

numerical expressions with exponents

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

$$\frac{1}{a^n} = a^{-n}$$

$$\sqrt[n]{x^m} = x^{m/n}$$

$$\sqrt[n]{x} = \begin{cases} x & \text{if } n \text{ is odd} \\ |x| & \text{if } n \text{ is even} \end{cases}$$

$$(ab)^n = a^n \cdot b^n$$

$$(a^n)^m = a^{n \cdot m} = a^{m \cdot n} = (a^m)^n$$

① Write using exponents.

$$\cdot \frac{1}{\sqrt{5}} = \frac{1}{5^{1/2}} = 5^{-1/2}$$

$$\cdot \sqrt[3]{7^2} = (7^2)^{1/3} = 7^{2/3}$$

$$\cdot \sqrt[5]{5^3} = 5^{3/5}$$

② Evaluate.

$$\cdot \sqrt[3]{-64} = (-64)^{1/3} = ((-4)^3)^{1/3} = -4$$

$$\cdot \sqrt[4]{\frac{1}{16}} = \left(\frac{1}{2^4}\right)^{1/4} = \left|\frac{1}{2}\right| = \frac{1}{2}$$

$$\cdot \sqrt[3]{-\frac{1}{64}} = \left[\left(-\frac{1}{4}\right)^3\right]^{1/3} = -\frac{1}{4}$$

$$\begin{aligned} \cdot \frac{\sqrt[5]{-3}}{\sqrt[5]{96}} &= \frac{(-3)^{1/5}}{(96)^{1/5}} = \left(\frac{-3}{96}\right)^{1/5} = \left(\frac{-3}{3 \times 2^5}\right)^{1/5} = \left(-\frac{1}{2}\right)^{1/5} \\ &= -\frac{1}{2} \end{aligned}$$

③ Use radicals.

$$\cdot 4^{2/3} = \sqrt[3]{4^2} = \sqrt[3]{16}$$

$$\begin{aligned} \cdot 11^{-3/2} &= (11^{-3})^{1/2} = \sqrt{11^{-3}} = \sqrt{\frac{1}{11^3}} \\ &= \frac{\sqrt[2]{1^2}}{\sqrt{11^3}} = \frac{1 \cdot 1}{\sqrt{11^2 \cdot 11}} = \frac{1}{\sqrt{11^2} \cdot \sqrt{11}} \\ &= \frac{1}{11\sqrt{11}} \end{aligned}$$

$$\begin{aligned} \cdot (-32)^{2/5} &= \sqrt[5]{(-32)^2} = \sqrt[5]{(-1)^2 (32)^2} \\ &= \sqrt[5]{(2^5)^2} = \sqrt[5]{(2^2)^5} = 2^2 = 4 \end{aligned}$$

$$\cdot -(32)^{2/5} = -(2^5)^{2/5} = -2^{5 \cdot 2/5} = -4$$