Name _____ Class _____ Date _____

Reteaching 7-4

Rational Exponents

OBJECTIVE: Simplifying expressions with rational exponents

MATERIALS: None

- You can simplify a number with a rational exponent using the properties of exponents or by converting the expression to a radical expression.
- To write an expression with rational exponents in simplest form, write every exponent as a positive number using the following rules for $a \neq 0$. $a^{-n} = \frac{1}{a^n}$ and $\frac{1}{a^{-m}} = a^m$

Example

Write $(8x^9y^{-3})^{-\frac{2}{3}}$ in simplest form.

$(8x^9y^{-3})^{-\frac{2}{3}} = (2^3x^9y^{-3})^{-\frac{2}{3}}$ ← **Factor any numerical coefficients.**

$= (2^3)^{-\frac{2}{3}}(x^9)^{-\frac{2}{3}}(y^{-3})^{-\frac{2}{3}}$ ← **Use the property $(ab)^m = a^mb^m$.**

$= 2^{-2}x^{-6}y^2$ ← **Multiply exponents, using the property $(a^m)^n = a^{mn}$.**

$= \frac{y^2}{2^2x^6}$ ← **Write every exponent as a positive number.**

$= \frac{y^2}{4x^6}$ ← **Simplify.**

Exercises

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

1. $y^{\frac{2}{3}}y^{\frac{3}{5}}$

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

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

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

5. $\left(\frac{49x^{-6}}{9x^2}\right)^{\frac{1}{2}}$

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

7. $\frac{x^{\frac{2}{3}}y^2}{x^{\frac{5}{3}}y^2}$

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

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

10. $a^{\frac{3}{4}} \cdot a^{\frac{3}{4}}$

11. $\left(\frac{x^2}{y^{-1}}\right)^{\frac{1}{5}}$

12. $(27m^9n^{-3})^{-\frac{2}{3}}$

13. $(2x^{\frac{1}{6}})(3x^{\frac{2}{6}})$

14. $\left(\frac{32r^2}{2s^4}\right)^{\frac{1}{4}}$

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