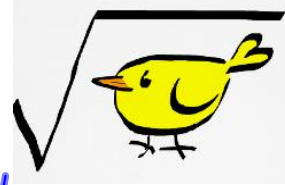


# 11.3 Solve Radical Equations

Radical equation: Has an expression with a variable in the radical.

ex  $\sqrt{x} = 2$  ,  $3\sqrt{7x} - 4 = 10$



To solve, isolate the radical

Squaring both side of an equation:

If 2 expression are equal, there squares are equal.

If  $a = b$   
Then  $a^2 = b^2$

If  $\sqrt{x} = 3$   
then  $(\sqrt{x})^2 = (3)^2$   
 $x = 9$

$$2\sqrt{x} - 8 = 0$$

$2\sqrt{x} = 8$  add 8 to both sides  
 $\sqrt{x} = 4$  divide both sides by 2  
 $(\sqrt{x})^2 = 4^2$  Square both sides  
 $x = 16$  Simplify  
 Solve

$$\sqrt{x} - 7 = 0$$

$$(\sqrt{x})^2 = 7^2$$

$$x = 49$$

$$12\sqrt{x} - 3 = 0$$

$$12\sqrt{x} = 3$$

$$\sqrt{x}^2 = \frac{3}{12} = \left(\frac{1}{4}\right)^2$$

$$x = \frac{1}{16}$$

## Solve a Radical Equation

2.  $\sqrt{x-5} + 7 = 12$  **28**

3.  $(\sqrt{x+4})^2 = (\sqrt{2x-1})^2$   
 $x+4 = 2x-1$   
 $-x+4 = -1$   
 $-x = -5$   
 $x = 5$

$(\sqrt{3x-17})^2 = (\sqrt{x+21})^2$

$3x-17 = x+21$   
 $2x-17 = 21$   
 $2x = 38$   
 $x = 19$

4.  $\sqrt{4x-3} - \sqrt{x} = 0$

$(\sqrt{4x-3})^2 = (\sqrt{x})^2$   
 $4x-3 = x$   
 $3x-3 = 0$   
 $3x = 3$   
 $x = 1$

## Extraneous Solutions

Solve  $(\sqrt{6-x})^2 = (x)^2$

$6-x = x^2$   
 $6 = x^2 + x$   
 $x^2 + x - 6 = 0$   
 $(x+3)(x-2) = 0$

$x+3=0$        $x-2=0$   
 ~~$x=-3$~~        $x=2$

Check

~~$\sqrt{6-(-3)} = -3$~~   
 ~~$\sqrt{9} = -3$~~

$\sqrt{6-2} = 2$   
 $\sqrt{4} = 2$  ✓

**MULTI-STEP PROBLEM** The velocity  $v$  (in meters per second) at which a trapeze performer swings can be modeled by the function  $v = \sqrt{19.6d}$  where  $d$  is the difference (in meters) between the highest and lowest position of the performer's center of gravity during the swing.

- a. A trapeze performer swings at a velocity of 5 meters per second. What is the value of  $d$ ?
  
  
  
  
  
  
  
  
  
  
  
- b. Suppose the performer jumps straight up off the starting board, increasing the velocity of the swing by 0.4 meter per second. By how many meters does the value of  $d$  increase?