Examples
Linear Equations in Two Variables

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

1. Memorize the definition of independent and dependent variables.

2. Memorize the general form of linear equations in two variables.

3. Memorize the characteristics of the graphs 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

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

Since we are not told which graphing method to use, let's use the *Intercept Method*.

Step 1 – 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!)

The *x*-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).

Step 2 – 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

The *y*-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 1: Graph a Linear Equation in Two Variables

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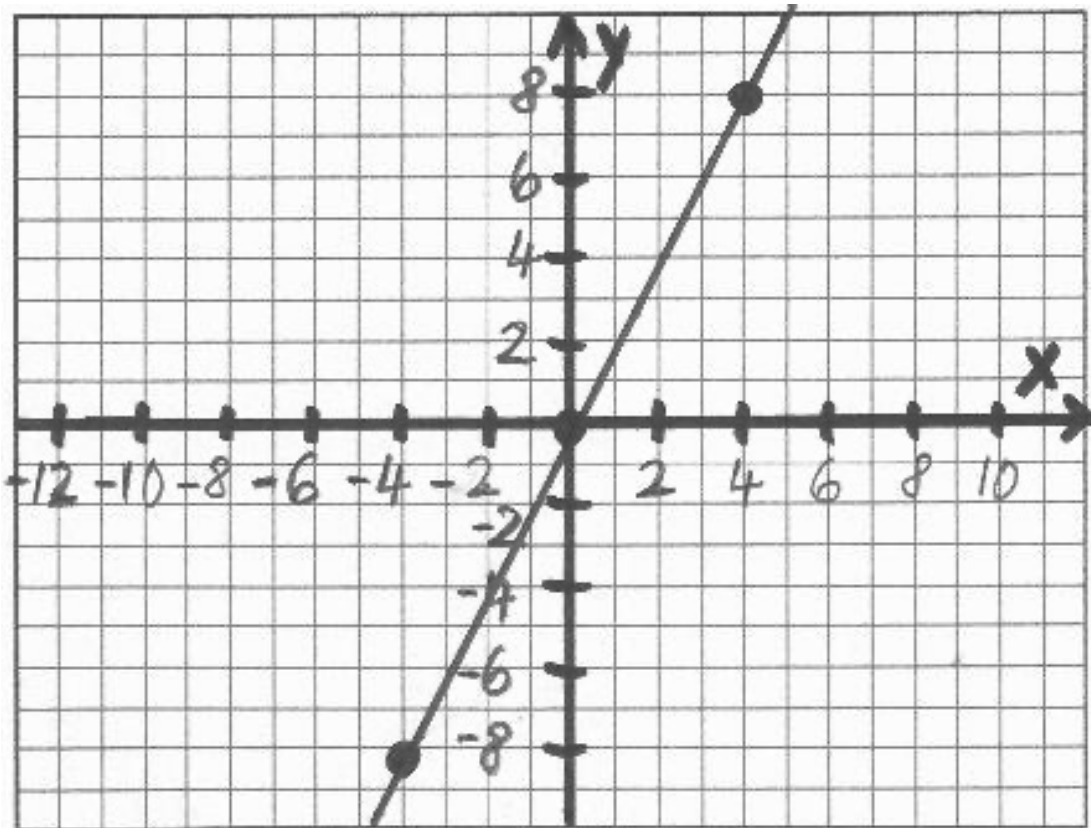
$2(-4) - y = 0$ and $y = -8$

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

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

Graph the 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 2: Graph a Linear Equation in Two Variables

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

Since we are not told which graphing method to use, let's use the *Intercept Method*.

Step 1 – Find the ordered pair associated with the *x*-intercept.

Let $y = 0$ and solve for x

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

$x = -2$

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

Example 2: Graph a Linear Equation in Two Variables

Step 2 – Find the ordered pair associated with the *y*-intercept.

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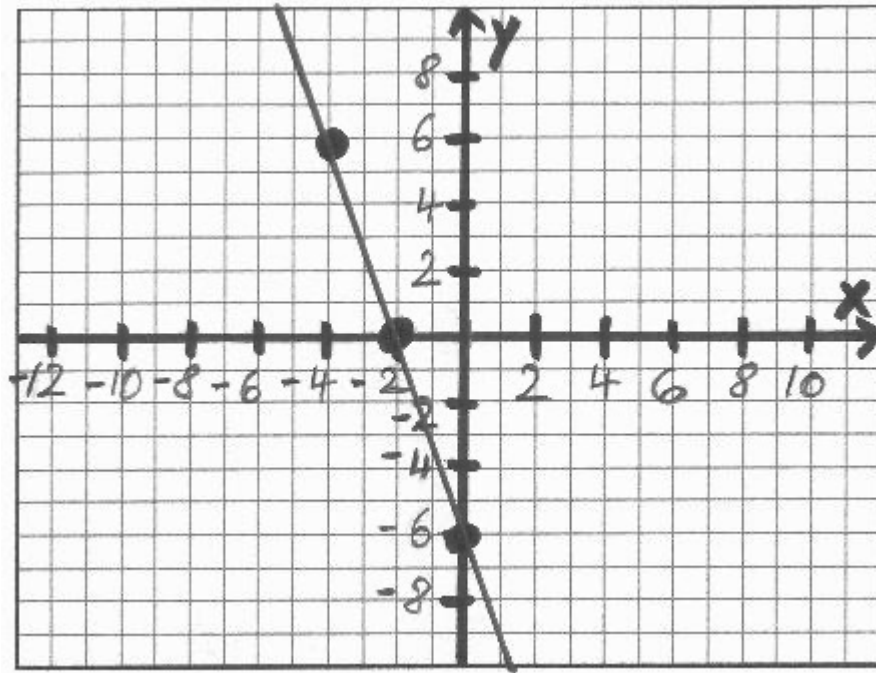3(0) + *y* + 6 = 0 (this is a linear equation in one variable)
y = − 6

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

We found two distinct ordered pairs and can attempt to graph the linear equation.

Example 2: Graph a Linear Equation in Two Variables

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

NOTE:

In addition to the ordered pairs associated with the intercepts, we found and graphed one additional ordered pair, namely (–4,6).

This allowed us to create a more accurate graph because the intercepts are very close to each other.

Example 3: Graph a Linear Equation in Two Variables

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

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

Step 1 – Find the ordered pair associated with the x-intercept.

Let $y = 0$ and solve for x

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

$5x = 7$

$x = \frac{7}{5}$

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? NOTE: We picked these particular values for a reason!

Given the equation $5x - 3y = 7$, we get the following linear equations in one variable:
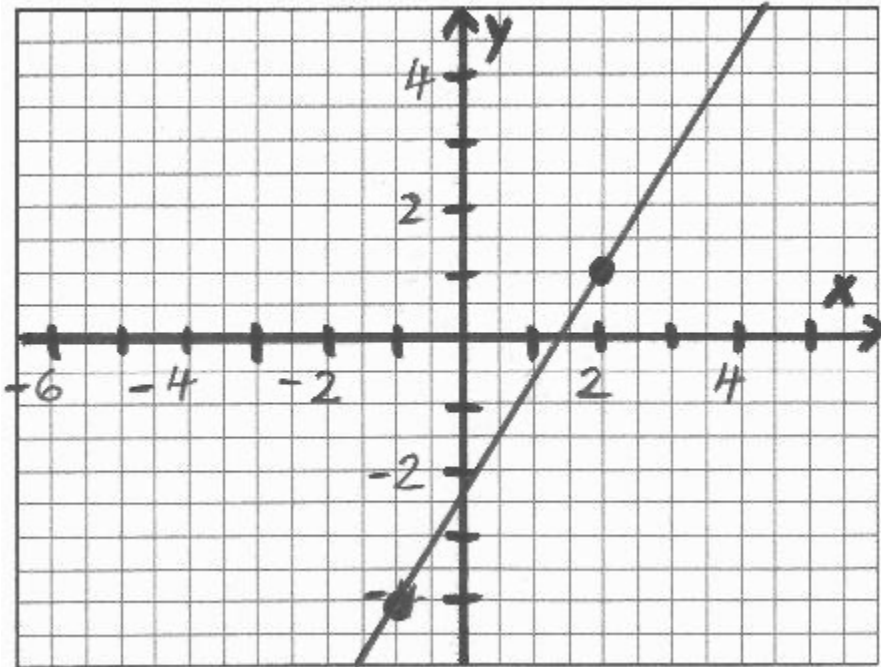
$5(-1) - 3y = 7$, then $-3y = 12$, and $y = -4$

$5(2) - 3y = 7$, 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!

Graph the 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 $(2, 1)$.