8.6 Parallel and Perpendicular Lines | May 26, 2016

Parallel means that slopes are equal.

Perpendicular slopes are negative reciprocals:

$$m = \frac{a}{b} \qquad m_{\perp} = -\frac{b}{a}$$

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27. $x - y + 1 = 0$ (+y)

$y = 1x + 1$

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

$4x + 4y + 1 = 0$ (−4x, −1)

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

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

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

∴ these are perpendicular

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

We need two things: (1) slope → turn to $y = mx + b$

(2) point $(1, 2)$

Slope: $2x - 3y + 1 = 0$ (+3y)

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

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

∴ $m = \frac{2}{3}$

Create the equation:

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

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

$3y - 6 = 2x - 2$

$0 = 2x - 3y + 4$

(now go to standard or $y = mx + b$)

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

We need: ① Point $\Rightarrow (-2, 5)$

② Slope, needs to be $\perp$ to $x - 5y + 2 = 0$

① Slope

$x - 5y + 2 = 0$

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

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

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

$m_{\perp} = \frac{-5}{1} = -5$

② Create equation

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

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

$y - 5 = -5x - 10$ (+5 to both sides)

$y = -5x - 5$

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

We need two things: ① point → the x-int of $2x - 9y + 27 = 0$

② slope → parallel to $x + 9y - 2 = 0$

① Point

x-int, $y = 0$

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

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

$x = \frac{-27}{2}$ or -13.5

$\therefore (-13.5, 0)$

② slope

$x + 9y - 2 = 0$ (−x, +2)

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

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

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

③ Equation

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

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

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

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

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

The following slopes are parallel. Determine the variable.

41. $2, \frac{-6}{m}$

$\therefore \frac{2}{1} = \frac{-6}{m}$

$2m = -6$

$m = -3$

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

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

$-18 = -3n$

$6 = n$

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

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

$10 = -4k$

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

OR

$-2.5 = k$

Homework: 8.6 pg 437 # 28 to 44

AND graph at least [4] from the handout.

from #'s 1-12.