Geometry 3.4

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

Solve problems by writing equations*

*Algebra 1 Ch. 5

slope $m = \frac{y_2 - y_1}{x_2 - x_1}$ $\frac{-6-5}{3-2}$

y-intercept B

slope intercept form $y = mx + B$

point-slope form $y - ? = m(x - ?)$

parallel $m =$

~~perpendicular~~ *

horizontal $y = 3$

vertical $x = 6$ *

$(\ )\cdot(\ ) = -1$

$(2, 5)$ $(3, -6)$

$\frac{5 - -6}{2 - 3} = \frac{11}{-1}$

$y - 5 = -11(x - 2)$

$y + 6 = -11(x - 3)$

whiteboards

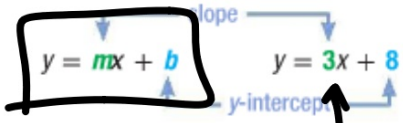
What do you need to know to graph a line?

Slope

point

KeyConcept 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.



$\frac{3}{1}$

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-? x-?

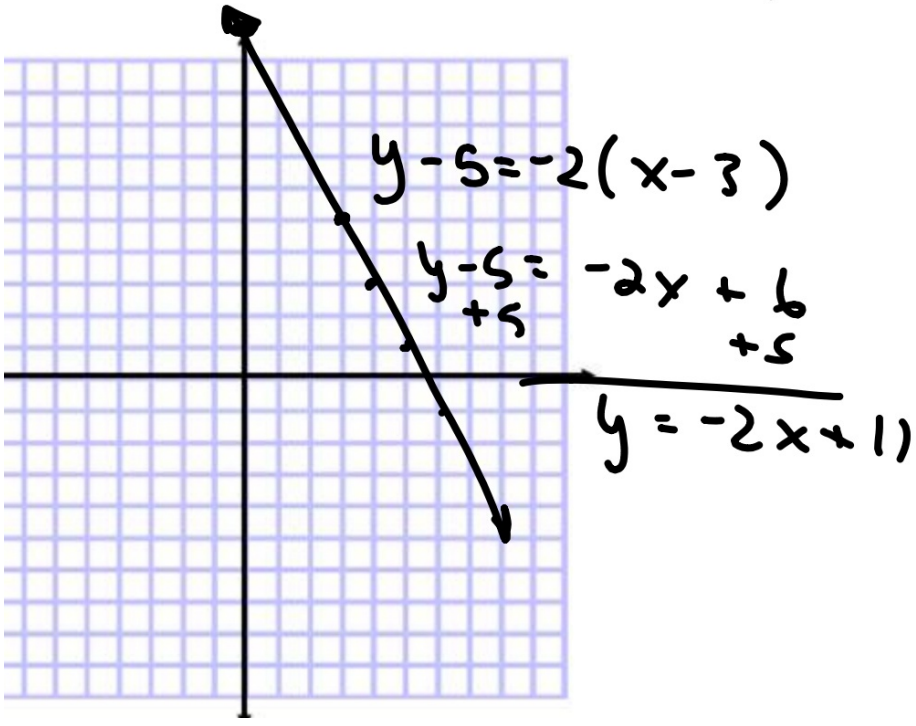
point on line (3, 5)

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

slope

opp

$\frac{-2}{1}$ (3,5)



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

$y-5=-2x+6$

$+5 \quad +5$

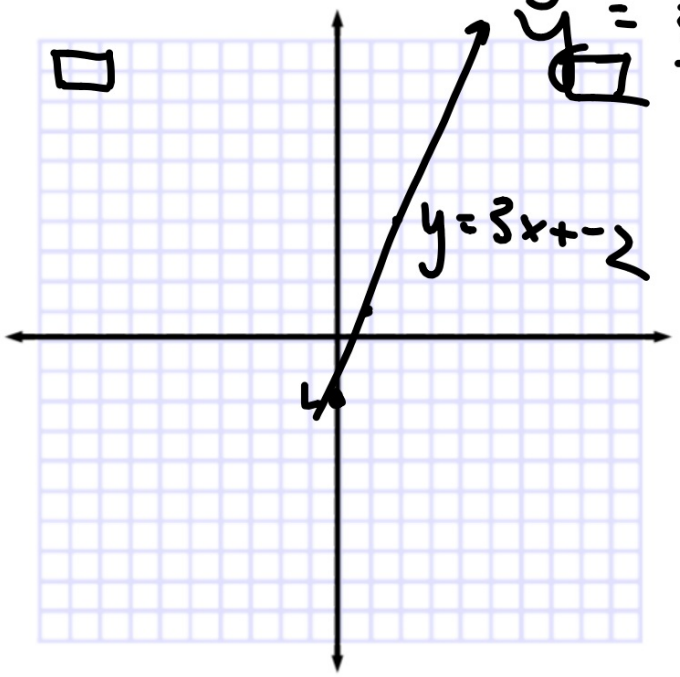
$y=-2x+11$

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.

$y = mx + b$

$y = 3x + -2$



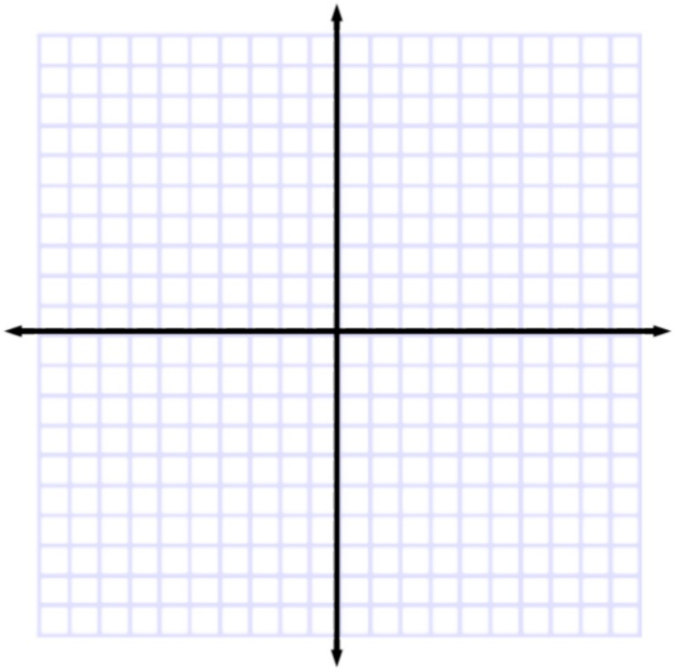
GuidedPractice

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.

$y = \frac{1}{2}x + 8$

$y = \frac{1}{2}x + 8$

$y = 8.5$



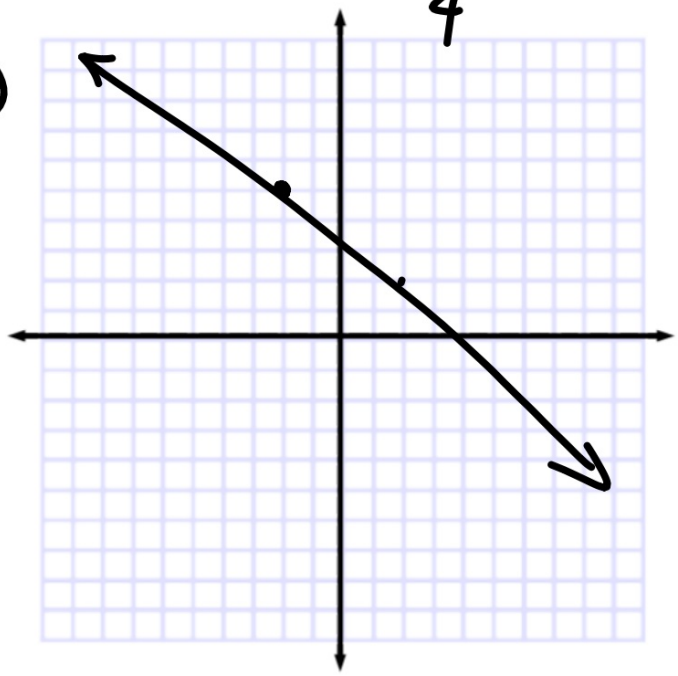
Example 2 Slope and a Point on the Line

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

$\frac{-3}{4}$

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

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



$y = mx + B$

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)

x y

$m = \frac{2}{1} = 2$

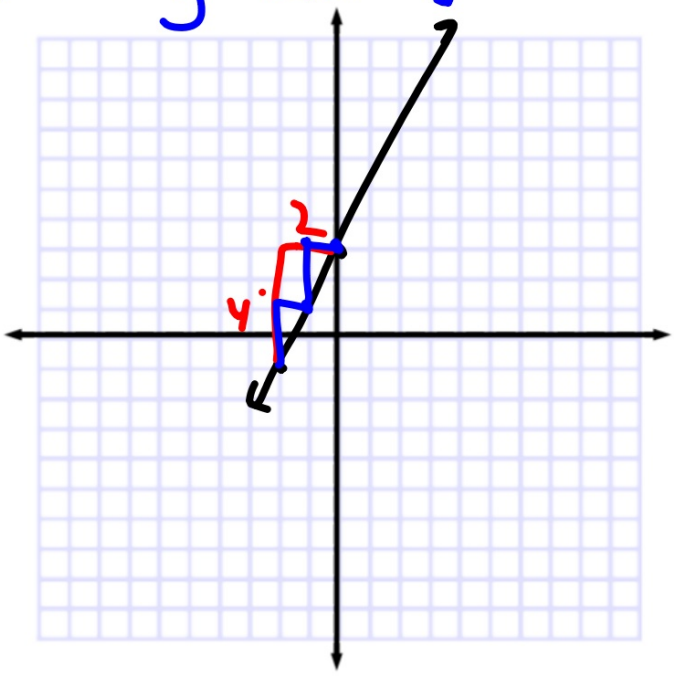
$-1 = 2(-2) + B$

$-1 = -4 + B$

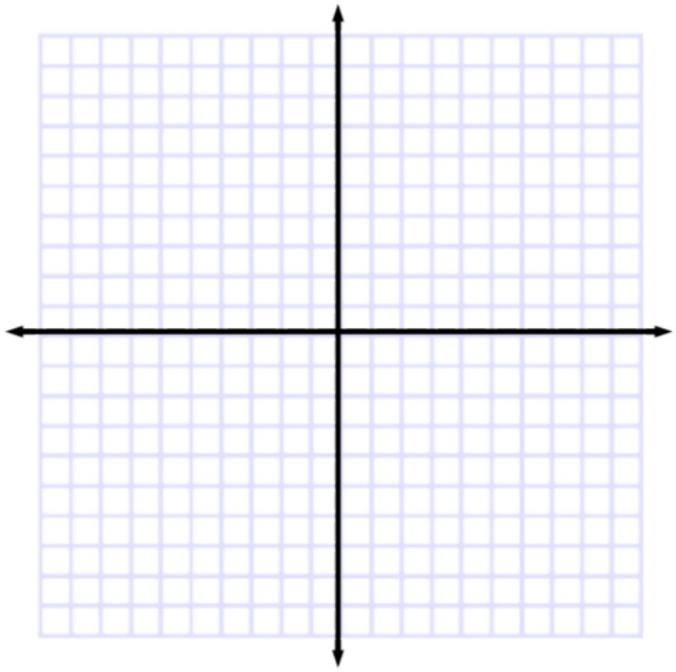
$+4 \quad +4$

$3 = B$

$y = 2x + 3$



b. **(−7, 4) and (9, −4)**

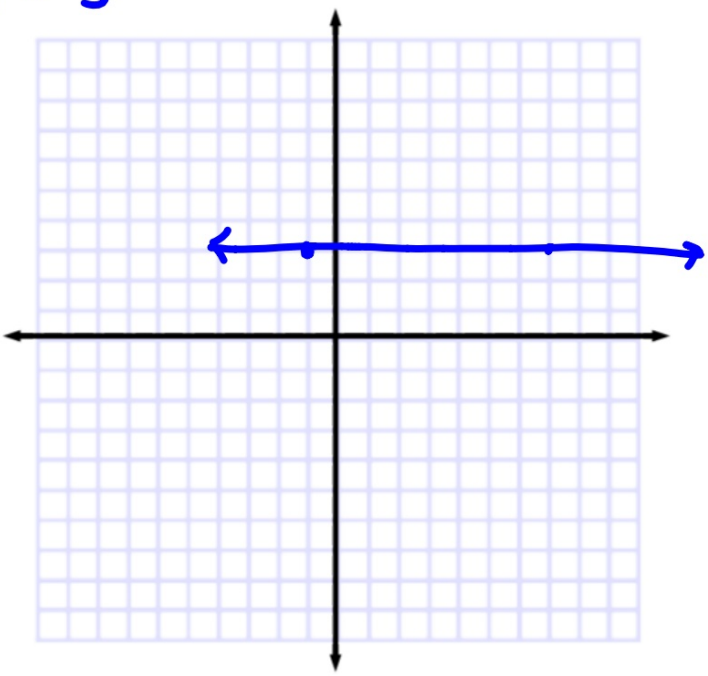


Guided Practice

3A. (−2, 4) and (8, 10)

3B. (−1, 3) and (7, 3)

$y = 3$



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.

$y = 0x + 6$

$y = 0 + 6$

$y = 6$

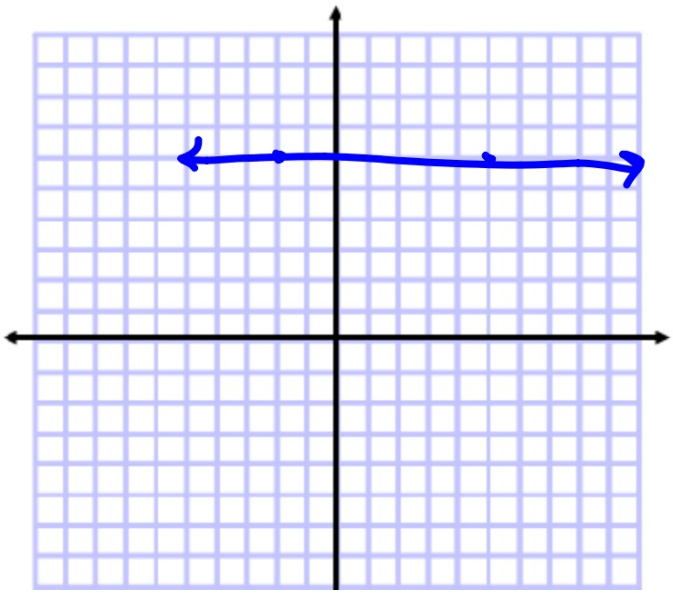
$y = mx + B$

$6 = 0 \cdot 5 + B$

$6 = 0 + B$

$B = 6$

$y = 6$



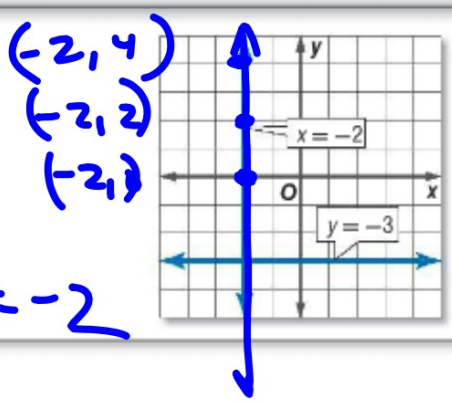
KeyConcepts Horizontal and Vertical Line Equations

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 $x = -2$



(-2, 4)
(-2, 2)
(-2,)

X = -2

~~y = mx + b~~

Graph:

y=4
y=-6
x=5
x=-3

