5.5: Write Equations of Parallel and Perpendicular Lines

Goals: *Write an equation in slope – intercept of parallel lines
*Write an equation in slope – intercept form of perpendicular lines

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Parallel Lines: lines that never intersect **Symbol:** ∥

****RECALL****

Parallel lines have the same slope

Write the equation of the line with the given information:

Ex: passes through (–3, –5) ∥ to $y = 3x - 1$

Given Equation	**Answer Equation**
What information do you know from the given equation?	What information can you infer about the answer equation as a result?
The given line has a slope of 3	The answer line will also have a slope of 3 since they are parallel.

$y = mx + b$
$-5 = 3(-3) + b$
$-5 = -9 + b$
$+9 \quad +9$
$4 = b$
$y = 3x + 4$

Ex: passes through (–2, 11) ∥ to $y = -x + 5$

$y = -x + 9$

Ex: passes through (–3, 3) ∥ to $y + 2x = 1$

$y = -2x - 3$

Perpendicular Lines: intersect at 90° angles **Symbol:** ⊥

****IMPORTANT****

The slopes of perpendicular lines are opposite reciprocals

Determine which lines, if any, are parallel or perpendicular:

1.

a. $y = 5x - 3$ **b.** $x + 5y = 2$ **c.** $-10y - 2x = 0$

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

b ∥ c and a ⊥ b and c

2.

a. $y = -3x + 1$ **b.** $-x + 3y = 1$ **c.** $2x - 6y = 4$

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

b ∥ c and a ⊥ b and c

3.

a. $2x + 6y = -3$ **b.** $y = 3x - 8$ **c.** $-1.5y + 4.5x = 6$

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

b ∥ c and a ⊥ b and c

Write the equation of the line with the given information:

Ex: passes through $(4, -5)$ ⊥ to $y = 2x + 3$

Given Equation

What information do you know from the given equation?

The slope is 2

Answer Equation

What information can you infer about the answer equation as a result?

The slope will be $-\frac{1}{2}$ since they are perpendicular lines.

$y = mx + b$

$-5 = -\frac{1}{2}(4) + b$

$-5 = -2 + b$

$+2 = +2$

$-3 = b$

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

Ex: passes through (4, 3) $\perp$ $y = 4x - 7$

$3 = -\frac{1}{4}(4) + b$

$3 = -1 + b$

$+1 = +1$

$4 = b$

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

Ex: passes through (4, –2) $\perp$ $y - 4x = 2$

$-2 = -\frac{1}{4}(4) + b$

$-2 = -1 + b$

$+1 = +1$

$-1 = b$

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