



## Unit 7:

## Lesson 02

## Writing the equation of a line given two points

## Writing the equations of horizontal &amp; vertical lines

It is possible to write the equation of a line given **two points** on that line:

- Apply the two points to the slope formula to find the slope,  $m$ .
- Using the slope just found in  $y = mx + b$ , substitute in **either** point and solve for  $b$ .
- Use the  $m$  and  $b$  just found to write the equation.

(Notice that the last two steps were the technique of lesson 1.)

**Example 1:** Write the equation of the line passing through (4, -8) and (1, 5).

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{5 - (-8)}{1 - 4} = \frac{5 + 8}{-3} = \frac{-13}{3}$$

$$y = mx + b$$

$$y = \frac{-13}{3}x + b \quad (1, 5)$$

$$5 = \frac{-13}{3}(1) + b$$

$$\frac{5}{1} - \frac{13}{3} = b$$

$$\frac{28}{3} = b$$

$$y = mx + b$$

$$y = \frac{-13}{3}x + \frac{28}{3}$$

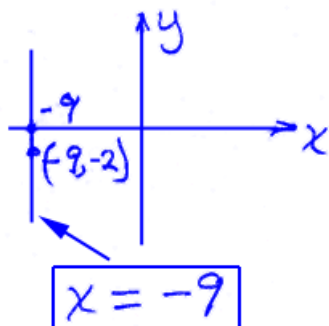
The equation of a vertical line passing through the point (a, c) is:

$$x = a \quad \text{Notice it uses the } a \text{ part of } (a, c).$$

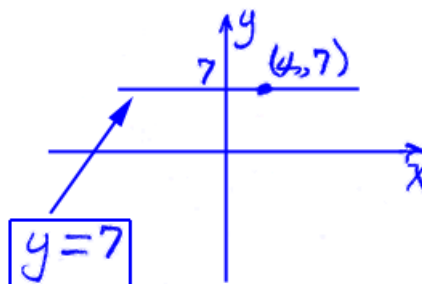
The equation of a horizontal line passing through (d, b) is:

$$y = b \quad \text{Notice it uses the } b \text{ part of } (d, b).$$

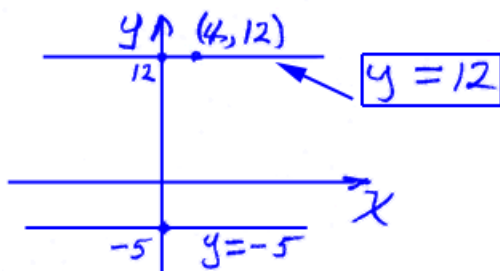
**Example 2:** Sketch the line parallel to the y-axis and passing through  $(-9, -2)$ . Find its equation.



**Example 3:** Sketch the horizontal line that passes through  $(4, 7)$ . Find its equation.



**Example 4:** Sketch the line passing through  $(4, 12)$  and parallel to the line given by  $y = -5$ , and then find its equation.



**Assignment:** Find the equation of all lines in slope-intercept form.

1. Find the equation of the line passing through  $(-9, 11)$  and  $(-1, 1)$ .

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2. What is the equation of the line connecting  $(4, 8)$  and  $(7, -2)$ ?

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3. What is the equation of the line that passes through the origin and whose x-intercept is 9?

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4. Find the equation of the line that has an x-intercept of 18 and a y-intercept of -10.

5. Sketch the line parallel to the x-axis and passing through  $(-6, 8)$ . Find its equation.

6. Sketch the vertical line that passes through  $(7, 0)$ . Find its equation.

7. Sketch the line parallel to the y-axis and passing through  $(11, 22)$ . Find its equation.

8. Sketch the line parallel to the x-axis and passing through  $(11, 22)$ . Find its equation.

9. Sketch the line passing through  $(2, 3)$  and parallel to the line given by  $x = -2$ , and then find its equation.

10. Sketch the line passing through  $(-8, 8)$  and parallel to the line given by  $y = -1$ , and then find its equation.

11. Which of the following lines is a vertical line?

- a.  $y = 3$
- b.  $x = 3$
- c.  $y = 3x$

12. Which of the following lines is a horizontal line?

- a.  $y = 3$
- b.  $x = 3$
- c.  $y = 3x$

13. Which of the following lines passes through the origin?

- a.  $y = 3$
- b.  $x = 3$
- c.  $y = 3x$

14. Which of the following lines is not a function?

- a.  $y = 3$
- b.  $x = 3$
- c.  $y = 3x$

15. What is the equation of a line parallel to  $x = -8$  and having an x-intercept of 4?

16. What is the equation of a line parallel to  $y = -2$  and having a y-intercept of 36?

\*17. Find the equation of the line connecting the point 4 units to the left of the origin on the x-axis with the point 5 units above the origin on the y-axis.