# Mini-Lecture 1.2

An Introduction to Problem Solving

#### **Learning Objectives:**

- 1. Translate English sentences into mathematical statements.
- 2. Model and solve direct translation problems.
- 3. Model and solve mixture problems.
- 4. Model and solve uniform motion problems.

#### **Preparing for Problem Solving:**

Express each English phrase as an algebraic expression.

*i*) 9 less than a number, t

ii) 2 more than 4 times the height, h

$$2+4h$$

#### Examples:

- 1. Translate each of the following English statements into a mathematical statement. Then solve the equation.
  - a) The difference between -12 and a number, *x*, is 20.

$$-12 - \chi = 20 \rightarrow \chi = -32$$
  
+12 +12 -x = 32

b) Twice the sum of a number, *z*, and 3 is the same as 5 times the number.

$$Z(z+3) = 5z$$
 7  $Z = 2$   
 $2z+6=5z$   
 $6=3z$ 

2. Consecutive Integers The sum of three consecutive odd integers is -147. Find the integers.

3. **Sales Tax** Cheryl purchased a new 4 GB iPod nano for \$268.75. If this price includes sales tax at the rate of 7.5%, what is the price of IPod without taxes?

>=#250 eorig. price P + .075p = 268.75he nano cost \$250 1.075p = 268.751.075 1.075

## SIMPLE INTEREST FORMULA

If a principal of P dollars is borrowed for a period of t years at an annual interest rate r, expressed as a decimal, the interest I charged is

I = Prt

Interest charged according to this formula is called simple interest.

4. **Investments** Amelia just received a \$9000 bonus. She has been advised to invest her bonus in two accounts, one yielding 3% per annum and the other 8% per annum. If Amelia wants to earn \$580 in interest, how much should she put in each account?

 $3_{x} = 7.800$ X=principle in 3%  $(2)_{9000} - x = prin. in 8\%$ 800a. 3% .03x + .08(9000 - x) = 580

5. Candy Store Valentine's Day is coming up so Andy decided to buy chocolates for his co-workers at \$4.50 per pound and truffles for his girlfriend at \$7.50 per pound. If he purchased a total of 11 pounds of candy and spent \$58.50, how many pounds of each type did he buy?

( = 8 X = pounds of choc. 8 lbs. choc. 3 lbs. truffles  $\frac{\partial}{\partial l} = pounds$  of truffles 4.5x + 7.50(11-x) = 58.50

### UNIFORM MOTION FORMULA

If an object moves at an average speed r, the distance d covered in time t is given by the formula

d = rt

6. **Boats** Two boats are traveling towards the same port from opposite directions. They are 63 miles apart and one boat is traveling 6 mph faster than the other. If the boats both reach the port in 4 hours and 30 minutes, find the speed for each.

 $4 \xrightarrow{r(4.5)} (r+6)4.5 4$ 2 r = rate lst. r+6 = rate 2nd. 4.5r + 4.5(r+6) = 633 V = 4 mphV + 6 = 10 mph