

PART I GET STARTED

Today's Mathematics

We will read the structure of a multi-step equation, simplify when useful, and undo operations in an efficient order.

Essential Question

How can structure help you solve a multi-step equation efficiently and check whether the answer is reasonable?

DO NOW

Solve on graph paper. Check one solution by substitution.

1. $x + 8 = -3$

2. $-5m = 35$

3. $\frac{a}{6} = -4$

4. Is $x = -2$ a solution of $3x + 4 = -2$? Show a check.

SEE IT

Two students begin solving $2(x + 4) - 3 = 15$.

Student A: $2(x + 4) = 18$

Student B: $2x + 8 - 3 = 15$

Both first steps preserve equality. Predict which path will feel more efficient and why.

QUICK WRITE | 2 MINUTES

List two possible first moves. Choose one and explain what structure you noticed.

PART II INVESTIGATE

FOLLOW THE EQUATION PATH

Solve $2(x + 4) - 3 = 15$ by both paths. Record the equation after each move, not just the final answer.

Stage	Path A: undo outside operations	Path B: distribute and combine
Start	$2(x + 4) - 3 = 15$	$2(x + 4) - 3 = 15$
Move 1		
Move 2		
Move 3		
Check		

ORGANIZE A CONTEXT

The angles of a triangle measure x° , $(x + 10)^\circ$, and $(x + 5)^\circ$.

1. Write one equation that uses the triangle angle sum.
2. Combine like terms, solve for x , and find all three angle measures.
3. Verify that the three measures total 180° .

COMPARE

When is distributing first helpful? When might undoing an outside operation first be shorter?

PART III MAKE SENSE AND PRACTICE

WHAT WE CAN CONCLUDE

1. Read the equation's structure before acting.
2. Simplify each side when distributing or combining like terms will help.
3. Undo operations in a logical order, then check in the original equation.

WORKED MODEL

Solve $2.4z + 1.2z - 6.5 = 0.7$.

$$3.6z - 6.5 = 0.7 \quad \text{combine like terms}$$

$$3.6z = 7.2 \quad \text{add 6.5}$$

$$z = 2 \quad \text{divide by 3.6}$$

TRY IT

1. Solve $5(2y - 1) + 3 = 28$. Show each intermediate equation.

2. Solve $4 - \frac{2}{3}(n + 6) = -8$. Check in the original equation.

MATH WRITE | 5 MINUTES

Describe an efficient order for solving $2(a + 7) - 7 = 9$. Explain why your order works and how you would check it.

PART IV PUZZLE PRACTICE

Homework

Name _____

Date _____

WHERE WAS THE DECLARATION OF INDEPENDENCE SIGNED?

Solve each problem. In the answer strip, circle the letter above each correct answer. Read the circled letters from left to right to answer the riddle.

1. $8 - 3x = 17$

3. $4.3t - 2.1t - 2.3 = 7.6$

5. Solve $x + b = 3$ for x .

7. Solve $3ax - 2ax = 5$ for x .
2. $5a - 6 - 2a = 12$

4. $8.1 + 3.8h - 5.6h = -7.2$

6. Solve $cx = -9$ for x .

8. Solve $bx - c = 7$ for x .
9. Grace used her phone for 43, 62, and 57 minutes during the past three months. How many minutes this month would make the four-month average 55 minutes?
10. A triangle's angles measure $3x^\circ$, $(2x + 20)^\circ$, and $(4x - 20)^\circ$. Find x .
11. Two \$3 smoothies plus a tip are split equally. Each person pays \$3.60. What was the tip rate in decimal form?

ANSWER STRIP

A	M	T	E	S	R	T	I	H	P	E	D	G	B	Y
$\frac{5}{a}$	60	6	8.2	0.10	5	$-\frac{9}{c}$	0.18	8.5	55	-3	10.5	-2	0.15	-62
F	B	I	R	O	H	T	C	U	T	N	O	L	M	S
9.5	0.20	3	10	$3 - b$	15	58	90	8	20	-55	4.5	68	$\frac{c+7}{b}$	12.5