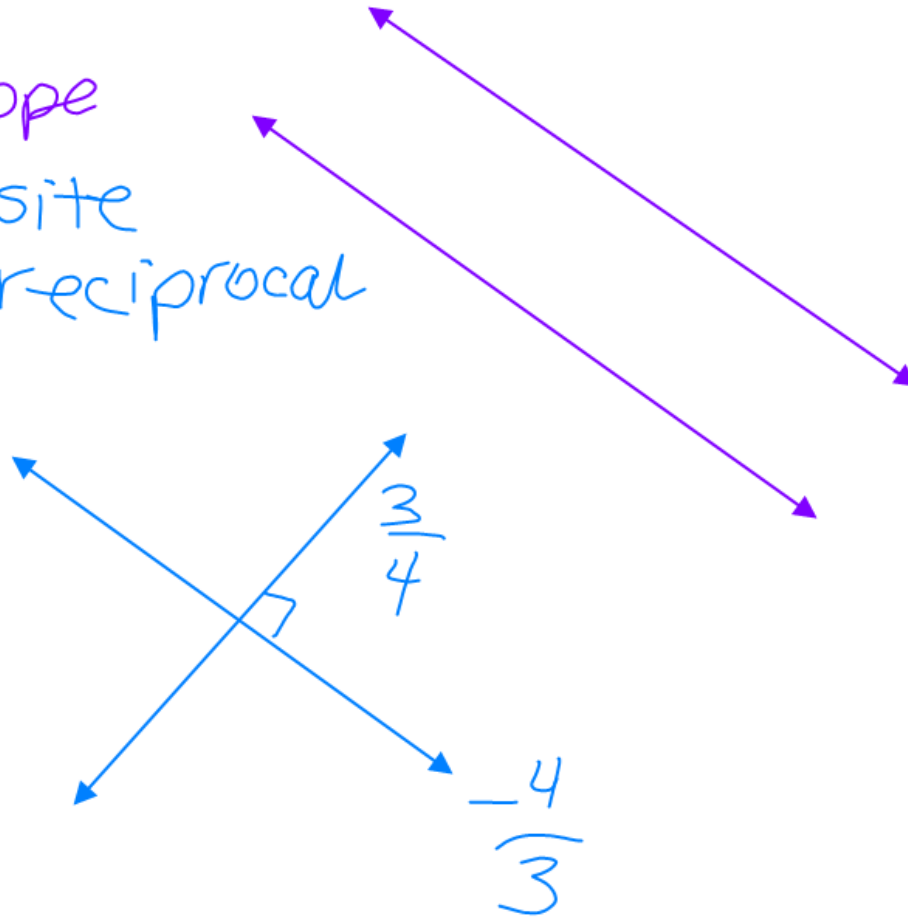


6.7 - Parallel and Perpendicular Lines

Vocabulary

- Parallel Lines *same slope*
- Perpendicular Lines *opposite reciprocal*
- Reciprocal



1 EXAMPLE

Are the graphs of $y = -2x - 1$ and $4x + 2y = 6$ parallel?

$$m = -2$$

$$y = mx + b$$

$$-4x + 2y = 6$$

$$\frac{2y}{2} = \frac{-4x + 6}{2}$$

$$y = -2x + 3$$

$$m = -2$$

yes

Find the slope of a line parallel to the given linear equation.

#1. $y = \frac{1}{2}x + 2.3$

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

#5. $-\frac{3}{x} + 4y = 12$
 ~~$-\frac{3}{x}$~~ ~~$-\frac{3}{x}$~~

$$\frac{4y}{4} = \frac{-3x}{4} + \frac{12}{4}$$

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

$m = -\frac{3}{4}$

2 EXAMPLE

in **slope-intercept form**
 Write an equation for the line that contains $(-2, 3)$ and is parallel to $y = \frac{5}{2}x - 4$.

$$\uparrow$$

$$m = \frac{5}{2}$$

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

$$\rightarrow y - 3 = \frac{5}{2}(x + 2)$$

$$y + 3 = \frac{5}{2}x + 5 + 3$$

$$y = \frac{5}{2}x + 8$$

$$\frac{5}{2} \cdot 2$$

Write an equation for the line that is parallel to the given line and that passes through the given point.

13. $y = 6x - 2$ $(0, 0)$

↑
 $m = 6$

~~$y - 0 = 6(x - 0)$~~

$y = 6x$

15. $y = -2x + 3$ $(-3, 5)$

↑
 $m = -2$

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

$y - 5 = -2(x + 3)$

$y - 5 = -2x - 6$

$+5$ $+6$

$y = -2x - 1$

3 EXAMPLE Write an equation of the line that contains $(6, 2)$ and is perpendicular to $y = -2x + 7$.

$$\uparrow$$

$$m = -2$$

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

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

$$y - 2 = \frac{1}{2}(x - 6)$$

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

$$\begin{array}{r} +2 \\ +2 \end{array}$$

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

Find the slope of a line perpendicular to the graph of each equation.

#19. $y = 2x$
↑
 $m = 2$

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

21. $y = \frac{7}{5}x - 2$
↑
 $m = \frac{7}{5}$

$$m = -\frac{5}{7}$$

Write an equation for the line that is perpendicular to the given line and that passes through the given point.

25.

$$y = 2x + 7 \quad (0, 0)$$



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

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

27.

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

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

$$m = 3$$

$$y - 2 = 3(x - 4)$$

$$y - 2 = 3x - 12$$

$$y = 3x - 12 + 2$$

$$y = 3x - 10$$

Homework: pg. 346 #2, 6, 8, 10, 16-26even, 32-38even, 43

#2) $m = -\frac{2}{3}$

#6) $\begin{array}{r} 7x - y = 5 \\ -7x \quad -7x \end{array}$

$$\begin{array}{r} 7y = -7x + 5 \\ \hline y = -x + \frac{5}{7} \end{array}$$

$$y = -x + \frac{5}{7}$$

$$\boxed{m = -1}$$

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

$$\begin{array}{r} 3x + 2y = 8 \\ -3x \quad -3x \end{array}$$

$$\begin{array}{r} 2y = -3x + 8 \\ \hline y = -\frac{3}{2}x + 4 \end{array}$$

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

yes, parallel

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

$$\begin{array}{r} 5x - 10y = 15 \\ -5x \quad -5x \end{array}$$

$$\begin{array}{r} -10y = 5x + 15 \\ \hline y = \frac{1}{2}x - 1.5 \end{array}$$

$$y = \frac{1}{2}x - 1.5$$

not parallel

16) $y + 6 = -\frac{7}{2}(x + 4)$

$$\begin{array}{r} y + 6 = -\frac{7}{2}x - 14 \\ -6 \quad -6 \end{array}$$

$$\boxed{y = -\frac{7}{2}x - 20}$$

① determine slope

② put in point-slope form

③ distribute

④ get y alone

$$\frac{7}{2} \cdot 42$$