

4-4 Slope and Writing Equations of Lines

Objectives

I can write an equation for a line given two points on the line.

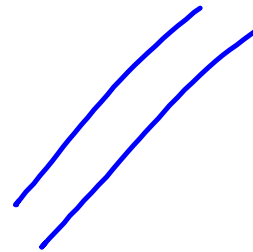
I can identify and write the slope of a line parallel or perpendicular to a given line

Point slope: $y = m(x - x_1) + y_1$

Slope intercept: $y = mx + b$

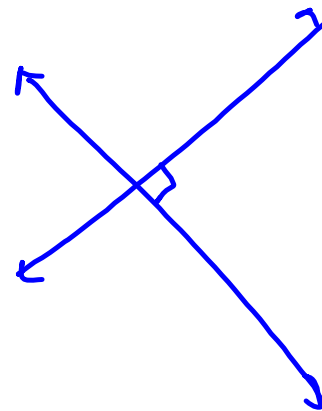
Vocabulary

Parallel Slope: *Same*



Perpendicular Slope:

- *opposite sign*
- *Reciprocal (flip)*



Write an equation of the line that passes through the given points.

1. $(2, 3), (5, 4)$
 $\begin{matrix} x & y \\ 2 & 3 \\ 5 & 4 \end{matrix}$

$\begin{matrix} +3 \\ \swarrow \\ (2, 3) \\ \searrow \\ (5, 4) \end{matrix} \begin{matrix} +1 \\ \\ \\ \end{matrix} \begin{matrix} 1 \\ \\ \\ \end{matrix}$
 $m = \frac{1}{3}$

$y = \frac{1}{3}(x-2) + 3 \rightarrow$ P.S.

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

$y = \frac{1}{3}x + 2\frac{1}{3} \rightarrow$ Slope intercept
 $y = mx + b$

$(3, -2) \quad (-1, 4)$

$\begin{matrix} -4 \\ \swarrow \\ (3, -2) \\ \searrow \\ (-1, 4) \end{matrix} \begin{matrix} +6 \\ \\ \\ \end{matrix} \quad m = \frac{6}{-4} = -\frac{3}{2}$

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

$y = -\frac{3}{2}(x-3) - 2$ point slope

$y = -\frac{3}{2}x + 4.5 - 2$

$y = -\frac{3}{2}x + 2.5$ Slope intercept

Write the equation of the line

3. $(2, 5)$ $(4, 7)$

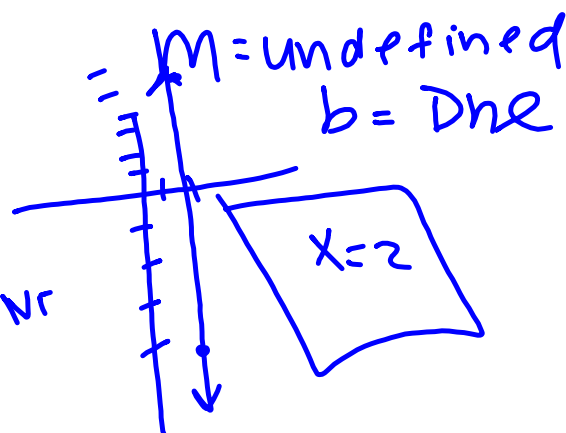
4. $(2, -4)$, $(2, 6)$
 x, y

$\begin{matrix} +2 \\ \swarrow \\ (2, 5) \\ \searrow \\ (4, 7) \end{matrix} \begin{matrix} +2 \\ \swarrow \\ (2, -4) \\ \searrow \\ (2, 6) \end{matrix}$ $m = \frac{2}{2} = 1$ $m = \frac{10}{0}$

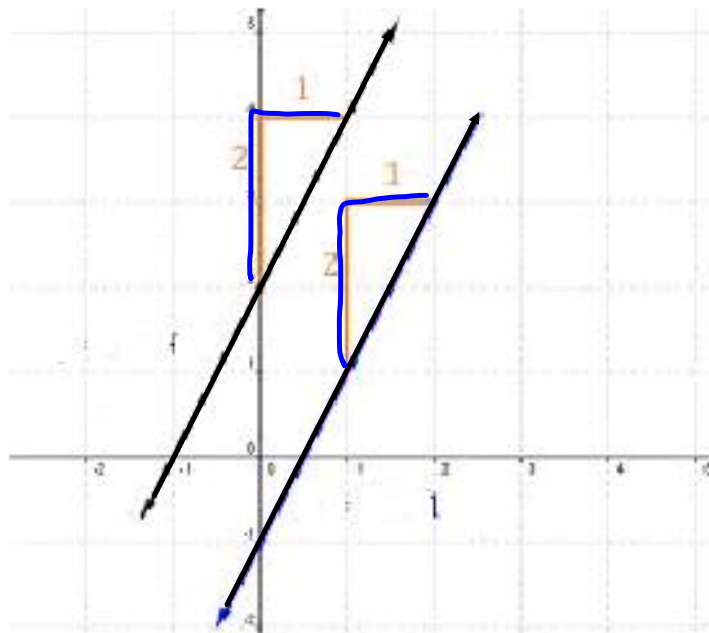
$$y = 1(x - 4) + 7$$

$$y = x - 4 + 7$$

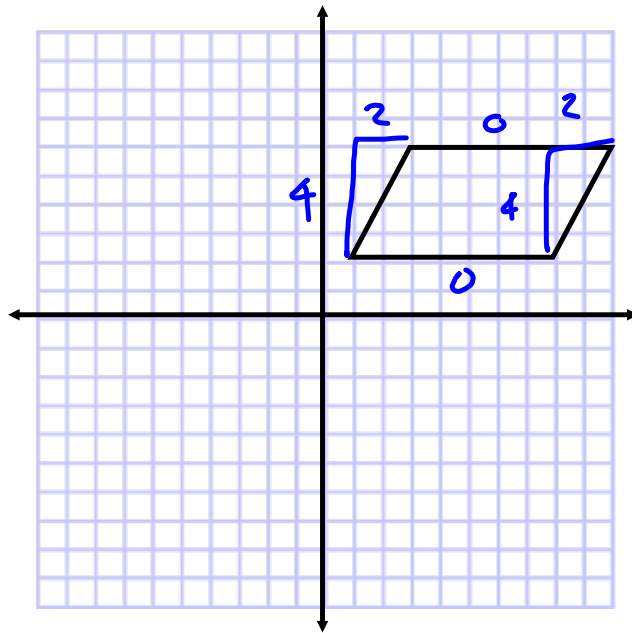
$$y = x + 3 \quad \text{SLOPE INT}$$



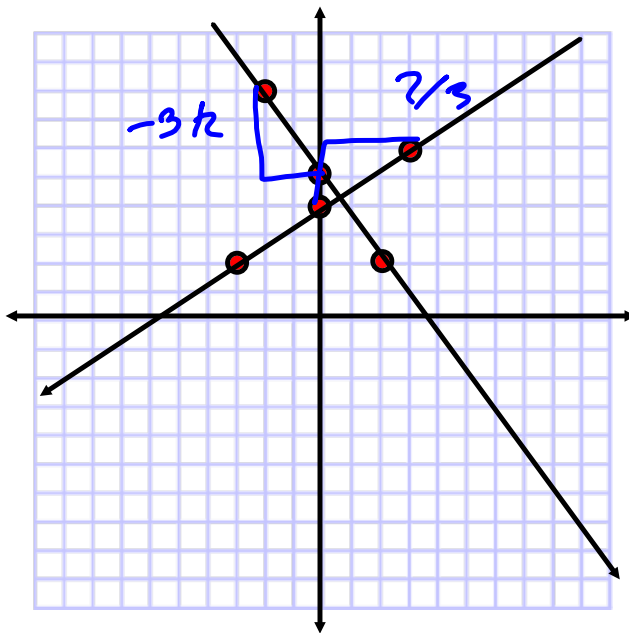
Parallel Lines



What do you notice about the slope of parallel lines?



Perpendicular Lines



Find the slope of both lines.

What do you notice about the slope of perpendicular lines?

Practice finding a perpendicular slope of the given slope

$$m = 1/2$$

$$m = 4/3$$

$$m = 3$$

$$m = -2/3$$

$$m = -2$$

$$m = -5/2$$

Write the slope of a line that is **parallel** to the given line

1. $y = \overset{(m)x+b}{2}x+3$

$$m = 2$$

2. $y = 1/2x - 5$

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

3. $y = 3x - 3$

$$m = 3$$

4. $y = -x - 5$

$$m = -1$$

Write the slope of a line that is **perpendicular** to the given line

1. $y = 1/2x - 2$

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

2. $y = -8/5x - 4$

$$m = \frac{5}{8}$$

3. $y = 1/3x - 2$

$$m = -\frac{3}{1} = -3$$

4. $y = -1/4x + 1$

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

Decide whether the lines with the given equations are *parallel*, *perpendicular*, or *neither*.

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

perp

b. $y = -5x - 2$ -5
 $y = 5x + 2$ 5

neither

c. $y = \frac{5}{6}x + 8$
 $y = -\frac{6}{5}x - 4$

perp

d. $f(x) = 2x - 7$
 $g(x) = 2x + 5$

parallel

Decide whether the lines with the given equations are *parallel*, *perpendicular*, or *neither*.

$$\cancel{6x} - 2y = -2 \quad \begin{matrix} \text{Aox} & & \text{-bx} \end{matrix}$$

$$y = 3x - 4$$

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

$$y = 3x + 1$$

Parallel

$$2x + 3y = 12 \quad \begin{matrix} -2x & & -2x \end{matrix}$$

$$\times 3x - 2y = -24 \quad \begin{matrix} -3x & & -3x \end{matrix}$$

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

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

$$\frac{-2y}{-2} = \frac{-3x - 24}{-2}$$

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

PERP

