UNIT 5—Multiplying and Dividing Radical Expressions

- *Students will be able to multiply and divide radical expressions*

Day 2

Algebra 3-4

Can radical expressions be multiplied? Divided?

Combining radical expressions using multiplication

If $\sqrt[n]{a}$ and $\sqrt[n]{b}$ are real numbers, then

$$\sqrt[n]{a}\cdot\sqrt[n]{b}=\sqrt[n]{ab}$$

Examples: Determine if the radical expression can be simplified. If it can, simplify it.

1. $\sqrt[3]{3}\cdot\sqrt[4]{5}$

NOT POSSIBLE

2. $\sqrt{14}\cdot\sqrt{3}$

$=\sqrt{14\cdot3}=\sqrt{7\cdot2\cdot3}$

$\sqrt{42}$

3. $\sqrt[4]{4}\cdot\sqrt{8}$ (4.2)

$\sqrt[4]{2\cdot2\cdot2\cdot2}$ (2)

$2\sqrt[4]{2}$

4. $\sqrt[3]{9x^2}\cdot\sqrt[3]{3x^1}=\sqrt[3]{27x^3}$

$\sqrt[3]{3\cdot3\cdot3\ x}$ (3)

$3x$

5. $\sqrt[5]{16a^6}\cdot\sqrt[5]{4a^3}$

$\sqrt[5]{16\cdot4\,a^9}$

$\sqrt[5]{2\cdot2\cdot2\cdot2\cdot2}$ (2) $a\cdot a^4$

$2a\sqrt[5]{2a^4}$

2	16
2	8
2	4
	2

16 → 8, 2 → 4, 2 → 2, 2

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Combining radical expressions using division

If $\sqrt[n]{a}$ and $\sqrt[n]{b}$ are real numbers and $b \neq 0$, then

$$\frac{\sqrt[n]{a}}{\sqrt[n]{b}} = \sqrt[n]{\frac{a}{b}}$$

Examples: Determine if the radical expression can be simplified. If it can, simplify it.

1. $\dfrac{\sqrt{18x^5}}{\sqrt{2x^3}}$

2. $\dfrac{\sqrt[3]{162y^5}}{\sqrt[3]{3y^2}}$

3. $\dfrac{\sqrt[3]{21a^{10}}}{\sqrt[3]{7a^5}}$

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Is there another way to simplify fractions with radicals?

Simplifying by Rationalizing the Denominator

Examples: Simplify the following radical expressions by rationalizing the denominator.

1. $\frac{\sqrt{5}}{\sqrt{2}}$

2. $\frac{\sqrt[3]{12a^4}}{\sqrt[3]{9a^2}}$

3. $\frac{\sqrt{14b^3}}{\sqrt{7b}}$