Nature of Solutions of Systems of Linear Equations
Date: $\qquad$ Period: $\qquad$

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.C. 8 Analyze and solve pairs of simultaneous linear equations.
a. Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously.
b. Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. For example, $3 x+2 y=5$ and $3 x+2 y=6$ have no solution because $3 x+2 y$ cannot simultaneously be 5 and 6 .
c. Solve real-world and mathematical problems leading to two linear equations in two variables. For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair.

## Student Outcomes

- Students know that since two equations in the form $a x+b y=c$ and ${ }^{\prime} x+b^{\prime} y=c^{\prime}$, when $a, b$, and $c$ are non-zero numbers, graph as the same line when $\frac{a^{z}}{a}=\frac{b^{f}}{b}=\frac{d^{f}}{c}$, then the system of linear equations has infinitely many solutions.
- Students know a strategy for solving a system of linear equations algebraically.


## Classwork

## Exercises

Determine the nature of the solution to each system of linear equations.

1. $\left\{\begin{array}{l}3 x+4 y=5 \\ y=-\frac{3}{4} x+1\end{array}\right.$
2. $\left\{\begin{array}{l}7 x+2 y=-4 \\ x-y=5\end{array}\right.$
3. $\left\{\begin{array}{l}9 x+6 y=3 \\ 3 x+2 y=1\end{array}\right.$

Determine the nature of the solution to each system of linear equations. If the system has a solution, find it algebraically, and then verify that your solution is correct by graphing.
4. $\left\{\begin{array}{l}3 x+3 y=-21 \\ x+y=-7\end{array}\right.$
5. $\left\{\begin{array}{l}y=\frac{3}{2} x-1 \\ 3 y=x+2\end{array}\right.$
6. $\left\{\begin{array}{c}x=12 y-4 \\ x=9 y+7\end{array}\right.$
7. Write a system of equations with $(4,-5)$ as its solution.

## Problem Set

Determine the nature of the solution to each system of linear equations. If the system has a solution, find it algebraically, and then verify that your solution is correct by graphing.

1. $\left\{\begin{array}{l}y=\frac{3}{7} x-8 \\ 3 x-7 y=1\end{array}\right.$
2. $\left\{\begin{array}{l}2 x-5=y \\ -3 x-1=2 y\end{array}\right.$
3. $\left\{\begin{array}{l}x=6 y+7 \\ x=10 y+2\end{array}\right.$
4. $\left\{\begin{array}{l}5 y=\frac{15}{4} x+25 \\ y=\frac{3}{4} x+5\end{array}\right.$
5. $\left\{\begin{array}{l}x+9=y \\ x=4 y-6\end{array}\right.$
6. $\left\{\begin{array}{l}3 y=5 x-15 \\ 3 y=13 x-2\end{array}\right.$
7. $\left\{\begin{array}{l}6 x-7 y=\frac{1}{2} \\ 12 x-14 y=1\end{array}\right.$
8. $\left\{\begin{array}{l}5 x-2 y=6 \\ -10 x+4 y=-14\end{array}\right.$
9. $\left\{\begin{array}{l}y=\frac{3}{2} x-6 \\ 2 y=7-4 x\end{array}\right.$
10. $\left\{\begin{array}{l}7 x-10=y \\ y=5 x+12\end{array}\right.$
11. Write a system of linear equations with $(-3,9)$ as its solution.
