SM 2

Date: **Section: 3.2**

Objective: Simplifying Radical Notes

Square Root: For an integer n greater than 1, if $a^2 = k,\ then\ \sqrt{k} = a$

Radical Sign: Given $\sqrt{k} = a$, $\sqrt{}$ is the radical sign

Radicand: Given $\sqrt{k} = a$, "k" is the radicand (The number under the square root sign.)

Perfect squares: When a number is multiplied by itself, the product is a perfect square

List of common perfect squares: 1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144, 169, 196, 225

Perfect cubes: When a number is multiplied by itself twice, the product is a perfect cube (When a number is the product of the same factor three times)

List of common perfect cubes: 1, 8, 27, 64, 125

Examples: Simplify each of the following:

a) $\sqrt{121}$ b) $\sqrt{81}$ c) $\sqrt{\frac{4}{9}}$ d) $\sqrt{y^4}$ e) $\sqrt{z^{14}}$

nth Root: A radical or the principal nth root of k: $\sqrt[n]{k}$
k, the radicand, is a real number
n, the index, is a positive integer greater than one.

Index: For an integer n greater than 1, if $a^n = k,\ then\ \sqrt[n]{k} = a$ and a is the nth root of k.

Examples: Simplify each expression, if possible.

a) $\sqrt[3]{125}$ b) $\sqrt[4]{81}$ c) $\sqrt[5]{32}$ d) $\sqrt[3]{8x^6y^3}$

Steps To Simplify a Radical Expression with Index *n* Using a Factor Tree:

1. Factor the radicand.
2. Split the radicand into groups of the index
3. List the number from each group only once on the outside of the radicand
4. Leave any non-index groups inside the radical
5. Multiply the outside numbers together, multiply the numbers left inside the radical together.

Examples: Simplify each expression.

a) $\sqrt{12}$

b) $\sqrt{40}$

c) $5\sqrt{72}$

d) $\sqrt{20x^2y^3}$

e) $2xy^2\sqrt{300x^3y^5}$

f) $\sqrt[3]{54}$

g) $7\sqrt[3]{40}$

h) $\sqrt[3]{32t^7u^9}$

i) $3m\sqrt[3]{40mn^6}$

j) $\sqrt[4]{240}$

k) $\sqrt[4]{x^6y^9z^3}$

l) $pr\sqrt[5]{p^7q^{23}r^{14}}$