

Rational Exponents

Rational exponent: an exponent that can be written as a fraction or a decimal.

$$a^{1/n} = \sqrt[n]{a}$$

Simplify.

1) $125^{1/3}$

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

2) $5^{1/2} \cdot 5^{1/2}$

$$\sqrt{5} \cdot \sqrt{5} = \sqrt{25} = 5$$

3) $10^{1/3} \cdot 100^{1/3}$

$$\sqrt[3]{10} \cdot \sqrt[3]{100} = \sqrt[3]{1000} = 10$$

4) $2^{1/4} \cdot 8^{1/4}$

Converting to radical form from exponential form: $a^{m/n} = \sqrt[n]{a^m}$ OR $(\sqrt[n]{a})^m$

Write each expression in radical form. (Note: all exponents must be positive and you should have only one radical sign in each problem)

5) $x^{3/5}$

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

6) $y^{2/3}$

$$\begin{aligned} 7) x^{-5/2} &= \frac{1}{x^{5/2}} = \frac{1}{\sqrt{x^5}} = \frac{1}{\sqrt{x^4} \cdot \sqrt{x}} = \frac{1}{x^2 \sqrt{x}} = \frac{\sqrt{x}}{x^2 \sqrt{x} \sqrt{x}} = \frac{\sqrt{x}}{x^3} \\ &= \sqrt[3]{\frac{x}{x^6}} = \sqrt[3]{x^{-5}} = \sqrt[3]{\frac{1}{x^5}} = \frac{1}{\sqrt[3]{x^5}} \end{aligned}$$

9) $y^{-1.4}$

10) $x^{3/2} y^{5/2}$

$$\sqrt{x^3 y^5} = xy^2 \sqrt{xy}$$

11) $(3r)^{2/5} s^{3/5}$

$$\sqrt[5]{3^2 r^2 s^3} = \sqrt[5]{9r^2 s^3}$$

12) $x^{2/3} y^{1/6}$

$$\sqrt[6]{x^2 y}$$

Write each expression in exponential form.

13) $\sqrt{a^3}$

$$a^{3/2}$$

14) $(\sqrt[3]{b})^2$

$$b^{2/3}$$

15) $\sqrt{10x^5}$

$$10^{1/2} x^{5/2}$$

16) $\sqrt[3]{(10x)^5}$

$$(10x)^{5/3} \text{ OR } 10^{5/3} x^{5/3}$$

17) $\sqrt[3]{4x^6}$

18) $\sqrt[3]{16a^5 b^7}$

