

DO NOW

The slope of \overline{QR} is $\frac{x-1}{4}$ and the slope of \overline{ST} is $\frac{8}{3}$.

If $\overline{QR} \perp \overline{ST}$, determine and state the value of x .

~~$4 \cdot \frac{x-1}{4} = -\frac{3}{8} \cdot 4$~~

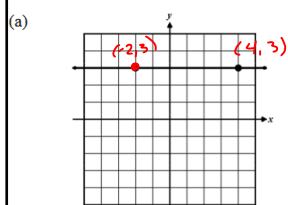
$$x - y = -\frac{3}{2}$$

$$\begin{array}{r} +1 \\ +1 \end{array}$$

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

So far we have worked with equations of **slanted** (also known as **oblique**) lines. In this lesson we will review the basics of **horizontal** and **vertical** lines. The first exercise will hit on many of the most important topics.

Exercise #1: In the graph below, a horizontal line is shown in (a) and a vertical line is shown in (b). Answer each question below the respective graph.



What is true about all points on this line?

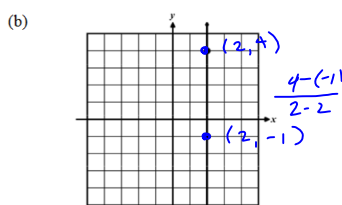
same y-value $\rightarrow 3$

What is an equation that would describe all points on this line?

$$y = 3$$

Using the two marked points, calculate the slope of this line. Be sure to simplify your final answer.

$$\frac{3-3}{4-(-2)} = \frac{0}{6} = 0$$



What is true about all points on this line?

All x-values = 2

What is an equation that would describe all points on this line?

$$x = 2$$

Using the two marked points, calculate the slope of this line. Be sure to simplify your final answer.

$$\frac{-1-4}{2-2} = \frac{-5}{0} = \text{undefined}$$

Exercise #2: It's important to have basic facts about horizontal and vertical lines very clear because of how often they are used. Fill in the statements about both below.

HORIZONTAL LINES
1. Are parallel to <u>x-axis</u>
2. Have equations of the form <u>y = #</u>
3. Have slopes equal to <u>zero</u>

VERTICAL LINES
1. Are parallel to <u>y-axis</u>
2. Have equations of the form <u>x = #</u>
3. Have slopes that are <u>undefined</u> <small>(no slope)</small>

Slope Intercept Form of a Line

$$y = mx + b$$

Where m is the slope, ~~m~~ and b is the y-intercept

Identify the slope and y-intercept of each line then graph each line on the grid below.

$$y = 2x - 7$$

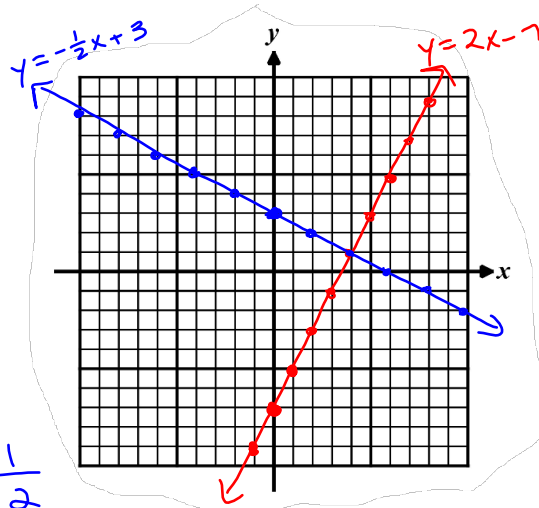
$$m = 2 \text{ or } \frac{2}{1}$$

$$b = -7$$

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

$$m = -\frac{1}{2} = -\frac{1}{2} \text{ or } -\frac{1}{2}$$

$$b = 3$$



Identify the slope and y-intercept of the lines whose equations are given below. (Rearrange equation into $y = mx + b$ form first!)

$$1) \quad y - 3x = 5$$

$$\quad \quad \quad +3x \quad +3x$$

$$y = 3x + 5$$

$$m = 3$$

$$b = 5$$

$$2) \quad 3x + 4y = 16$$

$$\quad \quad \quad -3x \quad \quad \quad -3x$$

$$\frac{4y}{4} = \frac{-3x}{4} + \frac{16}{4}$$

$$y = -\frac{3}{4}x + 4$$

$$m = -\frac{3}{4}$$

$$b = 4$$

$$3) \quad 6x - 3y = 8$$

$$\quad \quad \quad -6x \quad \quad \quad -6x$$

$$-3y = -6x + 8$$

$$\quad \quad \quad -3 \quad \quad \quad -3$$

$$y = 2x - \frac{8}{3}$$

$$m = 2$$

$$b = -\frac{8}{3}$$

4) Which of the following lines is perpendicular to $4x + 6y = -12$?

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

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

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

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

$$\begin{aligned} -4x & -4x \\ 6y & = -4x - 12 \\ \frac{6y}{6} & = \frac{-4x}{6} - \frac{12}{6} \\ y & = -\frac{2}{3}x - 2 \end{aligned}$$

5) Which of the following lines is parallel to $2x - y = 5$?

(1) $y = 2x + 1$

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

(2) $y = -2x + 1$

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

$$\begin{aligned} -2x & -2x \\ -y & = -2x + 5 \\ -1 & -1 -1 \\ y & = 2x - 5 \end{aligned}$$

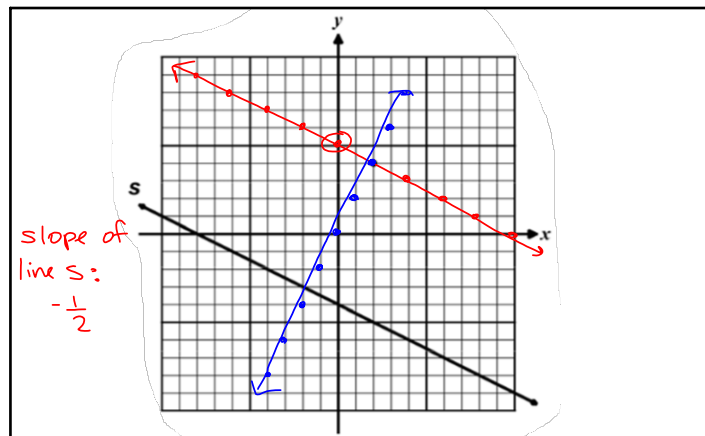
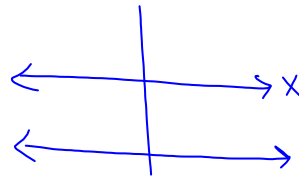
6) Which of the following lines is parallel to the x-axis?

(1) $x = 3$

~~(3) $y = x$~~

(2) $y = -4$

~~(4) $2x = y$~~



slope of line s: $-\frac{1}{2}$

7) Draw a line parallel to line s that passes through the point (2,4). Write its equation below.

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

8) Draw a line perpendicular to line s that passes through the point (2,4). Write its equation below.

$m = 2$ $b = 0$ $y = 2x$