

Simplifying Rational Exponents

Write as Radical Expression

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

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

c) $z^{\frac{1}{4}} = \sqrt[4]{z}$

Write with a Rational Exponent \rightarrow Fractional

$$d) \sqrt{5y} = (5y)^{1/2} \leftarrow 5y^{1/2} \begin{matrix} \downarrow \\ 5\sqrt{y} \end{matrix}$$

$$e) \sqrt[3]{4x} = (4x)^{1/3}$$

$$f) 3\sqrt[4]{5z} = 3(5z)^{1/4}$$

Simplify

$$g) 25^{\frac{1}{2}} = \sqrt{25} = 5$$

$$k) -16^{\frac{1}{4}} = -\sqrt[4]{16} = -2$$

$$h) 64^{\frac{1}{3}} = \sqrt[3]{64} = 4$$

$$l) -(-8)^{\frac{1}{3}} = -\sqrt[3]{-8} = -(-2) = 2$$

$$i) 256^{\frac{1}{4}} = \sqrt[4]{256} = 4$$

$$m) 16^{-\frac{1}{4}} = \frac{1}{2}$$

$$\frac{-2}{2i}$$

$$j) (-16)^{\frac{1}{4}} = \sqrt[4]{-16}$$

= Not Real
2i

$$n) 16^{\frac{1}{4}} = \sqrt[4]{16} = 2$$

$$16^{-\frac{1}{4}} = \frac{1}{16^{\frac{1}{4}}} = \frac{1}{2}$$

121 125 127

131 133 135

137 139

$$2^{-2} = \frac{1}{4}$$

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

$$2^0 = 1$$

$$2^1 = 2$$

$$2^2 = 4$$

$$2^3 = 8$$

$$2^4 = 16$$

$$2^5 = 32$$

$$\frac{2^2}{2^2} = 2^0$$

$$\frac{x^4}{x^4} = x^0 = 1$$

$$\text{o) } (64)^{\frac{1}{2}} = \sqrt{64} = 8$$

$$\text{p) } (64)^{-\frac{1}{2}} = \frac{1}{64^{\frac{1}{2}}} = \frac{1}{\sqrt{64}} = \frac{1}{8}$$

$$\text{q) } (256)^{-\frac{1}{4}} = \frac{1}{256^{\frac{1}{4}}} = \frac{1}{\sqrt[4]{256}} = \frac{1}{4}$$

Write with a rational exponent \rightarrow exponent will be a fraction

$$r) \sqrt{y^3} = (y^3)^{1/2} = y^{\frac{3}{2}}$$

$\frac{3}{2}$ ← power
← Root

$$s) (\sqrt[3]{2x})^4 = ((2x)^{1/3})^4 = (2x)^{\frac{4}{3}}$$

$$t) \sqrt{\left(\frac{3a}{4b}\right)^3} = \left(\frac{3a}{4b}\right)^{\frac{3}{2}}$$

Simplify

$$\begin{aligned} \text{u) } 125^{\frac{2}{3}} &= \sqrt[3]{(125)^2} = \sqrt[3]{15625} = 25 \\ &= \left(\sqrt[3]{125}\right)^2 = 5^2 = 25 \end{aligned}$$

$$\begin{aligned} \text{v) } 4^{\frac{3}{2}} &= \sqrt{4^3} = \sqrt{64} = 8 \\ &= \left(\sqrt{4}\right)^3 = 2^3 = 8 \end{aligned}$$

Simplify

$$w) -25^{\frac{3}{2}} = -(\sqrt{25})^3 = (-5)^3 = -125 \quad i^3 = -i$$

$$x) (-25)^{\frac{3}{2}} = (\sqrt{-25})^3 = (5i)^3 = 125i^3 = -125i$$

$$y) 81^{-\frac{3}{2}} = \frac{1}{81^{\frac{3}{2}}} = \frac{1}{(\sqrt{81})^3} = \frac{1}{9^3} = \frac{1}{729}$$

$$z) -25^{-\frac{3}{2}} = -\left(\frac{1}{25^{\frac{3}{2}}}\right) = -\frac{1}{(\sqrt{25})^3} = -\frac{1}{125}$$

$$i = i$$
$$i^2 = (\sqrt{-1})^2 = -1$$

$$i^3 = i^2 \cdot i = -1 \cdot i = -i$$

$$i^4 = i^2 \cdot i^2 = 1$$

$$i^5 = i^4 \cdot i = i$$

1413-1419

odd