Algebra 1 4.4 #1 $y = mx + B$

Write the equation of a line parallel to a given line

#3 Write the equation of a line perpendicular to a given line

$Ax + By = C$ #2 $y - y_1 = m(x - x_1)$

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

Slope (x, y)

slope $m = \frac{\text{vert.}}{\text{horiz}}$

vertical

horizontal

parallel never intersect (same slope)

perpendicular 90° angle (slope: reciprocal opposite)

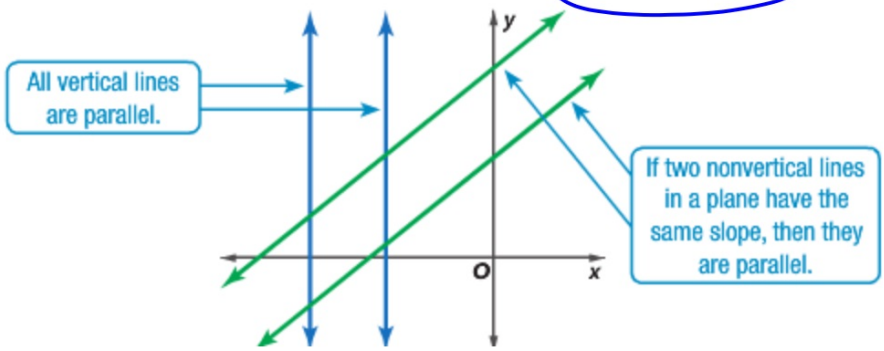
spaghetti lines

4.4 p. 243

11-37 odd

49, 51, 53

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



$y = mx + B$

Example 1 Parallel Line Through a Given Point

Write an equation in slope-intercept form for the line that passes through $(-3, 5)$ and is parallel to the graph of $y = 2x - 4$.

What do we need to know?

Slope = 2

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

$y = 2x + 11$

$y = 2x + B$

$5 = 2 \cdot -3 + B$

$5 = -6 + B$

$+6 \quad +6$

$11 = B$

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

GuidedPractice

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

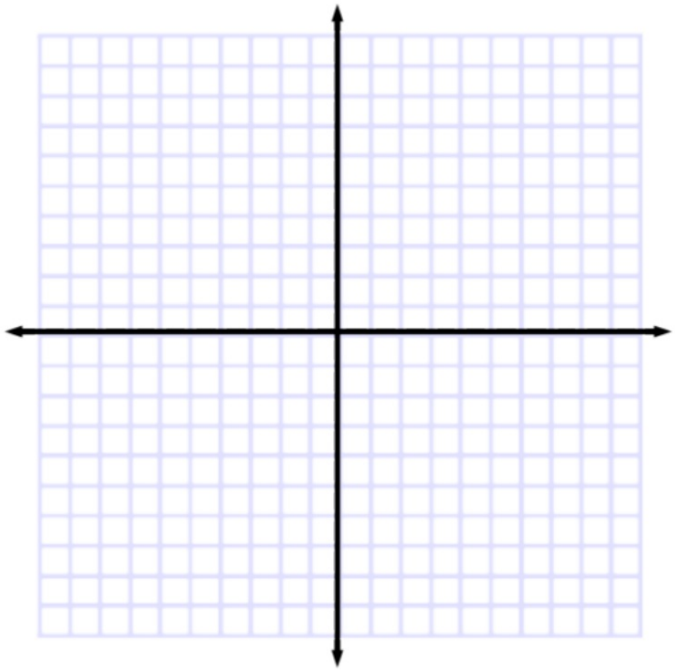
What do we need to know?

Slope $\frac{1}{4}$

(x, y) $(4, -1)$

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

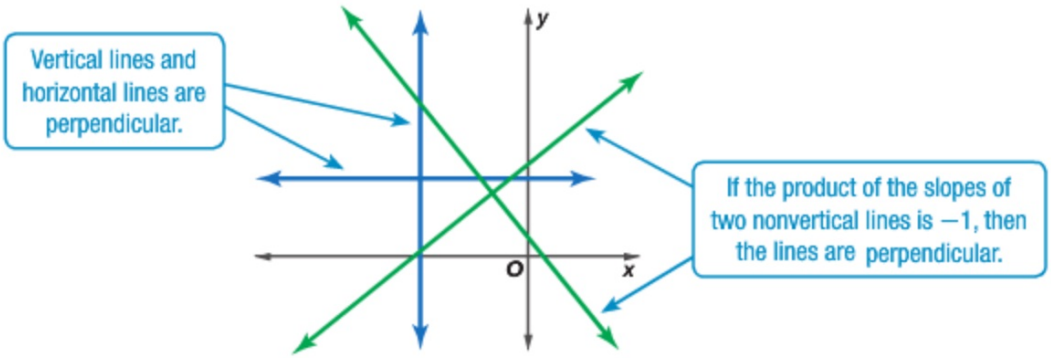
What does it look like when 2 lines are perpendicular?



graphing calc

If 2 lines are perpendicular...
(what?)

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 $-\frac{1}{4}$.

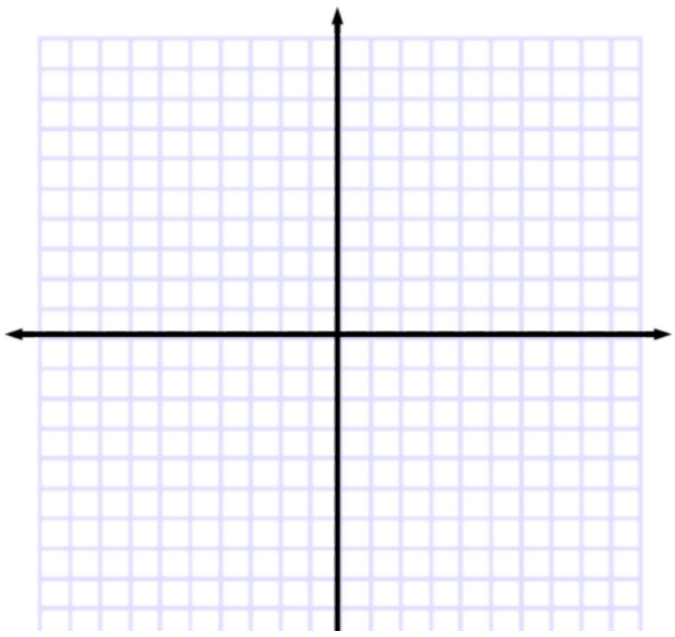


Partners:
One person write a slope.
Other person writes the perpendicular to the slope.

Eyeball is not enough…

GuidedPractice

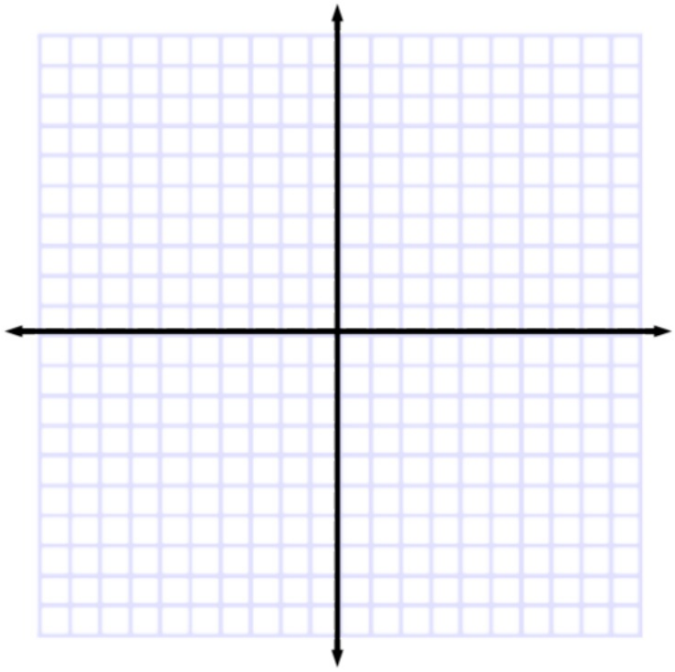
2. CONSTRUCTION On the plans for a treehouse, a beam represented by $\overline{QR}$ has endpoints $Q(-6, 2)$ and $R(-1, 8)$. A connecting beam represented by $\overline{ST}$ has endpoints $S(-3, 6)$ and $T(-8, 5)$. Are the beams perpendicular? Explain.



Example 3 Parallel or Perpendicular Lines

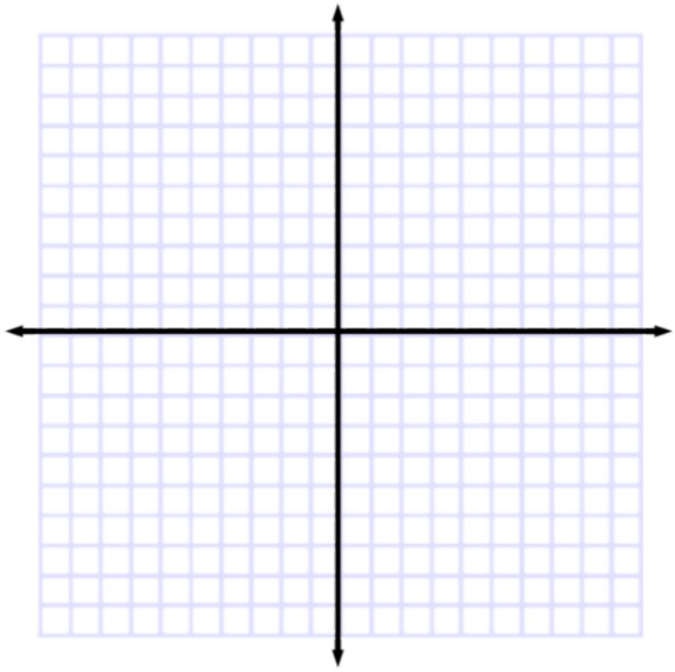
Determine whether the graphs of $y = 5$, $x = 3$, $y = -2x + 1$ are *parallel* or *perpendicular*. Explain.

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.

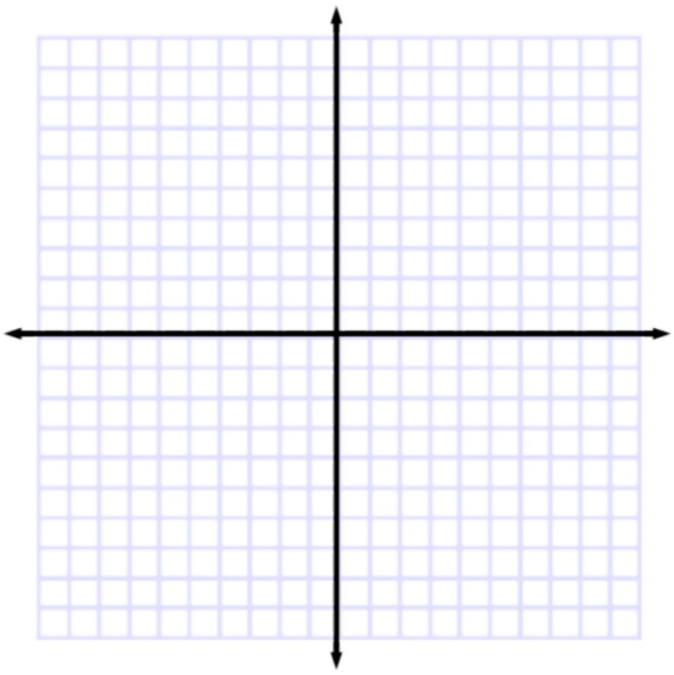
What do we need to know?



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 $2x + 3y = 12$.

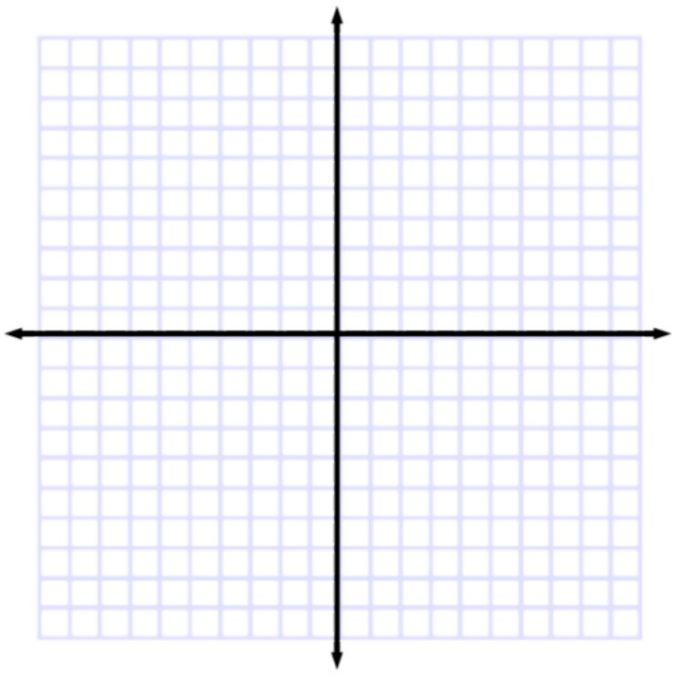
What do we need to know?



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?