Section 1.1 Linear Equations

Equation : A statement that two expressions are equal.

Example: $x + 2 = 9$

Solve: Find <u>all</u> numbers that makes the equation a true statement.

Solution: <u>a</u> number that makes the equation a true statement.

Solution Set: <u>all</u> the numbers that make the equation a true statement.

Identity equation : An equation that is true for <u>every</u> real number in the domain of the variable in the equation.

Conditional equation :   an equation that is satisfied (A Solution) by some numbers but not by others.

Contradiction: An equation which is false for every value of the variable in the equation.

Steps for Solving a Linear Equation

To solve a linear equation, follow these steps:

Step1: List any restrictions on the variable.

Step 2: If necessary, clear the equation of fractions by multiplying both sides (of the equation) by the least common multiple (LCM) of the denominators of **ALL** the fractions in the equation.

Step 3: Remove all parentheses and simplify.

Step 4: Collect all terms containing the variable on one side and all remaining terms on the other side.

Step 5: Simplify and solve.

Step 6: Check your solution(s).

Linear equation in one variable:

> an equation that can be written in the form:
> **ax + b = 0**,   where a ≠ 0.

Example 1: $3x - 5 = 4$

Example 2: $6(x - 1) + 4 = 3(7x + 1)$

Solving equations with fractions in them?

Clear the equation of all fractions. This is done by multiplying both members of the equation by the <u>Least Common Denominator</u> of <u>all</u> the fractions in the equation .

Example: $\dfrac{1}{2}(x + 5) - 4 = \dfrac{1}{3}(2x - 1)$

Example: $\dfrac{3}{x-2} = \dfrac{1}{x-1} + \dfrac{7}{(x-1)(x-2)}$

An equation with no solution:

Example: $\dfrac{3x}{x-1} + 2 = \dfrac{3}{(x-1)}$

Steps for Solving Applied Problems

<u>Step1</u>: Read the problem carefully, perhaps two or three times. Pay particular attention to the question being asked in order to identify what you are looking for. If you can, determine realistic possibilities for the answer.

<u>Step 2</u>: Assign a letter (variable) to represent what you are looking for, and, if necessary, express any remaining unknown quantities in terms of this variable.

<u>Step 3</u>: Make a list of all the known facts, and translate them into mathematical expressions. These may take the form of an equation (or later, an inequality) involving the variable. If possible, draw an appropriately labeled diagram to assist you. Sometimes a table or chart helps.

<u>Step 4</u>: Solve the equation for the variable, and then answer the question, usually using a complete sentence.

<u>Step 5</u>: Check the answer with the facts in the problem. If it agrees, congratulations! If it does not agree, try again.

EXAMPLE:
ANDY GROSSED $435 ONE WEEK BY WORKING 52 HOURS. HIS EMPLOYER PAYS TIME-AND-A-HALF FOR ALL HOURS WORKED IN EXCESS OF 40 HOURS. WHAT IS ANDY'S HOURLY WAGE?