

Solving Systems of Equations

Learning Goals

- Let's solve systems of equations.

Warm up: Solving Systems Mentally

Solve these without writing anything down:

$$\begin{cases} x = 5 \\ y = x - 7 \end{cases}$$

$$\begin{cases} y = 4 \\ y = x + 3 \end{cases}$$

$$\begin{cases} x = 8 \\ y = -11 \end{cases}$$

Activity 1: Challenge Yourself

Let's solve systems of equations.

- In this activity, you'll have **{enter minutes}** minutes to work with 12 systems of equations.
- First, you'll answer the questions on your own.
- Then, check in with your partner between questions.
If there is disagreement, work together to reach an agreement.
- We'll end with a class discussion.

Here are a lot of systems of equations:

$$A \begin{cases} y = 4 \\ x = -5y + 6 \end{cases}$$

$$E \begin{cases} y = -3x - 5 \\ y = 4x + 30 \end{cases}$$

$$I \begin{cases} 3x + 4y = 10 \\ x = 2y \end{cases}$$

$$B \begin{cases} y = 7 \\ x = 3y - 4 \end{cases}$$

$$F \begin{cases} y = 3x - 2 \\ y = -2x + 8 \end{cases}$$

$$J \begin{cases} y = 3x + 2 \\ 2x + y = 47 \end{cases}$$

$$C \begin{cases} y = \frac{3}{2}x + 7 \\ x = -4 \end{cases}$$

$$G \begin{cases} y = 3x \\ x = -2y + 56 \end{cases}$$

$$K \begin{cases} y = -2x + 5 \\ 2x + 3y = 31 \end{cases}$$

$$D \begin{cases} y = -3x + 10 \\ y = -2x + 6 \end{cases}$$

$$H \begin{cases} x = 2y - 15 \\ y = -2x \end{cases}$$

$$L \begin{cases} x + y = 10 \\ x = 2y + 1 \end{cases}$$

1. Without solving, identify 3 systems that you think would be the least difficult to solve and 3 systems that you think would be the most difficult to solve. Be prepared to explain your reasoning.
2. Choose 4 systems to solve. At least one should be from your "least difficult" list and one should be from your "most difficult" list.

Activity 2: Five Does Not Equal Seven

Let's share and discuss our work.

Which systems did you think would be easiest to solve?

Which did you think would be hardest?

Did you change your mind about any of the systems being more or less difficult after you solved them?

What was similar in these problems? What was different?

Will your strategy work for the other systems in this list?

Activity 2: Five Does Not Equal Seven

Let's solve more systems of equations.

- First, we'll look at what Tyler says about the solution to a system of equations.
- Next, we'll decide whether we agree or disagree with him.
- After that, we'll have a class discussion.

Activity 2: Five Does Not Equal Seven

Tyler was looking at this system of equations:

$$\begin{cases} x + y = 5 \\ x + y = 7 \end{cases}$$

He said,

“Just looking at the system, I can see it has no solution. If you add two numbers, that sum can’t be equal to two different numbers.”

Do you agree with Tyler?

Activity 2: Five Does Not Equal Seven

Class Poll: Who agrees with Tyler? Who disagrees? Why?

Activity 3

How many solutions do you think this system has?

$$\begin{cases} 4x+2y=8 \\ 2x+y=5 \end{cases}$$

Lesson Synthesis

$$\begin{cases} x = 2 \\ y = 3x - 1 \end{cases}$$

What is the first step you would take to solve the first system?

$$\begin{cases} x = 2y + 4 \\ x = 9 - 3y \end{cases}$$

What steps would you take to solve the second system?

$$\begin{cases} x = 2y + 3 \\ y = 2x - 9 \end{cases}$$

For the third system, a student begins the substitution method by writing $y = 2 \cdot 2y + 3 - 9$ and then $y = 4y - 6$. What has this student done wrong?

Exit Ticket: Solve the system

Solve this system of equations:

$$\begin{cases} y = 2x \\ x = -y + 6 \end{cases}$$

Learning Targets

- I can use the structure of equations to help me figure out how many solutions a system of equations has.