Algebra 1 4.4 // m = same

Write the equation of a line parallel to a given line

Write the equation of a line perpendicular to a given line

⊥ m = opp + recip

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

slope (x, y) $y = mx + b$

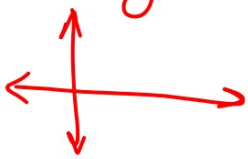
vertical

horizontal

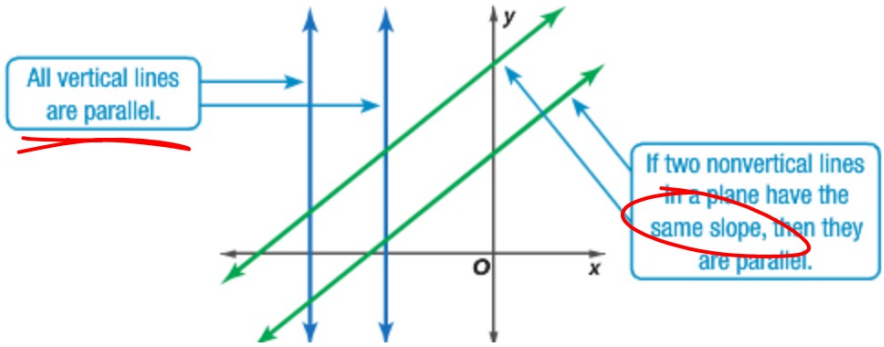
parallel

perpendicular

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

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

$m = \frac{1}{2}$ $(-1, 2)$ $y = \frac{1}{2}x + 2.5$

$y = mx + B$

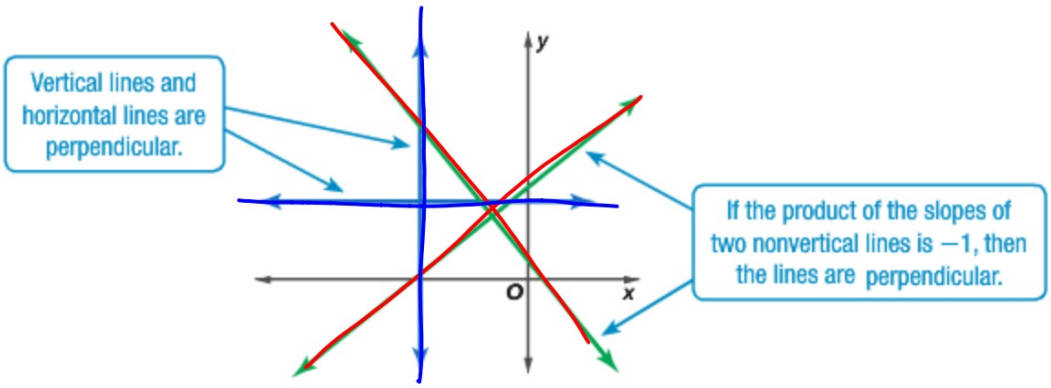
$2 = \frac{1}{2}(-1) + B$

$+2 = -\frac{1}{2} + B$ $+\frac{1}{2} \quad +\frac{1}{2}$

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

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.

$m = -2$ $\quad y = 5 \perp x = 3$

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

$y = mx + B$

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

$m = 3$

parallel

What do we need to know?

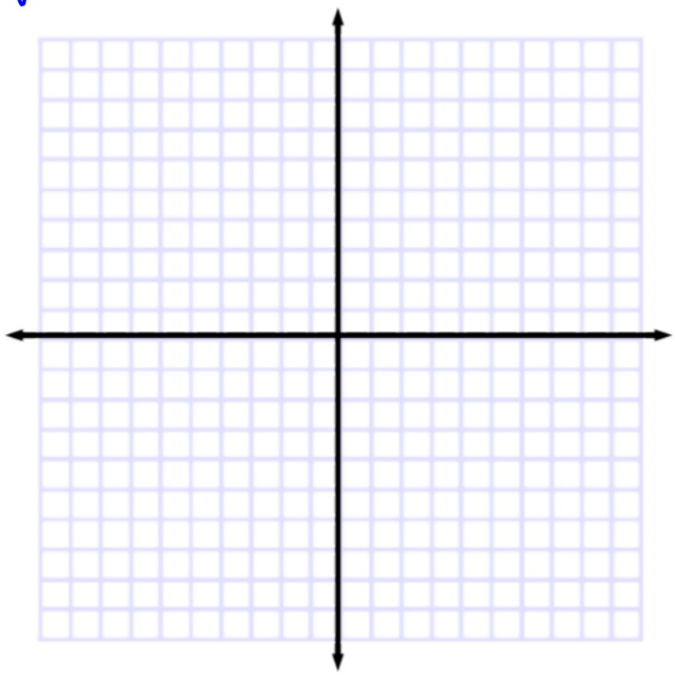
$6x - 2y = -2$

$-6x \quad -6x$

$-2y = -6x + -2$

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

$y = 3x + 1 \quad m = 3$



$y = mx + B$

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 $2x + 3y = 12$.

What do we need to know?

$m = \frac{3}{2}$ $(-4, 6)$

$6 = \frac{3}{2} \cdot \frac{-4}{1} + B$

$6 = -6 + B$

$+6 \quad +6$

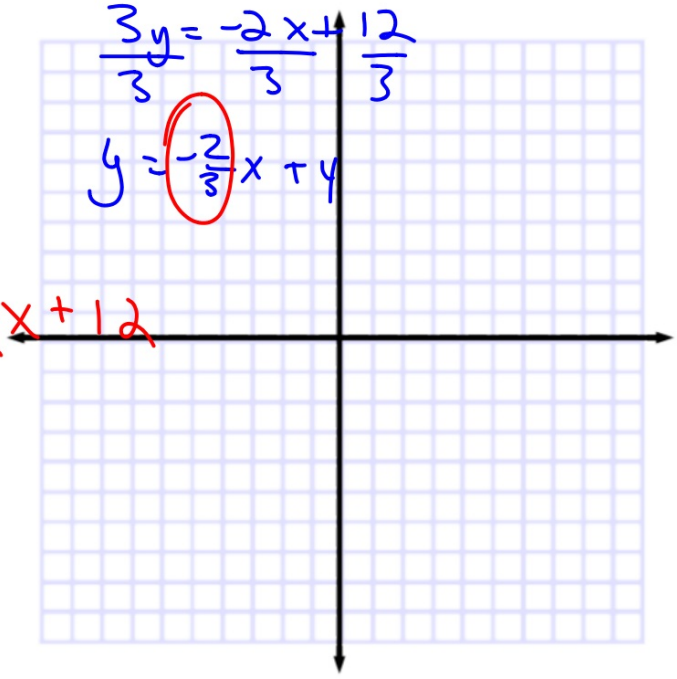
$B = 12$

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

$-2x \quad -2x$

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

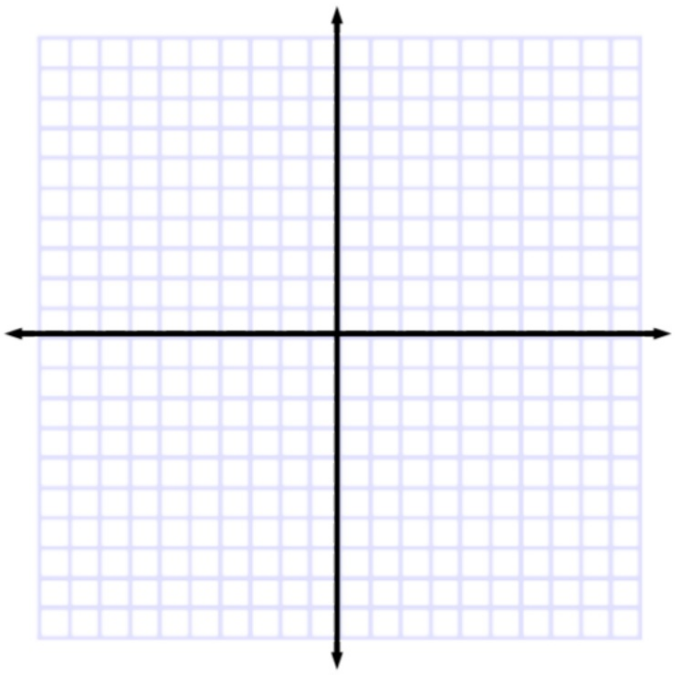
$y = -\frac{2}{3}x + 4$



What do we need to know?

Guided Practice

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



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?