We will solve two-step equations. | **Concept Development**

A **two-step equation** contains two operations.

- **Two-step equations** require two **inverse operations** to solve for the **variable**.
- To keep an equation **balanced**, **inverse operations** must be done on both sides of the equations.
- The **solution** is the value of the variable that makes the equation true.

multiplication

$2x + 3 = 7$

addition

division

$\frac{x}{4} - 5 = 1$

subtraction

Inverse Operation

$2 \bullet m + 2 = 8$

$-2 \quad -2$

Balance

$2m + 0 = 6$

Inverse Operation

$\frac{2m}{2} \quad \frac{6}{2}$

Balance

$m = 3$

$2 \bullet m + 2 = 8$

Inverse Operation

$-2 \quad -2$

Balance

Inverse Operation

$\frac{2m + 0}{2} = \frac{6}{2}$

Balance

$m = 3$ **Solution**

Solution m = 3

$2m + 2 = 8$
$2(3) + 2 = 8$
$6 + 2 = 8$
$8 = 8$ ✓

NOT a Solution m = 2

$2m + 2 = 8$
$2(2) + 2 = 8$
$4 + 2 = 8$
$6 \neq 8$ ×

CFU

Which of the following is an example of a two-step equation? Explain.

A $5x = 6$ **B** $5x - 4 = 6$ **C** $x - 4 = 6$

Which two inverse operations would be used to solve the equation $5x - 4 = 6$? Explain.

A addition and multiplication **B addition and division**

What is the difference between a solution and not a solution?

In your own words, what is a two-step equation?

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1. Isolate the variable.
2. Solve for the variable. (use inverse operations)
3. Check and interpret the solution.

1. $5m + 15 = 25$

Check:

Interpret:
The inverse operations
used to solve this problem are

_____.

The value of the variable is _____.

2. $3b + 6 = -18$

Check:

Interpret:
The inverse operations
used to solve this problem are

_____.

The value of the variable is _____.

3. $2k - 9 = -21$

Check:

Interpret:
The inverse operations
used to solve this problem are

_____.

The value of the variable is _____.

4. $4d - 7 = 5$

Check:

Interpret:
The inverse operations
used to solve this problem are

_____.

The value of the variable is _____.

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1. Isolate the variable.
2. Solve for the variable. (use inverse operations)
3. Check and interpret the solution.

5. $\frac{c}{6} + 1 = -1$

Check:

Interpret:
The inverse operations
used to solve this problem are

_____.

The value of the variable is _____.

6. $\frac{x}{2} - 3 = -2$

Check:

Interpret:
The inverse operations
used to solve this problem are

_____.

The value of the variable is _____.

1. Read the problem and write a corresponding equation.
2. Isolate the variable.
3. Solve for the variable. (use inverse operations)
4. Interpret the solution.

7. Emma bought several packs of markers, each costing $5. She used a $4 coupon, bringing her total to $26. How many packs did she buy?

Interpret:

8. Cory bought 6 apples and spent an additional $1 for sales tax. If she spent $13 in total, how much did each apple cost?

Interpret:

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Skill Closure

1. Isolate the variable.
2. Solve for the variable. (use inverse operations)
3. Check and interpret the solution.

1. $9w + 11 = 56$

Check:

Interpret:
The inverse operations
used to solve this problem are

_____.

The value of the variable is _____.

2. $7g - 6 = 50$

Check:

Interpret:
The inverse operations
used to solve this problem are

_____.

The value of the variable is _____.

Concept Closure

Write a corresponding equation for the word problem.

Jason has some trading cards and he wants to divide them equally among his 4 cousins. He also kept 3 cards for himself. If each cousin received 12 cards, how many trading cards did Jason have to start with?

Summary Closure

What did you learn today about solving two-step equations?

Word Bank

two-step equation
inverse operation
solution
isolate

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We will solve two-step equations. | **Independent Practice**

1. Isolate the variable.
2. Solve for the variable. (use inverse operations)
3. Check and interpret the solution.

1. $-5x + 9 = 44$

Check:

Interpret:
The inverse operations
used to solve this problem are

_____.

The value of the variable is _____.

2. $3x - 12 = -3$

Check:

Interpret:
The inverse operations
used to solve this problem are

_____.

The value of the variable is _____.

3. $\frac{z}{3} + 2 = -5$

Check:

Interpret:
The inverse operations
used to solve this problem are

_____.

The value of the variable is _____.

4. $\frac{d}{12} - 9 = -11$

Check:

Interpret:
The inverse operations
used to solve this problem are

_____.

The value of the variable is _____.

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1. Read the problem and write a corresponding equation.
2. Isolate the variable.
3. Solve for the variable. (use inverse operations)
4. Interpret the solution.

5. A movie theater charges $8 per ticket. There is also a service fee of $4 added to the total. If the total cost for a group of friends was $52, how many tickets did they buy?

Interpret:

6. Andy baked cupcakes to share equally among 3 friends. Each friend ate 2 cupcakes immediately. If each friend had 6 cupcakes remaining to take home, how many cupcakes did Andy bake in total?

Interpret:

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Listening

Listen to the problem. Solve and interpret the solution.

1. $2b + 2 = 6$

2. $\frac{a}{2}$ **+** $4 = \mathbf{12}$

Interpret:
The inverse operations used to solve this problem are

_____.

The value of the variable is _____.

Interpret:
The inverse operations used to solve this problem are

_____.

The value of the variable is _____.

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Reading

Read the problem. Solve, check and interpret the solution.

1. **Janice started with some books. She lost half of her original books in a fire, and then bought 5 more. If she had 17 books after buying the new ones, how many books did she have originally?**

2. **For a field trip, 4 students rode in cars, and the rest rode in nine buses. How many students were in each bus if there were 382 students in total on the trip?**

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Writing

Describe and correct the error each problem has.

1.

$$6b + 7 = 331$$
$$+7 \quad +7$$

$$\frac{6b}{6} + 0 = \frac{338}{6}$$

$$b = \frac{\mathbf{169}}{\mathbf{3}}$$

2.

$$4e + 5 = 25$$
$$-5 \quad -5$$

$$4 \cdot 4e \quad 0 = 20 \cdot 4$$

$$e = \mathbf{80}$$

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