

LESSON 23: One-Step Equations – Add and Subtract

[OBJECTIVE]

The student will solve one-step equations with addition and subtraction in mathematical and real-world situations.

[PREREQUISITE SKILLS]

writing and evaluating expressions

[MATERIALS]

Student pages **S273–S287**

Algebra unit tiles (6 yellow unit tiles per student pair)

Cups

Overhead algebra tiles

[ESSENTIAL QUESTIONS]

1. Why do we use variables in solving equations?
2. What are the goals when solving equations?
3. In an addition equation, how do we isolate the variable?

[WORDS FOR WORD WALL]

variable, equation, balance the equation, isolate the variable, inverse operation

[GROUPING]

Cooperative Pairs (CP), Whole Group (WG), Individual (I)

[LEVELS OF TEACHER SUPPORT]

Modeling (M), Guided Practice (GP), Independent Practice (IP)

[MULTIPLE REPRESENTATIONS]

SOLVE, Algebraic Formula, Concrete Representation, Pictorial Representation, Verbal Description, Graphic Organizer

[WARM-UP] (I, IP, WG,) S273 (Answers on T540.)

- Have students turn to S273 in their books to begin the Warm-Up. Students will complete the problems with addition and subtraction. Monitor students to see if any of them need help during the Warm-Up. Have students complete the problems and then review the answers as a class. **{Verbal Description}**

[HOMEWORK]

Take time to go over the homework from the previous night.

[LESSON] [1 – 2 days (1 day = 80 minutes) - (M, GP, WG, CP, IP)]

LESSON 23: One-Step Equations – Add and Subtract

SOLVE Problem**(GP, WG) S275 (Answers on T542.)**

Have students turn to S275 in their books. The first problem is a SOLVE problem. You are only going to complete the S step with students at this point. Tell students that during the lesson they will learn how to solve one-step equations with addition and subtraction. They will use this knowledge to complete real-world SOLVE problems throughout the lesson. **{SOLVE, Verbal Description, Graphic Organizer}**

Addition Equations with Concrete and Pictorial Models**(M, GP, IP, WG, CP) S274, S275, S276 (Answers on T541, T542, T543.)****WG, M, GP, CP:**

Students will use yellow unit tiles to explore one-step addition equations. Pass out yellow algebra tiles and cups to student pairs. Students will be using the cups, tiles, and a copy of the balance scale to build a foundational understanding of solving equations. Assign the roles of Partner A and Partner B to students. **{Concrete Representation, Verbal Description, Graphic Organizer, Algebraic Formula, Pictorial Representation}**

MODELING**Addition Equations – Concrete Models**

Step 1: Have students turn to S274 to use their balance scale.

- Have students place one yellow unit tile on the left side of the scale.
- Partner A, identify the value of one yellow tile. (1)
- Partner B, is the scale balanced? Explain your thinking. (No, because the value on one side is positive 1, and the value on the other side is zero.)
- Have student pairs discuss what we can do to balance the scale. (Place a yellow unit tile on the right side.)
- Partner A, place 2 yellow tiles on the left side of the scale. What is the value of the two tiles? (2)
- Partner B, is the scale balanced? (No) What can we do to balance the scale? (Place two yellow tiles on the right side of the scale.)
- What does it mean for the scale to be balanced? (Both sides need to be equal in value.) Remove the yellow tiles from the scale.
- Practice balancing the scale by placing different values of yellow tiles on the left side of the scale and have the students identify what number of tiles will balance the scale.

LESSON 23: One-Step Equations – Add and Subtract

Step 2: Write the **equation** $c + 2 = 3$ at the top of the balance scale. Explain to students that when modeling equations there are two things that they must focus on.

- The first is to **isolate the variable**. Ask students what it means to be isolated. (to be alone or by yourself)
- Partner B, what is the **variable** in the equation? (c)
- Partner A, explain the meaning of the word variable. (A variable is a symbol that represents an unknown value or number. Variables are usually written as letters.)

Step 3: The second focus is to **balance the equation**.

- Partner B, what does the equal sign mean? (If two things are equal, they have the same value.)
- In other words, whatever is on one side of the equation (in this case, $c + 2$) must equal what is on the other side (in this case, 3).
- Whatever you do to one side of the equation, you must do to the other side in order to keep the equation balanced.

Step 4: Model the equation in Problem 1 on S275 using a cup for the c .

- Have students place a cup on their scale on the left.
- Have students discuss how we can model adding 2. (2 yellow tiles)
- Model how to place 2 yellow tiles next to the cup on the left-hand side of the scale as students place their 2 yellow tiles on the left side of their balance scale.

Step 5: Have students discuss what needs to be placed on the right side of the scale to represent the 3. (3 yellow tiles)

- Model how to place 3 yellow tiles on the right-hand side of the scale as students place their 3 yellow tiles on the right side of their balance scale.

Step 6: What are the two goals whenever working with equations? (Isolate the variable and balance the equation; whatever you do to one side you must do to the other.)

- Ask students for ideas about how to isolate the variable. How could they use the ideas of opposite operations to isolate the variable?
- Explain that to isolate the variable, students perform the opposite or **inverse operation**.
- Partner A, what type of equation do we have? (addition)
- Partner B, what operation can we use to isolate the variable? Explain. (We can use subtraction because it is the opposite of addition.)

LESSON 23: One-Step Equations – Add and Subtract

Step 7: Model how to subtract, or take away, the 2 yellow tiles by removing them from the scale.

- Partner A, is the variable now isolated, or alone? (Yes)
- Partner B, is the equation still balanced? Explain your thinking. (No, because the same operation must be performed on both sides.)
- Model subtracting, or taking away, 2 yellow tiles from the right side.
- Partner A, is the equation balanced now? Justify your answer. (Yes, because we have performed the same operation to both sides of the equation).
- Ask students what the value of c is. ($c = 1$)

Step 8: Have students draw the model on S275.

- Model for students how to check the problem using the tiles.
- Go back to the original equation ($c + 2 = 3$) and model that on the scale.
- Partner B, what is the value of c ? (1)
- Model how to substitute 1 yellow tile for the c .
- Partner A, what is the value on the left? (3 yellow tiles)
- Partner B, what is the value is on the right? (3 yellow tiles)
- Is the equation balanced? Is our answer correct? (Yes, because 3 yellows = 3 yellows, the equation is balanced and we know the answer is correct.)
- Have students draw the check for the Model on S275.

Step 9: Repeat the modeling process for Problem 2 on S276. ($c + 4 = 6$). The process will be the same as the first equation.

- Have students draw the Model and check for Problem 2 on S276.

MODELING**Addition Equations – Pictorial Models**

Step 1: Partner A, what letter do we use to represent the cup? (c)

- Partner B, what letter do we use to represent the positive two? (Y)
- Model for students how to represent the equation $c + 2 = 3$ pictorially as students complete their pictorial example.
- What is our first step in solving the equation? (isolating the variable)
- Have student pairs discuss ideas for isolating the variable? (We can subtract the 2 Y s by crossing them out.)
- Have students cross out the 2 Y s on the left side of the equation.
- Have we isolated our variable? (Yes)
- Is the equation balanced? Explain your answer. (No, because we only subtracted the positive 2 from one side.)

LESSON 23: One-Step Equations – Add and Subtract

- Partner A, what do we need to do to balance the equation? (Subtract 2 Ys from the right side of the equation because whatever operation you do to one side, you must do to the other.)
- Model subtraction of the 2 Ys (yellows) by crossing them out.
- Partner B, what is the value of c ? [$c = 1$ yellow (Y)]
 $c + \cancel{YY} = \cancel{YYY}$
 $c = Y$

Step 2: Model for students how to check the equation by substituting the value of c (Y) into the original equation.

- Ask students if the equation is balanced. (Yes, because 3 Ys = 3 Ys.)
 $Y + YY = YYY$
 $YYY = YYY$

Step 3: Have students turn to S276 in their books.

- Model for students how to represent the equation $c + 4 = 6$ pictorially as students use S276 to complete their pictorial example.
- Partner A, what is our first goal? (isolate the variable)
- Model subtraction of the 4 Ys on the left by crossing them out.
- Partner B, is the variable now by itself? (Yes)
- Partner A, is the equation now balanced? (No)
- Partner B, what do we need to do to balance the equation? (Subtract 4 Ys from the right side of the equation because whatever operation you do to one side, you must do to the other.)
- Model subtraction of the 4 Ys (yellows) by crossing them out.
- Partner A, what is the value of c ? [$c = 2$ yellows (YY)]
 $c + YYYY = YYYYYY$
 $c + \cancel{YYYY} = \cancel{YYYYYY}$
 $c = YY$

Step 4: Model for students how to check the equation by substituting the value of c (YY) into the original equation.

- Ask students if the equation is balanced. (Yes, because 6 Ys = 6 Ys.)
 $YY + YYYY = YYYYYY$
 $YYYYYY = YYYYYY$

CP, IP, WG:

Have students work in partners to complete Problems 3–5 on S276 and S277 using their unit tiles to model the concrete representation and then the pictorial representation. Have students model and share their solutions with the class. **{Verbal Description, Concrete Representation, Pictorial Representation, Algebraic Formula, Graphic Organizer}**

LESSON 23: One-Step Equations – Add and Subtract

Solve Addition Equations**(M, WG, GP, CP, IP) S275, S276, S277 (Answers on T542, T543, T544.)****WG, M, GP, CP**

Students will solve one-step addition equations by building on foundational understanding of the concrete and pictorial representations. Be sure students know their designation as Partner A and Partner B. **{Pictorial Representation, Verbal Description, Graphic Organizer, Algebraic Formula}**

MODELING**Solve Addition Equations**

Step 1: Model for students how to represent the equation $c + 2 = 3$.

- Partner A, what is the first step in solving an equation? (isolate the variable)
- Partner B, explain how to isolate the variable. (by performing the opposite operation)
- What operation will we use in an addition equation to isolate the variable? (subtracting a 2)

Step 2: Model how to subtract 2 from the left side of the equation.

- Partner A, is the equation now balanced? (No)
- Partner B, what do we need to do to balance the equation? (Subtract 2 from the right side of the equation because whatever operation you do to one side, you must do to the other.)
- What is the value of c ? ($c = 1$) As in the pictorial model, substitute the value of c back into the original problem to check.

CP, IP, WG:

Have students work in partners to complete Problems 2 – 5 on S276 and S277. Remind students that they can use the pictorial representation as a model for their equation. Have students come back together as a class and share their results. **{Verbal Description, Graphic Organizer, Pictorial Representation, Algebraic Formula }**

Subtraction Equations**(M, WG, GP, CP, IP) S278 (Answers on T545.)****WG, M, GP, CP**

Students will solve one-step subtraction equations by building on foundational understanding using pictorial representations. We do not use a concrete representation, but can create a pictorial model. Be sure students know their designation as Partner A and Partner B. **{Pictorial Representation, Verbal Description, Graphic Organizer, Algebraic Formula}**

LESSON 23: One-Step Equations – Add and Subtract

MODELING

Subtraction Equations

Step 1: Have students discuss the two goals in solving any type of equation. (isolate the variable and balance the equation)

Step 2: Partner A, what operation did we use to isolate the variable in the addition equations? (subtraction, which is the opposite, or inverse, of addition)

- Partner B, what operation should we use to isolate the variable in a subtraction equation? (addition, which is the opposite, or inverse, of subtraction)

Step 3: For Problem 1, ask students what the equation means. (Subtract 3 from a number to get a difference of 5.) Draw a picture on S278 to show this.

$$c - YYY = YYYYY$$

Step 4: Partner A, how can we isolate the variable in this equation? (by adding a value to both sides of the equation, because the opposite of subtraction is addition.)

- Partner B, what number is being subtracted from the variable of c ? (3)
- Partner A, how can we model adding 3 to the left side of the equation? (by adding 3 Y's)
- Model how to add 3 to the left side of the equation.
- Partner B, is the equation now balanced? (No)
- Partner A, what do we need to do to balance the equation? (Add 3 Y's to the right side of the equation, because what you do to one side, you must do to the other.)
- What is the value of c ? ($c = 8$)

$$\begin{array}{r} c - YYY = YYYYY \\ + YYY + YYY \\ \hline c = YYYYYYYY \end{array}$$

Step 5: Have student pairs discuss how they can check the equation. (by substituting the value of c (YYYYYYYY) into the original equation)

- Ask students if the equation is balanced. (Yes, because 5 Ys = 5 Ys.)

$$\begin{array}{r} YYYYYYYY = YYYYY \\ YYYYY = YYYYY \end{array}$$

LESSON 23: One-Step Equations – Add and Subtract

Step 6: Write the equation $c - 3 = 5$ in the “Solve the equation” box.

- Partner A, what is our first goal? (isolate the variable)
- Partner B, how can we isolate the variable? (Use the opposite or inverse operation.)
- Partner A, what operation will help us to isolate the variable? (addition)
- Because this is a subtraction equation, students can isolate the variable by adding a 3 to both sides.

Step 7: Model how to add 3 to the left side of the equation.

- Ask students if the equation is now balanced. (No)
- What do we need to do to balance the equation? (Add 3 to the right side of the equation because whatever operation you do to one side, you must do to the other.)
- What is the value of c ? ($c = 8$)
- Substitute the value of c back into the original equation to check.

$$\begin{array}{r} c - 3 = 5 \\ + 3 + 3 \\ \hline c = 8 \end{array}$$

$$\begin{array}{r} c - 3 = 5 \\ 8 - 3 = 5 \\ 5 = 5 \end{array}$$

CP, IP, WG:

Have students work in partners to complete Problems 2–5 on S278. Remind students they will need to balance the equation by adding a value to both sides of the equation. Have students come back together as a class and share their results. They should be able to justify results pictorially. **{Verbal Description, Pictorial Representation, Graphic Organizer}**

Practice with Solving Equations

(CP, IP, WG) S279 (Answers on T546.)

CP, IP, WG:

Have students work in partners to complete Problems 1–5 on S279. Students may use the tiles as needed for Problems 3 and 4, but remind them that they cannot use a concrete model for subtraction equations. Have students come back together as a class and share their results. **{Verbal Description, Pictorial Representation, Graphic Organizer, Algebraic Formula}**

SOLVE Problem

(WG, GP) S280 (Answers on T547.)

Remind students that the SOLVE problem is the same one from the beginning of the lesson. Complete the SOLVE problem with your students. Ask them for possible connections from the SOLVE problem to the lesson. (They will solve an addition equation.) **{SOLVE, Verbal Description, Graphic Organizer, Algebraic Formula}**

LESSON 23: One-Step Equations – Add and Subtract

SOLVE with Addition and Subtraction Equations**(WG, CP, IP)****S281, S282, S283, S284, S285 (Answers on T548, T549, T550, T551, T552.)****IP, CP, WG:**

Have students complete the SOLVE problems on S281 – S285 in their books. Students will be applying their knowledge of solving addition and subtraction equations in a variety of real-world situations using SOLVE.

{Verbal Description, Graphic Organizer, SOLVE, Algebraic Formula}

There are a variety of ways to complete these problems. Here are a few suggestions which are alternatives to having students complete all 5 problems in student pairs:

- Have students work in groups of 4 or 5 and assign them one of the SOLVE problems to complete as a group. Students can then transfer answers to chart paper and present to the whole group.
- Have students work in 5 different groups. Post each SOLVE problem on a chart around the room. Students can start at one poster and complete the S step. After a few minutes, have student groups move to the next poster, read the S step, and then complete the O step. After a few minutes, have students move to the next poster, read the S and O steps, and complete the L step. Continue with this procedure until student groups have returned to their original problem. They can also present their problem to the whole group.
- Have a copy of one of the SOLVE problems at each table or group (5 groups). Have students complete the S Step and then pass the problem on to the next group when you give a signal. Students will continue this process until they get back their original problem.

If time permits...**(CP, IP) S286 (Answers on T553.)**

Have students complete Problems 1–8 on S286.

[CLOSURE]

To wrap up the lesson, go back to the essential questions and discuss them with students.

- Why do we use variables in solving equations? (*Variables take the place of unknown values in equations.*)
- What are the goals when solving equations? (*Isolate the variable and balance the equation.*)
- In an addition equation, how do we isolate the variable? (*In an addition equation, we use subtraction to isolate the variable.*)

[HOMEWORK] Assign S287 for homework. (Answers on T554.)

[QUIZ ANSWERS] T555

1. **C** 2. **A** 3. **D** 4. **D** 5. **A** 6. **D** 7. **C** 8. **B** 9. **B** 10. **D**

The quiz can be used at any time as extra homework or to see how students progress on solving one-step equations with addition and subtraction in mathematical and real-world situations.

LESSON 23: One-Step Equations – Add and Subtract

Here is the key to **S273**.

Warm-Up

Directions: Complete the following problems.

1. $20 + 16 = 36$

2. $25 - 18 = 7$

3. $27 + 18 = 45$

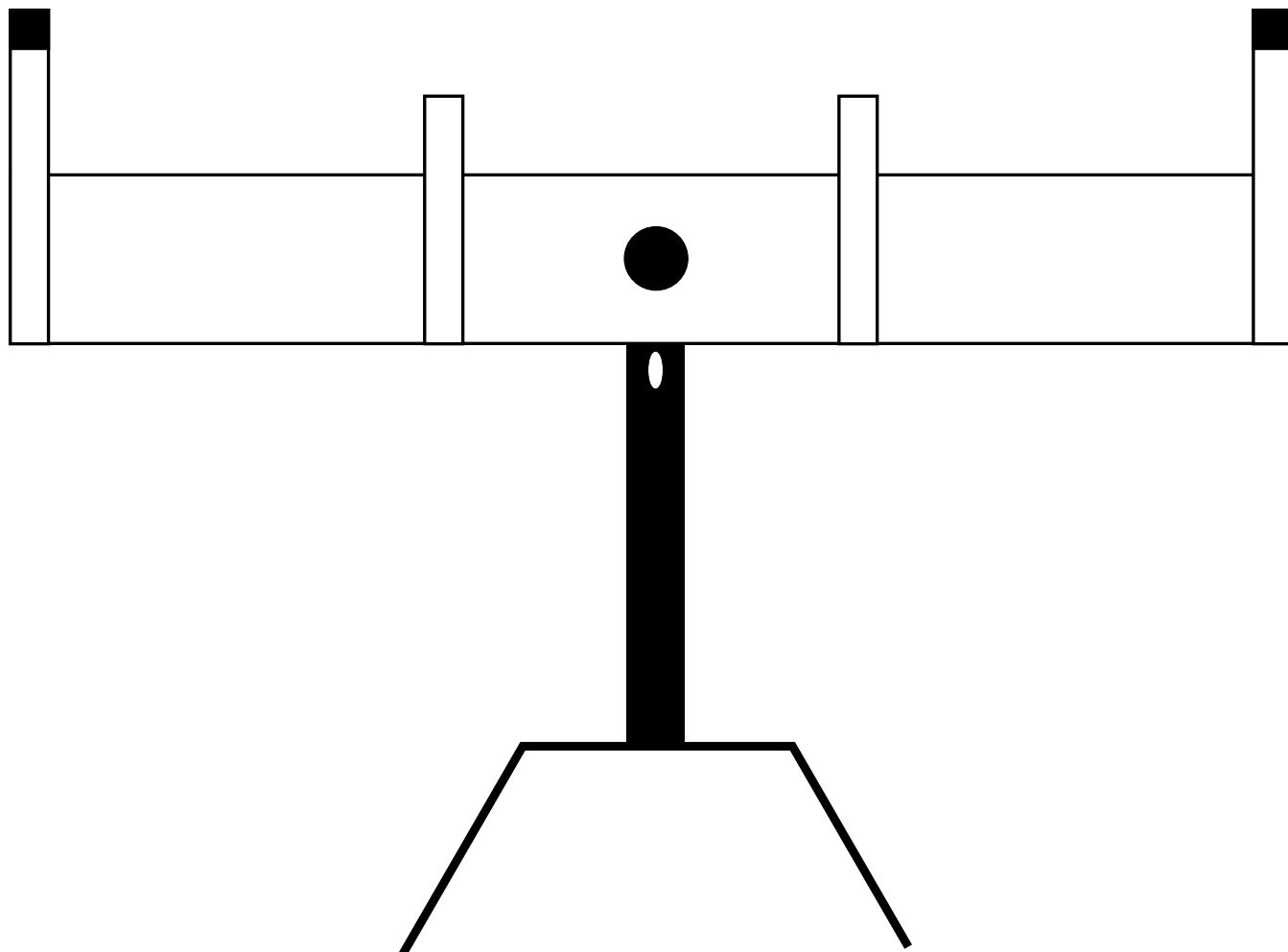
4. $38 - 13 = 25$

5. $12 + 16 = 28$

6. $39 - 11 = 28$

LESSON 23: One-Step Equations – Add and Subtract

Here is the key to **S274**.



LESSON 23: One-Step Equations – Add and Subtract

Here is the key to **S275**.

Directions: Complete the following SOLVE problem with your teacher. You will only complete the S step.

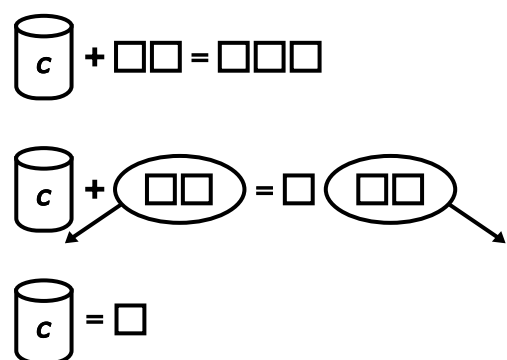
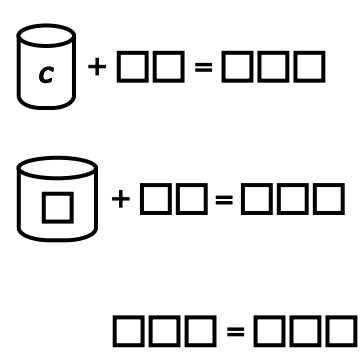
Maria’s mother is planning to help her buy a new pair of jeans. They are on sale. The total cost of the jeans, including tax, is \$17.00. Her mother gave her \$14.50. How much more money does Maria need to purchase the jeans?

S Underline the question.
 This problem is asking me to find **the amount of money Maria needs**.

Directions: Complete this page with your teacher and partner.

Addition Equations

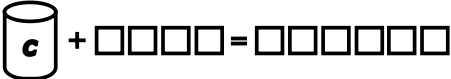
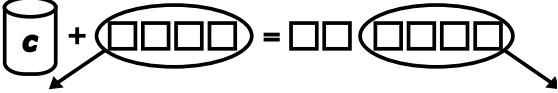
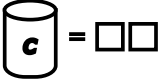
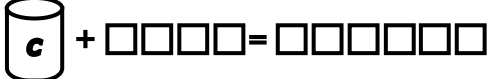
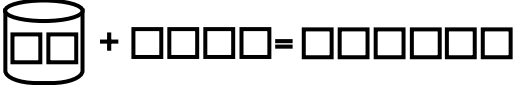
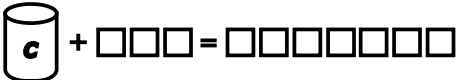
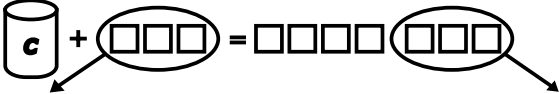
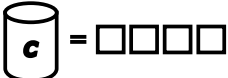
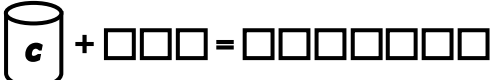
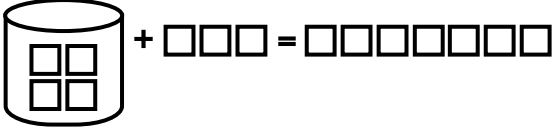
1. $c + 2 = 3$

<p>Model:</p> 	<p>Check:</p> 
<p>Pictorial</p> $c + \cancel{YY} = \cancel{YYY}$ $c = Y$ <p>Check: $Y + YY = YYY$ $YYY = YYY$</p>	<p>Solve the equation</p> $c + 2 = 3$ $\underline{-2 = -2}$ $c = 1$ <p>Check: $c + 2 = 3$ $1 + 2 = 3$ $3 = 3$</p>

LESSON 23: One-Step Equations – Add and Subtract

Here is the key to **S276**.





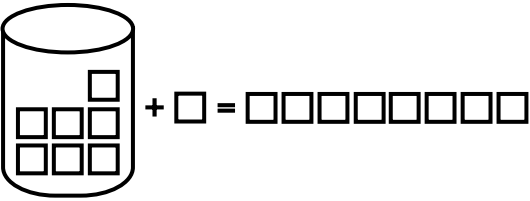
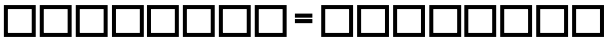
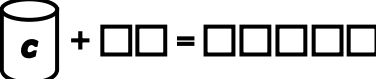
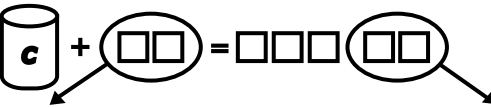
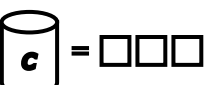
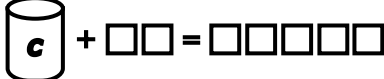
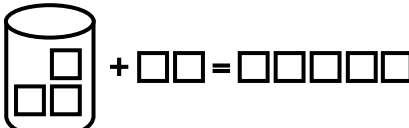
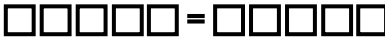
Directions: Complete this page with your teacher and partner.

<p>2. $c + 4 = 6$ Model</p> <p></p> <p></p> <p></p>	<p>Check:</p> <p></p> <p></p> <p>$\square\square\square\square\square\square = \square\square\square\square\square\square$</p>
<p>Pictorial</p> <p>$c + \text{YYYY} = \text{YYYYYY}$ $c = \text{YY}$</p> <p>Check: $\text{YY} + \text{YYYY} = \text{YYYYYY}$ $\text{YYYYYY} = \text{YYYYYY}$</p>	<p>Solve the equation</p> $\begin{array}{r} c + 4 = 6 \\ - 4 = - 4 \\ \hline c = 2 \end{array}$ <p>Check: $c + 4 = 6$ $2 + 4 = 6$ $6 = 6$</p>
<p>3. $c + 3 = 7$ Model</p> <p></p> <p></p> <p></p>	<p>Check:</p> <p></p> <p></p> <p>$\square\square\square\square\square\square\square = \square\square\square\square\square\square\square$</p>
<p>Pictorial</p> <p>$c + \text{YYY} = \text{YYYYYYY}$ $c = \text{YYYY}$</p> <p>Check: $\text{YYYY} + \text{YYY} = \text{YYYYYYY}$ $\text{YYYYYYY} = \text{YYYYYYY}$</p>	<p>Solve the equation</p> $\begin{array}{r} c + 3 = 7 \\ - 3 = - 3 \\ \hline c = 4 \end{array}$ <p>Check: $c + 3 = 7$ $4 + 3 = 7$ $7 = 7$</p>

LESSON 23: One-Step Equations – Add and Subtract

Here is the key to **S277**.

Directions: Complete this page with your partner.

<p>4. $c + 1 = 8$ Model</p> <p></p> <p></p> <p></p>	<p>Check:</p> <p></p> <p></p> <p></p>
<p>Pictorial</p> <p>$c + \cancel{Y} = \cancel{Y}YYYYYY$ $c = YYYYYYY$</p> <p>Check: $YYYYYYY + Y = YYYYYYYY$ $YYYYYYY = YYYYYYY$</p>	<p>Solve the equation</p> $\begin{array}{r} c + 1 = 8 \\ - 1 = - 1 \\ \hline c = 7 \end{array}$ <p>Check: $c + 1 = 8$ $7 + 1 = 8$ $8 = 8$</p>
<p>5. $c + 2 = 5$ Model</p> <p></p> <p></p> <p></p>	<p>Check:</p> <p></p> <p></p> <p></p>
<p>Pictorial</p> <p>$c + \cancel{YY} = \cancel{YY}YYYY$ $c = YYY$</p> <p>Check: $YYY + YY = YYYYYY$ $YYYYY = YYYYYY$</p>	<p>Solve the equation</p> $\begin{array}{r} c + 2 = 5 \\ - 2 = - 2 \\ \hline c = 3 \end{array}$ <p>Check: $c + 2 = 5$ $3 + 2 = 5$ $5 = 5$</p>

LESSON 23: One-Step Equations – Add and Subtract

Here is the key to **S278**.

Directions: Complete this page with your teacher and partner.

Subtraction Equations: We do not model subtraction equations at the concrete level (with counters and cups), but we do use pictorial models.

<p>1. $c - 3 = 5$</p> <p>Pictorial Model:</p> $\begin{array}{r} c - \text{YYY} = \text{YYYYY} \\ + \text{YYY} + \text{YYY} \\ \hline c = \text{YYYYYYYY} \end{array}$	<p>Solve the equation</p> $\begin{array}{r} c - 3 = 5 \\ + 3 = + 3 \\ \hline c = 8 \end{array}$	<p>Check:</p> $\begin{array}{r} c - 3 = 5 \\ 8 - 3 = 5 \\ 5 = 5 \end{array}$
<p>2. $x - 2 = 4$</p> <p>Pictorial Model:</p> $\begin{array}{r} x - \text{YY} = \text{YYYY} \\ + \text{YY} + \text{YY} \\ \hline x = \text{YYYYYY} \end{array}$	<p>Solve the equation</p> $\begin{array}{r} x - 2 = 4 \\ + 2 = + 2 \\ \hline x = 6 \end{array}$	<p>Check:</p> $\begin{array}{r} x - 2 = 4 \\ 6 - 2 = 4 \\ 4 = 4 \end{array}$
<p>3. $p - 4 = 6$</p> <p>Pictorial Model:</p> $\begin{array}{r} p - \text{YYYY} = \text{YYYYYY} \\ + \text{YYYY} + \text{YYYY} \\ \hline p = \text{YYYYYYYYYY} \end{array}$	<p>Solve the equation</p> $\begin{array}{r} p - 4 = 6 \\ + 4 = + 4 \\ \hline p = 10 \end{array}$	<p>Check:</p> $\begin{array}{r} p - 4 = 6 \\ 10 - 4 = 6 \\ 6 = 6 \end{array}$
<p>4. $r - 2 = 7$</p> <p>Pictorial Model:</p> $\begin{array}{r} r - \text{YY} = \text{YYYYYYY} \\ + \text{YY} + \text{YY} \\ \hline r = \text{YYYYYYYYY} \end{array}$	<p>Solve the equation</p> $\begin{array}{r} r - 2 = 7 \\ + 2 = + 2 \\ \hline r = 9 \end{array}$	<p>Check:</p> $\begin{array}{r} r - 2 = 7 \\ 9 - 2 = 7 \\ 7 = 7 \end{array}$
<p>5. $c - 1 = 8$</p> <p>Pictorial Model:</p> $\begin{array}{r} c - \text{Y} = \text{YYYYYYYYY} \\ + \text{Y} + \text{Y} \\ \hline c = \text{YYYYYYYYYY} \end{array}$	<p>Solve the equation</p> $\begin{array}{r} c - 1 = 8 \\ + 1 = + 1 \\ \hline c = 9 \end{array}$	<p>Check:</p> $\begin{array}{r} c - 1 = 8 \\ 9 - 1 = 8 \\ 8 = 8 \end{array}$

LESSON 23: One-Step Equations – Add and Subtract

Here is the key to **S279**.**Directions:** Complete this page with your partner.

<p>1. $n - 4 = 2$</p> <p>Pictorial Model:</p> $\begin{array}{r} n - \text{YYYY} = \text{YY} \\ + \text{YYYY} + \text{YYYY} \\ \hline n = \text{YYYYYY} \end{array}$	<p>Solve the equation</p> $\begin{array}{r} n - 4 = 2 \\ + 4 = + 4 \\ \hline n = 6 \end{array}$	<p>Check:</p> $\begin{array}{r} n - 4 = 2 \\ 6 - 4 = 2 \\ 2 = 2 \end{array}$
<p>2. $x - 2 = 5$</p> <p>Pictorial Model:</p> $\begin{array}{r} x - \text{YY} = \text{YYYYY} \\ + \text{YY} + \text{YY} \\ \hline x = \text{YYYYYYY} \end{array}$	<p>Solve the equation</p> $\begin{array}{r} x - 2 = 5 \\ + 2 = + 2 \\ \hline x = 7 \end{array}$	<p>Check:</p> $\begin{array}{r} x - 2 = 5 \\ 7 - 2 = 5 \\ 5 = 5 \end{array}$
<p>3. $s + 4 = 6$</p> <p>Pictorial Model:</p> $\begin{array}{r} s + \text{YYYY} = \text{YYYYYY} \\ s = \text{YY} \end{array}$	<p>Solve the equation</p> $\begin{array}{r} s + 4 = 6 \\ - 4 = - 4 \\ \hline s = 2 \end{array}$	<p>Check:</p> $\begin{array}{r} s + 4 = 6 \\ 2 + 4 = 6 \\ 6 = 6 \end{array}$
<p>4. $n + 2 = 5$</p> <p>Pictorial Model:</p> $\begin{array}{r} n + \text{YY} = \text{YYYYY} \\ n = \text{YYY} \end{array}$	<p>Solve the equation</p> $\begin{array}{r} n + 2 = 5 \\ - 2 = - 2 \\ \hline n = 3 \end{array}$	<p>Check:</p> $\begin{array}{r} n + 2 = 5 \\ 3 + 2 = 5 \\ 5 = 5 \end{array}$
<p>5. $c - 3 = 6$</p> <p>Pictorial Model:</p> $\begin{array}{r} c - \text{YYY} = \text{YYYYYY} \\ + \text{YYY} + \text{YYY} \\ \hline c = \text{YYYYYYYY} \end{array}$	<p>Solve the equation</p> $\begin{array}{r} c - 3 = 6 \\ + 3 = + 3 \\ \hline c = 9 \end{array}$	<p>Check:</p> $\begin{array}{r} c - 3 = 6 \\ 9 - 3 = 6 \\ 6 = 6 \end{array}$

LESSON 23: One-Step Equations – Add and Subtract

Here is the key to **S280**.

Directions: Complete the following SOLVE problem with your teacher.

~~Maria’s mother is planning to help her buy a new pair of jeans. | They are on sale. | The total cost of the jeans, including tax, is \$17.00. | Her mother gave her \$14.50. | How much more money does Maria need to purchase the jeans?~~

S Underline the question.

This problem is asking me to find **the amount of money Maria needs**.

O Identify the facts.

Eliminate the unnecessary facts.

List the necessary facts.

**Jeans cost \$17.00,
mother gave her \$14.50**

L Write in words what your plan of action will be. **Write an equation that we can use to solve the problem and then solve the equation.**

Choose an operation or operations. **Subtraction**

V Estimate your answer.

About \$2.00

Carry out your plan.

$$x + \$14.50 = \$17.00$$

$$\underline{- \$14.50 - 14.50}$$

$$x = \$2.50$$

E Does your answer make sense? (Compare your answer to the question.) **Yes, because we were looking for the amount of money Maria needs.**

Is your answer reasonable? (Compare your answer to the estimate.) **Yes, because it is close to the estimate of about \$2.00.**

Is your answer accurate? (Check your work.) **Yes**

Write your answer in a complete sentence. **Maria still needs \$2.50 to buy the jeans.**

LESSON 23: One-Step Equations – Add and Subtract

Here is the key to **S281**.**Directions:** Complete the following SOLVE problem.

Jaime tries to ride his bicycle 35 miles every week. | By Friday, he had ridden 28 miles for the week. | ~~He wants to finish his miles for the week on Saturday.~~ | Write an equation and solve to find out how many miles he must ride on Saturday to meet his goal.

S Underline the question.

This problem is asking me to find **the miles he must ride on Saturday to meet his goal.**

O Identify the facts.

Eliminate the unnecessary facts.

List the necessary facts. **Rides 35 miles each week, has ridden a total of 28 miles by Friday**

L Write in words what your plan of action will be. **Write an addition equation and solve to determine the miles he must ride on Saturday.**Choose an operation or operations. **Subtraction****V** Estimate your answer. **Less than 10 miles**Carry out your plan. $x + 28 = 35$ **Check:** $x + 28 = 35$

$$\begin{array}{r} -28 \\ \hline -28 \end{array}$$

$$x = 7$$

$$7 + 28 = 35$$

$$35 = 35$$

E Does your answer make sense? (Compare your answer to the question.) **Yes, because I found miles that he will have to ride on Saturday.**

Is your answer reasonable? (Compare your answer to the estimate.) **Yes, because my answer is close to my estimate of less than 10 miles.**

Is your answer accurate? (Check your work.) **Yes**

Write your answer in a complete sentence. **Jaime must ride 7 miles on Saturday to meet his weekly goal.**

LESSON 23: One-Step Equations – Add and Subtract

Here is the key to **S282**.

Directions: Complete the following SOLVE problem.

~~Stephen is buying a car.~~ | He found the car he wants for \$9,875. | He wants to put in a new stereo that will cost \$850. | Write an equation and solve it to determine the total cost of the car.

S Underline the question.

This problem is asking me to find **the total cost of the car**.

O Identify the facts.

Eliminate the unnecessary facts.

List the necessary facts. **Car cost is \$9875; new stereo for the car is \$850**

L Write in words what your plan of action will be. **Write a subtraction equation and solve to determine the total cost of the new car.**

Choose an operation or operations. **Addition**

V Estimate your answer. **About \$11,000**

Carry out your plan. $x - 850 = 9875$

$$\begin{array}{r} + 850 + 850 \\ \hline \end{array}$$

$$x = \$10,725$$

$$\text{Check: } x - 850 = 9875$$

$$10,725 - 850 = 9875$$

$$9875 = 9875$$

E Does your answer make sense? (Compare your answer to the question.) **Yes, because I found the cost of the car with the new stereo.**

Is your answer reasonable? (Compare your answer to the estimate.) **Yes, because my answer is close to my estimate of about \$11,000.**

Is your answer accurate? (Check your work.) **Yes**

Write your answer in a complete sentence. **The total cost of the new car is \$10,725.**

LESSON 23: One-Step Equations – Add and Subtract

Here is the key to **S283**.

Directions: Complete the following SOLVE problem.

~~Jennifer and her brother go to a restaurant for lunch. | Together they eat seven tacos. | If Jennifer ate 3 tacos, |~~ write and solve an equation to determine how many tacos Jennifer's brother ate.

S Underline the question.

This problem is asking me to find **the number of tacos Jennifer's brother ate.**

O Identify the facts.

Eliminate the unnecessary facts.

List the necessary facts. **Together they ate 7 tacos; Jennifer ate 3 tacos**

L Write in words what your plan of action will be. **Write an addition equation and solve to determine how many tacos Jennifer's brother ate.**

Choose an operation or operations. **Subtraction**

V Estimate your answer. **About 4 tacos**

Carry out your plan. $x + 3 = 7$

$$\begin{array}{r} x + 3 = 7 \\ -3 \quad -3 \\ \hline x = 4 \text{ tacos} \end{array}$$

Check: $x + 3 = 7$

$$4 + 3 = 7$$

$$7 = 7$$

E Does your answer make sense? (Compare your answer to the question.) **Yes, because I was looking for the number of tacos that Jennifer's brother ate.**

Is your answer reasonable? (Compare your answer to the estimate.) **Yes, because it matches my estimate of about 4 tacos.**

Is your answer accurate? (Check your work.) **Yes**

Write your answer in a complete sentence. **Jennifer's brother ate 4 tacos.**

LESSON 23: One-Step Equations – Add and Subtract

Here is the key to **S284**.

Directions: Complete the following SOLVE problem.

Abby had \$175 to spend on school clothes. | After her shopping trip, she had \$37.59 left in her purse. | Write an equation and solve to determine how much she spent on clothing.

S Underline the question.

This problem is asking me to find **the amount she spent on clothing**.

O Identify the facts.

Eliminate the unnecessary facts.

List the necessary facts. **Started with \$175; had \$37.59 left**

L Write in words what your plan of action will be. **Write an addition equation and solve to determine how much she spent on her shopping trip.**

Choose an operation or operations. **Subtraction**

V Estimate your answer. **About \$135**

Carry out your plan. $x + 37.59 = 175$

$$\begin{array}{r} - 37.59 \\ \hline \end{array} - 37.59$$

$$x = \$137.41$$

$$\text{Check: } x + 37.59 = 175$$

$$137.41 + 37.59 = 175$$

$$175 = 175$$

E Does your answer make sense? (Compare your answer to the question.) **Yes, because I was looking for the amount of money she spent on clothes.**

Is your answer reasonable? (Compare your answer to the estimate.) **Yes, my answer is close to my estimate of about \$135.**

Is your answer accurate? (Check your work.) **Yes**

Write your answer in a complete sentence. **Abby spent \$137.41 on school clothes.**

LESSON 23: One-Step Equations – Add and Subtract

Here is the key to **S285**.

Directions: Complete the following SOLVE problem.

~~The computer lab at school has a new computer system. | The system had a total cost of \$1895. | There is a special printer that can be added to the system. | The printer can be purchased separately for \$649. | Write an equation and solve to determine the cost of the system with the printer.~~

S Underline the question.

This problem is asking me to find **the cost of the system with the printer**.

O Identify the facts.

Eliminate the unnecessary facts.

List the necessary facts. **System cost of \$1895; printer cost is \$649**

L Write in words what your plan of action will be. **Write a subtraction equation and solve it to determine the cost of the system with the printer.**

Choose an operation or operations. **Addition**

V Estimate your answer. **About \$2500**

Carry out your plan. $x - 649 = 1895$

$$+ 649 + 649$$

$$x = \$2544$$

$$\text{Check: } x - 649 = 1895$$

$$2544 - 649 = 1895$$

$$1895 = 1895$$

E Does your answer make sense? (Compare your answer to the question.) **Yes, because I am looking for the price of the system with the printer.**

Is your answer reasonable? (Compare your answer to the estimate.) **Yes, because my answer is close to my estimate of about \$2500.**

Is your answer accurate? (Check your work.) **Yes**

Write your answer in a complete sentence. **The cost of the system with the printer is \$2,544.**

LESSON 23: One-Step Equations – Add and Subtract

Here is the key to **S286**.

Directions: Solve the following equations.

<p>1. $x + 4 = 13$</p> $\begin{array}{r} x + 4 = 13 \\ - 4 = - 4 \\ \hline x = 9 \end{array}$	<p>2. $s + 4 = 12$</p> $\begin{array}{r} s + 4 = 12 \\ - 4 = - 4 \\ \hline s = 8 \end{array}$
<p>3. $x - 4 = 9$</p> $\begin{array}{r} x - 4 = 9 \\ + 4 = + 4 \\ \hline x = 13 \end{array}$	<p>4. $x + 4 = 10$</p> $\begin{array}{r} x + 4 = 10 \\ - 4 = - 4 \\ \hline x = 6 \end{array}$
<p>5. $c - 4 = 7$</p> $\begin{array}{r} c - 4 = 7 \\ + 4 = + 4 \\ \hline c = 11 \end{array}$	<p>6. $x - 2 = 7$</p> $\begin{array}{r} x - 2 = 7 \\ + 2 = + 2 \\ \hline x = 9 \end{array}$
<p>7. $n + 3 = 12$</p> $\begin{array}{r} n + 3 = 12 \\ - 3 = - 3 \\ \hline n = 9 \end{array}$	<p>8. $r + 3 = 11$</p> $\begin{array}{r} r + 3 = 11 \\ - 3 = - 3 \\ \hline r = 8 \end{array}$

LESSON 23: One-Step Equations – Add and Subtract

Here is the key to **S287**.**Homework**.....
Name _____ **Date** _____**Directions:** Solve the following equations.

1. $s + 7 = 12$ **$s = 5$**

6. $x - 9 = 15$ **$x = 24$**

2. $r - 11 = 24$ **$r = 35$**

7. $g - 14 = 17$ **$g = 31$**

3. $n + 15 = 35$ **$n = 20$**

8. $p + 20 = 45$ **$p = 25$**

4. $x - 7 = 21$ **$x = 28$**

9. $b - 17 = 3$ **$b = 20$**

5. $x + 22 = 23$ **$x = 1$**

10. $p + 21 = 31$ **$p = 10$**

LESSON 23: One-Step Equations – Add and Subtract

Name _____

Date _____

Quiz**Directions:** Find the value for the given variable.

1. $m - 4 = 19$

- A. $m = 15$
- B. $m = 17$
- C. $m = 23$
- D. $m = 24$

6. $y - 21 = 42$

- A. $y = 21$
- B. $y = 52$
- C. $y = 62$
- D. $y = 63$

2. $x + 22 = 32$

- A. $x = 10$
- B. $x = 20$
- C. $x = 44$
- D. $x = 54$

7. $c - 18 = 20$

- A. $c = 2$
- B. $c = 18$
- C. $c = 38$
- D. $c = 48$

3. $r - 24 = 30$

- A. $r = 6$
- B. $r = 12$
- C. $r = 24$
- D. $r = 54$

8. $n + 14 = 20$

- A. $n = 4$
- B. $n = 6$
- C. $n = 24$
- D. $n = 34$

4. $s - 10 = 23$

- A. $s = 10$
- B. $s = 13$
- C. $s = 23$
- D. $s = 33$

9. $h + 2 = 30$

- A. $h = 2$
- B. $h = 28$
- C. $h = 32$
- D. $h = 64$

5. $n + 12 = 21$

- A. $n = 9$
- B. $n = 12$
- C. $n = 21$
- D. $n = 33$

10. $x - 20 = 100$

- A. $x = 60$
- B. $x = 80$
- C. $x = 100$
- D. $x = 120$