

## SQUARE ROOTS

THE INVERSE OF A SQUARE IS A SQUARE ROOT.

$$\sqrt{1} = 1$$

$$\sqrt{4} = 2$$

$$\sqrt{9} = 3$$

$$\sqrt{16} = 4$$

$$\sqrt{25} = 5$$

$$\sqrt{36} = 6$$

$$\sqrt{49} = 7$$

$$\sqrt{64} = 8$$

$$\sqrt{81} = 9$$

$$\sqrt{100} = 10$$

$$\sqrt{121} = 11$$

$$\sqrt{144} = 12$$

$$\sqrt{169} = 13$$

**ROOTS (CONTINUED)**

THERE ARE INFINITE TYPES OF  
ROOTS

**CUBE ROOTS**

$$\sqrt[3]{0} = 0$$

$$\sqrt[3]{1} = 1$$

$$\sqrt[3]{8} = 2$$

**4TH, 5TH, ETC. ROOTS**

$$\sqrt[4]{x}$$

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

$$\sqrt[7]{x}$$

## ROOT PARTS

The diagram shows the expression  $\sqrt[m]{a^n}$  with three handwritten labels in blue ink and red arrows pointing to their respective parts:

- Root: A red arrow points from the word "Root" to the radical symbol  $\sqrt{\phantom{x}}$ .
- exponent: A red arrow points from the word "exponent" to the superscript  $n$ .
- Base: A red arrow points from the word "Base" to the variable  $a$ .

## RATIONAL EXPONENTS

YOU CAN WRITE RATIONAL EXPONENTS BY USING ROOTS.

RATIONAL EXPONENTS: Fraction

The diagram illustrates the relationship between a radical and a rational exponent. On the left, the expression  $\sqrt[m]{a^n}$  is shown. A red arrow points from the word "Root" to the index  $m$ . A green arrow points from the word "EXP" to the exponent  $n$ . This is followed by an equals sign and the expression  $a^{\frac{n}{m}}$ . A green arrow points from the word "EXP. (TOP)" to the numerator  $n$ . A red arrow points from the word "Root (Bottom)" to the denominator  $m$ .

$$\sqrt[m]{a^n} = a^{\frac{n}{m}}$$

$$\sqrt[m]{a^n} = a^{\frac{n}{m}}$$

EXAMPLES:

1. Rewrite

$$\sqrt[4]{x^3}$$

$$x^{3/4}$$

2. Rewrite

$$\sqrt{5x^3}$$

$$(5x)^{3/2}$$

$$\sqrt[m]{a^n} = a^{\frac{n}{m}}$$

EXAMPLES:

3. Rewrite

$$\sqrt[7]{x^2}$$
$$x^{\frac{2}{7}}$$

4. Rewrite

$$\sqrt{2x}$$
$$(2x)^{\frac{1}{2}}$$

## RATIONAL EXPONENTS

YOU CAN WRITE ROOTS BY USING RATIONAL EXPONENTS.

$$a^{\frac{n}{m}} = \sqrt[m]{a^n}$$

**GO BACKWARDS**

EXAMPLES:  $a^{\frac{n}{m}} = \sqrt[m]{a^n}$

1. Rewrite

$$a^{\frac{6}{5}}$$

$$\sqrt[5]{a^6}$$

2. Rewrite

$$(10n)^{\frac{3}{2}}$$

$$\sqrt{(10n)^3}$$



EXAMPLES:  $a^{\frac{n}{m}} = \sqrt[m]{a^n}$

3. Rewrite

$$2^{\frac{5}{3}}$$

$$\sqrt[3]{2^5}$$

4. Rewrite

$$(5x)^{-\frac{5}{4}}$$

$$\frac{1}{5x^{\frac{5}{4}}} = \frac{1}{\sqrt[4]{(5x)^5}}$$