Algebra 1 4.4

Write the equation of a line parallel to a given line

Write the equation of a line perpendicular to a given line

What do we need to write an equation for a line?

slope m (x,y)

vertical $x=3$ $y=mx+B$

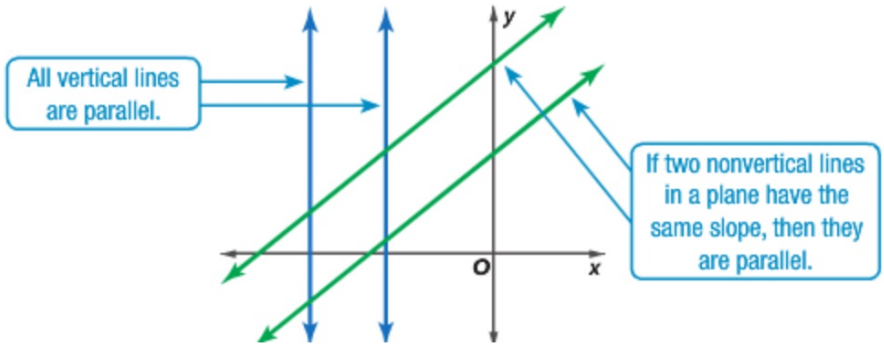
horizontal $y=6$

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

$\perp$ perpendicular recip opp

spaghetti lines

1 Parallel Lines Lines in the same plane that do not intersect are called **parallel lines**. Nonvertical parallel lines have the same slope.



Whiteboards

Write an equation in slope-intercept form for the line that passes through the given point and is parallel to the graph of the given equation.

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

2. $(0, 4), y = -4x + 5$

$y = -4x + 4$

$m = -4$

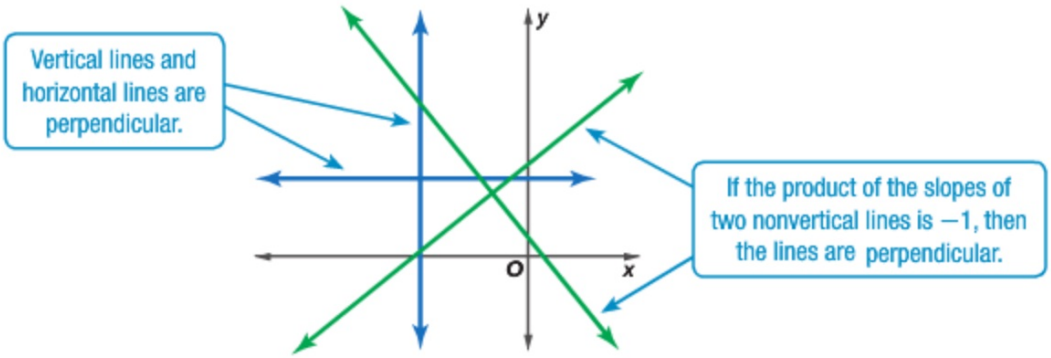
$4 = -4 \cdot 0 + B$

$y = -4x + 4$

$4 = 0 + B$

$4 = B$

2 Perpendicular Lines Lines that intersect at right angles are called **perpendicular lines**. The slopes of nonvertical perpendicular lines are opposite reciprocals. That is, if the slope of a line is 4, the slope of the line perpendicular to it is $-\frac{1}{4}$.



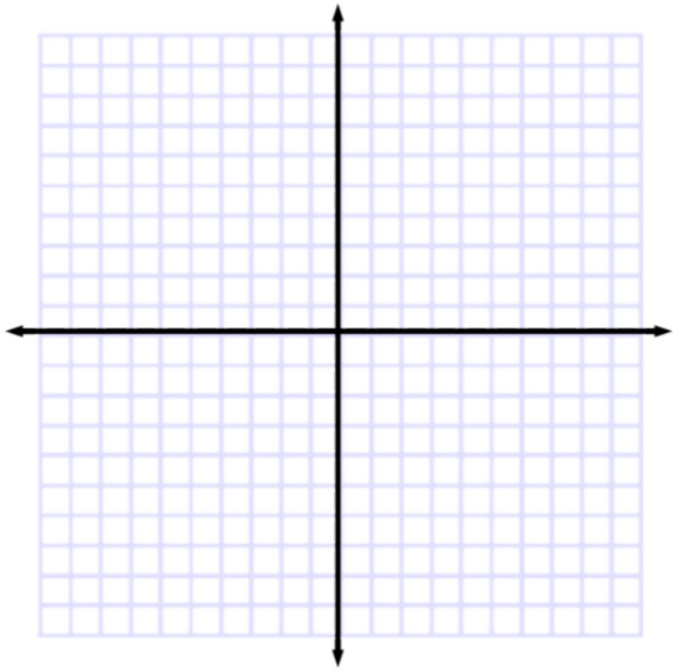
Example 3 Parallel or Perpendicular Lines

Determine whether the graphs of $y = 5$, $x = 3$, $y = -2x + 1$ are *parallel* or *perpendicular*. Explain.

What do we need to know so that we can answer the question?

3. Determine whether the graphs of $6x - 2y = -2$, $y = 3x - 4$, and $y = 4$ are *parallel* or *perpendicular*. Explain.

What do we need to know?



$y = \frac{3}{2}x + B$ $y = \frac{3}{2}x + 12$

Example 4 Perpendicular Line Through a Given Point

Write an equation in slope-intercept form for the line that passes through $(-4, 6)$ and is perpendicular to the graph of $2x + 3y = 12$.

x y (opp + recip)

What do we need to know?

$m = +\frac{3}{2}$

$6 = \frac{3}{2}(-4) + B$

$6 = -6 + B$

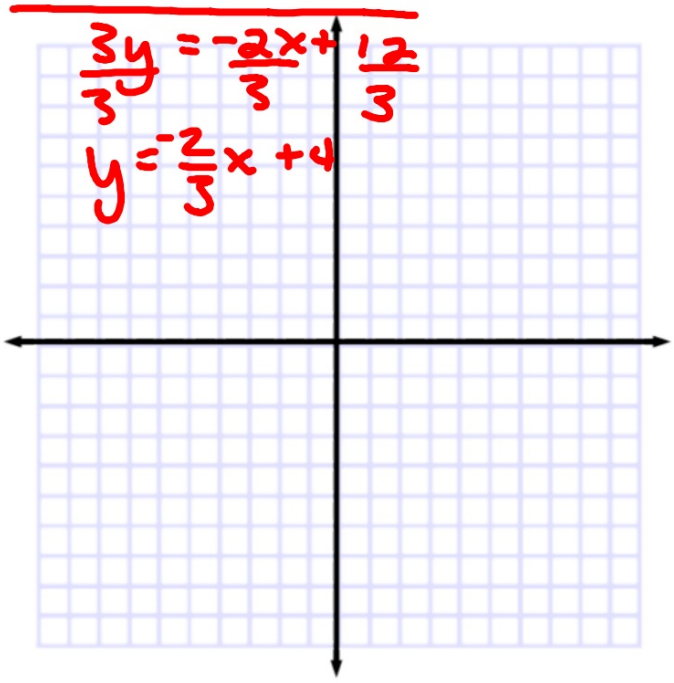
$+6 \quad +6$

$12 = B$

$-2x \quad -2x$

$\frac{3y}{3} = \frac{-2x}{3} + \frac{12}{3}$

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



What do we need to know?

GuidedPractice $y = \frac{-3}{2}x + 13$

4. Write an equation in slope-intercept form for the line that passes through (4,7) and is perpendicular to the graph of $y = \frac{2}{3}x - 1$.

$y = mx + B$

$7 = \frac{-3}{2} \cdot \frac{4}{1} + B$

$7 = -6 + B$

$+6 \quad +6$

$13 = B$

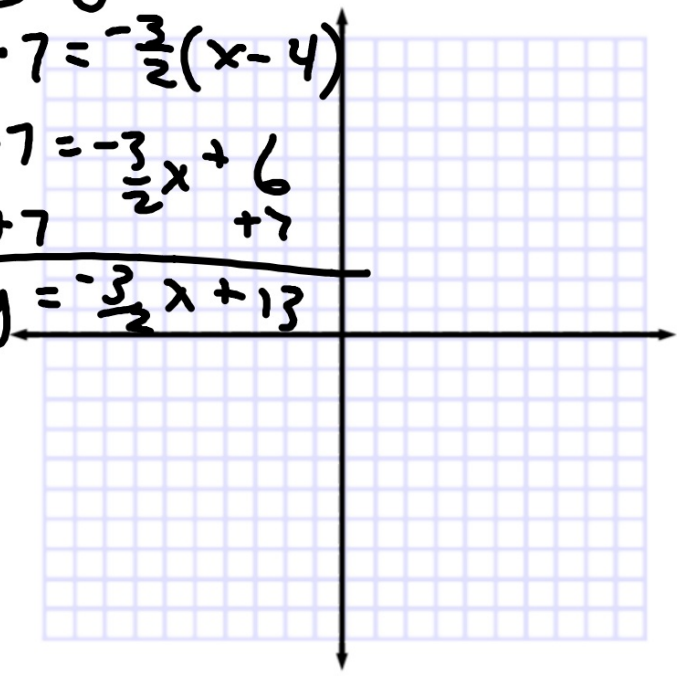
$y - y = m(x - x)$

$y - 7 = \frac{-3}{2}(x - 4)$

$y - 7 = \frac{-3}{2}x + 6$

$+7 \qquad +7$

$y = \frac{-3}{2}x + 13$



Write an equation in slope-intercept form for the line that passes through the given point and is perpendicular to the graph of the equation.

7. $(-2, 3), y = -\frac{1}{2}x - 4$

8. $(-1, 4), y = 3x + 5$

What do we need to know?