Name

Learning Objective

We will solve two-step equations.

February 19, 2014

CFU

What are we going to do?

Activate Prior Knowledge

An **equation** states[1] two expressions are equal.
Inverse operations are operations that undo each other.

Equation

$x + 7 = 9$

expression expression

Solve the one-step equations.

1. $x + 7 = 9$
2. $x + 3 = 7$
3. $4x = 16$
4. $2x = 4$

Inverse Operations

+ and –

• and ÷

Make Connection

Students, you already know how to solve equations. Now, we will solve two-step equations.

Vocabulary

[1] says or tells

CCSS 7th Grade Expressions and Equations 4.0a.1
Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where p, q, and r are specific rational numbers. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. *For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?*
Lesson to be used by EDI-trained teachers only.

Concept Development

A **two-step equation** contains[2] two operations.

multiplication

$$2x + 3 = 7$$

addition

subtraction

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

division

Inverse Operations

+ and –

• and ÷

Solving Two-Step Equations

A **two-step equation** requires[3] **two inverse operations** to solve for the variable.

- *To keep an equation **balanced**, **inverse operations** must be done on both sides of the equation.*

$$2x + 3 = 7$$

Inverse Operation $\quad -3 \quad -3$ *Balance*

$$\frac{2x}{2} = \frac{4}{2}$$

Inverse Operation *Balance*

$$x = 2$$

Solution

Checking a Solution

The **solution** is the value of the variable that makes the equation **true**.

Solution

$x = 2$

$2x + 3 = 7$

$2(2) + 3 = 7$

$4 + 3 = 7$

$7 = 7$ **True!**

NOT a Solution

$x = 4$

$2x + 3 = 7$

$2(4) + 3 = 7$

$8 + 3 = 7$

$11 = 7$ **False!**

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Which of the following is an example of a two-step equation? How do you know?

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

Which two inverse operations would be used to solve the two-step equation $5x - 4 = 6$? How do you know?

What is the difference between the solution ($x = 2$) and non-solution ($x = 4$)?

Flashcards
Inverse Operations

Vocabulary

[2] has within it
[3] needs (synonym)

Skill Development/Guided Practice

A **two-step equation** contains two operations.
A **two-step equation** requires two inverse operations to solve.

- *To keep an equation **balanced**, **inverse operations** must be done on both sides of the equation.*

The **solution** is the value of the **variable** that makes the equation true.

Solve two-step equations.

1. Isolate[2] the term with the variable. Hint: Use inverse operations.
2. Solve for the variable. Hint: Use inverse operations.
3. Check and interpret[3] the solution. Hint: Answer the question.

Inverse Operations

+ and –

• and ÷

1.

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

2.

$$\frac{x}{5} - 6 = -3$$

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1. How did I/you isolate the term with the variable?
2. How did I/you solve for the variable?
3. How did I/you check the solution?

Vocabulary

[2] separate
[3] explain

Skill Development/Guided Practice (continued)

A **two-step equation** contains two operations.
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- *To keep an equation **balanced**, **inverse operations** must be done on both sides of the equation.*

The **solution** is the value of the **variable** that makes the equation true.

Solve two-step equations.

1. Read the problem and identify (underline) important information.
   a. Connect the problem to the given equation.
2. Isolate the term with the variable. Hint: Use inverse operations.
3. Solve for the variable. Hint: Use inverse operations.
4. Check and interpret the solution. Hint: Answer the question.

Inverse Operations

$+$ and $-$

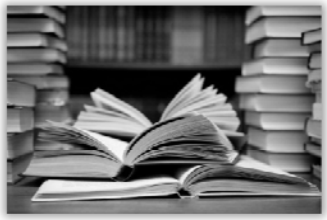
$\bullet$ and $\div$

3. Jessica paid a \$50 flat fee[5] to sign up for a gym and \$25 each month. If Jessica has paid \$175 to the gym, how long has she been a member?

$$25m + 50 = 175$$

4. Maurice paid \$15 to sign up for a book club and a \$7 annual[6] rate. If Maurice has paid \$36 to the book club, how long has he been a member?

$$7y + 15 = 36$$



CFU

1a How did I/you connect the problem to the given equation.
2 How did I/you isolate the term with the variable?
3 How did I/you solve for the variable?
4 How did I/you check the solution?

Vocabulary

[5] (flat fee) one-time payment
[6] yearly

Skill Development/Guided Practice (continued)

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Inverse Operations

$+$ and $-$

$\bullet$ and $\div$

5. The length of a rectangular computer monitor is 20 cm. The perimeter of the monitor is 72 cm. What is the width of the computer monitor?

$$2w + 2l = P$$

_____

_____

6. The length of a rectangular cell phone screen is 2 in. The perimeter of the cell phone screen is 10 in. What is the width of the cell phone screen?

$$2w + 2l = P$$

_____

_____

CFU

1a How did I/you connect the problem to the given equation.
2 How did I/you isolate the term with the variable?
3 How did I/you solve for the variable?
4 How did I/you check the solution?

A **two-step equation** contains two operations.
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- *To keep an equation **balanced**, **inverse operations** must be done on both sides of the equation.*

The **solution** is the value of the **variable** that makes the equation true.

Skill Closure

Solve two-step equations.

1. Read the problem and identify (underline) important information.
   a. Connect the problem to the given equation.
2. Isolate the term with the variable. Hint: Use inverse operations.
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4. Check and interpret the solution. Hint: Answer the question.

Inverse Operations

$+$ and $-$

$\bullet$ and $\div$

1. The length of the basketball backboard is 2 m.
   The perimeter of the backboard is 6 m.
   What is the width of the basketball backboard?

$$2w + 2l = P$$

_____

_____

Access Common Core

Which two inverse operations would be used to solve the equation? $6z - 36 = 60$
Explain your answer.

_____

_____

Summary Closure

What did you learn today about solving two-step equations?
(Pair-Share) Use words from the word bank.

Day 1 _____

_____

Day 2 _____

_____

Word Bank

two-step
equation
inverse
operation
solution
isolate