In this section we will discuss

* The Principal of Powers
* Equations with two radical terms

Recall again,

Def: The **solution** to an equation is the value of the unknown(s) that makes the equation true.

## The Principal of Powers

The Principal of Powers

If $a=b$ then $a^{n}=b^{n}$

Note: This is a conditional statement like “If it is an apple then it is a fruit”. Notice that this statement is not “commutative” in the sense that it does not necessarily work backwards. So the statement “If it’s a fruit then its an apple” is not necessarily true, because some fruit are oranges or peaches.

In math this will look like

$$If x=-3 then x^{2}=9$$

And backwards it may not necessarily be true.

$$If x^{2}=9 then x=-3$$

This is not necessarily true because $x$ could equal $3$.

So when we are looking for solutions we need to be very careful to check to be sure it actually makes the equation true.

Ex: Find the solution to the equations:

a)$\sqrt{x}+5=3$ b)$\sqrt{x}-3=4$

a)$\sqrt{x}=-2\rightarrow x=4 or$

$$ x is not a real number$$

if you get $x=4$ then you need to plug it in to see if it makes the equation true.

$\sqrt{4}+5=7\ne 3$ So, no solution.

Note: This type of issue will only arise for even valued roots like square roots, 4th roots, 6th roots, etc.

Find the solutions:

Ex:

a) $\sqrt[3]{6x+9}+5=2$

 b) $\sqrt[4]{2x+3}-5=-2$



 c) $x=\sqrt{x-1}+3$



 d) $3+\sqrt{z-6}=\sqrt{z+9}$



Ex: Find any x for which

a) $g\left(x\right)=5$ if $g\left(x\right)=\sqrt{x}+\sqrt{x-5}$



b) $g\left(x\right)=1$ if $g\left(x\right)=\sqrt{x}+\sqrt{x-9}$

