

Activity Cards

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Level I

3M Thinking It Out

Objective

Students can use problem-solving strategies to solve real-world problems arithmetically.

Materials

Program Materials

- E Solving Real-World Problems: Problem #1
- E Solving Real-World Problems: Problem #2
- E Solving Real-World Problems: Template

Alternative Groupings

Small Group: Complete this activity in small groups. Students can complete steps independently and compare their answers before completing subsequent steps.

Whole Class: Complete Problem #1 as a class. Have student volunteers complete the steps needed to solve Problem #2.

Prepare Ahead

Prepare Solving Real-World Problems: Problems #1, #2, and Template for display to the class.

Introduce the Activity

- Display Solving Real-World Problems: Problem #1.
- We will be exploring different ways to solve real-world problems over the next two days. Today we will be solving problems arithmetically, using problem-solving strategies.

Begin the Activity

- Distribute a copy of Solving Real-World Problems: Problem #1 to each student.
- What's the difference between solving a problem using arithmetic and solving a problem using algebra? When using arithmetic to solve a problem, known numbers are used to determine the solution. When using algebra, variables are used in place of unknown amounts.

- Have a volunteer read the problem aloud. Ask students what they know and what they are being asked to find.
- There are many different types of problemsolving strategies. Arithmetic problem-solving strategies include making a model or drawing, using logical reasoning, and working backward. For this problem, let's make a drawing and work backward to determine the solution.
- Write "make a drawing and work backward" for the problem-solving strategies. Have students fill out their copies of the Solving Real-World Problems graphic organizers throughout the activity.
- ► Now, let's make a drawing of this problem. This will help us visualize the situation.
- Draw the diagram below in the Step 1 row, Arithmetic Solution column.



- ▶ Now, let's work backward to solve the problem.
- First, we know that the total amount spent is \$75. We also know the cost of the hat. We can subtract the cost of the hat from \$75 to determine the cost of the 3 sweaters.
- Fill in the first write-on line in Step 2.
- Then, we will divide by three to determine the cost of 1 sweater.
- Fill in the second write-on line in Step 2.
- ► Now let's perform the operations needed to solve. First, \$75 minus the cost of the hat, \$15, is \$60.
- Write \$75 \$15 = \$60 in the blank space of the third row of the graphic organizser.
- ▶ \$60 divided by the number of sweaters, 3, is \$20.



- Write $60 \div 3 = 20$ below the previous equation.
- ► So, each sweater cost Tara \$20.
- Write the following concluding sentence on the displayed graphic organizer: So, each sweater cost Tara \$20.

Continue the Activity

- Now, you will work with a partner to solve Problem #2. Even though you are working with a partner, both of you should fill out your own graphic organizer.
- Display Solving Real-World Problems: Problem #2.
- To solve Problem #1, we used the make a drawing and work backward problem-solving strategies. You may wish to make a drawing or work backward to solve Problem #2. Or, you and your partner may decide to use another problemsolving strategy, such as logical reasoning, to solve the problem.
- Remember, you are only solving using arithmetic. That means you can only use known values to answer the question. You will fill in only the first column on your graphic organizer.
- Organize student pairs. Give each student a copy of Solving Real-World Problems: Problem #2.
- Monitor student progress, providing assistance as needed.

Conclude the Activity

- Invite volunteers to share their problem-solving strategies. Possible solution: Step 1: I will use the work-backward problem-solving strategy. 2: To solve the problem, I will first divide \$270 by 3 to determine the amount Ricardo earns in one day. Then, I will subtract \$35 from this amount to determine the amount Ricardo earns each day as a lifeguard. Step 3: \$270 ÷ 3 = \$90; \$90 \$35 = \$55; So, Ricardo earns \$55 each day as a lifeguard.
- Keep the two graphic organizers you filled out today. The next time we meet, you will be solving these two problems algebraically.
- Keep your display copies, with the worked-out arithmetic solutions.
- Give each student multiple copies of Solving Real-World Problems: Template to use when solving *Student Workbook* problems.

Questions to Ask

- Which strategy are you using to solve the problem? Why did you choose this strategy?
- Which operations do you need to use?
- How can you check your answers? Possible answer: I can substitute my solution into the original problem and perform the indicated operations to check my answer.

NIVITE Solving the Algebraic NWay

Objective

Students can write two-step equations arising from real-world problems and solve them algebraically.

Materials

Program Materials

- E Solving Real-World Problems: Problem #1
- E Solving Real-World Problems: Problem #2
- E Solving Real-World Problems: Template

Alternative Groupings

Small Group: Complete this activity in small groups. Students can complete steps independently and compare their answers before completing subsequent steps.

Whole Class: Complete the activity as a class. Have student volunteers complete the steps needed to solve Real-World Problem #2.

Prepare Ahead

Locate the previously created display copy of Solving Real-World Problems: Problem #1, Problem #2, and Template for use in today's activity.

Introduce the Activity

The last time we met, you used arithmetic to solve real-world problems. Today you will use algebra to solve the same problems.

Begin the Activity

- Have each student locate his or her copies of Solving Real-World Problems: Problem #1 and Solving Real-World Problems: Problem #2.
- Display Solving Real-World Problems: Problem #1.
- ► Let's solve Problem #1 together.
- Ask for a volunteer to read the problem. Review the information given in the problem and what students are being asked to determine.

- Since we are solving the problem algebraically, we will write our solution in the second column.
- What is the unknown amount we are trying to find? the cost of one sweater
- We can use the variable s to represent the cost of one sweater.
- Fill in the first two write-on lines in Step 1. Have students fill out their copies of the Solving Real-World Problems graphic organizers throughout the activity.
- ► We know that the cost of three sweaters plus \$15 totals \$75. So, our equation will be 3s + 15 = 75.
- Fill in the third write-on line in Step 1.
- ► To solve the equation, I will first subtract 15 from each side. Then, I will divide each side by 3.
- Fill in the write-on lines in Step 2.
- Remind students about inverse operations and performing the same function on both sides of an equation. Ask for a volunteer to solve the equation. Write out and complete the problem in Step 3 as dictated by the volunteer. 3s + 15 = 75, 3s = 60, s = 20; So, each sweater cost Tara \$20.
- Now, you will work with a partner to solve Problem #2 using algebra. Even though you are working with a partner, both of you should fill out your own graphic organizer.
- Display Solving Real-World Problems: Problem #2.
- ► To solve Problem #1, we wrote and solved an equation. You and your partner will write and solve an equation to solve Problem #2.
- Remember, you are solving using algebra. So, you will use a variable to represent the unknown.
 Since you are using an algebraic method to solve, you will fill in the second column.

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• Organize student pairs. Monitor student progress, providing assistance as needed.

Conclude the Activity

- Invite volunteers to share each step of the solution. Possible answer: Step 1: I will use the variable m to represent the amount of money earned each day as a lifeguard. I will solve the equation 3(m + 35) = 270.
 Step 2: To solve the equation, I will first divide each side by 3. Then, I will subtract 35 from each side. Step 3: 3(m + 35) = 270, m + 35 = 90, m = 55; So, Ricardo makes \$55 each day as a lifeguard.
- Keep your display copy of Solving Real-World Problems: Problem #1 and Problem #2, and tell students to keep their graphic organizers.

Questions to Ask

- What is the inverse operation of addition? of multiplication? subtraction; division
- How do you keep an equation balanced? by doing the same thing to each side of the equation
- ► Is it better to add/subtract first or to divide first? Possible answer: It depends on the form of the equation. If I first need to isolate a term with a variable, it is better to add/subtract first. If I need to first isolate a quantity, it is better to divide first.

SO It's Your Choice

Objective

Students can compare arithmetic and algebraic solutions to real-world problems.

Materials

Program Materials

- E Solving Real-World Problems: Problem #1
- E Solving Real-World Problems: Problem #2
- Solving Real-World Problems: Venn diagram

Additional Materials

Vocabulary Card 76, variable

Alternative Grouping

Whole Class: Solve each problem as a whole class, using both methods for each problem.

Prepare Ahead

- Prepare Solving Real-World Problems: Venn diagram for display to the class, or draw the Venn diagram on the board.
- Locate previously filled out Solving Real-World Problems: Problem #1 and Problem #2 for use in today's activity.

Introduce the Activity

- In this activity, you will compare arithmetic and algebraic solutions to real-world problems.
- Review the Solving Real-World Problems: Problem #1 and #2 graphic organizers. Discuss the arithmetic and algebraic strategies used to solve each problem.

Begin the Activity

- Write the following problem on the board: Mrs. Hudson bought 48 ice pops. She bought 6 boxes of ice pops that each had the same number of ice pops. Each box had 5 cherry ice pops and an unknown, but equal, number of grape ice pops. How many grape ice pops did Mrs. Hudson buy?
- Divide the class into two equal groups.
- One group will solve the problem on the board using arithmetic. The other group will solve the problem using algebra.
- Monitor student progress.
- Ask each group how they approached solving the problem. Invite a volunteer from each group to write the group's solution on the board. Review the solutions. 3 grape ice pops; Check students' solutions.
- Write the following problem on the board: James has 64 photos in an album. He has 8 photos on one page and 4 photos on all of the other pages. How many pages have 4 photos on them?
- You are now going to change methods. The group that solved the first problem using arithmetic will now solve this second problem using algebra. Those of you who solved the first problem using algebra will now solve this second problem using arithmetic.
- Monitor student progress.
- Ask each group how they approached solving the problem. Invite a volunteer from each group to write the group's solution on the board. Review the solutions. 14 pages; Check students' solutions.
- Which method did you prefer? Why did you prefer this method?

Conclude the Activity

• Discuss what it means to solve a problem arithmetically and what it means to solve a problem algebraically.



- Display Solving Real-World Problems: Venn diagram or draw a Venn diagram on the board. Label the left circle "Arithmetic Method" and the right circle "Algebraic Method."
- What characteristics do these two methods have in common? Possible answers: Both methods involve two operations, or two steps, to solve the problem; both methods involve using inverse operations.
- Write student responses on the Venn diagram where the circles overlap.
- What characteristics are unique to the arithmetic method? Possible answers: It uses only numbers and operations; it involves using problem-solving strategies, such as make a drawing and work backward.
- Write student responses on the Venn diagram in the *Arithmetic* circle.
- What characteristics are unique to the algebraic method? Possible answers: You need to define a variable for the unknown; it involves writing an equation.
- Write student answers on the Venn diagram in the *Algebraic* circle.
- If possible, display the Venn diagram for students to reference as they solve real-world problems.

Questions to Ask

- What information does the problem provide?
- What information do you need to find out?
- [when solving arithmetically] What problem-solving strategy are you using?
- [when solving algebraically] What does your variable represent? What equation are you using?
- Which operations do you need to use to solve the problem?
- ► How can you check your solution?

Variation

Have each group solve both problems the same way, or have each group solve both problems both ways.

CTIVITY

Arithmetically or Algebraically:

Which Will It Be?

Objective

Students can write and solve real-world two-step problems arithmetically or algebraically and explain why they choose the solution method.

Materials

Program Materials

- Number 1–6 Cubes, 1 per pair
- Two-Color Counters, 1 per pair
- Two-Step Real-World Problems, 1 per student

Additional Materials

- calculators, 1 per student
- Vocabulary Card 76, variable

Alternative Groupings

Individual: Have students solve the problems using a method of their choice.

Whole Class: Write the equations for the problems as a class, then divide the class into two teams. Have a member of each team solve one problem at the board, with a member from one team using arithmetic and a member from the other team using algebra. Then, continue having one student from each team complete a problem at the board until the problems are finished.

Prepare Ahead

Prepare Two-Step World Problems for display to the class.

Introduce the Activity

Today, you will play a game in which you and a partner solve real-world problems arithmetically and algebraically. The goal of the game is to earn more points than your opponent. Points are earned by solving problems correctly.

Begin the Activity

- Display Two-Step Real-World Problems.
- There are a total of six problems to solve, and two possible ways to solve each problem. You will roll a Number Cube to determine which problem to solve.
- ► For example, if you roll a 2, you will solve Problem 2.
- On the displayed Two-Step Real-Word Problems, point to Problem 2.
- ► If the problem has not yet been solved using either method, you will toss a Counter to determine which method to use. If the tossed Counter lands yellow side up, you will solve arithmetically. If the tossed Counter lands red side up, you will solve algebraically.
- If the problem has already been solved using one method, you do not need to toss the Counter. You will automatically solve the problem using the other method.
- If the problem has already been solved using both methods, roll the Number Cube again until you roll the number of an available problem.
- After a player solves a problem, his or her partner is responsible for checking the solution.
- When you solve a problem correctly, you earn the number of points equal to the solution of the problem. For example, if the solution is \$30, you earn 30 points.
- A round is over when both team members have attempted to solve a problem. After each round, record the number of points earned by you and your partner in the Points Earned table.
- On the displayed Two-Step Real-Word Problems, show students the location of the Points earned table.
- ► You may use a calculator to solve and check problems.

- Pair up students. Give to each pair a Number Cube and a Counter. Give to each student a copy of Two-Step Real-World Problems and a calculator.
- Monitor student progress. If students are having difficulty writing equations, you may wish to provide the equations so that they can focus on the problemsolving portion of the game. If pairs cannot agree on the solution to a problem, assist them with the process of checking a solution. Solutions to Two-Step Real-World Problems: 1) \$65; 2) \$45; 3) \$32; 4) \$24; 5) 60 feet; 6) \$35

Conclude the Activity

- When all pairs are done, discuss the answers as a class.
- Is there one method you prefer to use for all of the problems? Or, are there some types of problems that you prefer to solve using one particular method?

Questions to Ask

- What information does the problem provide?
- What information do you need to find out?
- [when solving arithmetically] What problem-solving strategy are you using?
- [when solving algebraically] What does your variable represent? What equation are you using?
- Which operations do you need to use to solve the problem?
- ► How can you check your solution?

Variation

Have students solve the problems using their choice of method.