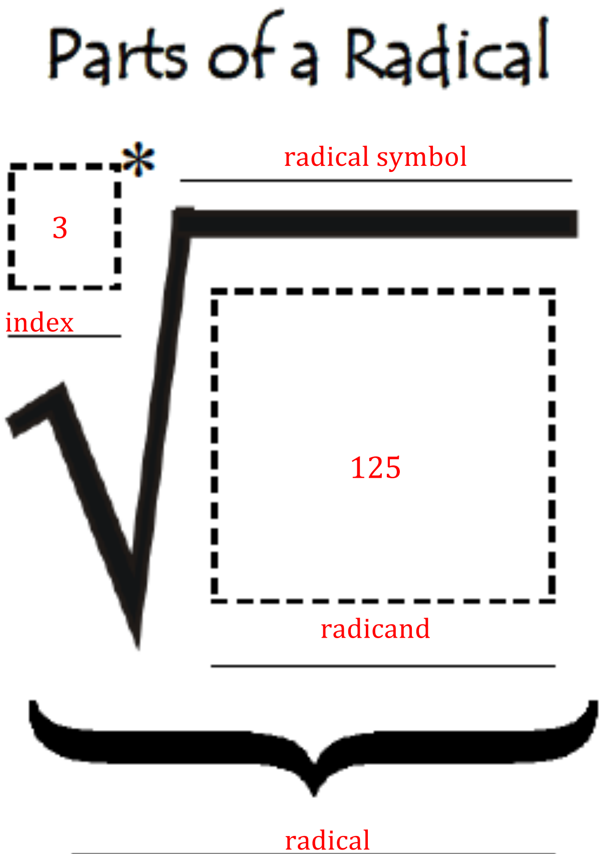
Algebra 1: 5.5 Guided Notes – Part 1 **Name** ________________________________ **Period** _____
Properties of Rational Exponents

Learning Goals
- *Write an expression in radical form.*
- *Find the nth root of a number.*

If $\underbrace{5\cdot5\cdot5}_{3}=5^3=125$, then $\sqrt[3]{125}=5$.



For each radical, determine the index and radicand.

1. $\sqrt{24}$

   index = 2

   radicand = 24

2. $\sqrt[4]{16xy^2}$

   index = 4

   radicand = $16xy^2$

3. $\sqrt[3]{-162}$

   index = 3

   radicand = –162

If the index is not written, it is automatically a 2.

A number a is a cube root of b if $a^3 = b$. Thus, 5 is a cube root of 125 because $5^3 = \underbrace{5\cdot5\cdot5}_{3} = 125$.

Complete each statement

1. $\sqrt[3]{8}=2$ because $2^3 = 8$

2. $\sqrt[3]{64}=4$ because $4^3 = 64$

3. $\sqrt[3]{27}=-3$ because $(-3)^3 = -27$

If n represents a positive number, then a is the ***nth root*** of b if $a^n = b$.

For example, 5 is the 4th root of 625 because $5^4 = \underbrace{5 \cdot 5 \cdot 5 \cdot 5}_{4} = 625$.

Complete each statement.

1. The number 2 is the 4th root of 16 because $2^4 = 16$.
2. The number 3 is the 5th root of 243 because $3^5 = 243$.
3. The number –2 is the cube root of –8 because $(-2)^3 = -8$.
4. The number 4 is the 6th root of 4096 because $4^6 = 4096$.

The ***n*th** root of a number b is designated as $\sqrt[n]{b}$, where n is the index of the radical and b is the radicand.

For example, $\sqrt{100} = 10$ because $10^2 = 100$.

Complete each statement.

1. $\sqrt[3]{216} = 6$ because $6^3 = 216$.
2. $\sqrt[4]{81} = 3$ because $3^4 = 81$.
3. $\sqrt[5]{-32} = -2$ because $(-2)^5 = -32$.

A power can be positive (+) or negative (–) depending on the base and the exponent.

Base	*Exponent*	*Power*	*Example*
Positive (+)	Even number (2, 4, 6…)	Positive The product of positive #s is always positive.	$5^2 = 25$
Negative (–)	Even number (2, 4, 6…)	Positive The product of an even number of negative #s is always positive.	$(-5)^2 = 25$
Positive (+)	Odd number (1, 3, 5…)	Positive The product of positive #s is always positive.	$2^3 = 8$
Negative (–)	Odd number (1, 3, 5…)	Negative The product of an odd number of negative #s is always negative.	$(-2)^3 = -8$