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**6-4**

**Reteaching** (continued)

Rational Exponents

Simplify expressions w/ rational exponents

To write an expression with rational exponents in simplest form, simplify all exponents and write every exponent as a positive number using the following rules for  $a \neq 0$  and rational numbers  $m$  and  $n$ :

$$a^{-n} = \frac{1}{a^n} \quad \frac{1}{a^{-m}} = a^m \quad (a^m)^n = a^{mn} \quad (ab)^m = a^m b^m$$

**Problem**

What is  $(8x^9y^{-3})^{-\frac{2}{3}}$  in simplest form?

$$\begin{aligned} (8x^9y^{-3})^{-\frac{2}{3}} &= (2^3 x^9 y^{-3})^{-\frac{2}{3}} \\ &= (2^3)^{-\frac{2}{3}} (x^9)^{-\frac{2}{3}} (y^{-3})^{-\frac{2}{3}} \\ &= 2^{-2} x^{-6} y^2 \\ &= \frac{y^2}{2^2 x^6} \\ &= \frac{y^2}{4x^6} \end{aligned}$$

Factor any numerical coefficients.

Use the property  $(ab)^m = a^m b^m$ .

Multiply exponents, using the property  $(a^m)^n = a^{mn}$ .

Write every exponent as a positive number.

Simplify.

**Exercises**

Write each expression in simplest form. Assume that all variables are positive.

7.  $(16x^2y^8)^{-\frac{1}{2}}$

8.  $(z^{-3})^{\frac{1}{9}}$

9.  $(2x^{\frac{1}{4}})^4$

10.  $(25x^{-6}y^2)^{\frac{1}{2}}$

11.  $(8a^{-3}b^9)^{\frac{2}{3}}$

12.  $(\frac{16z^4}{25x^8})^{-\frac{1}{2}}$

13.  $(\frac{x^2}{y^{-1}})^{\frac{1}{5}}$

14.  $(27m^9n^{-3})^{-\frac{2}{3}}$

15.  $(\frac{32r^2}{25s^4})^{\frac{1}{4}}$

16.  $(9z^{10})^{\frac{3}{2}}$

17.  $(-243)^{-\frac{1}{5}}$

18.  $(\frac{x^{\frac{2}{3}}}{y^{\frac{1}{2}}})^{10}$

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6-4

Reteaching (continued)

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Factor any numerical coefficients.

Use the property  $(ab)^m = a^m b^m$ .

Multiply exponents, using the property  $(a^m)^n = a^{mn}$ .

Write every exponent as a positive number.

Simplify.

**Exercises**

Write each expression in simplest form. Assume that all variables are positive.

7.  $(16x^2y^8)^{-\frac{1}{2}}$   $\frac{1}{4x^4y^4}$

8.  $(z^{-3})^{\frac{1}{9}}$   $\frac{1}{z^{\frac{1}{3}}}$

9.  $(2x^4)^{\frac{1}{4}}$   $16x$

10.  $(25x^{-6}y^2)^{\frac{1}{2}}$   $\frac{5y}{x^3}$

11.  $(8a^{-3}b^9)^{\frac{2}{3}}$   $\frac{4b^6}{a^2}$

12.  $(\frac{16z^4}{25x^8})^{-\frac{1}{2}}$   $\frac{5x^4}{4z^2}$

13.  $(\frac{x^2}{y^{-1}})^{\frac{1}{5}}$   $\frac{x^{\frac{2}{5}} y^{\frac{1}{5}}}{1}$

14.  $(27m^9n^{-3})^{-\frac{2}{3}}$   $\frac{n^2}{9m^6}$

15.  $(\frac{32r^2}{2s^4})^{\frac{1}{4}}$   $\frac{2r^{\frac{1}{2}}}{s}$

16.  $(9z^{10})^{\frac{3}{2}}$   $27z^{15}$

17.  $(-243)^{-\frac{1}{5}}$   $-\frac{1}{3}$

18.  $(\frac{x^5}{y^2})^{10}$   $\frac{x^4}{y^5}$