5-3b Activity Lab

Systems With Infinitely Many Solutions or No Solution

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You can classify a system of equations by the number of solutions it has: exactly one solution, no solution, or infinitely many solutions.

If you get an identity, such as $3 = 3$, when you solve a system of equations, then the system has infinitely many solutions. If you get a false statement, such as $2 = 7$, then the system has no solution.

EXAMPLE 1 Classifying Systems of Equations

Use elimination. Tell how many solutions each system has.

a.

$$\begin{array}{rr} & 2x - y = 3 \\ + & -2x + y = -3 \\ \hline & 0 = 0 \end{array}$$

← **The result is an equation that is always true. So the system has infinitely many solutions.**

b.

$$\begin{array}{rr} & 2x - 3y = 11 \\ + & -2x + 3y = -2 \\ \hline & 0 = 9 \end{array}$$

← **The result is an equation that is never true. So the system has no solution.**

You can also classify a system of equations without solving. By comparing the slopes and y-intercepts of the equations, you can find the number of solutions the system has.

EXAMPLE 2 Classying Systems Without Solving

Without solving, tell how many solutions each system has.

a. $-9x + y = 1$
$-9x + y = 8$

← **The slopes are the same, but the *y*-intercepts are different. So the lines are parallel. The system has no solution.**

b. $x + 3y = 2$
$2x + 6y = 4$

← **Think: Multiplying each side of $x + 3y = 2$ by 2 results in the second equation. When graphed, these equations are the same line. The system has infinitely many solutions.**

You have three problems to solve. You can work with your table partners, but every individual must turn in a paper with their three answers. These are due before the bell rings today.

Exercises

Tell how many solutions each system has.

1. $4x + 7y = 3$
$4x + 7y = 5$

2. $3x + y = 9$
$9x + 3y = 27$

3. $x = 4$
$x + y = 10$