NAME _____ Period _____

SHEET #190

1–9 Problem Solving with Equations

Objective: To solve word problems by using an equation in one variable.

Plan for Solving a Word Problem

Step 1 Read the problem carefully a few times. Decide what numbers are asked for and what information is given. Making a sketch may be helpful.

Step 2 Choose a variable and use it with the given facts to represent the number(s) described in the problem. Labeling your sketch or arranging the information in a chart may help.

Step 3 Reread the problem. Then write an equation that represents relationships among the numbers in the problem.

Step 4 Solve the equation and find the required numbers.

Step 5 Check your results with the *original* statement of the problem. Give the answer.

CAUTION Problems can contain information that is unnecessary or contradictory. Sometimes there is not enough information given. Therefore, it is important to understand the given facts and their relationships before you try to solve a problem.

Example The Junior class sold shirts bearing the school insignia for \$12.00 each. An extra \$1.00 was charged to have a shirt monogrammed. There were 324 shirts sold, and a total of \$4036.00 was collected. Of the shirts sold, 174 were bought by Juniors. How many shirts were *not* monogrammed?

Solution

Step 1 The problem asks for the number of shirts sold without a monogram.

Step 2 Let x = the number of shirts sold without a monogram.
Then $324 - x$ = number of shirts sold *with* a monogram.

	Price	× Number	= Sales
Without a monogram	12	x	$12x$
With a monogram	13	$324 - x$	$13(324 - x)$
	Total Shirt Sales		4036

Step 3

Sales without a monogram	+	Sales with a monogram	=	Total Sales
$12x$		$13(324 - x)$		4036

Step 4

$$\begin{aligned} 12x + 13(324 - x) &= 4036 \\ 12x + 4212 - 13x &= 4036 \\ -x + 4212 &= 4036 \\ -x &= -176 \\ x &= 176 \quad \text{(shirts without a monogram)} \\ 324 - x &= 148 \quad \text{(shirts with a monogram)} \end{aligned}$$

(Solution continues on the next page.)

NAME _____ DATE _____

1–9 Problem Solving with Equations *(continued)*

Step 5 *Check:* Is the total number of shirts 324? $176 + 148 \stackrel{?}{=} 324$

$324 = 324$ √

Do shirt sales total \$4036.00? $176(12) + 148(13) \stackrel{?}{=} 4036$

$2112 + 1924 \stackrel{?}{=} 4036$

$4036 = 4036$ √

$\therefore$ 176 shirts were sold without a monogram.

The information about the number of shirts bought by Juniors was unnecessary.

Solve each of the following problems. If there is not enough information to solve the problem, say so. If extra information is given, identify it.

1. Cheryl's weekly allowance is \$2.00 more than Emily's. Together they get \$11.00. What is each girl's weekly allowance?
2. A child's bank contains 70 coins consisting of nickels and dimes that have a total value of \$5.55. How many of each kind of coin are there?
3. A store sold 40 baseballs and 14 softballs over a two-week period. The sales for these items totaled \$200. What was the price of one baseball?
4. The length of a rectangle is 6 cm more than the width. A square can be formed by tripling the width of the rectangle, and reducing its length by 2 cm. Find the dimensions of the rectangle.
5. The perimeter of an isosceles triangle is 36 cm, and the area is 60 cm^2. The length of the base is 3 cm less than the length of a leg. Find the length of each side.
6. The measures of the angles of a quadrilateral are consecutive odd integers. Find the measure of each angle. (*Hint*: The sum of the measures of the angles of a quadrilateral is 360°.)
7. Two trains whose rates differ by 8 mi/h leave stations that are 432 miles apart at 10 A.M. If the trains meet at 2 P.M., what is the rate of each train?
8. A hiker hikes up a mountain 1 mi/h slower than she hikes down the mountain. If it takes her 1.5 hours to hike up the mountain, and only 1 hour to hike down it, how fast does she move in each direction?
9. Sharon earned \$460 in simple interest on an investment of \$6200. Some of the money earned an interest rate of 5%, and the rest earned 8%. Her average rate of interest was 7.4%. How much did she invest at each rate?

Mixed Review Exercises

Solve.

1. $4 - 5x = 14$
2. $4(y - 3) = y - 15$
3. $7z + 4 = 4z + 16$

Evaluate each expression if $a = -5$ and $b = 10$.

4. $(a + b)^2$
5. $(ab)^2$
6. $|a - 2b|$
7. $\frac{b - a}{-3}$
8. $\frac{ab}{-2}$
9. $\frac{b \div a}{2}$