§ 1.7 Problem Solving: Interest, Mixture, Constant Rate Applications

Translating Verbal Descriptions into Mathematical Expressions

Example 1: Write an algebraic expression for the verbal description.

a) The length of a rectangle is four times its width.

b) Five times a number, decreased by 3.

c) The product of 3 and a number increased by 5.

Example 2: Solve for the indicated variable.

a) $P = 2l + 2w$ (for l). b) $V = l \cdot w \cdot h$ (for w)

Solving Applied Problems

Step 1: Read the problem thoroughly.
Step 2: Give one unknown quantity a variable name and write it down.
Step 3: Draw a picture or make a chart to show the information. (If applicable).
Step 4: Write all other unknowns in terms of the variable.
Step 5: Write an equation in one variable.
Step 6: Solve the equation.
Step 7: Check the solution in the words of the problem to be sure it makes sense.

Simple Interest Problems

If a principal of **P** dollars is borrowed for a period of **t** years at a interest rate **r**, the interest **I** charged is

$$I = Prt$$

Example 3: Suppose that Juanita borrows $500 for 6 months at the simple interest rate of 9% per year. What is the interest that she will be charged on the loan? How much does Juanita owe after 6 months?

Solve Mixture Problems

These problems combine two or more quantities to form a mixture.

Example 4:

The manager of a Starbucks store decides to experiment with a new blend of coffee. She will mix some B grade Colombian coffee that sells for $5 per pound with some A grade Arabica coffee that sells for $10 per pound to get 100 pounds of the new blend. The selling price of the new blend is to be $7 per pound, and there is to be no difference in revenue from selling the new blend versus selling the other types. How many pounds of the B grade Colombian and A grade Arabica coffees are required?

Solve Constant Rate Job Problems

If a "machine" can perform a task in 5 hours, then it completes $\frac{1}{5}$ of the task each hour. This is the machine's **work rate**. The combined work rate of two or more "machines" is the sum of their individual work rates.

Example 5:
At 10 AM Danny is asked by his father to weed the garden. From past experience, Danny knows that this will take him 4 hours, working alone. His older brother, Mike, when it is his turn to do the job, requires 6 hours. Since Mike wants to go golfing with Danny and has a reservation for 1 PM, he agrees to help Danny. Assuming no gain or loss of efficiency, when will they finish if they work together? Can they make the golf date?