Section 4.5 Applications

1. Blueprint for Problem Solving: Follow these steps for solving applied problems.

Step 1 Read the problem, and then mentally list the items that are known and the items that are unknown.

Step 2 Assign a variable to one of the unknown items. (In most cases this will amount to letting x equal the item that is asked for in the problem.) Then translate the other information in the problem to expressions involving the variable.

Step 3 Reread the problem, and then write an equation, using the items and variables listed in Steps 1 and 2, that describes the situation.

Step 4 Solve the equation found in Step 3.

Step 5 Write your answer using a complete sentence.

Step 6 Reread the problem, and check your solution with the original words in the problem.

When solving an applied problem, you must show the following steps:

- Write a statement telling what quantity your variable(s) represent.
- Write an equation that describes the situation given in the problem.
- Solve the equation, showing steps.
- Write your solution to the applied problem using the correct units and in English words.

Each of the steps above is worth points on a test. Leaving out any step will result in the loss of the points for that step.

2. Number Problems: To solve number problems,

- Let x stand for the number that you are looking for.
- Translate the given problem into an equation using mathematical symbols for the words in the problem.
- Solve the equation.
- Write your solution in English words.

Example 1: Solve the given number problems.

a. The difference of a number and 10 is –15. Find the number.

b. Four times the sum of twice a number and 6 is –8. Find the number.

c. The product of a number and –4 is –21. Find the number.

3. Geometry Problems: To solve a geometry problem:

- Draw a figure if needed.
- Then label your unknown with a statement or by labeling it on your figure.
- Recall the geometry formula that is called for in the problem. This formula becomes your equation. Plug in any known values.
- Solve the equation.
- Write your solution in English words using proper units.

The problems in this section use geometry formulas that we have learned in previous sections as well as one new formula.

New formula: In any triangle, the sum of the angles is 180°.

Example 2: Solve the following geometry problem.

a. The length of a rectangle is three times the width. The perimeter is 80 feet. Find the length and the width.

b. One angle in a triangle measures twice the smallest angle, while the largest angle is six times the smallest angle. Find the measures of all three angles.

4. **Age Problems:** To solve age problems:
   - Set up a chart with the names of the people involved along the rows and the "now" and "years ago (or years in the future) as the columns.
   - Label one of the boxes "x", and fill in the other boxes appropriately.
   - Read the problem and use the information in the problem to write an equation using quantities in some of the boxes.
   - Solve the equation.
   - Write your solution(s) in English words.

   Example 3: Solve the following age problem.

   Diane is 23 year older than her daughter Amy. In 5 years, the sum of their ages will be 91. How old are they now?

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Practice Problems. Solve the given word problems. When solving an applied problem, you must show the following steps:

- Write a statement telling what quantity your variable(s) represent.
- Write an equation that describes the situation given in the problem.
- Solve the equation, showing steps.
- Write your solution to the applied problem using the correct units and in English words.

a. The sum of twice a number and –7 is 29. Find the number.

b. The width of a rectangle is 3 feet less than its length. If the perimeter is 22 feet, what is the width?

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c. Pat is 2 years younger than his wife, Wynn. Ten years ago the sum of their ages was 48. How old are they now?

Answers to Practice Problems:
a. The number is 18. b. The width is 4 ft.
c. Pat is 33 and Wynn is 35.

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