

## 4-10 Problems Without Solutions

**Objective:** To recognize problems that do not have solutions.

**CAUTION** Not all word problems have solutions. Here are some reasons for this:

1. Not enough information is given.
2. The given facts lead to an unrealistic result. (The result satisfies the equation used, but not the conditions of the problem situation.)
3. The given facts are contradictory. (They cannot all be true at the same time.)

**Example 1** On a trip of 210 km, Roberto went by train for 3h and by bus for the rest of the trip. The average speed of the train was 15 km/h more than that of the bus. Find the average speed of the bus.

### Solution

*Step 1* The problem asks for the speed of the bus.

*Step 2* Let  $r$  = the speed of the bus.  
Then  $r + 15$  = the speed of the train.

Make a chart showing the given facts.

	Rate $\times$ Time = Distance		
Train trip	$r + 15$	3	$3(r + 15)$
Bus trip	$r$	?	?

All of the given facts have been used, but *not enough information has been given to write an equation.*

The problem does not have a solution.

**Example 2** Angela says she has the same number of nickels as dimes. Three times the value of the dimes is equal to 20¢ more than six times the value of the nickels. How many of each kind does she have?

### Solution

*Step 1* The problem asks for the number of nickels and dimes.

*Step 2* Let  $x$  = the number of nickels and let  $x$  = the number of dimes.  
Then  $5x$  = the value (¢) of the nickels and  $10x$  = the value (¢) of the dimes.

*Step 3*  $3(10x) = 20 + 6(5x)$

*Step 4*  $30x = 20 + 30x$   
 $0 = 20$

The false statement " $0 = 20$ " tells you the *given facts are contradictory.*

The problem has no solution.

**4–10 Problems Without Solutions** (continued)

**Example 3** A bank teller cashes a check for \$100 and gives the customer the same number of \$10 bills and \$20 bills. How many of each type of bill will the customer get?

**Solution**

*Step 1* The problem asks for the number of bills of each type the customer will get.

*Step 2* Let  $x$  = the number of each kind of bill.

*Step 3*  $10x + 20x = 100$

*Step 4*  $30x = 100$   
 $x = 3\frac{1}{3}$  { Since you can't have  $\frac{1}{3}$  of a bill, the given facts lead to an unrealistic result. The problem does not have a solution.

**Solve each problem that has a solution. If a problem has no solution, explain why.**

- You plan a lawn 10 ft longer than it is wide. It is to be surrounded by a flower bed 3 ft wide. Find the dimensions of the lawn if the flower bed covers 80 ft<sup>2</sup>.
- A bank teller was asked to cash a check for \$180 and to give the customer the same number of \$10 bills and \$20 bills. How many bills of each kind did the teller count out?
- In the course of a year, the sum of an investor's gains and losses was \$2400. What were his gains that year?
- Find three consecutive integers whose sum is 47 more than the largest integer.
- Find two consecutive integers whose sum is 48.
- Chan bought more 25¢ stamps than 15¢ stamps. How many of each kind did he buy if the total cost of the stamps is \$7.80?
- Hans has as many dimes as quarters. The dimes and quarters total \$10. How many of each kind does he have?
- Last month Charlene worked as many 8 h shifts as she worked 10 h shifts. How many 8 h shifts did she work last month?
- Georgette has the same number of 25¢ stamps as she does 15¢ stamps. Six times the value of the 25¢ stamps is a dollar more than 10 times the value of the 15¢ stamps. How many of each type of stamp does she have?
- Last month Theo worked the same number of hours on 8 h shifts as he did on 6 h shifts. One fourth the amount of time he put in at 8 h shifts was 1 h less than one third the time he put in at 6 h shifts. How many hours did he work at each type of shift?

**Mixed Review Exercises**

**Solve.**

1.  $-5x = 40$

2.  $2(n - 3) = 28$

3.  $32 = -4x$

4.  $-n + 6 = 2$

5.  $x - 5 = |3 - 7|$

6.  $-y + 15 = 10$

7.  $-\frac{1}{2}(x + 4) = 3$

8.  $\frac{1}{5}x = 12$