

Standard Form:  $\boxed{a}x + \boxed{b}y = \boxed{c}$

## Lesson 14: The Graph of a Linear Equation—Horizontal and

### Vertical Lines

#### Classwork

#### Exercises

1. Find at least four solutions to graph the linear equation  $1x + 2y = 5$ .

→ 2. Find at least four solutions to graph the linear equation  $1x + 0y = 5$ .  $x = 5$

3. What was different about the equations in Exercises 1 and 2? What effect did this change have on the graph?

Any time the "b" = 0, the line is vertical

4. Graph the linear equation  $x = -2$ .

5. Graph the linear equation  $x = 3$ .

6. What will the graph of  $x = 0$  look like?

7. Find at least four solutions to graph the linear equation  $2x + 1y = 2$ .

8. Find at least four solutions to graph the linear equation  $0x + 1y = 2$ .

9. What was different about the equations in Exercises 7 and 8? What effect did this change have on the graph?

Any time the "a" = 0, the line is horizontal

10. Graph the linear equation  $y = -2$ .

11. Graph the linear equation  $y = 3$ .

12. What will the graph of  $y = 0$  look like?

The graph of  $y=0$  will be the x-axis

$$2.) \quad 1x + 0y = 5 \Rightarrow x = 5$$

x	y
5	-1
5	0
5	1
5	2

$$1x + 0(-1) = 5$$

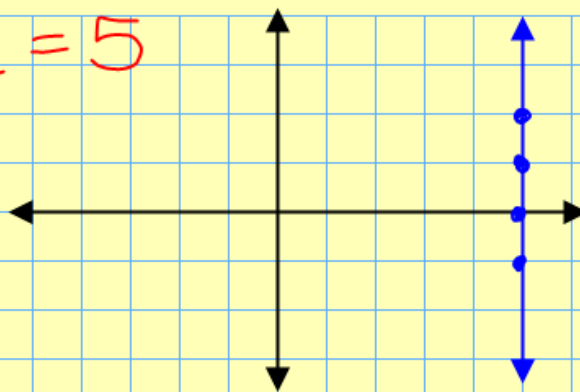
$$x + 0 = 5$$

$$x = 5$$

$$1x + 0(0) = 5$$

$$x + 0 = 5$$

$$x = 5$$



$$1x + 0(1) = 5$$

$$x + 0 = 5$$

$$x = 5$$

$$1x + 0(2) = 5$$

$$x + 0 = 5$$

$$x = 5$$

$$7) \quad 2x + 1y = 2$$

x	y
-1	4
0	2
1	0
2	-2

$$\begin{array}{r} 2(-1) + y = 2 \\ -2 + y = 2 \\ +2 \quad \oplus \\ \hline y = 4 \end{array}$$

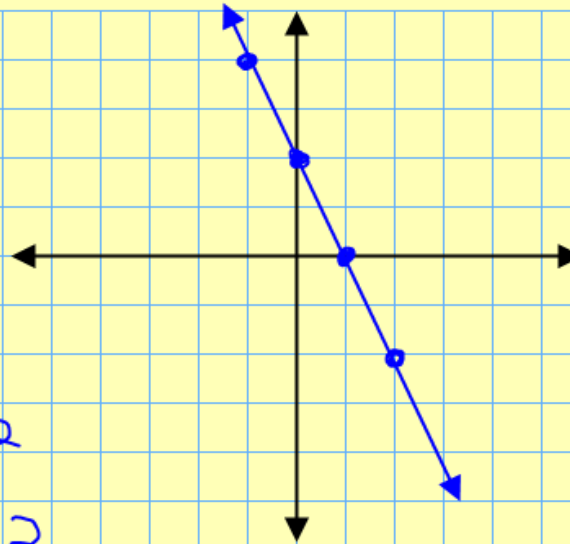
$$\begin{array}{r} 2(0) + y = 2 \\ 0 + y = 2 \\ \quad \oplus \\ \hline y = 2 \end{array}$$

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

$$\begin{array}{r} 2 + y = 2 \\ -2 + \oplus \\ \hline y = 0 \end{array}$$

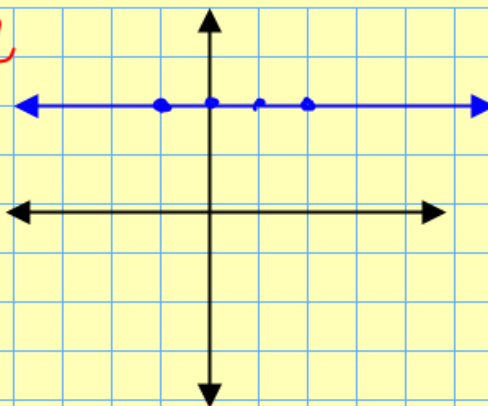
$$\begin{array}{r} 2(2) + y = 2 \\ 4 + y = 2 \\ \quad \oplus \\ \hline y = -2 \end{array}$$

$$\begin{array}{r} 4 + y = 2 \\ -4 + \oplus \\ \hline y = -2 \end{array}$$



$$8.) \quad 0x + 1y = 2 \Rightarrow y = 2$$

x	y
-1	2
0	2
1	2
2	2



$$\begin{aligned} 0(-1) + 1y &= 2 \\ 0 + y &= 2 \\ y &= 2 \end{aligned}$$

$$\begin{aligned} 0(1) + 1y &= 2 \\ 0 + y &= 2 \\ y &= 2 \end{aligned}$$

$$\begin{aligned} 0(0) + 1y &= 2 \\ 0 + y &= 2 \\ y &= 2 \end{aligned}$$

$$\begin{aligned} 0(2) + 1y &= 2 \\ 0 + y &= 2 \\ y &= 2 \end{aligned}$$

$$a=2 \quad b=4 \quad c=10$$

$$2x + 4y = 10$$

$$a=5 \quad b=7 \quad c=-2$$

$$5x + 7y = -2$$

$$a = 1 \quad b = -3 \quad c = 0$$

$$1x + (-3)y = 0$$

$$x - 3y = 0$$

$$-4x + y = 10$$

$$a = -4 \quad b = 1 \quad c = 10$$

## Lesson Summary

A linear equation in standard form,  $ax + by = c$ , where  $a = 1$  and  $b = 0$ , is the graph of the equation  $x = c$ . The graph of  $x = c$  is the vertical line passing through the point  $(c, 0)$ .

A linear equation in standard form,  $ax + by = c$ , where  $a = 0$  and  $b = 1$ , is the graph of the equation  $y = c$ . The graph of  $y = c$  is the horizontal line passing through the point  $(0, c)$ .

## Problem Set

1. Graph the two-variable linear equation  $ax + by = c$ , where  $a = 0$ ,  $b = 1$ , and  $c = -4$ .
2. Graph the two-variable linear equation  $ax + by = c$ , where  $a = 1$ ,  $b = 0$ , and  $c = 9$ .
3. Graph the linear equation  $y = 7$ .
4. Graph the linear equation  $x = 1$ .
5. Explain why the graph of a linear equation in the form of  $y = c$  is the horizontal line, parallel to the  $x$ -axis passing through the point  $(0, c)$ .
6. Explain why there is only one line with the equation  $y = c$  that passes through the point  $(0, c)$ .