Unit 4 – Lesson 19

Name: \_\_\_\_\_

The Graph of Linear Equation is a Line

Date: \_\_\_\_\_ Period: \_\_\_\_\_

Focus Standards:	8.EE.B.5	Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.
	8.EE.B.6	Use similar triangles to explain why the slope <i>m</i> is the same between any two distinct points on a non-vertical line in the coordinate plane; derive the equation for a line through the origin and the equation for a line intercepting the vertical axis at .

## **Student Outcomes**

- Students prove that any point on the graph of y = mx + b is on a line *l* and that any point on a line *l* is a point on the graph of y = mx + b.
- Students graph linear equations on the coordinate plane, using the x and y-intercepts.

1. Use x = 4 and x = -4 to find two solutions to the equation x + 2y = 6. Plot the solutions as points on the coordinate plane, and connect the points to make a line.

a. Identify two other points on the line with integer coordinates. Verify that they are solutions to the equation x + 2y = 6.

b. When x = 1, what is the value of y? Does this solution appear to be a point on the line?

c. When x = -3, what is the value of y? Does this solution appear to be a point on the line?

- d. Is the point (3, 2) on the line?
- e. Is the point (3, 2) a solution to the linear equation x + 2y = 6?

2. Use x = 4 and x = 1 to find two solutions to the equation 3x - y = 9. Plot the solutions as points on the coordinate plane, and connect the points to make a line.

a. Identify two other points on the line with integer coordinates. Verify that they are solutions to the equation 3x - y = 9.

- b. When x = 4.5, what is the value of y? Does this solution appear to be a point on the line?
- c. When  $x = \frac{1}{2}$ , what is the value of y? Does this solution appear to be a point on the line?

- d. Is the point (2, 4) on the line?
- e. Is the point (2, 4) a solution to the linear equation 3x y = 9?

3. Use x = 3 and x = -3 to find two solutions to the equation 2x + 3y = 12. Plot the solutions as points on the coordinate plane, and connect the points to make a line.

- a. Identify two other points on the line with integer coordinates. Verify that they are solutions to the equation 2x + 3y = 12.
- b. When x = 2, what is the value of y? Does this solution appear to be a point on the line?

c. When x = -2, what is the value of y? Does this solution appear to be a point on the line?

- d. Is the point (8, -3) on the line?
- e. Is the point (8, -3) a solution to the linear equation 2x + 3y = 12?

4. Use x = 4 and x = -4 to find two solutions to the equation x - 2y = 8. Plot the solutions as points on the coordinate plane and connect the points to make a line.

- a. Identify two other points on the line with integer coordinates. Verify that they are solutions to the equation x 2y = 8.
- b. When x = 7, what is the value of y? Does this solution appear to be a point on the line?

c. When x = -3, what is the value of y? Does this solution appear to be a point on the line?

- d. Is the point (-2, -3) on the line?
- e. Is the point (-2, -3) a solution to the linear equation x 2y = 8?

5. Based on your work in Exercises 2–5, what conclusions can you draw about the points on a line and solutions to a linear equation?

6. Based on your work in Exercises 2–5, will a point that is not a solution to a linear equation be a point on the graph of a linear equation? Explain.

7. Based on your work in Exercises 2–5, what conclusions can you draw about the graph of a linear equation?

8. Graph the equation -3x + 8y = 24 using intercepts.

9. Graph the equation x - 6y = 15 using intercepts.

10. Graph the equation 4x + 3y = 21 using intercepts.

## **Problem Set**

Graph each of the equations in the Problem Set on a different pair of x and y axes.

- 11. Graph the equation: y = -6x + 12.
- 12. Graph the equation: 9x + 3y = 18.
- 13. Graph the equation: y = 4x + 2.
- 14. Graph the equation:  $y = -\frac{5}{7}x + 4$ .
- 15. Graph the equation:  $\frac{3}{4}x + y = 8$ .
- 16. Graph the equation: 2x 4y = 12.
- 17. Graph the equation: y = 3. What is the slope of the graph of this line?
- 18. Graph the equation: x = -4. What is the slope of the graph of this line?
- 19. Is the graph of  $4x + 5y = \frac{3}{7}$  a line? Explain.
- 20. Is the graph of  $6x^2 2y = 7$  a line? Explain.