Unit 4 - Lesson 19
The Graph of Linear Equation is a Line

Name:
Date: $\qquad$ Period: $\qquad$

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

## Student Outcomes

- Students prove that any point on the graph of $y=m x+b$ is on a line $l$ and that any point on a line $l$ is a point on the graph of $y=m x+b$.
- 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 $x+2 y=6$. 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 $x+2 y=6$.
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 $x+2 y=6$ ?
2. Use $x=4$ and $x=1$ to find two solutions to the equation $3 x-y=9$. 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 $3 x-y=9$.
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 $3 x-y=9$ ?
3. Use $x=3$ and $x=-3$ to find two solutions to the equation $2 x+3 y=12$. 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 $2 x+3 y=12$.
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 $2 x+3 y=12$ ?
4. Use $x=4$ and $x=-4$ to find two solutions to the equation $x-2 y=8$. 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 $x-2 y=8$.
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 $x-2 y=8$ ?
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 $-3 x+8 y=24$ using intercepts.
9. Graph the equation $x-6 y=15$ using intercepts.
10. Graph the equation $4 x+3 y=21$ 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: $y=-6 x+12$.
12. Graph the equation: $9 x+3 y=18$.
13. Graph the equation: $y=4 x+2$.
14. Graph the equation: $y=-\frac{5}{7} x+4$.
15. Graph the equation: $\frac{{ }^{3}}{4} x+y=8$.
16. Graph the equation: $2 x-4 y=12$.
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 $4 x+5 y=\frac{3}{7}$ a line? Explain.
20. Is the graph of $6 x^{2}-2 y=7$ a line? Explain.

