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

m y b $y = mx + b$

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

slope $m = \frac{\text{rise}}{\text{run}}$

vertical

horizontal

parallel same slope

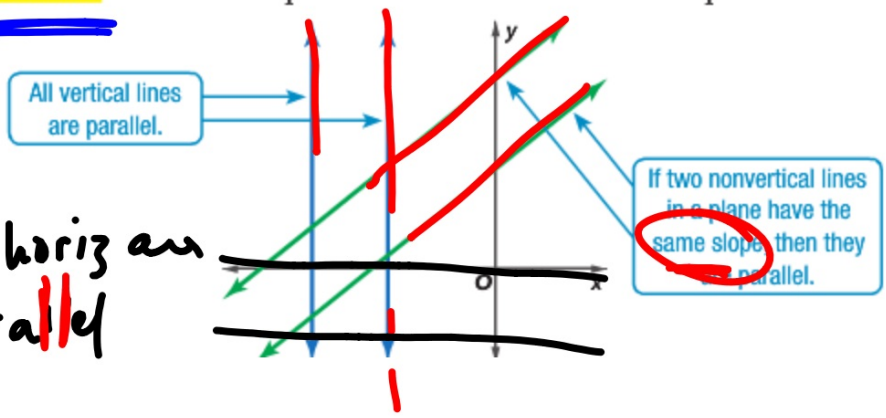
perpendicular meet at 90°

spaghetti lines

$y = \frac{1}{3}x + 5$

$y = \frac{1}{3}x - 2$

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



all horiz are parallel

Write the equation of a line parallel to...

$y = \frac{1}{4}x - 10$

$y = \frac{1}{4}x - 5$

$y = \frac{1}{4}x - 6$

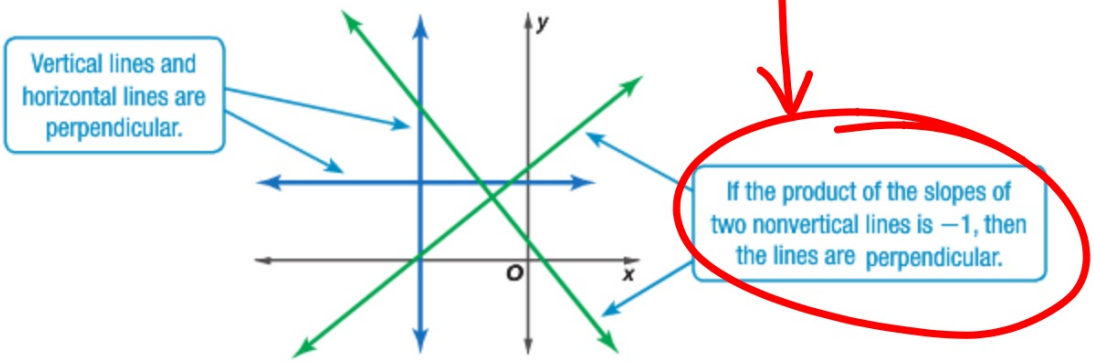
→ $y = \frac{1}{4}x + 3$

$y = \frac{1}{4}x + 2$

$y = \frac{1}{4}x + 4$

⊥ slope are opposite & reciprocal

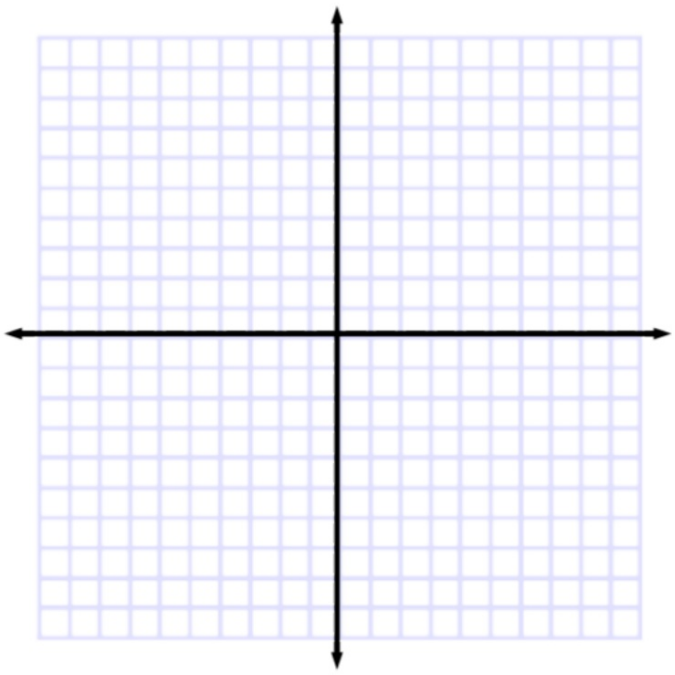
2 Perpendicular Lines Lines that intersect at right angles are called **perpendicular lines**. The slopes of nonvertical perpendicular lines are opposite reciprocals. That is, if the slope of a line is 4, the slope of the line perpendicular to it is $-\frac{1}{4}$.

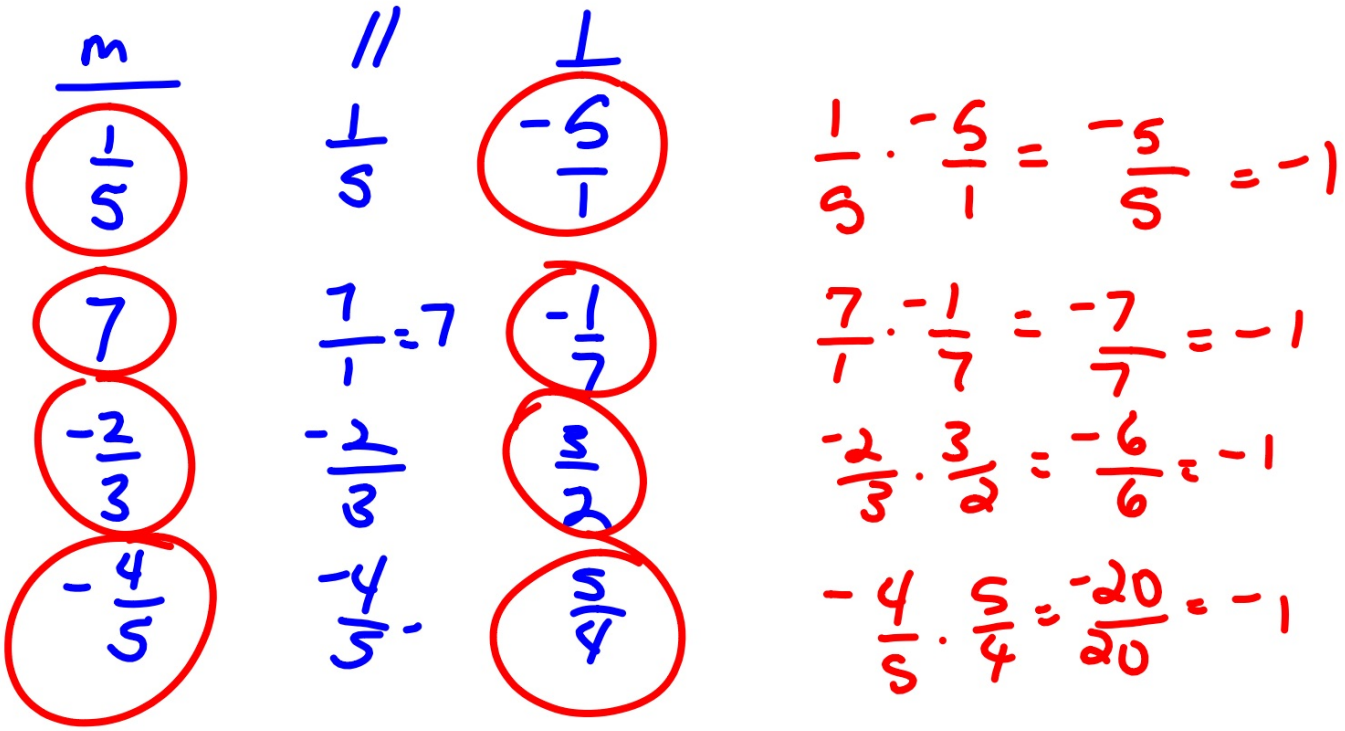


What do we need to know?

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



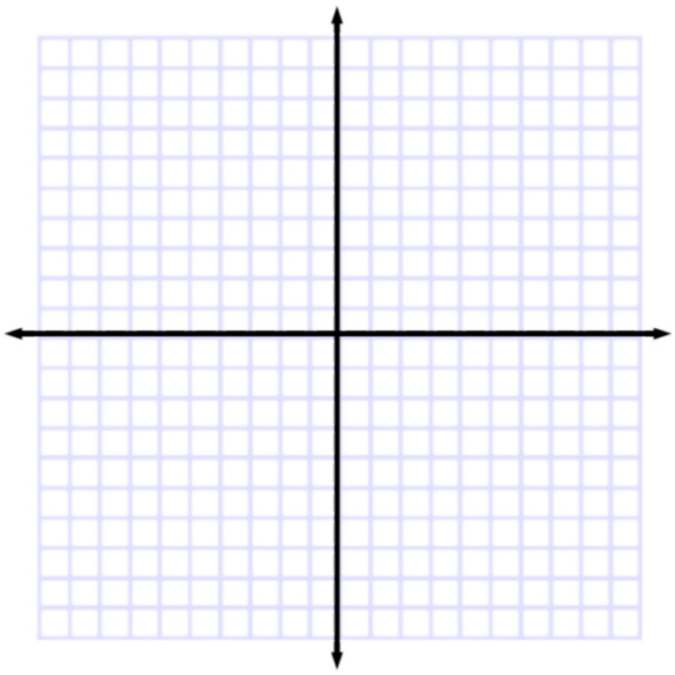

m
//
l
1/5
1/5
-5/1
7
7/1 = 7
-1/7
-2/3
-2/3
3/2
-4/5
-4/5
5/4
1/5 · -5/1 = -5/5 = -1
7/1 · -1/7 = -7/7 = -1
-2/3 · 3/2 = -6/6 = -1
-4/5 · 5/4 = -20/20 = -1

What do we need to know?

Guided Practice

4. Write an equation in slope-intercept form for the line that passes through (1,6) and is to the graph of $y = \frac{2}{3}x - 1$.

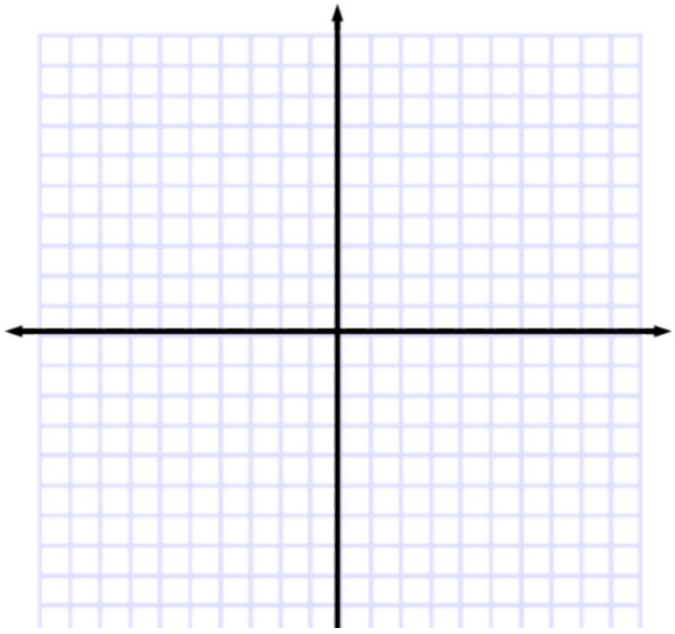
parallel



Eyeball is not enough…

GuidedPractice

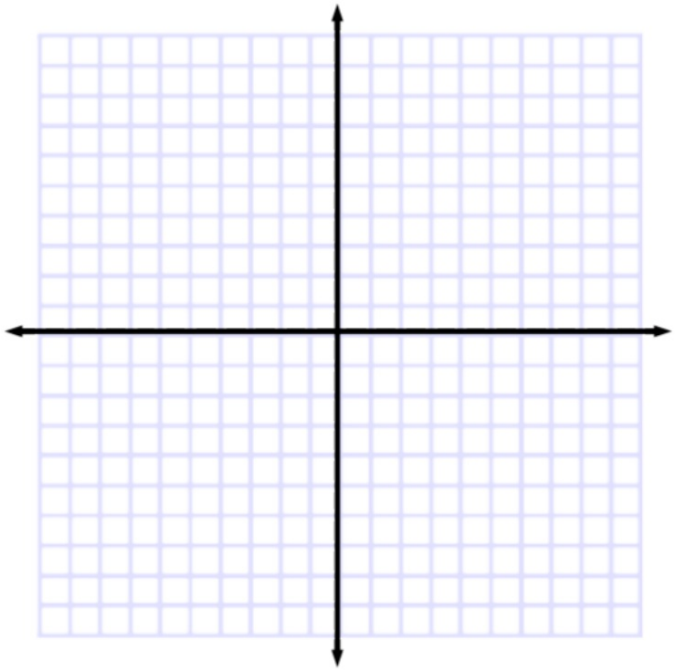
2. CONSTRUCTION On the plans for a treehouse, a beam represented by $\overline{QR}$ has endpoints $Q(-6, 2)$ and $R(-1, 8)$. A connecting beam represented by $\overline{ST}$ has endpoints $S(-3, 6)$ and $T(-8, 5)$. Are the beams perpendicular? Explain.



Example 3 Parallel or Perpendicular Lines

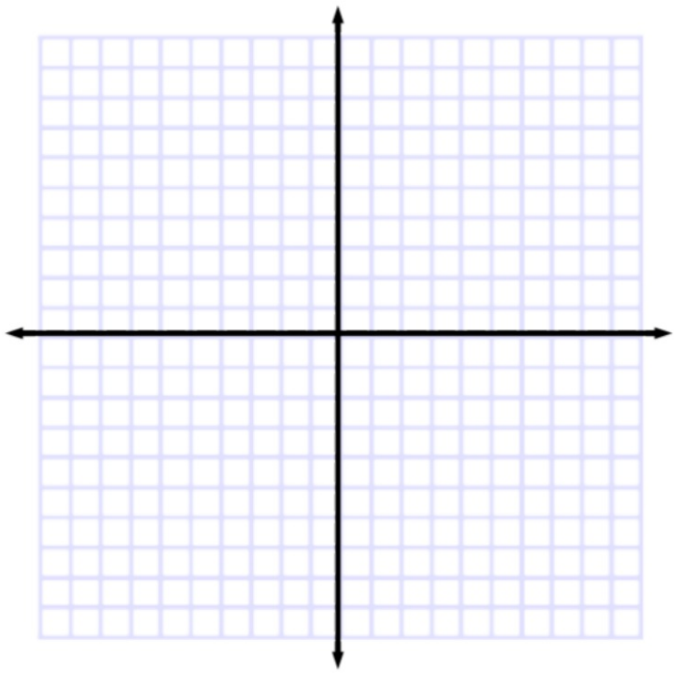
Determine whether the graphs of $y = 5$, $x = 3$, and $y = -2x + 1$ are *parallel* or *perpendicular*. Explain.

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.

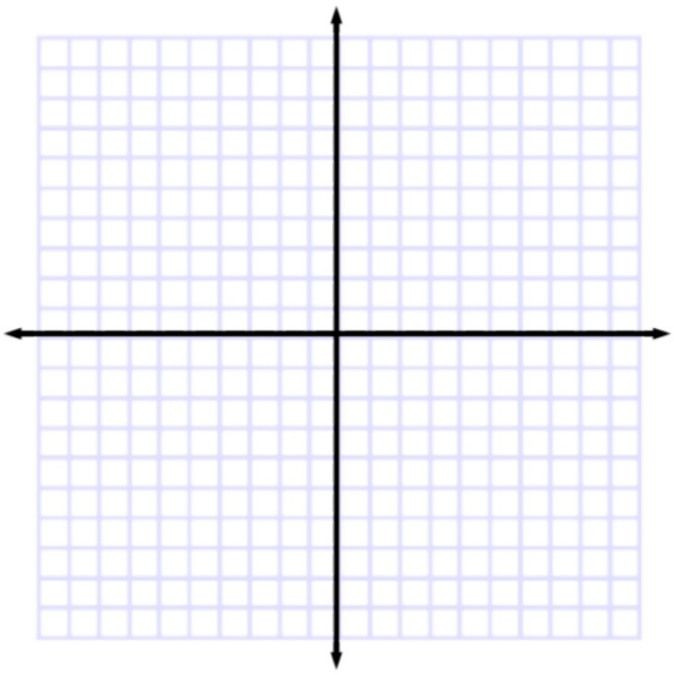
What do we need to know?



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?



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?