Roots Properties
By **BrushMyQuant**

YouTube Video Link to this Post is Here

Following is covered in the video

¤ **Square root of a number is ALWAYS positive**
¤ **Simplifying $\sqrt{a} * \sqrt{b}$**
¤ **Simplifying $\sqrt{a} / \sqrt{b}$**
¤ **Simplifying $(\sqrt{a})^n$**
¤ **Simplifying $\sqrt{(x \pm y)}$**
¤ **Simplifying $a^{(x/y)}$**
¤ **Simplifying $\sqrt{(a^2)}$**
¤ **Simplifying $\sqrt{n}$**

Square root of a number is ALWAYS positive

Even root of any number will always be a positive value
Ex: $\sqrt{36} = + 6$

Although, $x^2 = 36 \Rightarrow x = \pm \sqrt{36} = \pm 6$

Simplifying $\sqrt{a} * \sqrt{b}$

$\sqrt{a} * \sqrt{b} = \sqrt{(ab)}$
Ex: $\sqrt{2} * \sqrt{3} = \sqrt{(2*3)} = \sqrt{6}$

Simplifying $\sqrt{a} / \sqrt{b}$

$\sqrt{a} / \sqrt{b} = \sqrt{(a/b)}$
Ex: $\sqrt{4} / \sqrt{2} = \sqrt{(4/2)} = \sqrt{2}$

Simplifying $(\sqrt{a})^n$

$(\sqrt{a})^n = \sqrt{(a^n)}$

Ex: $(\sqrt{2})^4 = \sqrt{(2^4)} = 2^2 = 4$

Simplifying $\sqrt{(x \pm y)}$

$\sqrt{(x \pm y)} \neq \sqrt{x} \pm \sqrt{y}$
Ex: $\sqrt{(2 + 3)} \neq \sqrt{2} + \sqrt{3}$
=> $\sqrt{5} \neq \sqrt{2} + \sqrt{3}$
=> $2.23 \neq 1.414 + 1.732$
=> $2.23 \neq 3.146$

Simplifying $a^{(x/y)}$

$a^{(x/y)} = \sqrt[y]{a^x}$
Ex: $2^{(6/3)} = \sqrt[3]{2^6} = 2^2 = 4$

Simplifying $\sqrt{(a^2)}$

$\sqrt{(a^2)} = |a|$
$\sqrt{(a^2)} = -a$, when $a \leq 0$
$\sqrt{(a^2)} = a$, when $a \geq 0$

Ex: $\sqrt{(3^2)} = +3 = |3|$
$\sqrt{(-3^2)} = 3 = -(-3) = |-3|$

Simplifying $\sqrt{n}$

To simplify $\sqrt{n}$, we need to express n in powers of prime numbers and then need to take out the even powers.

Example: $\sqrt{56} = \sqrt{(4*14)} = \sqrt{((2^2) * 14)} = 2\sqrt{14}$

Hope it helps!
Good Luck!