

## Warm Up

Find the equation of the line going through  
 $A(\overset{x_1}{-3}, \overset{y_1}{-1})$  and  $B(\overset{x_2}{-6}, \overset{y_2}{1})$

$$y = ax + b$$

$$(1) \quad a = \frac{y_2 - y_1}{x_2 - x_1} = \frac{1 + 1}{-6 + 3} = \frac{2}{-3} = -\frac{2}{3}$$

$$(2) \quad y = ax + b \quad \text{OR} \quad b = y_1 - a(x_1)$$

$$(-6, 1) \quad 1 = \frac{-2}{3}(-6) + b \quad (-3, -1) \quad b = -1 - \left(\frac{-2}{3}\right)\left(-3\right)$$

$$1 = 4 + b$$

$$-4 \leftarrow$$

$$-3 = b$$

$$b = -3$$

$$(-3, -1) \quad -1 = \frac{-2}{3}(-3) + b$$

$$-1 = 2 + b$$

$$-2 \leftarrow$$

$$-3 = b$$

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

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

# Lesson 24 - Parallel and Perpendicular Lines

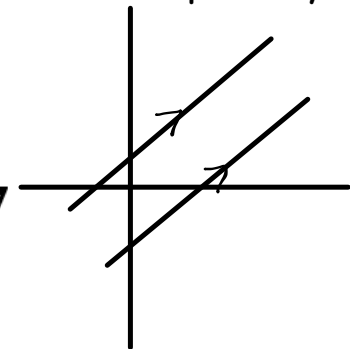
Parallel Lines: Two lines are parallel if they have the same slope.

Conversely, if two lines have the same slope they are parallel.

Coincident - same line

Ex.  $y = 2x + 3$        $y = 2x - 7$

slope = 2                      slope = 2

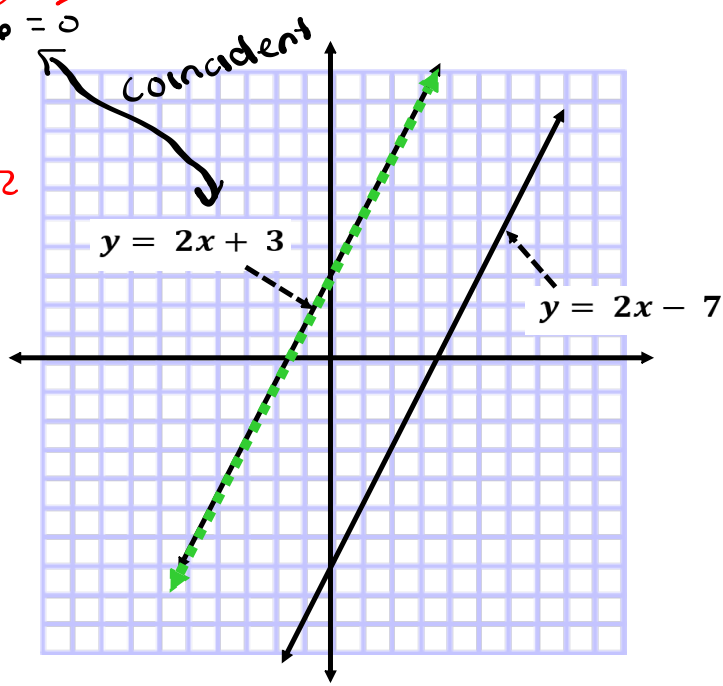


Therefore these two lines are parallel.

$$4x - 2y + 6 = 0$$

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

$$y = 2x + 3$$



Ex. Prove that the following equations represent parallel lines.

$$y = -5x - 9$$

$$10x + 2y - 12 = 0$$

$$\frac{2y}{2} = -\frac{10x}{2} + \frac{12}{2}$$

$$y = -5x + 6$$

Ex. Find the equation of the line that passes through point A (1, 6) and is parallel to  $y = 2x - 7$

$$a = 2$$

$$\therefore y = 2x + b$$

$$6 = 2(1) + b$$

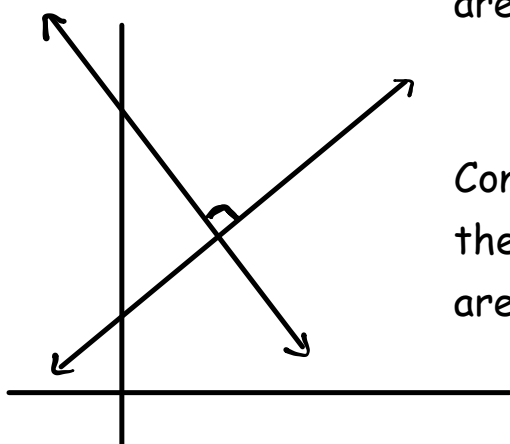
$$6 = 2 + b$$

$$4 = b$$

$$y = 2x + 4$$

Perpendicular Lines: Two lines are perpendicular if their **slopes** are **negative reciprocals** of each other.

$$\frac{a}{b} \times \frac{b}{c} = -\frac{ab}{ab} = -1 \quad \text{[ex } \frac{2}{1} \times \frac{1}{2} = \frac{2}{2} = 1 \text{]}$$



Conversely, if two lines have slopes that are the negative reciprocal of each other they are perpendicular.

Ex.  $y = \underline{4}x - 5$        $y = -\frac{x}{4} + 3$

$$\text{Slope} = \underline{4}$$

$$\rightarrow \text{negative reciprocal} = -\frac{1}{4}$$

Therefore these two lines are perpendicular

Ex. Find the equation of the line that passes through point B (3, 8) and is perpendicular to  $y = -\frac{1}{3}x + 4$ .

$$\text{Slope} = -\frac{1}{3} \rightarrow \text{Slope of new line} = 3$$

$$\therefore y = 3x + b$$

$$8 = 3(3) + b$$

$$-1 = b$$

$$y = 3x - 1$$

## Practice

(Homework if not completed in class)

<sup>work</sup>  
Textbook:

P. 149 # 12

P. 154 # 7-11

P. 155 # 12+13

