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## 6: Simple Strategies

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### OBJECTIVE

Students will be able to make a diagram, identify a pattern, and work backwards to solve mathematical word problems. They will also explore money concepts such as budgeting and spending.



### MATERIALS

- 1 copy of an age-appropriate text relating to problem solving, such as:
  - *Penny Pot* by Stuart J. Murphy
  - *Chair For My Mother* by Vera B. Williams
  - *The Best Vacation Ever* by Stuart J. Murphy
  - *Upside-Downside, Downside-Upside* by Pat Canady
  - *I Want It* by Elizabeth Crary, Marina Megale
  - *What Do You Think? The Book of Problem Solving* by Jack Wasserman, Selma Wasserman, Dennis Smith
- Chalkboard/chalk
- Chart paper/markers
- 1 overhead transparency of the “Problem Solving Strategies” page
- 1 overhead projector
- “Practice Problem Solving” pages
- “Strategize!” page
- “Strategize! Key” page



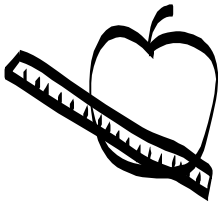
### PREPARATIONS

- Make copies of the following:
  - “Practice Problem Solving” packets (1 per student)
  - “Strategize!” page (1 per student)
  - “Strategize! Key” page (1 copy)
- Make an overhead transparency of the “Problem Solving Strategies” page.
- Locate an age-appropriate text relating to problem solving (see examples under “Materials”).



### GROUPINGS

- Whole group
- Pairs
- Individual work

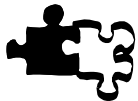


# Simple Strategies



## CLASS TIME

Three 30- to 45-minute sessions



## CONNECTIONS

- Mathematics



## TERMS AND CONCEPTS

- Quarter
- Reverse (back)
- Problem Solving
- Make a Diagram
- Identify Patterns
- Work Backwards



## BACKGROUND KNOWLEDGE

Students should have a basic knowledge of:

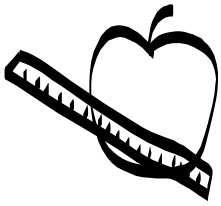
- Addition
- Subtraction
- Patterns
- Coins
- Coin values



## STEPS

### Session 1

1. Discuss problem solving with students. Give a personal account of a time that you have solved a problem in your life. Then, have students share similar stories.
2. Introduce the selected text. Ask the students to generate predictions about what is occurring during different parts of the story.
3. Read the text aloud to the group. During the reading, attend to any unfamiliar vocabulary.
4. Have the students identify different strategies the characters used in trying to solve their problems.
5. Write the following word problem on the board: “Frank and Maureen went to the grocery store. Frank bought four apples. Maureen bought two apples. How many apples did they buy in all?”

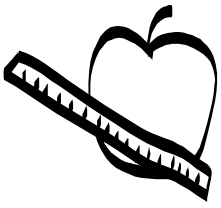


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# Simple Strategies

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6. Ask the students to identify the very first thing they need to do in order to solve this problem. Guide the students to respond that they need to read the problem first.
7. Label a piece of chart paper “Steps of Problem Solving.” Underneath the title, write “Step 1: READ the problem.”
8. Read the problem aloud to the class.
9. Explain to the students that the next thing to do in order to solve this problem is to identify the important information that’s been given.
10. On the piece of chart paper, write “Step 2: Underline GIVEN information.”
11. Reread the problem aloud and have the students identify important words or phrases. Student responses should include that Frank has four apples and Maureen has two. Underline the sentences “Frank bought four apples” and “Maureen bought two apples” on the board.
12. Explain to the students that the next thing to do in order to solve this problem is to identify what the problem is asking them to do.
13. On the piece of chart paper, write “Step 3: Circle the QUESTION.”
14. Reread the problem aloud and have the students identify what the problem is asking them to do. The students should respond that the problem is asking them to figure out how many apples Maureen and Frank bought altogether. Circle the question on the board.
15. Explain to the students that the next thing to do in order to solve the problem is to answer the question that the problem is asking.
16. On the piece of chart paper, write “Step 4: Choose a STRATEGY to solve the problem.”
17. Discuss with the students how to solve the problem. Have the students consider whether they need to add or subtract numbers. Guide the students to respond that the words “in all” are a hint that addition is involved. Then, have the students consider what numbers should be added together. Guide the students to respond that Frank’s apples plus Maureen’s apples will give them the total number of apples.
18. Explain to the students that the last thing to do is to solve the problem. On the piece of chart paper, write “Step 5: SOLVE the problem.”
19. Direct the students to find the answer to the question with a partner. Have the students pay close attention to how they solve the problem.
20. Have the students share their answers with the class. Explain, if necessary, that the correct answer is that Maureen and Frank bought six apples in all.
21. Lead a class discussion on the process that the students followed to find their answers. Record the student responses on the board.
22. Explain to the students that there are a lot of different ways to solve any problem. Explain that, in the coming days, the students will experiment with different ways to solve problems.



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# Simple Strategies

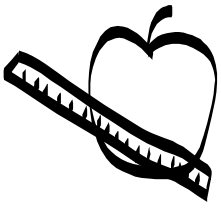
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## Session 2

1. Review the “Steps of Problem Solving” chart paper from the previous session. Ask the students to recall and discuss what each step means.
2. Remind the students of the problem from the previous session. Explain to the students that, in this session, they will be exploring different ways to solve problems.
3. Display an overhead transparency of the “Problem Solving Steps” page. Explain that these are just some of the problem solving strategies that students can use.
4. Read each strategy aloud and have the students predict what each one means.
5. Distribute one “Practice Problem Solving” packet to each student.
6. Read the first strategy aloud. Then, have a student read the word problem aloud. Direct the students to underline the important information and circle the question. Then, explain how to execute this problem solving strategy. Write and draw on the board as necessary as students follow along. Have the students solve the problem and share their answers. Answer student questions.
7. Direct the students to complete the two practice examples for this problem solving strategy individually or with a partner. Review each example as a class.
8. Repeat steps 6 and 7 for each of the problem solving strategies.
9. Explain to the students that, in the following session, they will work together in groups to solve problems by selecting the appropriate problem solving strategy.

## Session 3

1. Have the students recall the three problem solving strategies they learned in the previous session. Write each strategy on the board. Have the students discuss all the strategies and how they work.
2. Review the problem solving steps with the students. Keep the chart paper that the steps are listed on visible for the rest of the session.
3. Write the following problem on the board: “There are three coins on a desk. Two are nickels. The total value of the coins is 20 cents. What is the other coin?”
4. Have the class read the problem aloud, underline the important information, and circle the question.
5. Direct the students to select a strategy and solve the problem.
6. Have the students share which strategy they used to solve the problem. Point out that both the “making a diagram” and “working backwards” strategies are effective in solving this problem.
7. Have a student show on the board how each of the strategies could solve the problem.
8. Explain to the students that they will be working in groups to solve word problems using the strategy that makes the most sense to them.



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# Simple Strategies

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9. Distribute one “Strategize!” handout to each student and arrange the class into groups of three or four.
10. Allow an appropriate amount of time for the students to complete the activity in groups.
11. Review the problems as a class, using the “Strategize! Key” if necessary. Have groups come up to the board or overhead projector and write out the strategy and solution to each problem.
12. Allow for student discussion. Explain that there isn’t necessarily one correct strategy to use for any one problem. Different strategies can be used to solve the same problem and will give the same answer.



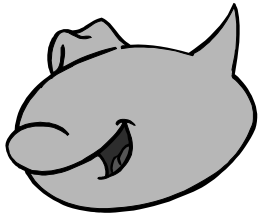
## ENRICHMENT/EXTENSIONS

- Direct students to create their own word problems. On a separate piece of paper, students can show which strategy would work for this problem and include the correct answer. Students can then swap problems and challenge each other.
- Groups that finish the “Strategize!” activity early can go back and try to solve the same problems using different strategies.



## DIFFERENTIATED LEARNING OPTION

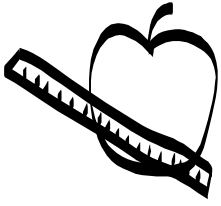
- Students needing extra support with problem solving can practice by visiting one of the following websites:
  - [www.abcteach.com/Reading/suess/math1.htm](http://www.abcteach.com/Reading/suess/math1.htm)
  - [mathforum.org/mathworld/k3newtwo.html](http://mathforum.org/mathworld/k3newtwo.html)
  - [www.gouchercenter.edu/jcampf/patterns.htm](http://www.gouchercenter.edu/jcampf/patterns.htm)
  - [www.dupagechildrensmuseum.org/aunty/images/4\\_20\\_04/challenge\\_easier.html](http://www.dupagechildrensmuseum.org/aunty/images/4_20_04/challenge_easier.html)
- Create a study guide for students, outlining each of the problem solving strategies.



## CONNECTION TO WWW.USMINT.GOV/KIDS

Check out the following lesson plans on the United States Mint H.I.P. Pocket Change™ Web site, all related to mathematical problem solving!

- Can You Make Change For a Dollar? ([www.usmint.gov/kids/index.cfm?FileContents=/kids/teachers/LessonView.cfm&LessonPlanId=39](http://www.usmint.gov/kids/index.cfm?FileContents=/kids/teachers/LessonView.cfm&LessonPlanId=39))
- How Many Months? ([www.usmint.gov/kids/index.cfm?FileContents=/kids/teachers/LessonView.cfm&LessonPlanId=90](http://www.usmint.gov/kids/index.cfm?FileContents=/kids/teachers/LessonView.cfm&LessonPlanId=90))
- That’s A Lot of Coins! ([www.usmint.gov/kids/index.cfm?FileContents=/kids/teachers/LessonView.cfm&LessonPlanId=91](http://www.usmint.gov/kids/index.cfm?FileContents=/kids/teachers/LessonView.cfm&LessonPlanId=91))



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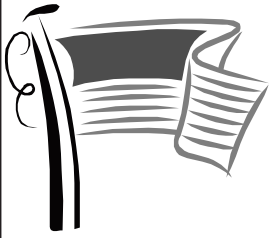
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- Alexander’s Coin Conundrum ([www.usmint.gov/kids/index.cfm?FileContents=/kids/teachers/LessonView.cfm&LessonPlanId=93](http://www.usmint.gov/kids/index.cfm?FileContents=/kids/teachers/LessonView.cfm&LessonPlanId=93))
- In The Bag! ([www.usmint.gov/kids/index.cfm?FileContents=/kids/teachers/LessonView.cfm&LessonPlanId=10](http://www.usmint.gov/kids/index.cfm?FileContents=/kids/teachers/LessonView.cfm&LessonPlanId=10))
- How Tall Are You, Really? ([www.usmint.gov/kids/index.cfm?FileContents=/kids/teachers/LessonView.cfm&LessonPlanId=154](http://www.usmint.gov/kids/index.cfm?FileContents=/kids/teachers/LessonView.cfm&LessonPlanId=154))
- Using Guess, Check, and Revise ([www.usmint.gov/kids/index.cfm?FileContents=/kids/teachers/LessonView.cfm&LessonPlanId=163](http://www.usmint.gov/kids/index.cfm?FileContents=/kids/teachers/LessonView.cfm&LessonPlanId=163))
- Coin Archeology ([www.usmint.gov/kids/index.cfm?FileContents=/kids/teachers/LessonView.cfm&LessonPlanId=180](http://www.usmint.gov/kids/index.cfm?FileContents=/kids/teachers/LessonView.cfm&LessonPlanId=180))



# Problem Solving Steps

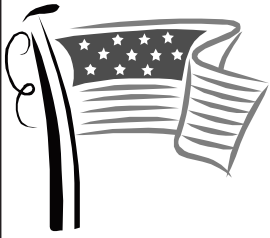
**STEP 1: READ** the problem.

**STEP 2: UNDERLINE** the given information.

**STEP 3: CIRCLE** the question.

**STEP 4: CHOOSE** a strategy.

**STEP 5: SOLVE** the problem.



NAME \_\_\_\_\_

# Practice Problem Solving

## Making a Diagram (1)

Step 1: **READ** the problem.

Enrique has \$1.75 and Olivia has \$2.25.  
How many quarters do they have?

Step 2: **UNDERLINE** the given information.

Step 3: **CIRCLE** the question.

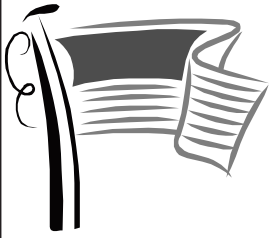
Step 4: **CHOOSE** a strategy (make a diagram).

Draw Enrique and Olivia's quarters in the box  
and then count them all up.

Step 5: **SOLVE** the problem.

Enrique and Olivia have \_\_\_\_\_ quarters.





# Practice Problem Solving

## Making a Diagram (2)

### EXAMPLE 1

Step 1: **READ** the problem.

Ethan had a handful of quarters, but he gave them all away. He gave 2 quarters each to Chloe, Juan, and Dominic. He also gave 4 to Anne. How many quarters did Ethan have at the start?

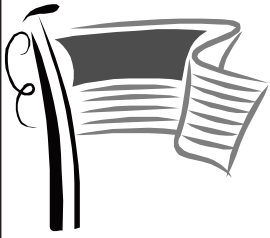
Step 2: **UNDERLINE** the given information.

Step 3: **CIRCLE** the question.

Step 4: **CHOOSE** a strategy (make a diagram).

Step 5: **SOLVE** the problem.

Ethan started with \_\_\_\_\_ quarters.



# Practice Problem Solving

## Making a Diagram (3)

### EXAMPLE 2

Step 1: **READ** the problem.

One hot summer day, you see this sign:

STRAWBERRY SCOOP	40 CENTS
VANILLA SCOOP	65 CENTS
CHOCOLATE CHIP SCOOP	80 CENTS

You have \$1.30 in your pocket. Is that enough money to buy a cone with one scoop of chocolate chip and one scoop of vanilla? How do you know?

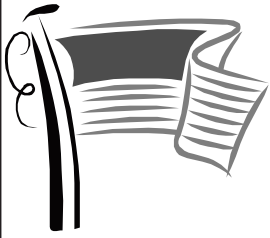
Step 2: **UNDERLINE** the given information.

Step 3: **CIRCLE** the question.

Step 4: **CHOOSE** a strategy (make a diagram).

Step 5: **SOLVE** the problem.

Yes or no? You need \$\_\_\_\_\_ for the cone.



# Practice Problem Solving

## Working Backwards (1)

Step 1: **READ** the problem.

Jay has \$1.25 in his pocket. He spent 25 cents on a snack this morning. He later spent 75 cents on a baseball card. How much money did Jay have in the beginning?

Step 2: **UNDERLINE** the given information.

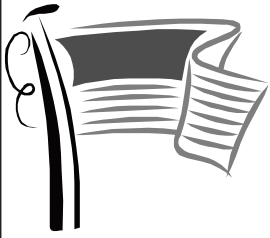
Step 3: **CIRCLE** the question.

Step 4: **CHOOSE** a strategy (work backwards).

Add the amount Jay spent to the amount he has now to find out how much he started with.

Step 5: **SOLVE** the problem.

Jay started with \$\_\_\_\_\_.



# Practice Problem Solving

## Working Backwards (2)

### EXAMPLE 1

Step 1: **READ** the problem.

Xavier has double the number of quarters that Erin has.  
Erin has 4 more quarters than Colin. Colin has 3 quarters.  
How many quarters do Erin and Xavier have?

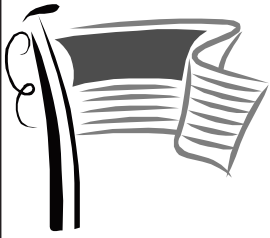
Step 2: **UNDERLINE** the given information.

Step 3: **CIRCLE** the question.

Step 4: **CHOOSE** a strategy (work backwards).

Step 5: **SOLVE** the problem.

Xavier has \_\_\_\_\_ quarters. Erin has \_\_\_\_\_ quarters.



# Practice Problem Solving

## Working Backwards (3)

### EXAMPLE 2

Step 1: **READ** the problem.

At the store, Aisha spent twice as much as Sue. Sue spent 25 cents less than Diego. Diego spent half of his \$3.00 allowance. How much did Aisha and Sue spend?

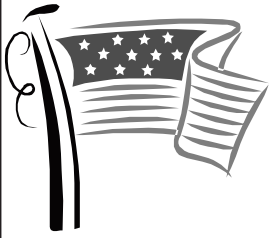
Step 2: **UNDERLINE** the given information.

Step 3: **CIRCLE** the question.

Step 4: **CHOOSE** a strategy (work backwards).

Step 5: **SOLVE** the problem.

Aisha spent \$\_\_\_\_\_. Sue spent \$\_\_\_\_\_.



# Practice Problem Solving

## Identifying Patterns (1)

Step 1: **READ** the problem.

What coin comes next in the sequence?

**Quarter**

**Nickel**

**Quarter**

**Nickel**

\_\_\_\_\_



?

Step 2: **UNDERLINE** the given information.

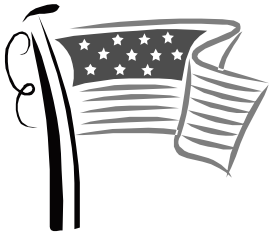
Step 3: **CIRCLE** the question.

Step 4: **CHOOSE** a strategy (identify a pattern).

What is the coin or group of coins that repeats?

Step 5: **SOLVE** the problem.

The next image in the sequence is a \_\_\_\_\_.



# Practice Problem Solving

## Identifying Patterns (2)

### EXAMPLE 1

Step 1: **READ** the problem.

What comes next in the sequence?



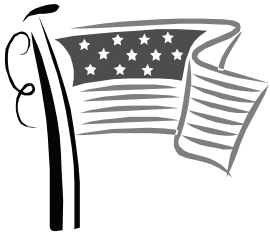
Step 2: **UNDERLINE** the given information.

Step 3: **CIRCLE** the question.

Step 4: **CHOOSE** a strategy (identify a pattern).

Step 5: **SOLVE** the problem.

The next group in the sequence is \_\_\_\_\_ quarter(s).



# Practice Problem Solving

## Identifying Patterns (3)

### EXAMPLE 2

Step 1: **READ** the problem.

What coin comes next in the sequence?



Step 2: **UNDERLINE** the given information.

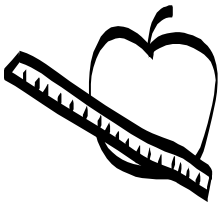
Step 3: **CIRCLE** the question.

Step 4: **CHOOSE** a strategy (identify a pattern).

Step 5: **SOLVE** the problem.

The next coin in the sequence is a \_\_\_\_\_.





# Practice Problem Solving

## Key

### Making a Diagram

**Question:** Enrique has \$1.75 and Olivia has \$2.25. How many quarters do they have?

**Answer:** Answers may vary. Acceptable answers include: 16 quarters, 4 quarters (and 3 bills), etc.

#### EXAMPLE 1

**Question:** Ethan had a handful of quarters, but he gave them all away. He gave 2 quarters each to Chloe, Juan, and Dominic. He also gave 4 to Anne. How many quarters did Ethan have at the start?

**Answer:** Ethan started with 10 quarters.

#### EXAMPLE 2

**Question:** One hot summer day, you see this sign:

- STRAWBERRY SCOOP: 40 CENTS
- VANILLA SCOOP: 65 CENTS
- CHOCOLATE CHIP SCOOP: 80 CENTS

You have \$1.30 in your pocket. Is that enough money to buy a cone with one scoop of chocolate chip and one scoop of vanilla? How do you know?

**Answer:** No. You need \$1.45 for the cone ( $65 + 80$ ). That is more than the \$1.30 in your pocket.

### Working Backwards

**Question:** Jay has \$1.25 in his pocket. He spent 25 cents on a snack this morning. He later spent 75 cents on a baseball card. How much money did Jay have in the beginning?

**Answer:** Jay started with \$2.25.

#### EXAMPLE 1

**Question:** Xavier has double the number of quarters that Erin has. Erin has 4 more quarters than Colin.

Colin has 3 quarters. How many quarters do Erin and Xavier have?

**Answer:** Xavier has 14 quarters. Erin has 7 quarters.

#### EXAMPLE 2

**Question:** At the store, Aisha spent twice as much as Sue. Sue spent 25 cents less than Diego. Diego spent half of his \$3.00 allowance. How much did Aisha and Sue spend?

**Answer:** Aisha spent \$2.50. Sue spent \$1.25.

### Identifying Patterns

**Question:** What comes next in the sequence?



**Answer:** Quarter

#### EXAMPLE 1

**Question:** What comes next in the sequence?



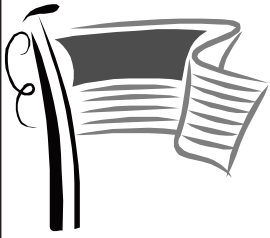
**Answer:** 5 quarters

#### EXAMPLE 2

**Question:** What comes next in the sequence?



**Answer:** 1 penny



NAME \_\_\_\_\_

# Strategize!

## Problem 1

**Directions:** In your group, see if you can solve this problem.

Step 1: **READ** the problem.

On Monday, Mrs. Johnson gave her daughter Jill one cent. On Tuesday, Mrs. Johnson gave Jill five cents. On Wednesday, Jill received 10 cents. How much did Jill receive on Thursday?

Step 2: **UNDERLINE** the given information.

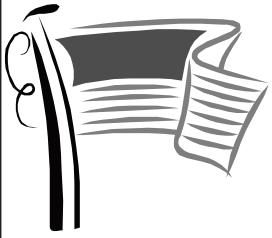
Step 3: **CIRCLE** the question.

Step 4: **CHOOSE** a strategy.

Write your strategy here: \_\_\_\_\_

Step 5: **SOLVE** the problem.

Jill received \_\_\_\_\_ cents on Thursday.



NAME \_\_\_\_\_

# Strategize!

## Problem 2

Step 1: **READ** the problem.

One pencil and one eraser together cost 3 cents.  
One pencil and one pad of paper together cost 4 cents.  
One pad of paper and one eraser together cost 5 cents.  
How much does one pencil cost by itself?

Step 2: **UNDERLINE** the given information.

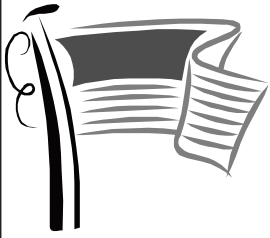
Step 3: **CIRCLE** the question.

Step 4: **CHOOSE** a strategy.

Write your strategy here: \_\_\_\_\_

Step 5: **SOLVE** the problem.

One pencil costs \_\_\_\_\_ cents.



NAME \_\_\_\_\_

# Strategize!

## Problem 3

Step 1: **READ** the problem.

The cash register has 17 coins (quarters, nickels, dimes and pennies) in it. Six of them are quarters. There are two fewer dimes than quarters. There is one less nickel than there are dimes. How many pennies are there?

Step 2: **UNDERLINE** the given information.

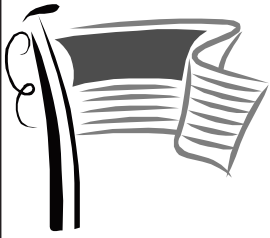
Step 3: **CIRCLE** the question.

Step 4: **CHOOSE** a strategy.

Write your strategy here: \_\_\_\_\_

Step 5: **SOLVE** the problem.

There are \_\_\_\_\_ pennies in the cash register.



NAME \_\_\_\_\_

# Strategize!

## Problem 4

Step 1: **READ** the problem.

Anna spends two quarters every school day on breakfast. If Anna buys breakfast on Monday, Tuesday, and Wednesday, how many quarters does she spend? How much money does Anna need for breakfast for a five-day school week?

Step 2: **UNDERLINE** the given information.

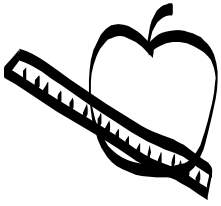
Step 3: **CIRCLE** the question.

Step 4: **CHOOSE** a strategy.

Write your strategy here: \_\_\_\_\_

Step 5: **SOLVE** the problem.

Anna spends \_\_\_\_\_ quarters for breakfast on Monday, Tuesday, and Wednesday. Anna needs \$\_\_\_\_\_ for breakfast for the week.



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# Strategize!

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## Key

### PROBLEM 1

**Question:** On Monday, Mrs. Johnson gave her daughter Jill one cent. On Tuesday, Mrs. Johnson gave Jill five cents. On Wednesday, Jill received 10 cents. How much did Jill receive on Thursday?

**Answer:** Answers will vary. Accept all reasonable responses.

### PROBLEM 2

**Question:** One pencil and one eraser together cost 3 cents. One pencil and one pad of paper together cost 4 cents. One pad of paper and one eraser together cost 5 cents. How much does one pencil cost by itself?

**Answer:** One pencil costs one cent. (One eraser costs two cents, one pad of paper costs three cents.)

### PROBLEM 3

**Question:** The cash register has 17 coins (quarters, nickels, dimes and pennies) in it. Six of them are quarters. There are two fewer dimes than quarters. There is one less nickel than there are dimes. How many pennies are there?

**Answer:** There are four pennies in the cash register.

### PROBLEM 4

**Question:** Anna spends two quarters every school day on breakfast. If Anna buys breakfast on Monday, Tuesday, and Wednesday, how many quarters does she spend? How much money does Anna need for breakfast for a five-day school week?

**Answer:** Anna spends six quarters on breakfast for Monday, Tuesday, and Wednesday. Anna needs \$2.50 for breakfast for a five day school week.