

How do we operate with fractional exponents?

Do Now

$$\sqrt{2} \sqrt{2} = 2$$

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

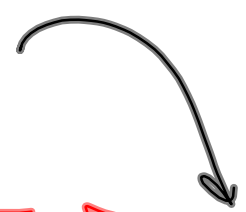
$$2^x 2^x = 2^1$$

$$2^{x+x} =$$

$$2^{2x} = 2^1$$

$$2x = 1$$

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

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


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

$$\sqrt[3]{2} = 2^y = 2^{\frac{1}{3}}$$

$$2^y 2^y 2^y = 2^1$$

$$2^{3y} = 2^1$$

$$3y = 1$$

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

Simplify

$$\begin{aligned} (4a^2b^3)^{\frac{1}{2}} &= \sqrt{4a^2b^3} \\ &= 2ab\sqrt{b} \end{aligned}$$

Simplify

$$(8a^3b^5)^{\frac{1}{3}} = \sqrt[3]{8a^3b^5}$$

$$2ab\sqrt[3]{b^2}$$

Simplify

$$(4a^3)^{\frac{2}{3}} = \left((4a^3)^{\frac{1}{3}} \right)^2$$

$$= \left(\sqrt[3]{4a^3} \right)^2 = \left(\underline{a} \sqrt[3]{\underline{4}} \right)^2$$

$$16 = 2^4$$

$$= a^2 \sqrt[3]{16} = a^2 \sqrt[3]{2^3 \cdot 2}$$

$$= 2a^2 \sqrt[3]{2}$$

Simplify

$$1) (2a^2)^{\frac{3}{2}}$$

$$= \left(\sqrt{2a^2} \right)^3$$

$$= \left(a\sqrt{2a} \right)^3$$

$$= a^3 \sqrt{2a^3}$$

$$= a^3 2a \sqrt{2a}$$

$$= 2a^4 \sqrt{2a}$$

$$2) 3(2a^2)^{\frac{2}{3}}$$

$$= 3 \left(\sqrt[3]{2a^2} \right)^2$$

$$= 3 \left(\sqrt[3]{2^2 a^4} \right)$$

$$= 3a \sqrt[3]{4a}$$

Simplify

$$2x(4x^3y^2)^{\frac{3}{2}}$$

$$\rightarrow 2x(2xy\sqrt{x})^3$$

$$2x(\sqrt{4x^3y^2})^3 = \cancel{4xy}(\sqrt{x})^3$$

$$= 2x(2^3x^3y^3\sqrt{x^3})$$

$$\cancel{4xy\sqrt{3x}}$$

$$= 16x^4y^3x\sqrt{x}$$

$$= 16x^5y^3\sqrt{x}$$