

Questions on 7.1

89. Skip 89-93

$$23. \sqrt[3]{27} = 3$$

$$25. \sqrt[3]{-64} = -4$$

$$49. \sqrt{(x-5)^2} = |x-5|$$

$$\sqrt{9} = \pm 3$$
$$\sqrt{(x-2)^2} = x-2$$

you need the absolute value bars when you have a variable and the root or index is even.

$$31. \sqrt[3]{(2x)^6}$$

$$= \sqrt[3]{(2x)^{2 \cdot 3}}$$

$$= (2x)^2$$

$$= 2^2 x^2$$

$$= 4x^2$$

$$\text{or } \sqrt[3]{64x^6}$$

$$= 4x^2$$

$$\frac{\sqrt[3]{x} \cdot x^{1/3}}{(x^{6/3})^{1/3}}$$
$$= \frac{x^{2/3}}{x^{2/3}}$$
$$= x^2$$

10:23

Section 7.2 - Rational Exponents (Fractional)

$$x^{3/4}$$

Exponent Rules

Product Rule

$$a^p \cdot a^q = a^{p+q}$$

$$x^2 \cdot x^3 \\ x \cdot x \cdot x \cdot x \cdot x = x^5$$

Quotient Rule

$$\frac{a^p}{a^q} = a^{p-q}$$

$$\frac{x^5}{x^3} = \frac{\cancel{x} \cdot \cancel{x} \cdot \cancel{x} \cdot x \cdot x}{\cancel{x} \cdot \cancel{x} \cdot \cancel{x}} = x^2$$

Power Rule

$$(a^p)^q = a^{pq}$$

$$(x^2)^3 = x^2 \cdot x^2 \cdot x^2 \\ = x^6$$

Distributing Power

$$(ab)^p = a^p b^p$$

$$\left(\frac{a}{b}\right)^p = \frac{a^p}{b^p}$$

$$(2x^2)^4 \\ = 2^4 x^8 \\ = 16x^8$$

$$\left(\frac{x^2}{y^3}\right)^4 = \frac{x^8}{y^{12}}$$

Negative Exponents (reciprocal)

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

$$\neq x^{-3} = \frac{1}{x^3}$$

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

$$\frac{1}{y^b} = y^{-b}$$

Fractional Exponents (roots or radicals)

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

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

denominator (pointing to n)
numerator (pointing to m)

$$\sqrt[3]{27} = 3$$

$$27^{(1/3)} = 3$$

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

$$\begin{aligned} & \sqrt[3]{x^6} \\ &= (x^{6/1})^{1/3} \\ &= x^{6/3} \\ &= x^2 \end{aligned}$$

$$a^{-2/3} = \frac{1}{a^{2/3}}$$

Examples

$$18. \quad 10^{1/2} \leftarrow \text{root} = \sqrt{10} = \sqrt{10}$$

$$20. \quad y^{1/4} = \sqrt[4]{y}$$

$$22. \quad x^{3/2} = \sqrt{x^3} \quad \text{or} \quad \sqrt[2]{x^3}$$

$$24. \quad (x+y)^{2/3} = \sqrt[3]{(x+y)^2}$$

$$(x+y)^2 \\ = (x+y)(x+y)$$

$$26. \quad b^{-3/4} = \frac{1}{b^{3/4}} \\ = \frac{1}{\sqrt[4]{b^3}}$$

You do not
need to
rationalize denominators

$$34. \quad \sqrt[3]{a^3+b^3} = (a^3+b^3)^{1/3} \quad \sqrt[4]{\frac{1}{b^3}}$$

42. Calculator

$$13^{5/4} = 13^1 (5/4) \leftarrow \text{must have } ()$$

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$$\approx 24.68$$

$$56. \quad (32)^{-2/5} = \frac{1}{32^{2/5}} \\ = \frac{1}{\sqrt[5]{32^2}} \\ = \frac{1}{\sqrt[5]{2^5 \cdot 2}} \\ = \frac{1}{2^2} \\ = \frac{1}{4}$$

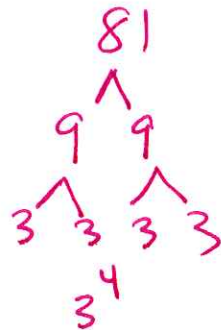
$$2^2 \\ 2^3 \\ 2^4 \\ 2^5 = 32$$

$$32 \\ \swarrow \searrow \\ 2 \quad 16 \\ \swarrow \searrow \\ 2 \quad 8 \\ \swarrow \searrow \\ 2 \quad 4 \\ \swarrow \searrow \\ 2 \quad 2$$

$$54. \left(\frac{1}{81}\right)^{-1/4} = \left(\frac{81}{1}\right)^{1/4} = 81^{1/4} = \sqrt[4]{81}$$

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

$$= 3$$



$$90. \frac{(b^{3/4})^4}{(b^{4/5})^{-5}}$$

$$= \frac{b^{3/4 \cdot 4}}{b^{4/5 \cdot (-5)}} = \frac{b^3}{b^{-4}} = b^3 b^4 = b^7$$

$$98. \frac{\sqrt[5]{32x^2}}{\sqrt[3]{8x}} = \frac{(32x^2)^{1/5}}{(8x)^{1/3}} = \frac{(2^5 x^2)^{1/5}}{(2^3 x)^{1/3}}$$

$$= \frac{2^{5 \cdot \frac{1}{5}} x^{2 \cdot \frac{1}{5}}}{2^{3 \cdot \frac{1}{3}} x^{1/3}}$$

$$= \frac{\cancel{2} x^{2/5}}{\cancel{2} x^{1/3}}$$

$$= x^{\frac{2}{5} - \frac{1}{3}}$$

$$= x^{\frac{2}{3} \cdot \frac{2}{3} - \frac{1}{3} \cdot \frac{5}{5}}$$

$$= x^{\frac{6}{15} - \frac{5}{15}}$$

$$= x^{1/15}$$