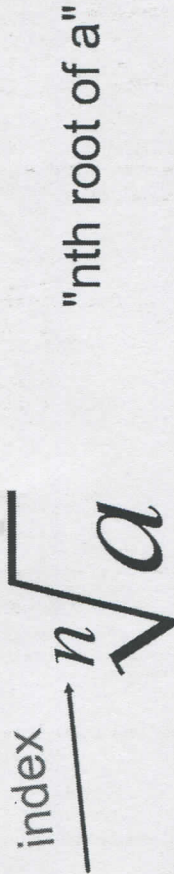


OBJECTIVE 1: nth Root



The index "n" can change to whatever it wants. We call them square roots because if there is not a number there it defaults to a 2 for "square." If it is a 3, then it is called a cube root.

The index tells us how many of the same number we need in order for it to come outside of the radical.

ie: $\sqrt[2]{4} = \sqrt{2 \cdot 2} = 2$ or $\sqrt[3]{8} = \sqrt[3]{2 \cdot 2 \cdot 2} = 2$ or $\sqrt{8} = \sqrt{2 \cdot 2 \cdot 2} = 2\sqrt{2}$

It matters if the "n" is an even number or an odd number when it comes to + and - signs.

TASK 1: Find the indicated real nth root(s) of "a".

Show the set up and then simplify if possible.

a) $n = 4$ & $a = 16$

$\sqrt[4]{16} = \sqrt[4]{2 \cdot 2 \cdot 2 \cdot 2} = 2$

c) $n = 5$ & $a = -243$

$\sqrt[5]{-243} = -3$

b) $n = 3$ & $a = -125$

$\sqrt[3]{-125} = -5$

Real nth Roots of a	
n is even	n is odd
a < 0 imaginary	a < 0 $\sqrt[n]{a} = a^{\frac{1}{n}}$
a = 0	a = 0
a > 0 $\pm \sqrt[n]{a} = \pm a^{\frac{1}{n}}$	a > 0 $\sqrt[n]{a} = a^{\frac{1}{n}}$

OBJECTIVE 2: Rational Exponents

TASK 2:

Evaluate WITHOUT a calculator and then with a calculator.

a) $2^{\frac{5}{2}}$ or $\sqrt[2]{4^5}$ or $\sqrt[5]{32}$
 $(2)^5 = \boxed{32}$

c) $(\sqrt[4]{16})^5$ or $\sqrt[5]{16^4}$
 $(2)^5 = \boxed{32}$

b) $81^{\frac{3}{2}}$
 $(\sqrt[4]{81})^3$ or $\sqrt[3]{81^2}$
 $(3)^3 = \boxed{27}$

Let $\sqrt[n]{a}$ be an n th root of a , and let m be a positive integer.

$$\frac{m}{a^n} = (a^n)^{\frac{m}{n}} = (\sqrt[n]{a})^m \text{ OR } \sqrt[n]{a^m}$$

$$a^{\frac{m}{n}} = \frac{1}{(\frac{1}{a^n})^m} = \frac{1}{(\sqrt[n]{a})^m}, a \neq 0$$

OBJECTIVE 3: Solving Equations with n^{th} Roots

STEPS:

- 1) Get the exponent alone
- 2) Use the inverse to "cancel" the exponent
 - A square cancels a square root
 - A cube cancels a cube root
 - A fourth cancels a fourth root

TASK 3: Solve the Equations with the n^{th} Roots

a) $8x^3 = 64$

$$\sqrt[3]{\frac{8x^3}{8}} = \sqrt[3]{\frac{64}{8}} < 4 < \frac{2}{2}$$
$$\boxed{X=2}$$

b) $\frac{1}{2}x^5 = 512 \cdot 2$

$$\sqrt[5]{\frac{1}{2}x^5} = \sqrt[5]{1024}$$
$$\boxed{X=4}$$

c) $(x+5)^4 = \sqrt[4]{16}$

$$x+5 = \sqrt[4]{16} < 4 < \frac{2}{2}$$

$$x + \frac{5}{-5} = \pm \frac{2}{-5}$$

$$x = -5 \pm 2 \rightarrow -5+2 = -3$$

$$\rightarrow -5-2 = -7$$

$$\boxed{X = -3, -7}$$

Still need help with: