

PART I GET STARTED

Today's Mathematics

We will simplify equations with variable terms on both sides and use the final statement to classify the solution set.

Essential Question

How can simplifying both sides reveal whether an equation has one solution, no solution, or infinitely many solutions?

DO NOW

Solve on graph paper. Show each intermediate equation.

1. $4k - 1.5k = 50$

2. $5(p + 6) = 45$

3. $3(2x - 5) + 6 = 27$

4. What first move would help solve $8 - 2n = 20$? Explain.

SEE IT

Plan A charges 100 plus 10 per movie. Plan B charges 15 per movie.

1. Write expressions for the cost of each plan after m movies.

2. Without solving exactly, predict when the costs might be equal. How do you know your prediction is reasonable?

QUICK WRITE | 2 MINUTES

Record your prediction, equation, and any mental comparisons you used.

PART II INVESTIGATE

WHAT SURVIVES?

Simplify both sides. Then perform the same operation on both sides until the equation becomes as simple as possible.

Equation	Simplified equation	Final statement	What the statement means
$3(x - 2) = 2x + 5$			
$4(2x + 1) = 8x + 4$			
$5x - 7 = 5x + 2$			

MAKE SENSE OF THE RESULTS

1. Which equation produces a value for the variable? Verify it.
2. Which equation produces a statement that is always true? Test two different values in the original equation.
3. Which equation produces a false statement? Why can no value repair it?

RETURN TO THE PLANS

Solve $100 + 10m = 15m$. Interpret the solution in the original context.

PART III MAKE SENSE AND PRACTICE

WHAT WE CAN CONCLUDE

After simplifying and collecting variable terms:

- A statement such as $x = 11$ gives **one solution**.
- A true statement such as $0 = 0$ means **infinitely many solutions**.
- A false statement such as $0 = 9$ means **no solution**.

WORKED MODEL

Solve $3(g - 7) = 2(10 + g)$.

$$3g - 21 = 20 + 2g$$

$$g - 21 = 20$$

$$g = 41$$

Because the work ends with a value for g , the equation has one solution.

TRY IT

Solve and classify each equation. Show the final statement.

1. $x + 16 = 9x$

2. $4(y + 2) = 4y + 8$

3. $7n - 3 = 7n + 5$

MATH WRITE | 5 MINUTES

Explain how a final statement tells you whether an equation has one solution, no solution, or infinitely many solutions. Include one example.

PART IV PUZZLE PRACTICE

Homework

Name _____

Date _____

WHAT HAPPENS WHEN A FROG DOUBLE-PARKS ON A LILY PAD?

Solve each problem. Match each answer to its letter in the answer bank. Write the letter above the corresponding exercise number in the decoder.

- | | |
|--|--|
| 1. $x + 36 = 4x$ | 2. $4(a + 3) = 4a + 12$ |
| 3. $\frac{3}{2}p - 14 = p + 13$ | 4. $7 - 4.9t = 15 + 7.6t$ |
| 5. $3(12f - 3) = 4f - 1$ | 6. $\frac{1}{3}(b + 6) = \frac{1}{4}b + 8$ |
| 7. $\frac{2}{3}(m - 30) = \frac{2}{3}m + 10$ | 8. $8.2(s + 4) = 6.7s + 5.2$ |
9. On Monday, you run for $\frac{1}{2}$ hour at x miles per hour. On Tuesday, you walk the same distance at $(x - 2)$ miles per hour for $\frac{3}{4}$ hour. How many miles did you run Monday?
10. Jess spent $7x$ minutes on a computer. Her sister spent $5x + 10$ minutes, the same amount of time. How many minutes did Jess spend?
11. A rectangle is 6 units wide and $(x - 8)$ units long. It has the same area as a triangle with height 7 and base $(x - 3)$. Find the rectangle's area.

ANSWER BANK

- | | | | |
|-------|----------|----------------|--------------------|
| Y. 72 | A. -18.4 | T. 42 | O. infinitely many |
| A. 35 | S. 54 | A. 12 | D. -0.64 |
| W. 3 | I. 0.25 | T. no solution | |

CRACK THE CODE

5 _____ 7 _____ 3 _____ 11 _____ 2 _____ 10 _____ 4 _____ 8 _____ 9 _____ 1 _____ 6 _____