example 3: Graph a Linear Equation in Two Variables (1 of 3)

Graph the linear equation 5x - 3y = 7 by hand.

This linear equation is NOT quite in *general form*! However, this does not matter. We will still use either the *Point-by-Point Plotting Method* or the *Intercept Method*. Since we are not told which graphing method to use, let's try to use the *Intercept Method*.

Find the ordered pair associated with the *y*-intercept.

Let x = 0 and solve for x

5(0) - 3y = 7 (this is a linear equation in one variable)

$$-3y = 7$$

$$\chi = \frac{7}{-3} = -\frac{7}{3}$$

The *y*-intercept is $-\frac{7}{3}$, so the ordered pair associated with it is $\left(0, -\frac{7}{3}\right)$.

Example 3: Graph a Linear Equation in Two Variables (2 of 3)

When any intercepts end up being fractions, it is easier to use the *Point-by-Point Plotting Method*!

How about we let x equal – 1 and 2? We picked these particular values for a reason! See last sentence!

Given the equation 5x - 3y = 7, we get the following linear equations in one variable:

$$5(-1) - 3y = 7$$
, then $-3y = 12$, and $y = -4$

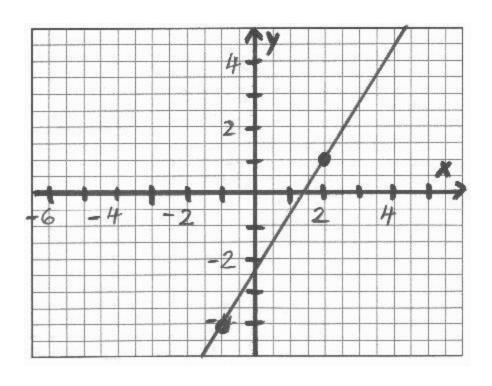
$$5(2) - 3y = 7$$
, then $-3y = -3$ and $y = 1$

Therefore, the coordinates of the ordered pairs are (-1, -4) and (2, 1).

Note that the picks of x-values created integer y-values!

Example 3: Graph a Linear Equation in Two Variables (3 of 3)

Graph the linear equation by drawing a line through the points created by the ordered pairs found in the previous steps.



Reminder:

We found the ordered pairs (-1, -4) and (2, 1).

Example 4: Graph a Linear Equation in Two Variables (1 of 3)

Graph the linear equation y = -3x - 6 by hand.

This linear equation is NOT quite in *general form*! However, this does not matter. We will still use either the *Point-by-Point Plotting Method* or the *Intercept Method*. Since we are not told which graphing method to use, let's try to use the *Intercept Method*.

Find the ordered pair associated with the *y*-intercept.

Let x = 0 and solve for y. y = 3(0) - 6 (this is a linear equation in one variable) y = -6

The y-intercept is -6, so the ordered pair associated with it is (0, -6).

Example 4: Graph a Linear Equation in Two Variables (2 of 3)

Find the ordered pair associated with the *x*-intercept.

```
Let y = 0 and solve for x

0 = -3x - 6 (this is a linear equation in one variable)

3x = -6

x = -2
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The x-intercept is -2, so the ordered pair associated with it is (-2, 0).

Example 4: Graph a Linear Equation in Two Variables (3 of 3)

Graph the linear equation by drawing a line through the points created by the ordered pairs associated with the y- and x-intercepts.

