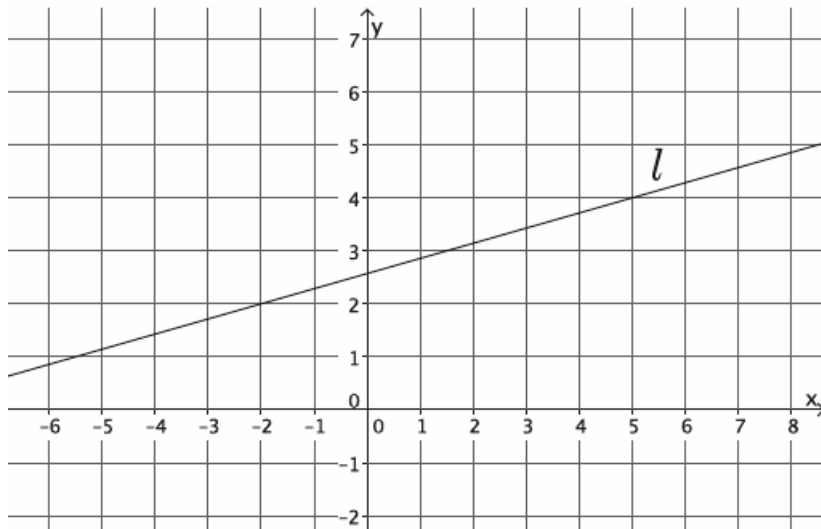


## Lesson 21: Some Facts About Graphs of Linear Equations in Two Variables

### Classwork

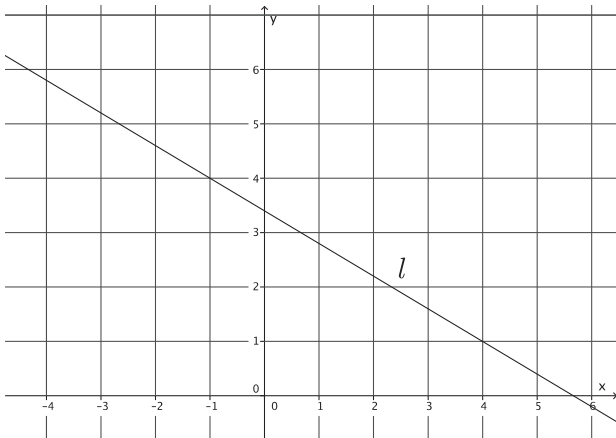
#### Example 1

Let a line  $l$  be given in the coordinate plane. What linear equation is the graph of line  $l$ ?



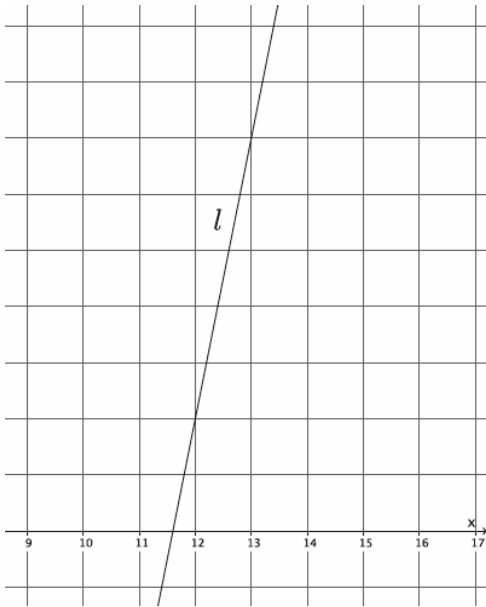
#### Example 2

Let a line  $l$  be given in the coordinate plane. What linear equation is the graph of line  $l$ ?

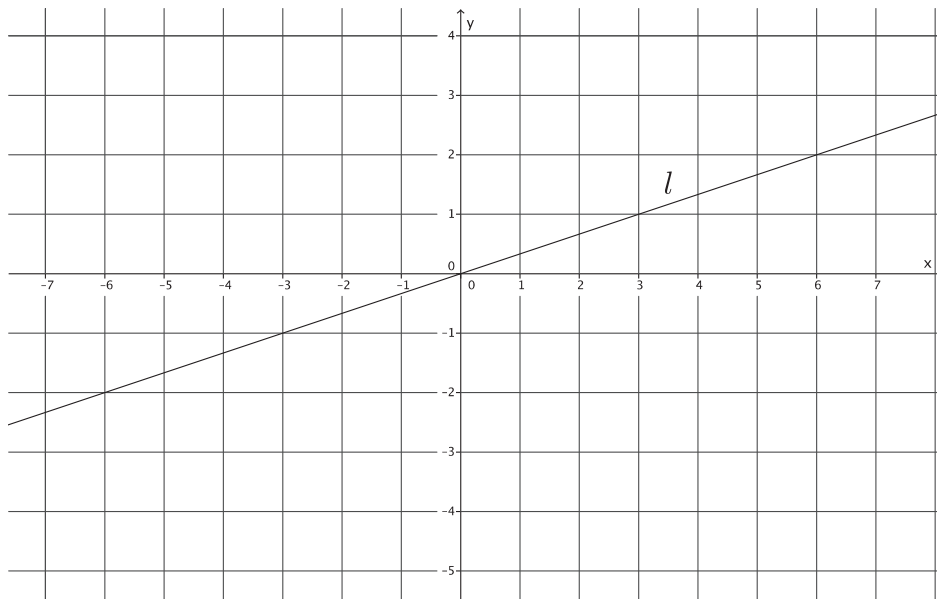


**Example 3**

Let a line  $l$  be given in the coordinate plane. What linear equation is the graph of line  $l$ ?

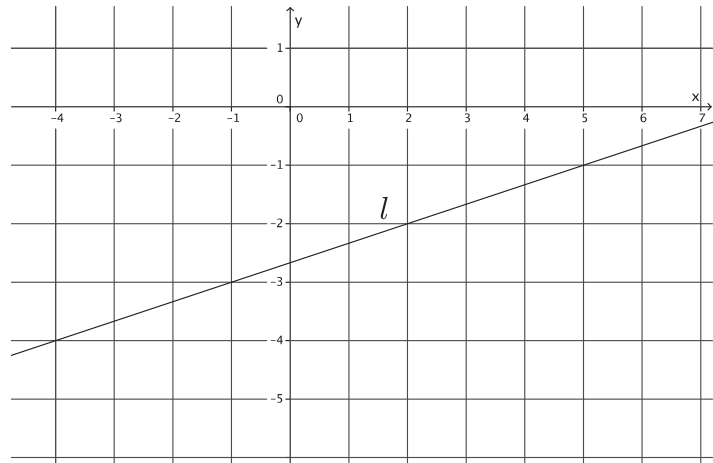
**Example 4**

Let a line  $l$  be given in the coordinate plane. What linear equation is the graph of line  $l$ ?

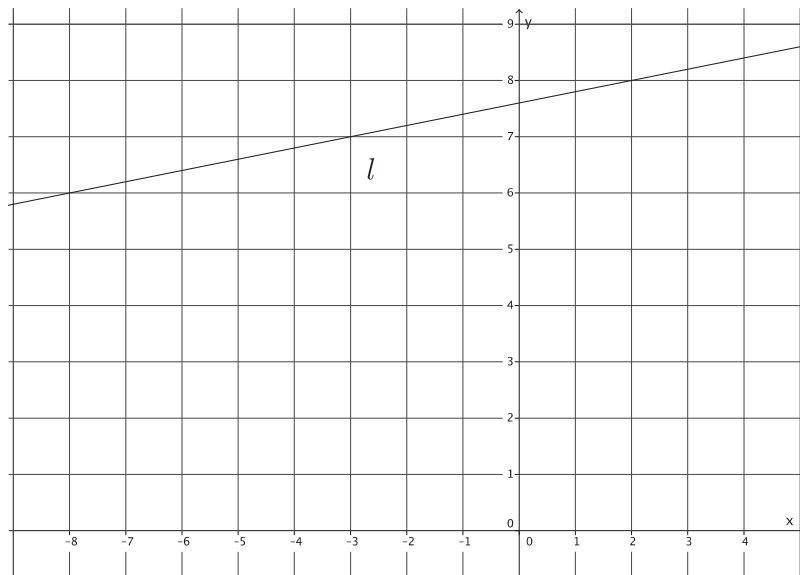


## Exercises

1. Write the equation for the line  $l$  shown in the figure.

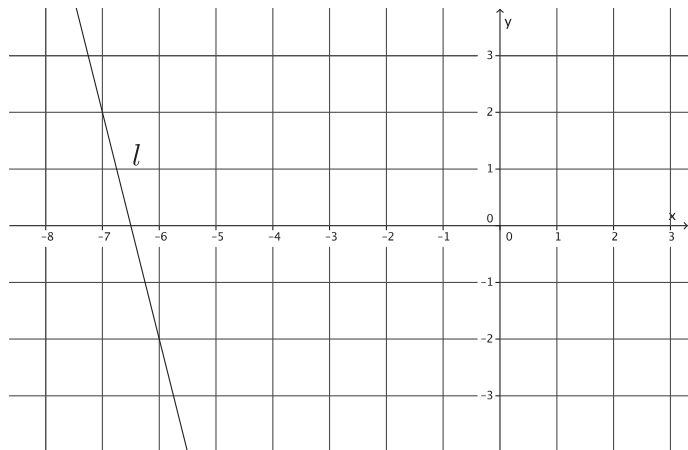


2. Write the equation for the line  $l$  shown in the figure.



3. Determine the equation of the line that goes through points  $(-4, 5)$  and  $(2, 3)$ .

4. Write the equation for the line  $l$  shown in the figure.



5. A line goes through the point  $(8, 3)$  and has slope  $m = 4$ . Write the equation that represents the line.

### Lesson Summary

Let  $(x_1, y_1)$  and  $(x_2, y_2)$  be the coordinates of two distinct points on a non-vertical line in a coordinate plane. We find the slope of the line by

$$m = \frac{y_2 - y_1}{x_2 - x_1}.$$

This version of the slope formula, using coordinates of  $x$  and  $y$  instead of  $p$  and  $r$ , is a commonly accepted version.

As soon as you multiply the slope by the denominator of the fraction above, you get the following equation:

$$m(x_2 - x_1) = y_2 - y_1.$$

This form of an equation is referred to as the *point-slope form* of a linear equation.

Given a known  $(x, y)$ , then the equation is written as

$$m(x - x_1) = (y - y_1).$$

The following is slope-intercept form of a line:

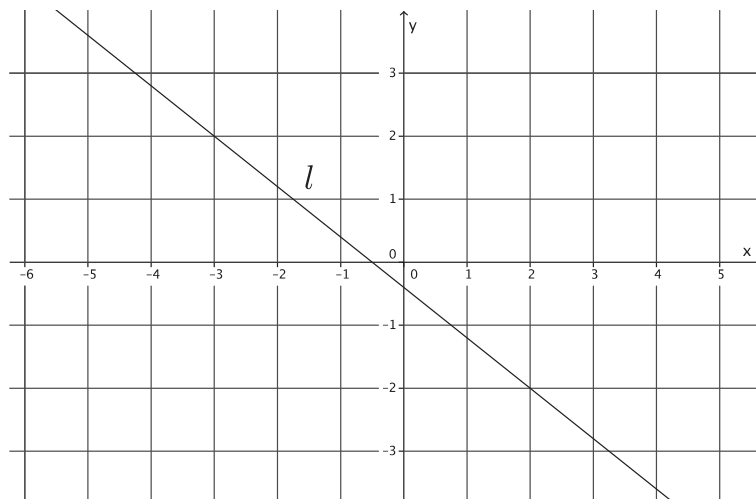
$$y = mx + b.$$

In this equation,  $m$  is slope, and  $(0, b)$  is the  $y$ -intercept point.

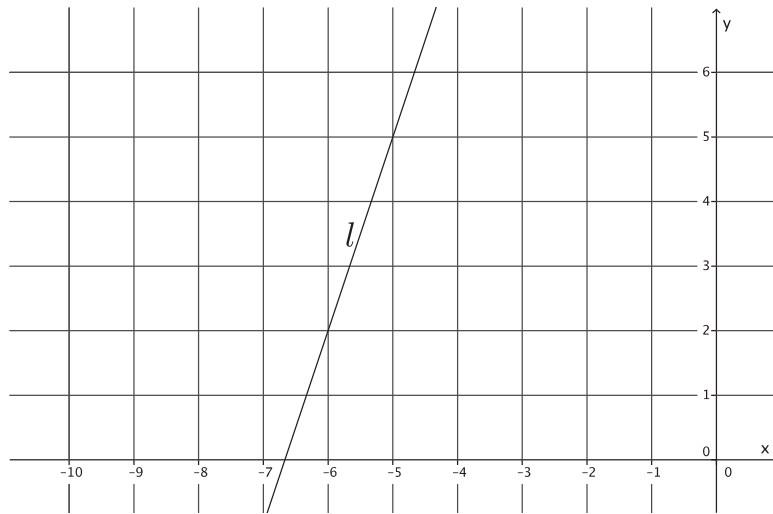
To write the equation of a line, you must have two points, one point and slope, or a graph of the line.

### Problem Set

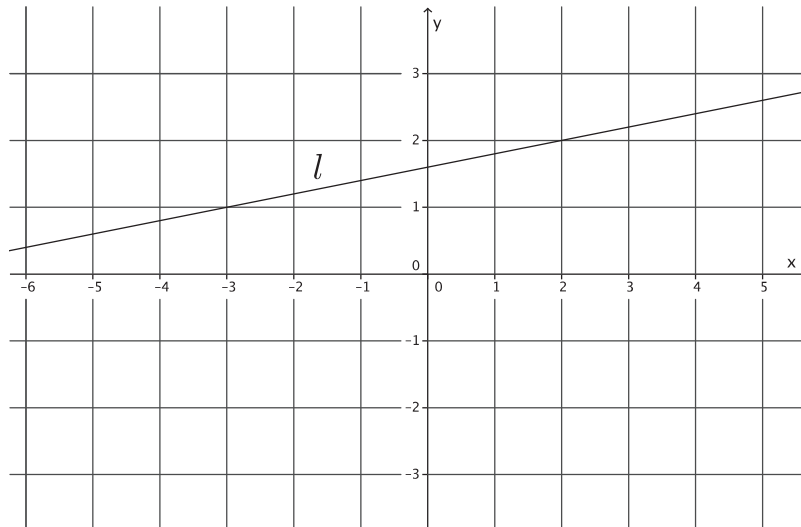
- Write the equation for the line  $l$  shown in the figure.



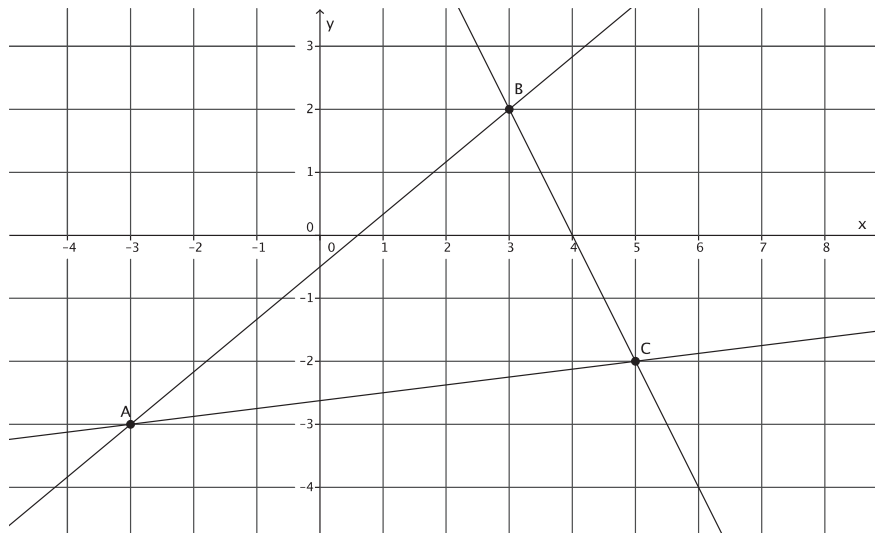
2. Write the equation for the line  $l$  shown in the figure.



3. Write the equation for the line  $l$  shown in the figure.



4. Triangle  $ABC$  is made up of line segments formed from the intersection of lines  $L_{AB}$ ,  $L_{BC}$ , and  $L_{AC}$ . Write the equations that represent the lines that make up the triangle.



5. Write the equation for the line that goes through point  $(-10, 8)$  with slope  $m = 6$ .
6. Write the equation for the line that goes through point  $(12, 15)$  with slope  $m = -2$ .
7. Write the equation for the line that goes through point  $(1, 1)$  with slope  $m = -9$ .
8. Determine the equation of the line that goes through points  $(1, 1)$  and  $(3, 7)$ .