Notes Name: _____

Order of Operations-Guided Notes

- *Target Objective: Order of Operations with Positive Integers*

I. Order of Operations

A. Vocabulary

- _____ _____ _____: the order in which you perform operations in a math problem

    - The order of operations tells you the order in which you should go about solving problems like these:

Ex) $3 + 5 \times 6$ Ex) $10 \div 2 + 4 \times 3$ Ex) $5 \times (3 + 4) - 3$

B. What is the order?

* You should always solve math problems in the following order:

Parenthesis – (also called grouping symbols)

Exponents

Multiplication OR Division – (whichever comes first)

Addition OR Subtraction – (whichever comes first)

C. Parentheses

- The parentheses symbol looks like this _____.
  Ex) 7 + (9 + 4)

- Parenthesis can also look like this _____. We call these _____.
  Ex) 3 x [7 + 1]

- You **ALWAYS** want to work from the **inside parenthesis** to the **outside parenthesis**.
  Ex) 3 + [4 – (2 • 1)]

Examples

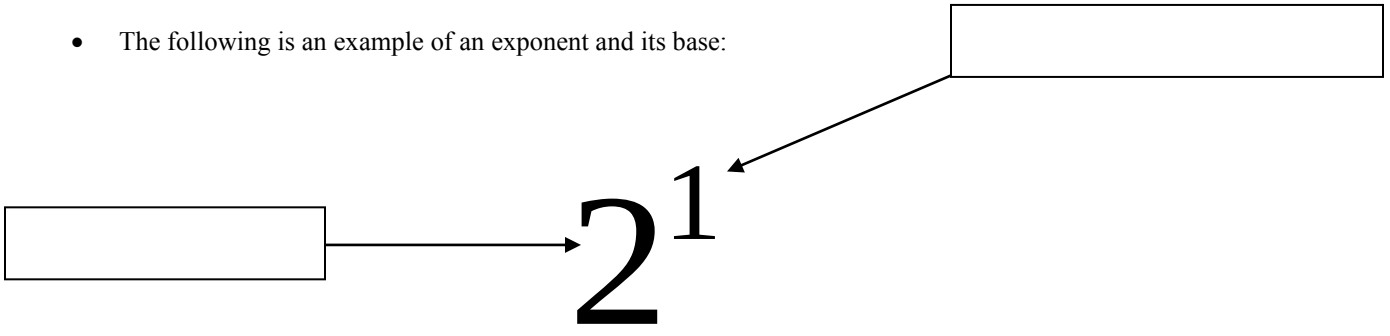
Directions: Simplify each expression.

Ex) $7 + (8 \div 4)$ Ex) $3(7 + 4)$ Ex) $3(20 - 14) + (9 \bullet 1)$

Ex) $2 + [5 - (3 \bullet 1)]$ Ex) $[(5 + 2) - 2] \times 6$

D. Defining Powers & Exponents

- The following is an example of an exponent and its base:



- We say this is "_____ to the _____ _____."

- The exponent tells you how many times you should multiply the _____ by _____.

Directions: Simplify each expression.

Ex) $2^0 =$ Ex) $2^1 =$ Ex) $2^2 =$ Ex) $2^3 =$

1. Squared & Cubed

- Any integer that has 2 for an exponent is said to be "_____."

- Any integer that has 3 for an exponent is said to be "_____."

Directions: Please tell me whether each power is “squared” or “cubed”.

Ex) 4^2 Ex) 4^3 Ex) 8^2 Ex) 8^3

2. Zero as An Exponent

- When any integer has 0 as an exponent, it is **ALWAYS** equal to _____.

Ex) $4^0 =$ Ex) $12^0 =$

3. One as An Exponent

- Any integer with 1 as an exponent is **ALWAYS** equal to _____.

Ex) $10^1 =$ Ex) $3^1 =$ Ex) $31^1 =$

4. Any Power w/ a Base of One

- When the integer 1 has an exponent (any exponent), it is **ALWAYS** equal to _____.

Ex) $1^4 =$ Ex) $1^1 =$ Ex) $1^9 =$

Examples

Directions: Simplify each expression.

Ex) $4(1 + 1)^2$ Ex) $49 – (3 \bullet 2)^2$ Ex) $5(5 – 2)^2$

Ex) $70 – 3 – (4 \div 2)^2$ Ex) $[10 – 2^2] + [4^2 – 10]$ Ex) $(5 + 2)^2 – 2 + [4^2 + 3]$

E. Multiplication AND Division

- Multiply and divide in order from _____ to _____.
    - This **does not** mean that you always multiply first before you divide. You should multiply or divide depending on whichever operation comes first as you work from left to right.

Examples

Directions: Simplify each expression.

Ex) $7 \div 1 \times 3$ Ex) $3^2 \times 4 \div 1$ Ex) $2^2 \bullet (4 \times 3)$

Ex) $27 \div (3 \times 1)^2$ Ex) $6 \div 2[1 + (1 \bullet 2)]$ Ex) $2[(1 \bullet 2)^3 - 6] + (11 - 6)$

F. Addition AND Subtraction

- Add and subtract in order from _____ to _____.

    *This **does not mean** that you always add first before you subtract. You should add or subtract depending on whichever operation comes first as you work from left to right.

Examples

Directions: Simplify each expression.

Ex) $3 \times 5 - 8 \div 4 + 6$ Ex) $3^2 \div 3 + 4 \times 4 - 2$ Ex) $6 + 2(4 + 1)^2$

Ex) $1 + (3 \bullet 2) \times 2 - 2^3$

Ex) $[4(2+1)] + 6 \bullet 3^2$

G. Order of Operations Involving Fractions

- Whenever you see an order of operations problem involving fractions like this:

$$\frac{(2+3)^2 + 3}{2 + 15 \div 3}$$

1) solve everything in the numerator (or top) as if it is its own PEMDAS problem
2) solve everything in the denominator (or bottom) as if its own PEMDAS problem
3) and then divide out to find the answer

Ex) $\frac{16 + 24}{30 - 22}$

Ex) $\frac{(3 \bullet 3) - 4}{12 \div 4 + 1^4}$

H. Order of Operation Problems

Directions: Simplify each expression.

Ex) $4 + 3 \times 5$

Ex) $10 + 4 \div 2^2$

Ex) $4 - 1 \bullet 2 + (6 \div 3)$

Ex) $(6 - 3)^2 \bullet 4 \div 9 - 1$

Ex) $13 - 4(3 + 2) \div 2^2$

Ex) $\frac{2(3-1)^2}{1+1} \times 3 + 3$

Ex) $10^2 \div [9 - (2 \bullet 2)] + 1(4)$