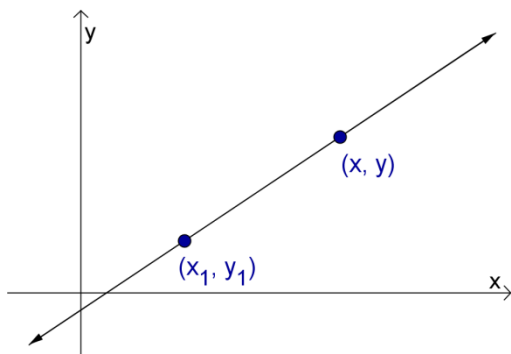


## The Point-Slope Form of the Equation of a Line



Suppose we know a point on a line is  $(x_1, y_1)$ , and the slope of that line is  $m$ . Then any other point on the line  $(x, y)$  must satisfy the following equation:

We can rewrite this to get the \_\_\_\_\_  
of the equation of a line:

So, if we know a \_\_\_\_\_ on a line, and the \_\_\_\_\_ of the line, we can use point-slope form to get an equation of the line.

### Ex 1.

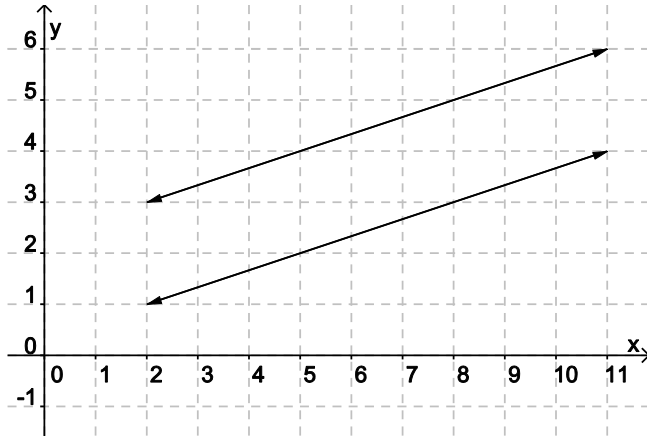
Write the point-slope form of the equation of the line with slope 3 that passes through the point  $(1, -4)$ .

Now write the equation in slope-intercept form.

### Ex 2.

A line passes through the points  $(3, -2)$  and  $(1, 4)$ . Find an equation of the line in point-slope form.

Nonintersecting lines that lie in the same plane are called \_\_\_\_\_.



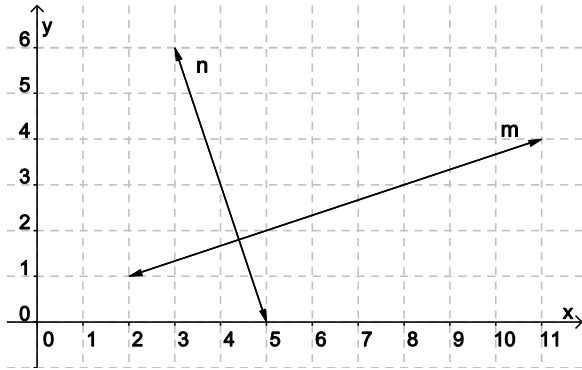
What can you say about the slopes of parallel lines?

If two lines have the same slope, are they guaranteed to be parallel?

**Ex 3.**

Write an equation of the line passing through  $(-2, 1)$  and parallel to the line whose equation is  $y = 3x - 2$ . Express the equation in point-slope form.

Lines that intersect at a right angle ( $90^\circ$ ) are called \_\_\_\_\_.



What is the slope of line m?

What is the slope of line n?

What happens when you multiply the slopes?

In general, product of slopes of two nonvertical perpendicular lines is \_\_\_\_\_.

In other words, slopes of two nonvertical perpendicular lines are \_\_\_\_\_.

For example, if a line has slope  $\frac{2}{5}$ , then any perpendicular line will have slope \_\_\_\_\_.

**Ex 4.**

Find the slope of any line that is perpendicular to the line whose equation is  $x + 2y = 4$ .

**Ex 5.**

Write the equation of the line passing through  $(3, -5)$  and perpendicular to the line whose equation is  $-3x + y = 1$ . Express the equation in point-slope form and slope-intercept form.

**Summary**

**point-slope form:**  $y - y_1 = m(x - x_1)$

**parallel**  $\leftrightarrow$  **same slope**

(also two vertical lines are parallel)

**perpendicular**  $\leftrightarrow$  **slopes are negative reciprocals**

(also, vertical and horizontal lines are perpendicular)

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**Practice**

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1. Write the point-slope form of the equation of the line with slope  $-6$  that passes through the point  $(-2, -4)$ . Then write the equation in slope-intercept form.
2. A line passes through the points  $(1, 3)$  and  $(2, 4)$ . Find an equation of the line in point-slope form. Then write the equation in slope-intercept form.
3. Write an equation of the line passing through  $(-2, -7)$  and parallel to the line whose equation is  $y = -5x + 4$ . Express the equation in point-slope form.
4. Find the slope of any line that is perpendicular to the line whose equation is  $3x - 2y = 5$ .
5. Write the equation of the line passing through  $(-4, 2)$  and perpendicular to the line whose equation is  $y = -\frac{1}{3}x + 7$ . Express the equation in point-slope form.

Q: I can run but not walk. Wherever I go, thought follows close behind. What am I?