**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. **Therefore, all solutions of a squared equation must be checked in the original equation.**

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) $\dfrac{\sqrt{2x}-1}{-2}=-1$

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.

$3x^2-2=5x$

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

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

$3x+1=0$ or $x-2=0$

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

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

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. $Q$ = a quantity

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

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

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

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