Math 9 – Unit 1: Real Numbers Name: Mr. Hagen

Lesson #4: Order of Operations Date: Sept 14, 2017

Evaluate the following expression on your own, without anybody's help:

$$2(4-6)^2-9\div(5-2)+1$$

$= 2(-2)^2 - 9 \div (3) + 1$

$= 2(4) - 9 \div 3 + 1$

$= 8 - 3 + 1$

$= 6$

13.75
6
-6
-18
4
-10
-25
11

Without order, there is chaos. Math cannot have chaos, so logically there must be an order. The order of operations (sometimes knows as BEDMAS) gives the structure or algorithm to solve mathematical questions.

The order is:

Brackets
Exponents
Division
Multiplication — in order from left to right
Addition
Subtraction — in order from left to right

The same order MUST be applied when we work with fractions. Let's do some examples:

a) $\frac{2}{1}+\boxed{\frac{\cancel{4}^{1}}{5}\times\frac{1}{\cancel{4}_{1}}}$

$= \frac{2^{\times 5}}{1_{\times 5}} + \frac{1}{5}$

$= \frac{10}{5} + \frac{1}{5}$

$= \frac{11}{5}$

$= \frac{2}{1} + \frac{4}{20}$

$= \frac{2}{1} + \frac{1}{5}$

b) $\frac{3}{2}\boxed{-\frac{7}{5}\div\frac{1}{3}}+\frac{3}{2}$

$= \frac{3}{2}\boxed{-\frac{7}{5}\times\frac{3}{1}}+\frac{3}{2}$

$= \frac{3^{\times 5}}{2}\boxed{-\frac{21}{5}}^{\times 2}+\frac{3^{\times 5}}{2}$ C.D. = 10

$= \frac{15}{10} - \frac{42}{10} + \frac{15}{10}$

$= \frac{-12^{\div 2}}{10_{\div 2}} = \frac{-6}{5}$

c) $\frac{5}{6}+\left(\frac{9}{5}\div\frac{6}{5}\right)^2-\frac{1}{2}$

$= \frac{5}{6}+\left(\frac{\cancel{9}^{3}}{\cancel{5}}\times\frac{\cancel{5}}{\cancel{6}_{2}}\right)^2-\frac{1}{2}$

$= \frac{5}{6}+\left(\frac{3^2}{2^2}\right)^2-\frac{1}{2}$

$= \frac{5}{6}^{\times 2}+\frac{9}{4}^{\times 3}-\frac{1}{2}^{\times 6}$

$= \frac{10}{12}+\frac{27}{12}-\frac{6}{12}=\frac{31}{12}$

d) $\frac{2}{5}\times\frac{3}{5}+\left(\frac{4}{3}+\frac{2}{1}\right)\times\frac{1}{2}$

$= \frac{2}{5}\times\frac{3}{5}+\left(\frac{4}{3}+\frac{6}{3}\right)\times\frac{1}{2}$

$= \boxed{\frac{2}{5}\times\frac{3}{5}}+\boxed{\frac{\cancel{10}^{5}}{3}\times\frac{1}{\cancel{2}}}$

$= \frac{6}{25}^{\times 3}+\frac{5}{3}^{\times 25}$ C.D. = 75

$= \frac{18}{75}+\frac{125}{75} \longrightarrow = \frac{143}{75}$

In Math, you are usually given an algebraic expression which you need to use to solve given certain values. When you substitute numbers into letters, always do so with parenthesis ().

Example: Solve the following two expressions given $x=4$ and $y=-2$.

a) $6y-x^2-y$ multiply

2 negative = +

$= 6(-2)-(4)^2\boxed{-(-}2)$

$= -12-16+2$

$= -26$

b) $(x-y)(x+y)$ multiply

$= ((4)-(-2))((4)+(-2))$ +

$= (6)(2)$

$= 12$

Application: Jimmy went to Tim Horton's during their "Roll up the Rim" season and won a bike. However, in order to get the bike, he had to answer the following skill testing question: $4+4\div 2\times(3+1)$. Jimmy answered 16. Did he get the bike?

$4+4\div 2\times(3+1)$

$= 4+\underbrace{4\div 2}\times 4$

$= 4+\underbrace{2\times 4}$

$= 4+8$

$= 12$