

Simplify...

$$\begin{aligned}
 a) \quad & -27^{-\frac{2}{3}} \\
 &= \frac{-1}{27^{\frac{2}{3}}} = \frac{-1}{(\sqrt[3]{27})^2} \\
 &= \frac{-1}{9}
 \end{aligned}$$

$$\begin{aligned}
 c) \quad & \frac{3^{\frac{7}{12}}}{3^{\frac{1}{4}} \cdot 3^{\frac{1}{3}}} \\
 &= \frac{3^{\frac{7}{12}}}{3^{\frac{2}{12}} \cdot 3^{\frac{4}{12}}} \\
 &= \frac{3^{\frac{7}{12}}}{3^{\frac{6}{12}}} \\
 &= 3^{\frac{7}{12} - \frac{6}{12}} = 3^{\frac{1}{12}}
 \end{aligned}$$

$$b) \quad \left(a^{\frac{4}{5}}\right)^{\frac{5}{4}} = 16 \quad (\text{Find } a)$$

$$a = \left(\sqrt[4]{16}\right)^5$$

$$a = 32$$

$$(a^{-1})^2 \quad d) \quad \left(\frac{2a}{b}\right)^{-3} (2ab^2)^2$$

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

$$\left(\frac{b^3}{8a^3}\right) (4a^2b^4)$$

$$= \frac{4a^2b^7}{8a^3}$$

$$= \frac{a^{-1}b^7}{2}$$

$$= \frac{b^7}{2a}$$

$$\frac{4}{8}$$

Example 3**Simplifying Algebraic Expressions with Rational Exponents**

Simplify. Explain the reasoning.

$$\text{c) } \frac{4a^{-2}b^{\frac{2}{3}}}{2a^2b^{\frac{1}{3}}}$$

$$\text{d) } \left(\frac{100a}{25a^5b^{-\frac{1}{2}}} \right)^{\frac{1}{2}}$$

SOLUTION

$$\begin{aligned} \text{a) } (8a^3b^6)^{\frac{1}{3}} &= 8^{\frac{1}{3}} \cdot a^{3\left(\frac{1}{3}\right)} \cdot b^{6\left(\frac{1}{3}\right)} \\ &= (2^3)^{\frac{1}{3}} \cdot a^1 \cdot b^2 \\ &= 2ab^2 \end{aligned}$$

Using the power of a power law.

$$\begin{aligned} \text{b) } (x^{\frac{3}{2}}y^2)(x^{\frac{1}{2}}y^{-1}) &= x^{\frac{3}{2}} \cdot x^{\frac{1}{2}} \cdot y^2 \cdot y^{-1} \quad \text{Use the product of powers law.} \\ &= x^{\frac{3}{2} + \frac{1}{2}} \cdot y^{2 + (-1)} \\ &= x^2y \end{aligned}$$

(Solution continues.)

4.6 Applying the Exponent Laws

$$c) \left(\frac{4a^{-2}b^{\frac{2}{3}}}{2a^2b^{\frac{1}{3}}} \right)$$

$$= 2a^{-4}b^{\frac{1}{3}}$$

$$= \frac{2b^{\frac{1}{3}}}{a^4}$$

$$= \frac{2\sqrt[3]{b}}{a^4}$$

$$(a^{-4})^{1/2}$$

$$= \left(\frac{4a^{-4}}{b^{-1/2}} \right)^{1/2}$$

$$= \frac{2a^{-2}}{b^{-1/4}}$$

$$= \frac{2b^{1/4}}{a^2}$$

$$= \frac{2\sqrt[4]{b}}{a^2}$$

$$d) \left(\frac{100d}{25a^5b^{-1/2}} \right)^{\frac{1}{2}}$$

$$\frac{10a^{1/2}}{5a^{\frac{5}{2}}b^{-1/4}}$$

$$= \frac{2a^{-4/2}}{b^{-1/4}}$$

$$= \frac{2a^{-2}}{b^{-1/4}}$$

$$= \frac{2b^{1/4}}{a^2}$$

Example 3**Simplifying Algebraic Expressions with Rational Exponents**

$$\begin{aligned} \text{c) } \frac{4a^{-2}b^{\frac{2}{3}}}{2a^2b^{\frac{1}{3}}} &= \frac{4}{2} \cdot \frac{a^{-2}}{a^2} \cdot \frac{b^{\frac{2}{3}}}{b^{\frac{1}{3}}} \\ &= 2 \cdot a^{(-2) - 2} \cdot b^{\frac{2}{3} - \frac{1}{3}} \\ &= 2 \cdot a^{-4} \cdot b^{\frac{1}{3}} \\ &= \frac{2b^{\frac{1}{3}}}{a^4} \end{aligned}$$

Use the quotient of powers law.

Write with a positive exponent.

(Solution continues.)

4.6 Applying the Exponent Laws

Example 3

Simplifying Algebraic Expressions with Rational Exponents

$$\text{d) } \left(\frac{100a}{25a^5b^{-\frac{1}{2}}} \right)^{\frac{1}{2}} = \left(\frac{100}{25} \cdot \frac{a^1}{a^5} \cdot \frac{1}{b^{-\frac{1}{2}}} \right)^{\frac{1}{2}}$$

Simplify inside the brackets first.
Use the quotient of powers law.
Write with a positive exponent.

$$= \left(4 \cdot a^{1-5} \cdot b^{\frac{1}{2}} \right)^{\frac{1}{2}}$$

$$= \left(4 \cdot a^{-4} \cdot b^{\frac{1}{2}} \right)^{\frac{1}{2}}$$

Use the power of a power law.

$$= 4^{\frac{1}{2}} \cdot a^{(-4)\left(\frac{1}{2}\right)} \cdot b^{\left(\frac{1}{2}\right)\left(\frac{1}{2}\right)}$$

$$= 2 \cdot a^{-2} \cdot b^{\frac{1}{4}}$$

Write with a positive exponent.

$$= \frac{2b^{\frac{1}{4}}}{a^2}$$



CHECK YOUR UNDERSTANDING



Practice Problems...

Page 242-243

#9 a, d, g	#17
#10 b, f, g	#19
#11 b, c	#21
#14 b	#22
# 15 b, d	
#16 b, c	

Attachments

Worksheet - General to Standard (a not 1).doc