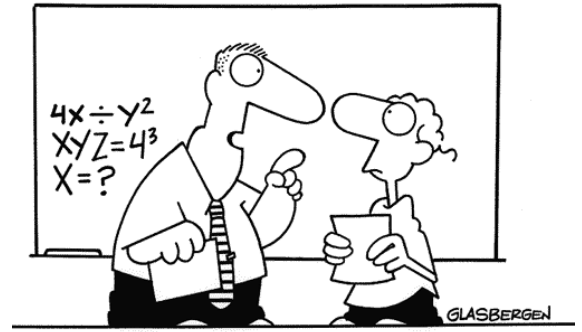


Chapter 3 – Solving 2-Step Equations

NAME: _____

This packet is your notes for all of chapter 3. It is expected you will take good notes and work the examples in class with your teacher **in pencil**. It is expected that you bring your packet to class every day and do not lose it! Should you be absent, it is expected that you get the notes and examples you missed. This packet will be collected and graded out after the chapter 3 test.

- Objectives: Define and identify the identity and inverse properties of addition and multiplication.
 - Add, subtract, multiply, and divide integers
 - Translate two-step verbal expressions into algebraic expressions
 - Solve 2-step equations



“Algebra class will be important to you later in life because there’s going to be a test six weeks from now.”

Day 1: Lesson 3.1A Solving Two-Step Equations with positive variables.

Learning Goal: I will be able to solve two-step equations with positive variables

Review: **Vocabulary** Choose the best term from the list to complete each sentence.

isolate the variable **equation** **inverse operations**

1. _____ are mathematical operations that undo each other.
2. To solve an equation you need to _____.
3. A(n) _____ is a mathematical statement that two expressions are equivalent.

Inverse Operations

How do you 'undo' addition?

How do you 'undo' subtraction?

How do you 'undo' multiplication?

How do you 'undo' division?

Review Vocabulary (Prior Grade) Fill in the blank with the correct term or phrase that describes the order of operations.

Order of Operations

1. Simplify within the _____.
2. Evaluate the _____.
3. _____ from left to right.
4. _____ from left to right.

Discover: **Solving Two-Step Equations**

.....

1. Evaluate the expressions below. Show your steps.

$5 \times 6 + 4$

$5 + 6 \times 4$

2. Did you get the same value for both expressions? _____

3. Which operation did you perform first in each expression? Why?

4. Solve the equations below. Show your steps.

$5x + 4 = 34$

$5 + 4x = 29$

5. Which operation did you perform first to solve each equation?

6. Was it the same operation you used first in Exercise 1?

7. How were your steps in Exercise 4 different from your steps in Exercise 1?

8. Write a rule for solving a two-operation equation containing a variable.

Solving Two -Step Equations with positive variables

Key Concept

Solving Two-Step Equations

Step 1 Undo the addition or subtraction first.

Step 2 Then undo the multiplication or division.

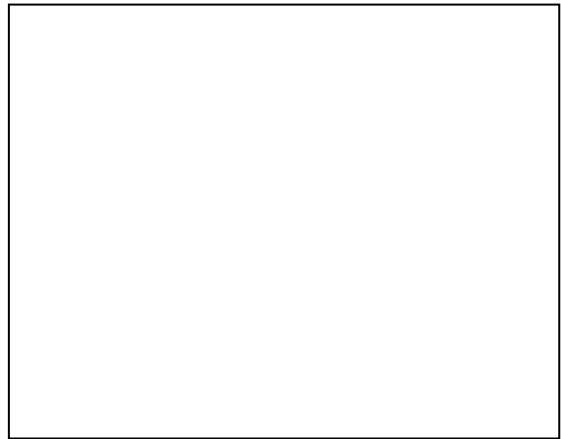
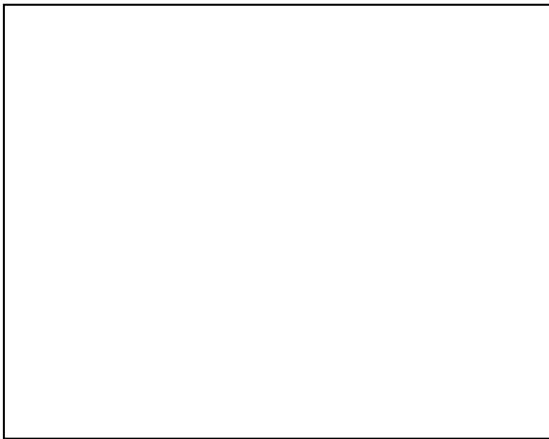
Examples

1: $2x + 3 = 15$



Check: $2(\underline{\quad}) + 3 = 15$
 $\underline{\quad} = 15$

2: $\frac{x}{2} - 5 = 15$



Check: $\frac{\underline{\quad}}{2} - 5 = 15$
 $\underline{\quad} = 15$

3.

SEE	DO
↓	↑
→	

Solve

$4x$	$+ 7$	$=$	3
	$4x$	$=$	
		$=$	
	x	$=$	

Check

$$4x + 7 = 3$$

$$4(\underline{\quad}) + 7 = 3$$

$$\underline{\quad} + 7 = 3$$

$$\underline{\quad} = 3$$

4.

SEE	DO
↓	↑
→	

Solve

$\frac{x}{-2}$	$- 8$	$=$	10
	$\frac{x}{-2}$	$=$	
	x	$=$	

Check

$$\frac{x}{-2} - 8 = 10$$

$$\frac{\underline{\quad}}{-2} - 8 = 10$$

$$\underline{\quad} - 8 = 10$$

$$\underline{\quad} = 10$$

Example 5 Solve $5v - 12 = 8$.

$$5v - 12 = 8$$

$$\frac{5v}{\square} = \frac{\square}{\square}$$

$$v = \square$$

Add _____ to each side.

Simplify.

Divide each side by _____

Simplify.

Check: $5v - 12 = 8$

$$5(\square) - 12 \stackrel{?}{=} 8$$

$$\square - 12 \stackrel{?}{=} 8$$

$$\square = 8$$

Replace v with _____

Example 6: Solve $\frac{2}{18}x - 15 = 12$

$$\frac{2}{18}x - 15 = 12$$

$$\frac{2}{18}x = \square$$

$$\square \cdot \frac{2}{18}x = \square \cdot \square$$

$$x = \square$$

Add _____ to each side.

Simplify.

Multiply each side by the reciprocal _____

Simplify.

Check

$$\frac{2}{18} \cdot \square - 15 \stackrel{?}{=} 12$$

Replace x with _____ and multiply.

$$\square - 15 \stackrel{?}{=} 12$$

$$\square = 12$$

Simplify.

Fraction Button:

Type: 2 18
to put it as a fraction into your calculator.

Reciprocal: Flip the numerator and denominator of the fraction. Multiplying the fraction by the reciprocal produces a value of 1.

Solving Two -Step Equations with positive variables

Test Practice: **Solving a Two-Step Equation** Solve $6x - 14 = 16$.

A. 3

B. 4

C. 5

D. 6

$$6x - 14 = 16$$

$$+ \square = + \square$$

$$6x = 30$$

$$\frac{6x}{\square} = \frac{30}{\square}$$

$$x = \square$$

← Add _____ to each side to undo the _____

← Simplify.

← Divide each side by \square to undo the _____

← Simplify.

The correct answer is choice

Word Problem Practice

1. You order plant seeds from a catalog. Each packet costs \$.90 each. The shipping charge is \$2.50. If you have \$18.50 to spend, how many seed packets can you order?

Relate cost per packet times number of packets plus shipping equals amount to spend

Write · + =

Let b = the number of packages you can order.

Check Is the solution reasonable? Can you order part of a packet? _____

18 packets would cost: $18 * \$0.90 + 2.50 =$ _____

17 packets would cost: $17 * \$0.90 + 2.50 =$ _____

How many packets can you order? _____

Practice: Solving Two -Step Equations with positive variables

Describe in words each step shown for solving the equation.

$$\begin{array}{r} 12 + 7s = -9 \\ -12 \quad \quad = -12 \\ \hline \end{array}$$

$$7s = -21$$

$$\frac{7s}{7} = \frac{-21}{7}$$

$$s = -3$$

1. Solve each equation. Show your check.

a. $15x + 3 = 48$

b. $\frac{t}{4} - 10 = -6$

✓

✓

c. $\frac{b}{3} + 13 = 11$

d. $9g + 11 = 2$

✓

✓

Key Concept**Solving Two-Step Equations****Step 1** Undo the addition or subtraction first.**Step 2** Then undo the multiplication or division.

Practice: Solve each equation for the variable.
Show your work and check.

c) $3.2x - 4 = 12$

✓

d) $\frac{n}{2} + 9 = 14$

✓

e) $\frac{n}{7} - 3 = 11$

✓

f) $\frac{x}{3} + 2.7 = 5$

✓

g) $-16 + \frac{x}{4} = -32$

✓

h) $27 = \frac{3}{7} + 6$

✓

3-1A • Guided Problem Solving



Choose the correct equation. Then solve the equation.

Sales A sales representative earns weekly base salary of \$250 and a commission of 8% on her weekly sales. (A commission is money earned that equals a percent of the sales.) At the end of one week, she earned \$410. How much did she sell that week? Let s represent the total sales.

- A. $250 + 0.08s = 410$ B. $250 + 410 = 0.08s$

Understand

1. What is a commission?

2. To choose the correct equation, determine which one represents weekly salary + commission = total earned.

Plan and Carry Out

3. What is the first step in solving the equation?

4. Simplify both sides of the equation. _____

5. What is the second step in solving the equation?

6. Simplify both sides of the equation. _____

7. What are her total sales for the week? _____

Show your work below:

Equation: _____

Check

8. How can you check your answer?

Check: _____

Solve Another Problem

9. A sales representative earns pay as described above. During a holiday promotion, he earned \$650. What were his total sales for that week?

Puzzle 3-1A

Solving Two-Step Equations

Solve the two-step equations below. Shade in your answers in the puzzle at the bottom of the page. The correct solutions will reveal the identity of the state that is the largest gold-producing state in the nation —second in the world behind South Africa. SHOW YOUR WORK!

1. $3y - 6 = 9$

2. $4x - 9 = 3$

3. $7 + 2y = 21$

$y =$ _____

$x =$ _____

$y =$ _____

4. $\frac{a}{5} + 7 = 10$

5. $3n - 6 = 12$

6. $-6 + 2x = 4$

$a =$ _____

$n =$ _____

$x =$ _____

7. $\frac{x}{4} - 2 = 3$

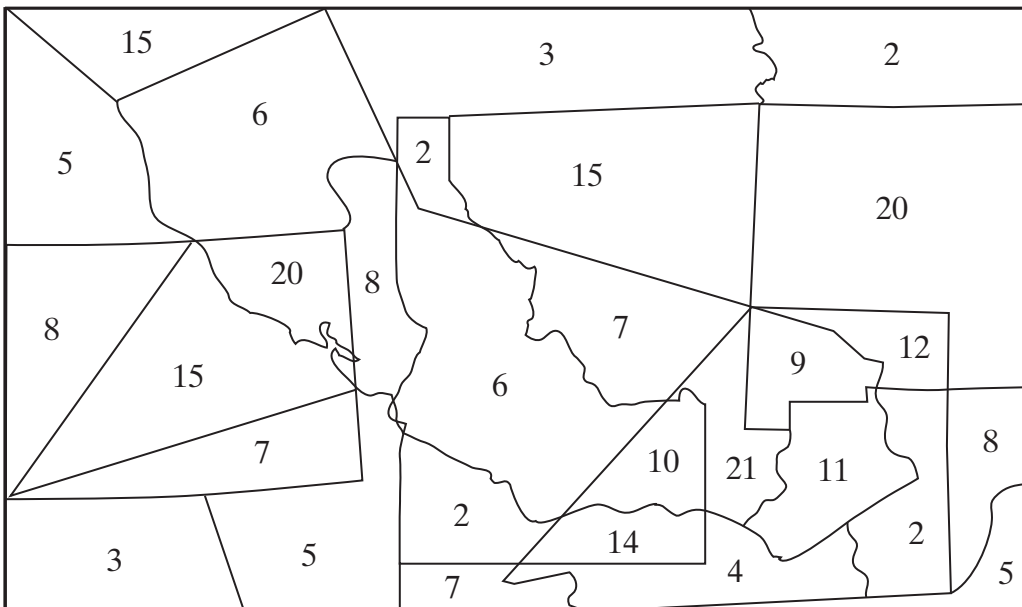
8. $6d - 4 = 8$

9. $4 + \frac{y}{2} = 8$

$x =$ _____

$d =$ _____

$y =$ _____



Day 3: 3.1 B Solving 2-Step Equations with negative variables

Solving Two-Step Equations

Step 1 Use the Addition or Subtraction Property of Equality to get the term with a variable alone on one side of the equation.

Step 2 Use the Multiplication or Division Property of Equality to write an equivalent equation in which the variable has a coefficient of .

Rule for Subtracting Integers: Keep, Change, Opposite
Show the changes for subtracting integers:

1. $3 - 7$

2. $-4 - 2$

3. $-4 - (-6)$

4. $x - 3x$

5. $3 - 4x$

6. $-3 - (-2x)$

Example 1 Negative Coefficients Solve $7 - 3b = 1$.

$$7 - 3b = 1$$

$$7 + \boxed{} - 3b = \boxed{} + 1$$

$$\boxed{} = \boxed{}$$

$$\boxed{} = \boxed{}$$

$$\boxed{} = \boxed{}$$

$$b = \boxed{}$$

Use the rules for subtracting integers. Change subtraction to addition and change the sign of the second term to its opposite.

Subtract to each side.

Simplify.

Divide each side by

Simplify.

✓ $7 - 3b = 1$

Example 2

$$21 = -p + 8$$

$$- \boxed{} = - \boxed{}$$

$$= -p$$

$$13 = (-p)$$

$$\boxed{} = \boxed{}$$

$$= p$$

Subtract from each side.

Simplify.

Divide each side by

Simplify.

Check $21 = -p + 8$
 $21 \stackrel{?}{=} -(\boxed{}) + 8$
 $21 = \boxed{}$

Solve each equation. Show your work and check.

a. $-a + 6 = 8$

b. $-9 - \frac{y}{7} = -12$

c. $13 - 6f = 31$

d. Jacob bought four begonias in 6-in. pots and a \$19 fern at a fundraiser. He spent a total of \$63. Solve the equation $4p + 19 = 63$ to find the price p of each begonia.

Practice: Solve the given two-step equation and check your solution!

a) $3x - 5 = -23$

b) $4 - x = 14$

c) $-8x + 5 = 29$

d) $\frac{x}{-7} - 3 = 11$

e) $19 = -4x - 5$

f) $\frac{-m}{7} + 3 = -4$

g) $7 - 8k = 23$

h) $8 - \frac{t}{3} = 12$

Choose the correct equation. Solve. Show your work.

1. Tehira has read 110 pages of a 290-page book. She reads 20 pages each day. How many days will it take to finish?
A. $20 + 110p = 290$ B. $20p + 290 = 110$
C. $110 + 20p = 290$ D. $290 = 110 - 20p$

Write an equation to describe the situation. Solve. Show your work.

2. You and a friend split the cost of a moped rental. Your friend pays the bill. You owe your friend only \$12, because your friend owed you \$9 from yesterday. How much was the total bill? Let m represent the cost of the moped rental. Solve the equation $\frac{m}{2} - 9 = 12$.

3. A waitress earned \$73 for 6 hours of work. The total included \$46 in tips. What was her hourly wage?

4. You used $6\frac{3}{4}$ c of sugar while baking muffins and nutbread for a class party. You used a total of $1\frac{1}{2}$ c of sugar for the muffins. Your nutbread recipe calls for $1\frac{3}{4}$ c of sugar per loaf. How many loaves of nutbread did you make?