

Geometry 3.4

Write the equation of a line given information about the graph*

Solve problems by writing equations*

*Algebra 1 Ch. 5

slope

y-intercept

slope intercept form

point-slope form

parallel $m = m$

perpendicular

horizontal

vertical

$y =$
 $x =$

$$y = mx + B$$

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

opp + recip slope

$$\frac{2}{5} \rightarrow -\frac{5}{2}$$

whiteboards

Quiz 3.1-3.2 today

What do you need to know to graph a line?

Slope (x, y)
↑
 $a(x, y)$

Key Concept Nonvertical Line Equations

The **slope-intercept form** of a linear equation is $y = mx + b$, where m is the slope of the line and b is the y -intercept.

$$y = mx + b \qquad y = 3x + 8$$

The diagram illustrates the correspondence between the general form $y = mx + b$ and the specific example $y = 3x + 8$. A blue double-headed arrow labeled "slope" connects the coefficient m in the general form to the coefficient 3 in the specific equation. Another blue double-headed arrow labeled "y-intercept" connects the constant b in the general form to the constant 8 in the specific equation.

$$y = mx + b$$

Handwritten diagram of the slope-intercept form $y = mx + b$. An arrow points from the letter m to the word "slope". Another arrow points from the letter b to the text "y-int".

The **point-slope form** of a linear equation is $y - y_1 = m(x - x_1)$, where (x_1, y_1) is any point on the line and m is the slope of the line.

$$y - 5 = -2(x - 3)$$

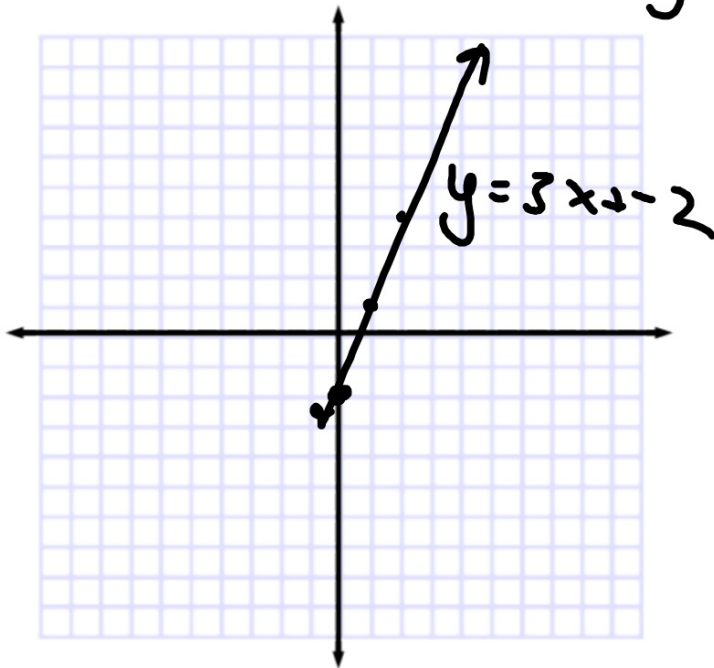
Diagram illustrating the point-slope form equation $y - 5 = -2(x - 3)$. The point $(3, 5)$ is labeled as the "point on line". The slope -2 is labeled as the "slope".

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

Example 1 Slope and y -intercept

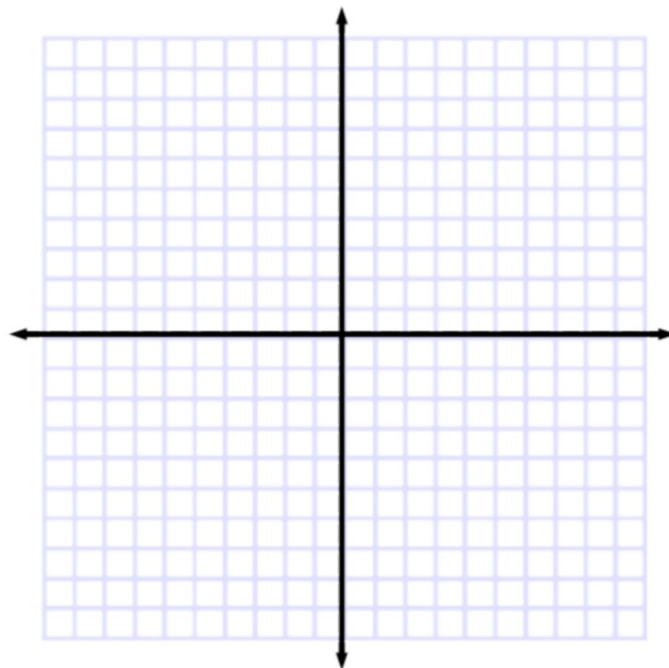
Write an equation in slope-intercept form of the line with slope 3 and y -intercept of -2 . Then graph the line.

$$y = \frac{3}{1}x + \underline{-2}$$



Guided Practice

1. Write an equation in slope-intercept form of the line with slope $\frac{1}{2}$ and y -intercept of 8. Then graph the line.



Example 2 Slope and a Point on the Line

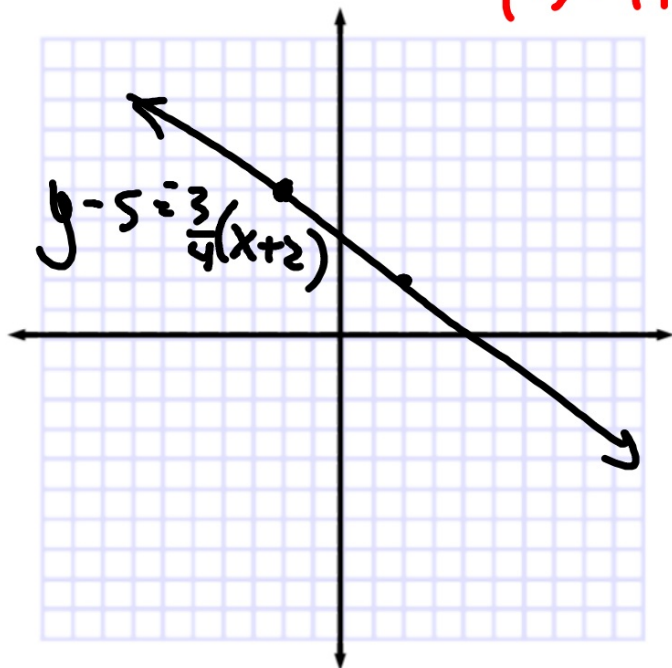
Write an equation in point-slope form of the line with slope $-\frac{3}{4}$ that contains $(-2, 5)$. Then graph the line.



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$$y - 5 = -\frac{3}{4}(x + 2)$$

$$-\frac{3}{4}$$

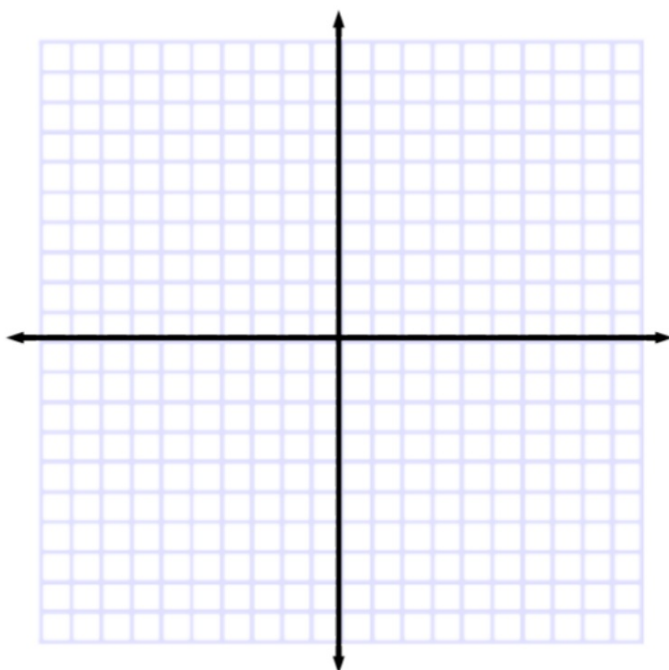




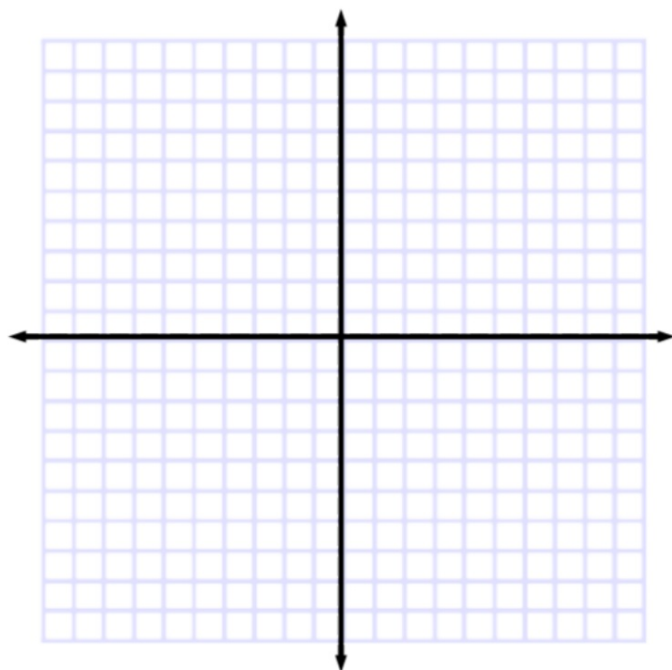
Example 3 Two Points

Write an equation of the line through each pair of points in slope-intercept form.

- a. $(0, 3)$ and $(-2, -1)$



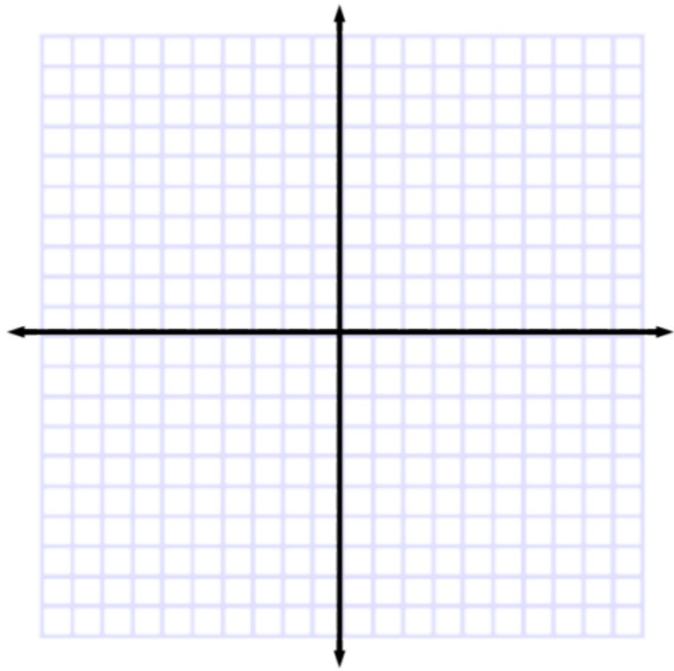
b. $(-7, 4)$ and $(9, -4)$



· **Guided**Practice

3A. $(-2, 4)$ and $(8, 10)$

3B. $(-1, 3)$ and $(7, 3)$

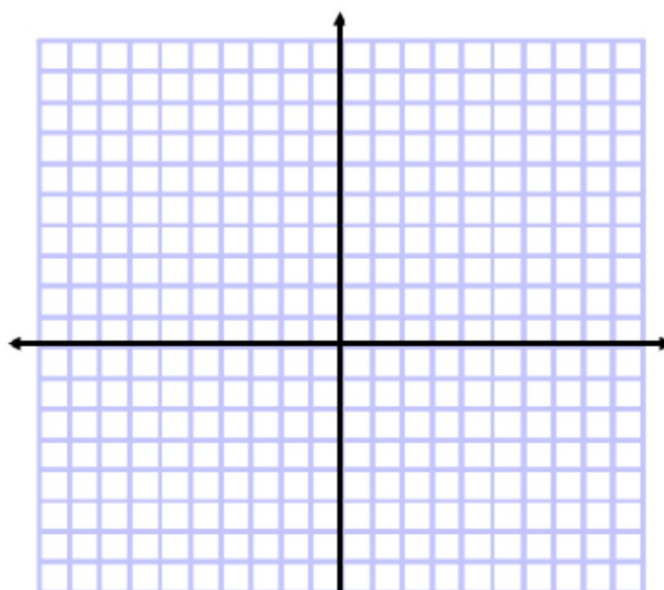


Horizontal/vertical lines: special cases

Example 4 Horizontal Line



Write an equation of the line through $(-2, 6)$ and $(5, 6)$ in slope-intercept form.



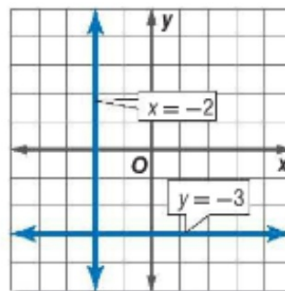
Key Concepts Horizontal and Vertical Line Equations

The equation of a horizontal line is $y = b$, where b is the y -intercept of the line.

Example $y = -3$

The equation of a vertical line is $x = a$, where a is the x -intercept of the line.

Example $x = -2$



Graph:

$$y=4$$

$$y=-6$$

$$x=5$$

$$x=-3$$

