

$$\sqrt[3]{27}$$

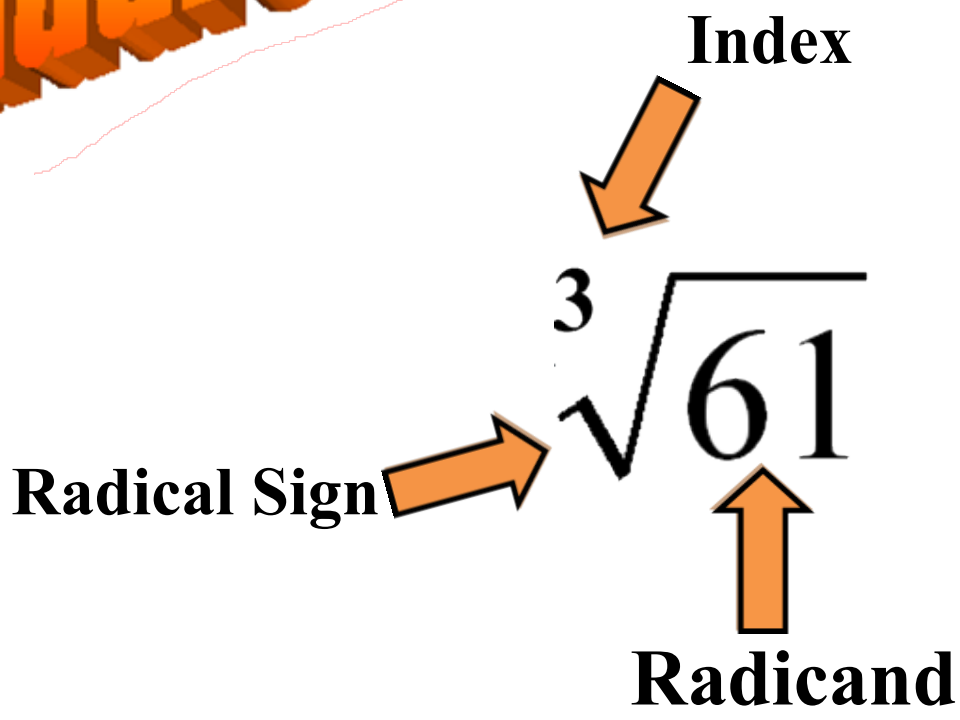
$$\sqrt[5]{243}$$

Roots & Powers



$$\left(\frac{1}{4}\right)^{-3}$$

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.

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



**Perfect
Squares**

$$\begin{aligned} 2^2 &= 4 \\ 3^2 &= 9 \\ 4^2 &= 16 \\ 5^2 &= 25 \\ 6^2 &= 36 \\ 7^2 &= 49 \\ 8^2 &= 64 \\ 9^2 &= 81 \\ 10^2 &= 100 \\ 11^2 &= 121 \end{aligned}$$

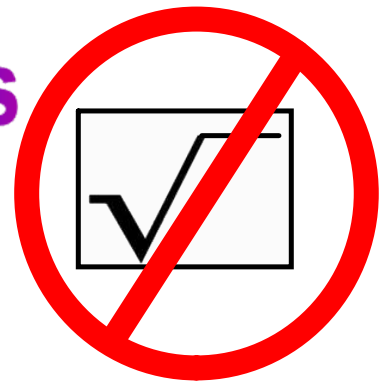
**Perfect
Cubes**

$$\begin{aligned} 2^3 &= 8 \\ 3^3 &= 27 \\ 4^3 &= 64 \\ 5^3 &= 125 \\ 6^3 &= 216 \\ 7^3 &= 343 \\ 8^3 &= 512 \\ 9^3 &= 729 \\ 10^3 &= 1000 \\ 11^3 &= 1331 \end{aligned}$$

**Perfect
Fourth Root**

$$\begin{aligned} 2^4 &= 16 \\ 3^4 &= 81 \\ 4^4 &= 256 \\ 5^4 &= 625 \\ 6^4 &= 1296 \\ 7^4 &= 2401 \\ 8^4 &= 4096 \\ 9^4 &= 6561 \\ 10^4 &= 10000 \\ 11^4 &= 14641 \end{aligned}$$

Estimating Radicals



What is the square root of 13?

$$\sqrt{9}$$



3

$$\sqrt{13}$$



?

$$\sqrt{16}$$



4

13 is closer to 16 3.8

$$3.8^2 = 14.44$$

$$3.7^2 = 13.69$$

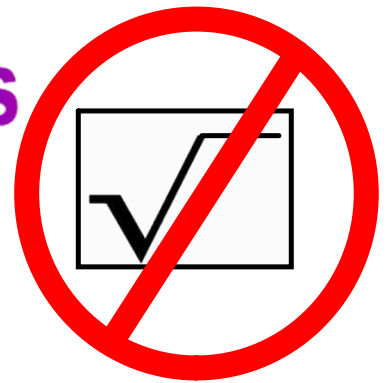
$$3.6^2 = 12.96$$

To far away. Let try something smaller

Try again

Close enough !!!

Estimating Radicals



What is the square root of 41?

$$\sqrt{36}$$

↓
6

$$\sqrt{41}$$

↓
?

$$\sqrt{49}$$

↓
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?

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



4

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



?

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



5

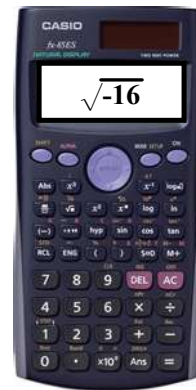
68 is closer to 64 4.2

$4.2^3 = 74.08$ **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 $\sqrt[3]{-64} = -4$
 $\sqrt[4]{-64} = \text{Error}$
 $\sqrt[5]{-64} = -2.29739\dots$

What do you Notice?

Look at the Index!!

Even index - Can not be evaluated
Odd index - Can be evaluated