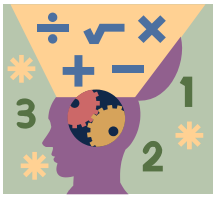

Study Guide and Notes: Order of Operations

If your class were given the following problem to simplify, would everyone get the same answer? **30 - 12 ÷ 2 + 4 · 3 - 5**

Some possible answers may be 34, 16, 4, or 31.

We can arrive at a variety of answers because there is confusion as to which operations should be done in what order. Sometimes symbols of inclusion (parentheses or brackets) are used to group the numbers together in a specific arrangement to help. To avoid confusion and to assure that we all get the same answer, we use the order of operations shown below:

Order of Operations (PEMDAS is a special acronym to help you remember)

1. **Simplify expressions inside grouping symbols. (parentheses)**
2. **Simplify or evaluate any terms raised to powers. (exponents)**
3. **Do multiplication and division operations in order as you come to them from left to right. (multiply, divide)**
4. **Finally, do all addition and subtraction operations in order as you come to them from left to right. (add, subtract)**

* **Notice the words in the parentheses at the end of the lines make "pemdas".**

Example #1. **30 - 12 ÷ 2 + 4 · 3 - 5 =**

Since there are no parentheses or exponents, using "pemdas" we would begin by doing multiplication and division in order left to right. Leave all other operations alone. Let's group what we need to do.

30 - (12 ÷ 2) + (4 · 3) - 5 = 30 – 6 + 12 – 5

Next we will do the addition and subtraction in order left to right. The steps are underlined in order.

30 – 6 + 12 – 5 =
24 + 12 - 5 =
36 – 5 = 31

Example #2.

$(8 + 4) \div (10 - 6) + 5^2$

We begin with parentheses: $12 \div 4 + 5^2$

Next evaluate the exponent term $12 \div 4 + 25$

Now do multiplication and division in order $3 + 25$

Finally, add and subtract in order 28

Evaluate each expression. Check with a calculator .

1. $12 \div 4 + 2$
2. $6^2 \div (3 + 9) + 2(5+3)$
3. $\dfrac{6(2+5)}{3(7)}$

Substitute the given value for the variable and evaluate the expression. $x = 4$, $y = 3$, $m = ½$, $p = 2/3$.

4. $3x - y$
5. $6p + (2y + 5x)$
6. $mxy + 2(x + y)$
7. $2x^2 + y^3$