Name ______________________ Class ____________ Date ____________

6-2 Reteaching

Multiplying and Dividing Radical Expressions

You can simplify a radical if the radicand has a factor that is a perfect *n*th power and *n* is the index of the radical. For example:

$$\sqrt[n]{xy^nz} = y\sqrt[n]{xz}$$

Problem

What is the simplest form of each product?

a. $\sqrt[3]{12} \cdot \sqrt[3]{10}$

$\sqrt[3]{12} \cdot \sqrt[3]{10}$	$= \sqrt[3]{12 \cdot 10}$	Use $\sqrt[n]{a} \cdot \sqrt[n]{b} = \sqrt[n]{ab}$.
	$= \sqrt[3]{2^2 \cdot 3 \cdot 2 \cdot 5}$	Write as a product of factors.
	$= \sqrt[3]{2^3 \cdot 3 \cdot 5}$	Find perfect third powers.
	$= \sqrt[3]{2^3} \cdot \sqrt[3]{3 \cdot 5}$	Use $\sqrt[n]{ab} = \sqrt[n]{a} \cdot \sqrt[n]{b}$.
	$= 2\sqrt[3]{15}$	Use $\sqrt[n]{a^n} = a$ to simplify.

b. $\sqrt{7xy^3} \cdot \sqrt{21xy^2}$

$\sqrt{7xy^3} \cdot \sqrt{21xy^2}$	$= \sqrt{7xy^3 \cdot 21xy^2}$	Use $\sqrt[n]{a} \cdot \sqrt[n]{b} = \sqrt[n]{ab}$.
	$= \sqrt{7xy^2y \cdot 3 \cdot 7xy^2}$	Write as a product of factors.
	$= \sqrt{7^2x^2(y^2)^2 \cdot 3y}$	Find perfect second powers.
	$= 7xy^2\sqrt{3y}$	Use $\sqrt[n]{a^n} = a$ to simplify.

Exercises

Simplify each product.

1. $\sqrt{15x} \cdot \sqrt{35x}$ $5x\sqrt{21}$
2. $\sqrt[3]{50y^2} \cdot \sqrt[3]{20y}$ $10y$
3. $\sqrt[3]{36x^2y^5} \cdot \sqrt[3]{-6x^2y}$ $-6xy^2\sqrt[3]{x}$
4. $5\sqrt{7x^3y} \cdot \sqrt{28y^2}$ $70xy\sqrt{xy}$
5. $-\sqrt[3]{9x^5y^2} \cdot \sqrt[3]{2x^2y^5}$ $-x^2y^2\sqrt[3]{18xy}$
6. $\sqrt{3}\left(\sqrt{12} - \sqrt{21}\right)$ $6 - 3\sqrt{7}$

6-2 Reteaching (continued)

Multiplying and Dividing Radical Expressions

Rationalizing the denominator means that you are rewriting the expression so that no radicals appear in the denominator and there are no fractions inside the radical.

Problem

What is the simplest form of $\frac{\sqrt{9y}}{\sqrt{2x}}$?

Rationalize the denominator and simplify. Assume that all variables are positive.

$\frac{\sqrt{9y}}{\sqrt{2x}} = \sqrt{\frac{9y}{2x}}$ Rewrite as a square root of a fraction.

$= \sqrt{\frac{9y \cdot 2x}{2x \cdot 2x}}$ Make the denominator a perfect square.

$= \sqrt{\frac{18xy}{4x^2}}$ Simplify.

$= \frac{\sqrt{18xy}}{\sqrt{2^2 \cdot x^2}}$ Write the denominator as a product of perfect squares.

$= \frac{\sqrt{18xy}}{2x}$ Simplify the denominator.

$= \frac{\sqrt{3^2 \cdot 2 \cdot x \cdot y}}{2x}$ Simplify the numerator.

$= \frac{3\sqrt{2xy}}{2x}$ Use $\sqrt[n]{a^n} = a$ to simplify.

Exercises

Rationalize the denominator of each expression. Assume that all variables are positive.

7. $\frac{\sqrt{5}}{\sqrt{x}}$ $\frac{\sqrt{5x}}{x}$

8. $\frac{\sqrt[3]{6ab^2}}{\sqrt[3]{2a^4b}}$ $\frac{\sqrt[3]{3b}}{a}$

9. $\frac{\sqrt[4]{9y}}{\sqrt[4]{x}}$ $\frac{\sqrt[4]{9x^3y}}{x}$

10. $\frac{\sqrt{10xy^3}}{\sqrt{12y^2}}$ $\frac{\sqrt{30xy}}{6}$

11. $\frac{4\sqrt[3]{k^9}}{16\sqrt[3]{k^5}}$ $\frac{k\sqrt[3]{k}}{4}$

12. $\sqrt{\frac{3x^5}{5y}}$ $\frac{x^2\sqrt{15xy}}{5y}$

13. $\frac{\sqrt[4]{10}}{\sqrt[4]{z^2}}$ $\frac{\sqrt[4]{10z^2}}{z}$

14. $\sqrt[3]{\frac{19a^2b}{abc^4}}$ $\frac{\sqrt[3]{19ac^2}}{c^2}$