11-5 Problem-Solving Investigation: Work Backward - Analyze the Strategy

1. What is the best way to check your solution when using the *work backward* strategy?

   Sample answer: Start with the answer that you found and then work the problem backward to see if you arrive at the number you were given in the problem.

11-5 Problem-Solving Investigation: Work Backward - Mixed Problem Solving

Solve using the *work backward* strategy.

3. **EXERCISE** David swims and lifts weights for a total of 35 minutes at the gym before school. He spends 10 minutes getting ready for school after he works out. It takes him 15 minutes to get to the gym from his house and 20 minutes to get to school from the gym. If he needs to be at school at 8:15 a.m., what time should he leave his house in the morning to get to the gym?

   8:15 A.M. − 35 min. = 7:40 A.M.

   7:40 A.M. − 10 min. = 7:30 A.M.

   7:30 A.M. − 15 min. = 7:15 A.M.

   7:15 A.M. − 20 min. = 6:55 A.M.

5. **NUMBER SENSE** A number is multiplied by 4, and then 6 is added to the product. The result is 18. What is the number?

   Understand: We know the final result and the steps taken to get there. We need to find the original number.

   Plan: Work backward from the result undoing the steps one at a time to find the number.

   Solve: The result is 18. The second step is to add 6, so subtract 6 from 18 to move back a step.
   18 − 6 = 12
   The first step was to multiply by 4, so divide by 4 to get the number.
   12 ÷ 4 = 3
   The number is 3.

   Examine: Check the answer by starting with 3 and working forward through the steps to make sure that you get 18.

Use any strategy to solve. Some strategies are shown below.

PROBLEM-SOLVING STRATEGIES

• Make a table.

• Work backward.

• Act it out.

7. **CAMERAS** Francesca saved 13 new pictures on her digital camera's memory card and deleted 32 pictures. If there are now 108 pictures, how many pictures had she saved originally?

$$= 108 + 32 - 13$$
$$= 140 - 13$$
$$= 127$$

9. **NUMBER SENSE** A number is multiplied by 4, and then 6 is added to the product. The result is 18. What is the number?

Understand: We know that first the number is multiplied by 4 then 6 is added. This process arrives at the number 18.

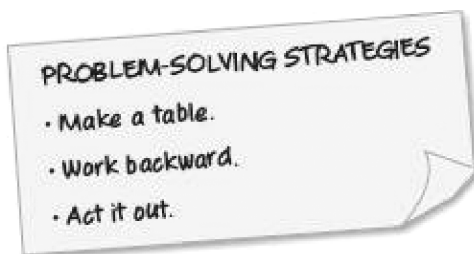**Plan:** Work backward from 18, subtracting 6 and dividing by 4.

Solve:
$$18 - 6 = 12$$
$$12 \div 4 = 3$$
The number is 3.

Check: Start with 3 and multiply by 4 which gives you 12. Then add 6 to 12 and you get 18.

Use any strategy to solve Exercises 6-14. Some strategies are shown below.

PROBLEM-SOLVING STRATEGIES

• Make a table.

• Work backward.

• Act it out.

11. **MONEY** Chet has $4.50 in change after purchasing a skateboard for
    $62.50 and a helmet for $32. How much money did Chet have originally?

    Explore: We know that Chet has $4.50 left after he purchases items costing $62.50 and $32. We
    need to find the amount that he had originally.

    Plan: Add the costs of the two items and the amount of change to find the original amount.

    Solve: 62.50 + 32.00 + 4.50 = 99.00
    Chet originally had $99.

    Examine: Check the answer by subtracting the costs of the items from $99 to make sure that the
    change is $4.50.

13. **CABLE** In 1977, there were 12,168,450 cable television subscribers. By 2003, there were 73,365,880
    subscribers. How many more cable television subscribers were there in 2003 than in 1977?

    Explore: We need to find how many more cable subscribers there were in 2003 than in 1977. We
    know the number of subscribers for each year.

    Plan: Subtract the number of subscribers in 1977 from the number of subscribers in 2003.

    Solve:
    $$\begin{array}{r} 73{,}365{,}880 \\ -\,12{,}168{,}450 \\ \hline 61{,}197{,}430 \end{array}$$

    Examine: Add the difference of 61,197,430 to the number of subscribers in 1977 to make sure that
    you get the number of subscribers in 2003.

15. **RECIPES** A fruit punch recipe calls for 8 cups of orange juice. If there are 4 cups in one quart, how many
    quarts of juice are needed for the recipe?

    Explore: We need to find the number of quarts of orange juice needed for the fruit punch recipe. We
    know how many cups are called for in the recipe.

    Plan: Use division since you need to find the number of quarts in 8 cups.

    Solve: 8 ÷ 4 = 2
    So 2 quarts of orange juice are needed for the recipe.

    Examine: Multiply the number of quarts needed by the number of cups in a quart to make sure you
    get 8 cups.

17. **COMPUTERS** A megabyte is equal to 1,000 kilobytes. A kilobyte is equal to 1,024 bytes. If a byte is equal to
    8 bits, how many bits are in a megabyte?

    $1{,}024 \times 8 = 8{,}192$

    $8{,}192 \times 1{,}000 = 8{,}192{,}000$