Exponents

Date: 10-3-12

Objective: Today we will define and apply the properties of exponents in order to simplify expressions.

Notes:

Exponent Expression:

What are the parts of exponent expressions?

Base: the number being multiplied → 5^2 ← **Exponent:** tells you how many times to write the number

How do we say exponents?

We read this as "five to the second power" or "five to the power of two."

5 squared

Example: 5^2

$5 \cdot 5 = 25$

Example: 2^3

$2 \cdot 2 \cdot 2 = 8$

$4 \cdot 2 = 8$

Example: $\left(\frac{1}{4}\right)^2$

$\frac{1}{4} \cdot \frac{1}{4} = \frac{1}{16}$

Example: $\left(\frac{2}{3}\right)^4$

$\frac{2}{3} \cdot \frac{2}{3} \cdot \frac{2}{3} \cdot \frac{2}{3}$

$4 \cdot 4$

$9 \cdot 9 \quad \frac{16}{81}$

Special Cases with Exponents:

- **No Exponent or Exponent of 1**
  - > Any number with no exponent has an assumed exponent of 1
  - > Any number with an exponent of 1 is just itself

Example: $3^1 = 3$

Why does this work?

$2^4 = 16 \div 2$
$2^3 = 8 \div 2$
$2^2 = 4 \div 2$
$2^1 = 2 \div 2$
$2^0 = 1$

- **Exponent of Zero**
  - > Any number to the zero power equals 1

Example: $16^0 = 1$

Example: $18{,}952^0 = 1$

Exponents with Negative Bases:

- **Rule 1:** When the negative base is written inside parentheses,
  - > Even exponent makes it positive
  - > Odd exponent makes it negative

Example: $(-4)^2 = -4 \cdot -4 = 16$

Example: $(-4)^3 = -4 \cdot -4 \cdot -4$

$16 \cdot -4 = -64$

- **Rule 2:** When the negative base is written without parentheses,

THE ANSWER IS ALWAYS NEGATIVE

Example: $-4^2 = -16$

Exit Ticket

Evaluate the exponents.

1. 3^4
2. 3^1
3. 3^0
4. $(-3)^2$
5. -3^2