

Rational Exponents

$$\overset{\text{n}^{\text{th}} \text{ root}}{\boxed{}} \quad n\sqrt{b} = b^{\frac{1}{n}} \quad \boxed{}^{\text{n}^{\text{th}} \text{ root}}$$

$\sqrt{b} = b^{\frac{1}{2}}$	$\sqrt{49}$	$49^{\frac{1}{2}}$	7
$\sqrt[3]{b} = b^{\frac{1}{3}}$	$\sqrt[3]{64}$	$64^{\frac{1}{3}}$	4
$\sqrt[4]{b} = b^{\frac{1}{4}}$	$\sqrt[4]{81}$	$81^{\frac{1}{4}}$	3
$\sqrt[5]{b} = b^{\frac{1}{5}}$	$\sqrt[5]{32}$	$32^{\frac{1}{5}}$	2
$\sqrt[6]{b} = b^{\frac{1}{6}}$	$\sqrt[6]{64}$	$64^{\frac{1}{6}}$	2

$$\overset{\text{m}^{\text{th}} \text{ power}}{\boxed{}} \quad (\overset{\text{n}^{\text{th}} \text{ root}}{\boxed{}} \sqrt[n]{b})^m = (b^{\frac{1}{n}})^m = b^{\frac{m}{n}} \quad \boxed{}^{\text{m}^{\text{th}} \text{ power}}$$

$\boxed{}^{\text{n}^{\text{th}} \text{ root}}$
 $\boxed{}^{\text{n}^{\text{th}} \text{ root}}$

$(\sqrt{b})^3 = b^{\frac{3}{2}}$	$(\sqrt{9})^3$	$9^{\frac{3}{2}}$	27
$(\sqrt[3]{b})^2 = b^{\frac{2}{3}}$	$(\sqrt[3]{64})^2$	$64^{\frac{2}{3}}$	16
$(\sqrt[3]{b})^4 = b^{\frac{4}{3}}$	$(\sqrt[3]{8})^4$	$8^{\frac{4}{3}}$	16
$(\sqrt[4]{b})^3 = b^{\frac{3}{4}}$	$(\sqrt[4]{16})^3$	$16^{\frac{3}{4}}$	8
$(\sqrt[5]{b})^2 = b^{\frac{2}{5}}$	$(\sqrt[5]{32})^2$	$32^{\frac{2}{5}}$	4

$$\sqrt[3]{12n} = (12n)^{\frac{1}{3}}$$

$$\sqrt[3]{b} = b^{\frac{1}{3}}$$

$$\sqrt[5]{37} = 37^{\frac{1}{5}}$$

$$\sqrt[2]{144} = 144^{\frac{1}{2}}$$

$$\sqrt[3]{125} = 125^{\frac{1}{3}}$$

$$\sqrt[2]{64} = 64^{\frac{1}{2}}$$

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

$$19ab^{\frac{2}{5}} = 19a\sqrt[5]{b^2}$$

$$y^{\frac{3}{4}} = \sqrt[4]{y^3}$$

$$64^{\frac{2}{3}} = 16$$

$$100^{\frac{2}{3}} = 1000$$

$$\sqrt[3]{16} = 8$$

$$14^{\frac{2}{3}} = \sqrt[3]{14^2}$$

$$5x^{\frac{2}{3}} = 5\sqrt[3]{x^2}$$

$$17y^{\frac{3}{2}} = 17\sqrt[2]{y^3}$$

$$49^{\frac{2}{3}} = 343$$

\uparrow
 $(\sqrt[3]{49})^2$

$$25^{\frac{2}{3}} = 125$$

\uparrow
 $(\sqrt[3]{25})^2$
Simplify!

$$27^{\frac{2}{3}} = 9$$

Practice translating expressions in radical and exponential form.

$$\sqrt[2]{12n} = (12n)^{\frac{1}{2}}$$

$$\sqrt[3]{b} = b^{\frac{1}{3}}$$

$$\sqrt[2]{37} = 37^{\frac{1}{2}}$$

$$\sqrt{144} = 144^{\frac{1}{2}}$$

$$\sqrt[3]{125} = 125^{\frac{1}{3}}$$

$$\sqrt{64} = 64^{\frac{1}{2}}$$

$$x^{\frac{1}{3}} = \sqrt[3]{x}$$

$$19ab^{\frac{2}{1}} = 19ab^2$$

$$\sqrt[4]{y} = y^{\frac{1}{4}}$$

$$64^{\frac{1}{3}} = 4$$

$$100^{\frac{1}{2}} = 10$$

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

$$14^{\frac{2}{1}} = 14^2$$

$$5x^{\frac{2}{1}} = 5x^2$$

$$17y^{\frac{3}{1}} = 17y^3$$

$$49^{\frac{2}{1}} = 7$$

$$25^{\frac{2}{1}} = 5$$

$$27^{\frac{1}{1}} = 3$$

Simplify!

Practice translating expressions in radical and exponential form.