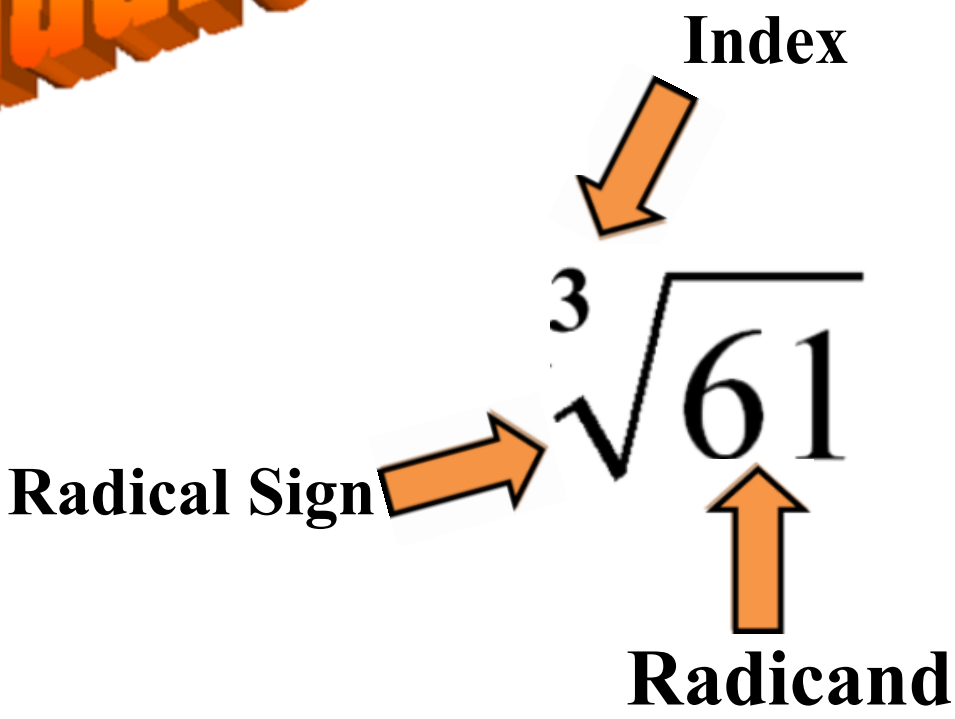
$\sqrt[3]{27}$

$\sqrt[5]{243}$

Roots & Powers

$(1/4)^{-3}$

Radicals



ERASE FOR ANSWERS

Let's Check Your Understanding!

1. **What is the index of $\sqrt[5]{13}$**

   5

2. **What is the radicand of $\sqrt[7]{24}$**

   24

3. **Explain the meaning of the index.**

   The index tells us which root to take.

4. **Write 2 as a square root, a cube root, and a fourth root.**

$$2^2 = 4, \quad \sqrt{4} = 2$$
$$2^3 = 8, \quad \sqrt[3]{8} = 2$$
$$2^4 = 16, \quad \sqrt[4]{16} = 2$$

Our Lifelines

Perfect Squares	Perfect Cubes	Perfect Fourth Root
$2^2 = 4$	$2^3 = 8$	$2^4 = 16$
$3^2 = 9$	$3^3 = 27$	$3^4 = 81$
$4^2 = 16$	$4^3 = 64$	$4^4 = 256$
$5^2 = 25$	$5^3 = 125$	$5^4 = 625$
$6^2 = 36$	$6^3 = 216$	$6^4 = 1296$
$7^2 = 49$	$7^3 = 343$	$7^4 = 2401$
$8^2 = 64$	$8^3 = 512$	$8^4 = 4096$
$9^2 = 81$	$9^3 = 729$	$9^4 = 6561$
$10^2 = 100$	$10^3 = 1000$	$10^4 = 10000$
$11^2 = 121$	$11^3 = 1331$	$11^4 = 14641$

Estimating Radicals

What is the square root of 13?

$\sqrt{9}$ $\sqrt{13}$ $\sqrt{16}$

3 ? 4

13 is closer to 16 ..... 3.8

$3.8^2 = 14.44$ To far away. Let try something smaller

$3.7^2 = 13.69$ Try again

$3.6^2 = 12.96$ Close enough !!!

Estimating Radicals

What is the square root of 41?

$\sqrt{36}$ $\sqrt{41}$ $\sqrt{49}$

6 ? 7

41 is closer to 36 ..... 6.4

$6.4^2 = 40.96$ Close Enough !!

Perfect Cubes

$2^3 = 8$
$3^3 = 27$
$4^3 = 64$
$5^3 = 125$
$6^3 = 216$
$7^3 = 343$
$8^3 = 512$
$9^3 = 729$
$10^3 = 1000$
$11^3 = 1331$

Estimating Radicals

What is the cube root of 68?

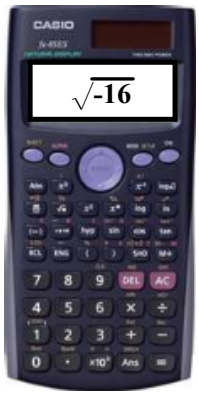
$\sqrt[3]{64}$ $\sqrt[3]{68}$ $\sqrt[3]{125}$

4 ? 5

68 is closer to 64 ..... 4.2

$4.2^3 = 74.08$ Try Again
$4.1^3 = 68.921$ Try Again
$4.08^3 = 67.9173$ Close Enough

Can You Find the Root of a Negative Number?



Calculate $\sqrt{-64}$ = Error !!!

DOES THIS MEAN WE CAN'T TAKE THE ROOT OF A NEGATIVE NUMBER?

Let Try

$$\sqrt[3]{-64} = -4$$

$$\sqrt[4]{-64} = \text{Error}$$

$$\sqrt[5]{-64} = -2.29739....$$

What do you Notice?

Look at the Index !!

Even index - Can not be evaluated

Odd index - Can be evaluated