In general:

All positive numbers have:	All Negative numbers have:
2 Real Even Roots $\pm$	0 Real Even Roots
1 Odd Root $+$	1 Odd Root $-$

Is the coefficient of each positive, negative, or both?

a $12m$ w^7 $(x-8)^2$ $|x+3|$

All are positive

Principal Root: When a number has two square roots the Principal Root is the positive root.

The radical symbol $\sqrt{\ }$ indicates the Principal Root.

POS

$-\sqrt{\ }$ Indicates the Negative Root

$\pm\sqrt{\ }$ Incidates both roots.

$\sqrt[n]{a}$ When n is even the answer must be Positive!

Unless you see $-\sqrt{\ }$ or $\pm\sqrt{\ }$

$\sqrt[n]{a}$ When n is odd the answer can be Positive OR Negative.

Answer has the same sign as the radicand.

Can you tell if each answer is positive, negative, or both?

1. $-\sqrt{P}$ Neg

2. $\sqrt[3]{H}$ Pos or Neg

3. $\sqrt[6]{R}$ Pos

4. $\pm\sqrt[8]{C}$ Both Pos and Neg

Can you tell if each answer is positive or negative?

1. a^4 POS

2. b^7 Could be Pos or Neg

3. c^3 Could be Pos or Neg

4. d^{10} POS

In general:

- any real number raised to an even power is always POS

- any real number raised to an odd power can be either POS or NEG

Has the same sign as the base

DEFINITELY POSITIVE:

$\sqrt[\text{even}]{\quad}$ x^{even}

COULD BE POS OR NEG:

$\sqrt[\text{odd}]{\quad}$ x^{odd}

Simplify each:

1. $\sqrt[2]{g^{12}} = (g^{12})^{\frac{1}{2}} = g^6$

2. $\sqrt[4]{w^{20}} = |w^5|$

3. $\sqrt[5]{x^{35}} = x^7$

4. $\sqrt[3]{h^{12}} = h^4$

To ensure that the result of an even root is positive (Principal Root) you may have to place some or all of the answer in Absolute Value symbols.

- Absolute Value symbols must be used if:
  Index is EVEN and result could be negative
  (has an ODD exponent)
- No Absolute Value symbols should be used if:
  - Index is EVEN and answer is positive
    (has an EVEN exponent)
  - Index is ODD

Simplify each.

1. $\sqrt{m^{13}}$

$\sqrt{m^{12} \cdot m^1}$

$m^6\sqrt{m}$

2. $\sqrt[3]{c^{20}}$

$\sqrt[3]{c^{18} \cdot c^2} = c^6\sqrt[3]{c^2}$