

# Parallel and Perpendicular Lines Notes

## Important Information

- **Parallel lines**- lines that never intersect (cross).
- The **slopes of parallel lines** are the same.
- **Perpendicular lines**- lines that intersect at a right angle.
- The **slopes of perpendicular lines** are opposite reciprocals (flipping the fraction).

## Examples:

- Are the lines parallel, perpendicular, or neither?

$$y = -3x + 7 \text{ and } y = 3x - 2$$

$$y = 5x + 8 \text{ and } y = -1/5x - 4$$

$$y = 6x + 9 \text{ and } y = 6x + 2$$

- If the equation is not in  $y = mx + b$ , you will need to put it into that form.

not in  $y = mx + b$  form

$$-4x + 2y = 12$$

$$+4x \qquad \qquad \qquad +4x$$


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$$2y = 4x + 12$$

$$\frac{2y}{2} = \frac{4x + 12}{2}$$

$$y = 2x + 6$$

## Things to remember!

- You can write the equation of a new line that is parallel or perpendicular to any line and goes through a specific point.

$y = 3x + 4$  thru  $(9, 2)$

Parallel	Perpendicular
$m = 3$	$m = -\frac{1}{3}$
$(x, y)$ $(9, 2)$	$(x, y)$ $(9, 2)$
$y = mx + b$	$y = mx + b$
$2 = 3(9) + b$	$2 = -\frac{1}{3}(9) + b$
$2 = 27 + b$	$2 = -\frac{1}{3}(9) + b$
$-27 \quad -27$	$2 = -\frac{9}{3} + b$
$-25 = b$	$2 = -3 + b$
$y = 3x - 25$	$+3 \quad +3$
	$5 = b \quad y = \frac{1}{3}x + 5$

## More Examples:

- Create your own equation and write it (in  $y = mx + b$  form or not).
- The pick a point.
- Do the calculations to find the equation of the line that will be parallel to your line that will go through your point.
- Do the calculations to find the equation of the line that will be perpendicular to your line that will go through your point.