

8.6 Parallel and Perpendicular Lines | May 27, 2016

Parallel lines have slopes that are equal.

Perpendicular lines have slopes that are negative reciprocals
— Flip

$$\text{ex: } m = \frac{23}{8}$$

$$m_{\perp} = -\frac{8}{23}$$

32. Determine an equation of a line parallel to $2x - 3y + 1 = 0$ and passes through the point $(1, 2)$.

To create an equation, we need 2 things:

① Slope is parallel to $2x - 3y + 1 = 0$

② Point $\Rightarrow (1, 2)$

① Get slope.

$$2x - 3y + 1 = 0$$

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

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

$$\therefore m = \frac{2}{3}$$

② Create Equation

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

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

$$3y - 6 = 2x - 2$$

$$0 = 2x - 3y + 4$$

33. Determine the equation perpendicular to $x - 5y + 2 = 0$ and passes the point $(-2, 5)$.

We need 2 things:

① Slope $\perp$ to $x - 5y + 2 = 0$

② Point $\Rightarrow (-2, 5)$

① Get slope

$$x - 5y + 2 = 0$$

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

$$y = \frac{1}{5}x + \frac{2}{5}$$

$$\therefore m = \frac{1}{5}$$

$$m_1 = -\frac{5}{1} = -5$$

② Create Equation.

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

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

$$y - 5 = -5x - 10$$

$$y = -5x - 5$$

36. Determine the line parallel to $x + 9y - 2 = 0$ and having the same x -intercept as $2x - 9y + 27 = 0$.

We need 2 things:

① Slope parallel to $x + 9y - 2 = 0$

② Point the x -int of $2x - 9y + 27 = 0$

① get slope

$$x + 9y - 2 = 0$$

$$9y = -x + 2$$

$$y = -\frac{1}{9}x + \frac{2}{9}$$

$$\therefore m = -\frac{1}{9}$$

② Get the x -int

x -int, $y = 0$

$$2x - 9(0) + 27 = 0$$

$$2x = -27$$

$$x = -\frac{27}{2}$$

$$\therefore \left(-\frac{27}{2}, 0\right)$$

③ create equation

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

$$(y - 0) = -\frac{1}{9}\left(x + \frac{27}{2}\right)$$

$$\frac{9}{9}y = -\frac{x}{9} - \frac{27}{2(9)}$$

$$y = -\frac{1}{9}x - \frac{27}{18}$$

$$y = -\frac{1}{9}x - \frac{3}{2}$$

The following slopes are parallel. Find the value of the variable.

41. $-3, \frac{w}{4}$

$$(4) - 3 = \frac{w}{4}$$

$$-12 = w$$

42. $-\frac{2}{3}, -\frac{n}{9}$

$$-\frac{2}{3} = -\frac{n}{9}$$

$$\underline{-18} = \underline{-3n}$$

$$6 = n$$

45. $\frac{2}{k}, -\frac{4}{5}$

$$\frac{2}{k} = -\frac{4}{5}$$

$$\underline{10} = \underline{-4k}$$

$$-\frac{5}{2} = k$$

The following slopes are perpendicular. Find the value of the variable.

46. $3, \frac{x}{6}$

$$\text{If } m=3, m_{\perp} = -\frac{1}{3}$$

$$\text{Now: } -\frac{1}{3} = \frac{x}{6}$$

$$\underline{-6} = \underline{3x}$$

$$-2 = x$$

49. $\frac{2}{3}, \frac{x}{4}$

$$\text{If } m=\frac{2}{3}, m_{\perp} = -\frac{3}{2}$$

$$\text{Now: } -\frac{3}{2} = \frac{x}{4}$$

$$\underline{-12} = \underline{2x}$$

$$-6 = x$$

Homework: 8.6 pg 437 # 34 to 50

Handout #1-8