Name ______________________________ Date ______________

Notes: Lesson 2

Simplifying, Multiplying and Dividing Radicals

We've worked with square roots – what times itself equals a number. In this section, we start looking at higher roots – cube roots, fourth roots, fifth roots, etc.

Example 1... Find each real number root.

a. the real square root of -16

$\sqrt{-16}$ none

b. $\sqrt[3]{-1000}$

-10

c. $\sqrt[4]{16}$

2

d. the real cube root of $-\frac{8}{27}$

$\sqrt[3]{-\frac{8}{27}} = \frac{\sqrt[3]{-8}}{\sqrt[3]{27}} = -\frac{2}{3}$

Example 2... Simplify each radical expression.

a. $\sqrt[2]{64x^4y^6}$

$8x^2y^3$

b. $\sqrt[3]{27y^6}$

$3y^2$

c. $\sqrt[4]{x^8y^{12}}$

x^2y^3

d. $\sqrt[3]{-64a^3b^{15}}$

$-4ab^5$

Example 3... Simplify each expression.

a. $\sqrt{30x^3}$

$x\sqrt{30x}$

b. $\sqrt[3]{81y^2z^4}$

$27 \quad 3$

$3z\sqrt[3]{3y^2z}$

c. $\sqrt[4]{32s^7t^{12}}$

$16 \quad 2$

$2st^3\sqrt[4]{2s^3}$

When multiplying & dividing radical expressions, the root must be the same. No multiplying or dividing square roots with cube roots! That's just crazy talk.

Example 4... Multiply, if possible, and simplify.

a. $\sqrt[3]{25xy^8} \cdot \sqrt[3]{5x^4y^3}$

$\sqrt[3]{125x^5y^{11}}$

$5xy^3\sqrt[3]{x^2y^2}$

b. $\sqrt{3} \cdot \sqrt[3]{27}$

Not possible

c. $3\sqrt{7x^3} \cdot 2\sqrt{21x^3y^2}$

$6\sqrt{147x^6y^2}$

$49 \quad 3$

$6 \cdot 7x^3y\sqrt{3}$

$42x^3y\sqrt{3}$

Example 5... Divide, if possible, and simplify.

a. $\frac{\sqrt{6x}}{\sqrt{3x}} = \sqrt{\frac{6x}{3x}}$

$= \sqrt{2}$

b. $\sqrt[4]{\frac{243k^7}{3k^3}}$

$\sqrt[4]{81k^4}$

$3k$

c. $\frac{\sqrt[3]{108x^5y^{14}}}{\sqrt[3]{4x^2y^6}}$

$\sqrt[3]{27x^3y^8}$

$3xy^2\sqrt[3]{y^2}$