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 $y = mx + B$

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

parallel same m

perpendicular opp/recip

horizontal $m = 0$ $y = 6$

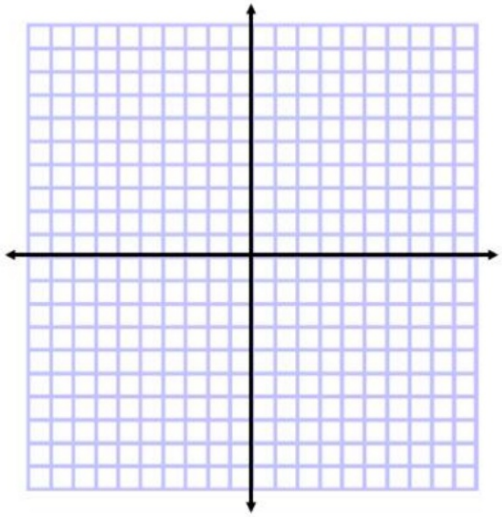
vertical m = undef $x = 3$

whiteboards

What do you need to know to graph a line?

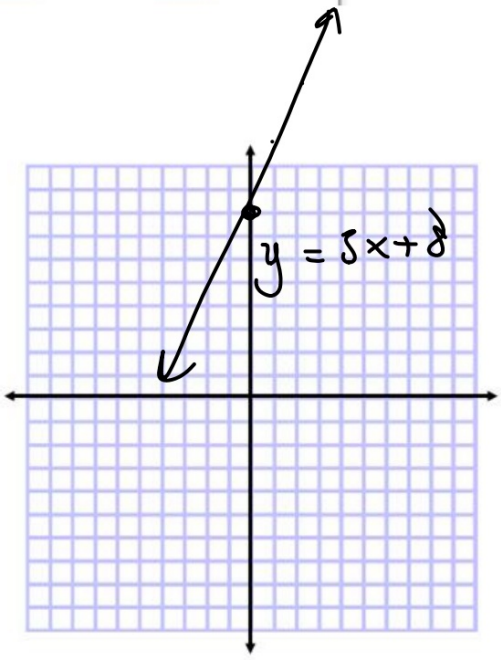
Slope (m)

(x, y)



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.



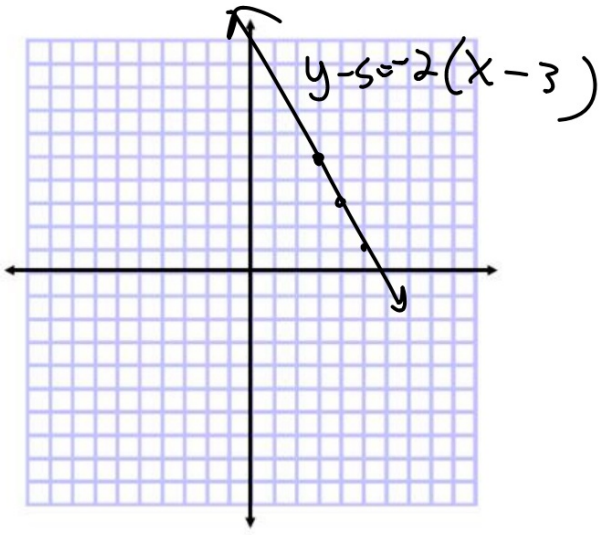
The **point-slope form** of a linear equation is $y - y_1 = m(x - x_1)$, where (x_1, y_1) is any point on the line and m is the slope of the line.

point on line (3, 5)

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

slope

(3, 5)



Example 1 Slope and *y*-intercept

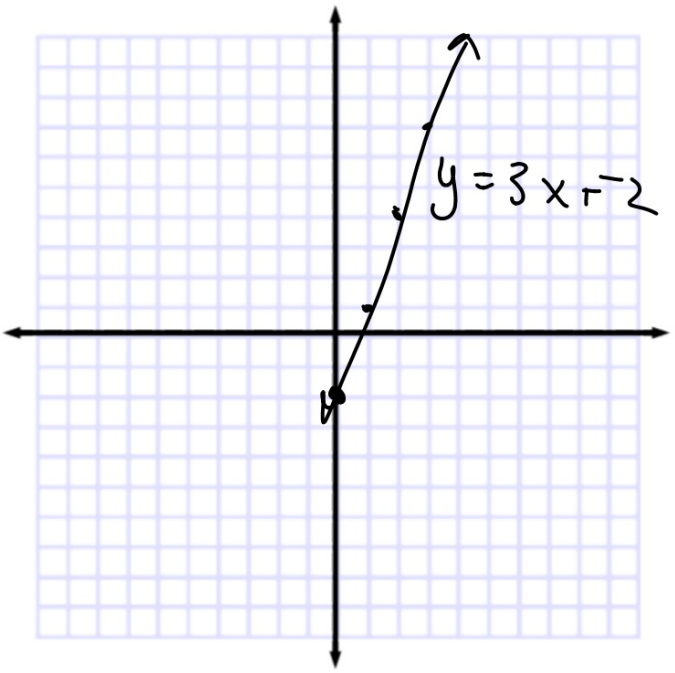
m

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

b

$y = 3x + -2$

$y = 3x - 2$

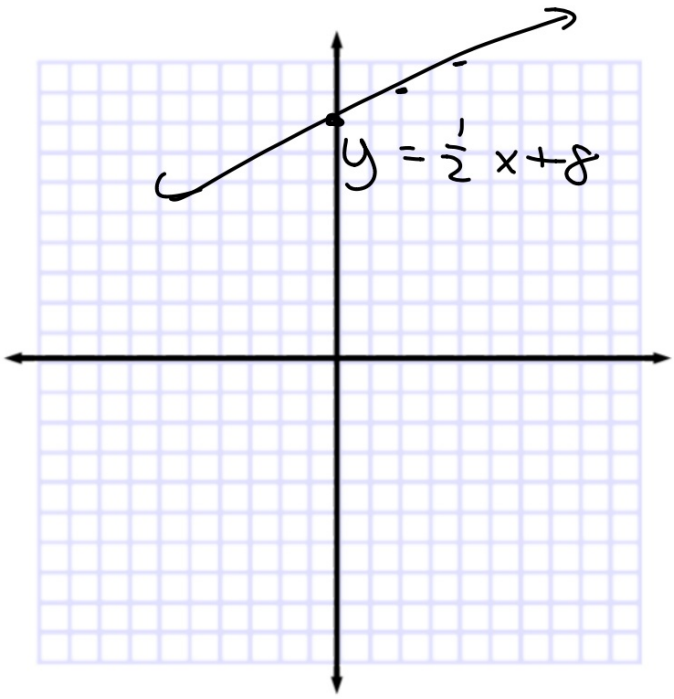


GuidedPractice

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.

$y = mx + B$

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



$y - \quad = m(x - \quad)$

Example 2 Slope and a Point on the Line

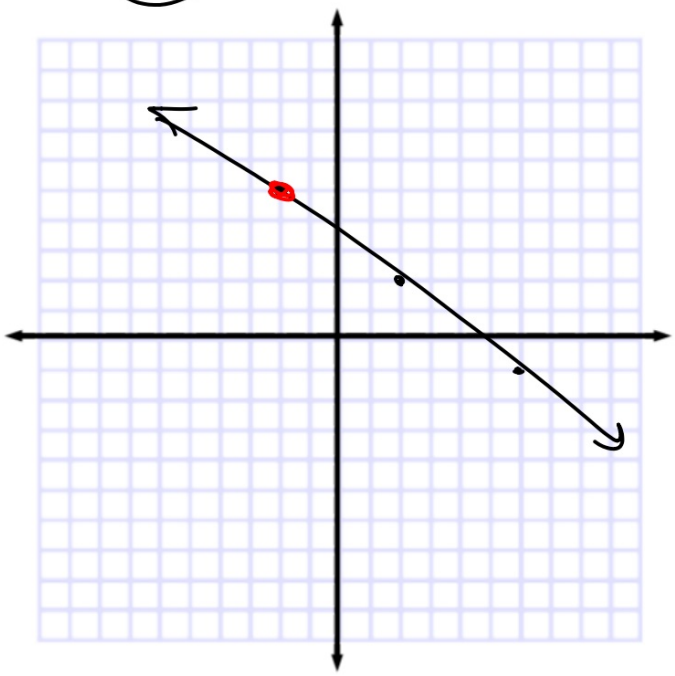
Write an equation in point-slope form of the line with slope $-\frac{3}{4}$ that contains $(-2, 5)$. Then graph the line.

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

$(-2, 5)$

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

$(x+2)$



Example 3 Two Points

$y = mx + B$

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

a. (0, 3) and (−2, −1)

$m = \frac{4}{2} = \frac{2}{1} = 2$

$y = 2x + B$

$-1 = 2 \cdot -2 + B$

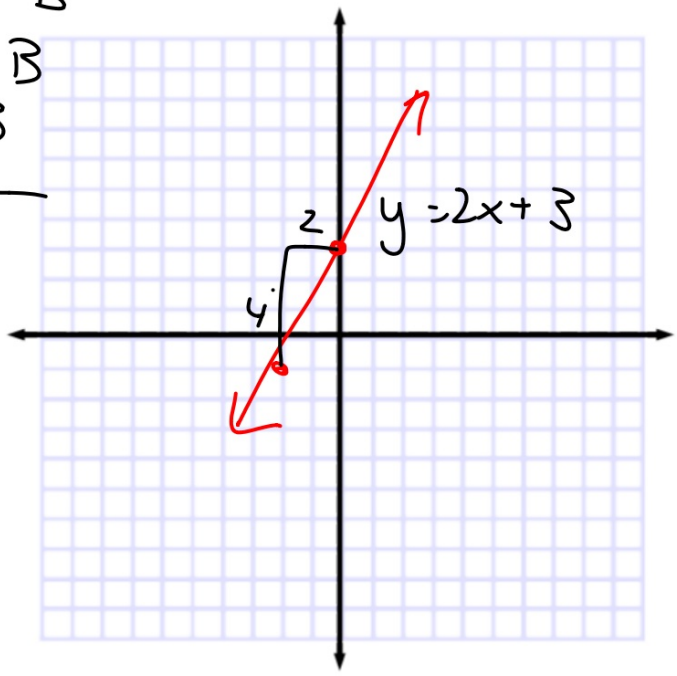
$-1 = -4 + B$

$+4 \quad +4$

$3 = B$

$y = mx + B$

$y = 2x + 3$

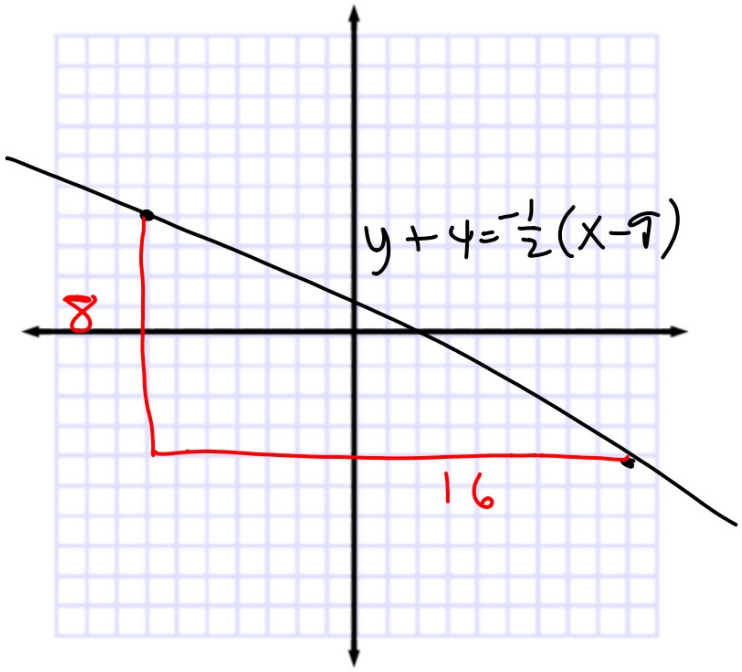


b. $(-7, 4)$ and $(9, -4)$

$m = \frac{-8}{16} = \frac{-1}{2}$

$y - -4 = \frac{-1}{2}(x - 9)$

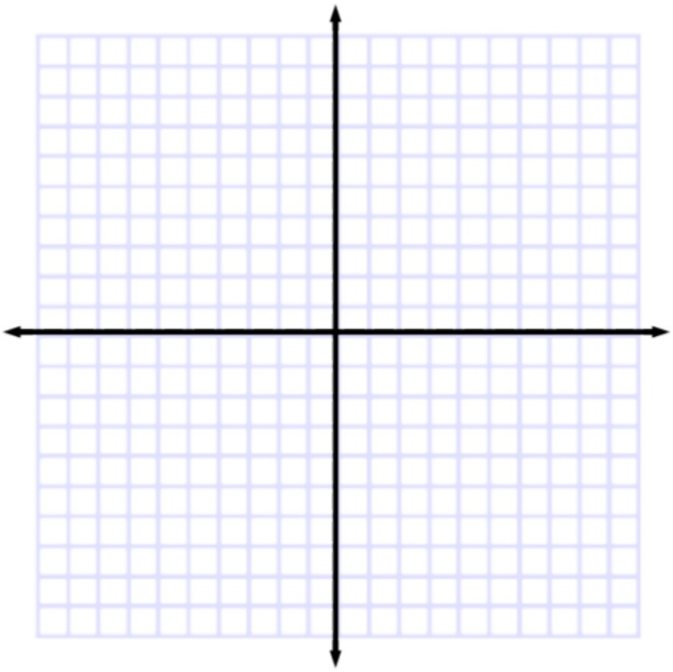
$y + 4 = \frac{-1}{2}(x - 9)$



Guided Practice

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

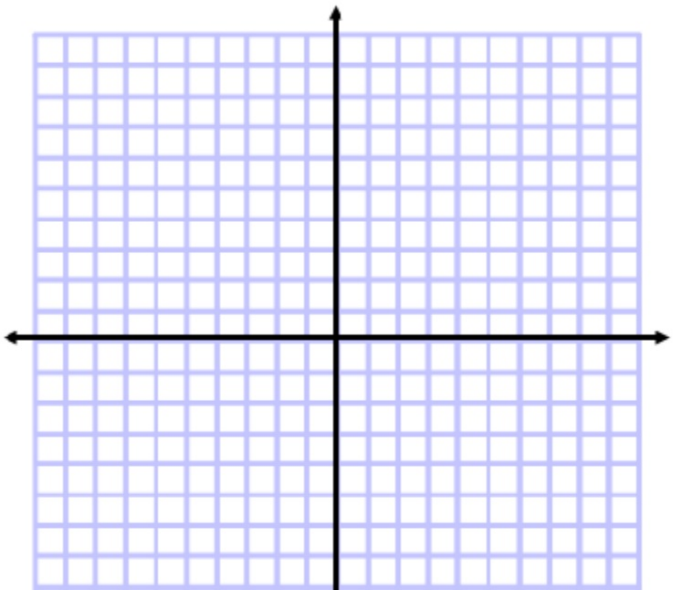
3B. $(-1, 3)$ and $(7, 3)$



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.



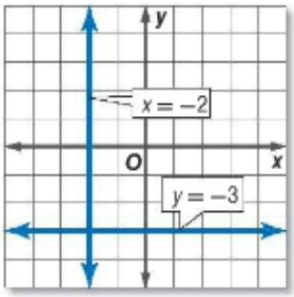
KeyConcepts Horizontal and Vertical Line Equations

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

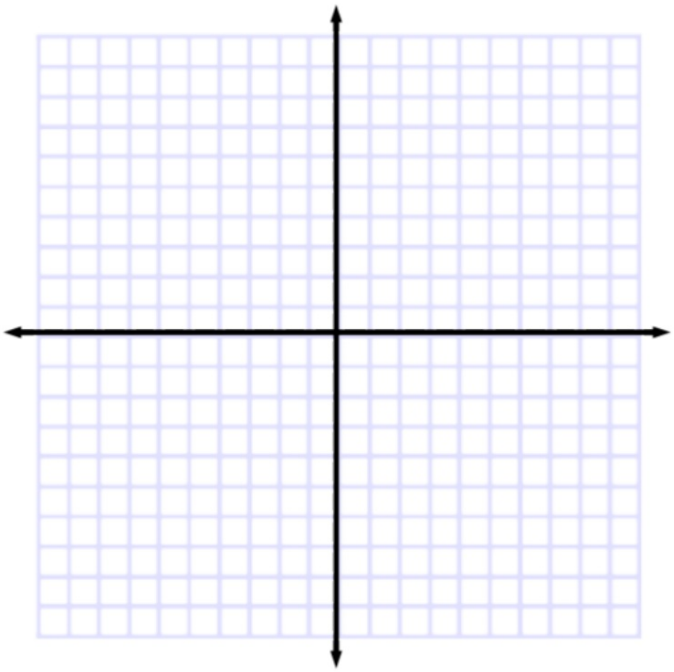
Example $y = -3$

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

Example $x = -2$



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



parallel = same slope

1) $y = 3x - 5$ $(1, 6)$

$m = 3$

$y - 6 = 3(x - 1)$

perp. line slope opp & recip.

2) $y = -\frac{1}{2}x + 3$ $(4, 3)$

$m = 2$

$y - 3 = 2(x - 4)$

$y = mx + B$

$3 = 2 \cdot 4 + B$

$3 = 8 + B$

$-8 \quad -8$

$B = -5$

$y = 2x + -5$