Lesson 39 Sections 7.6 and 8.1
Solving Radical Equations
Using the Principle of Square Roots to Solve an Equation

$x = 3$

You know you can add, subtract, multiply, or divide (by nonnegative number) and get a true equation. Let's see if both sides can be raised to the same power. Square both sides of the equation above.

$x^2 = 9$

Is $x = 3$ still a solution? Yes. However, -3 could also be a solution of the squared equation. So raising both sides to the same power results in an equation with a solution of the original equation. However, sometimes there may also be solutions that are not solutions of the original equation.

Power Rule: If $a = b$, then $a^2 = b^2$ has the same solution as the original equation. However, the squared equation may also have 'extra' solutions that are not solutions of the original equation. **<u>Therefore, all solutions of a squared equation must be checked in the original equation.</u>**

Solve the following equations. Check all solutions.

16) $\sqrt{3x - 2} = 6$

Before squaring, the radical must be isolated.

17) $\sqrt{x} - 2 = 5$

18) $\sqrt{a - 1} - 5 = -7$

19) $\sqrt{x - 2} - 7 = -4$

20) $\frac{\sqrt{2x} - 1}{-2} = -1$

21) $\sqrt{4x+13} = x+2$

A **Quadratic Equation** is any equation that can be written in the form $ax^2 + bx + c = 0$.

You have already learned one way to solve a quadratic equation, using factoring as in the following example.

$3x^2 - 2 = 5x$

$3x^2 - 5x - 2 = 0$

$(3x+1)(x-2) = 0$

$3x+1 = 0 \qquad x-2 = 0$

$3x = -1 \qquad x = 2$

$x = -\frac{1}{3}$

You will now learn another way to solve a quadratic equation. In lesson 40, you will learn a third way to solve quadratic equations.

Using the Principle of Square Roots

Principle of Square Roots:

For any real number k, if $x^2 = k$ then $x = \sqrt{k}$ or $x = -\sqrt{k}$.

Use the principle of square roots to solve these two quadratic equations.

1) $x^2 = 9$

2) $3y^2 - 2 = 0$

The principle of square roots can be generalized. X = a quantity

If $X^2 = k$ then $X = \sqrt{k}$ or $X = -\sqrt{k}$

3) $(x+3)^2 = 36$

4) $(n+2)^2 = 12$

5) If $f(x) = (2x-1)^2$, find any values of x such that $f(x) = 11$.