Math 9 – Unit 1: Real Numbers

Lesson #4: Order of Operations

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First day of snow!

Learning Goal: We are learning to work with the Order of Operations

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

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

6

4

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

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

$=8-3+1=6$ ☺

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
Divide and Multiply
Add and Subtract.

$3(4)^2 \neq 12^2 = 144$

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

a) $2+\frac{4}{5}\times\frac{1}{4}$

$=\frac{2}{1}\times\frac{5}{5}+\frac{1}{5}$ CD is 5

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

$=\frac{11}{5}$

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

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

$=\frac{3}{2}\times\frac{5}{5}-\frac{21}{5}\times\frac{2}{2}+\frac{3}{2}\times\frac{5}{5}$ CD = 10

$=\frac{15-42+15}{10}=\frac{-12}{10}=-\frac{6}{5}$

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

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

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

$=\frac{5^{\times 2}}{6_{\times 2}}+\frac{9_{\times 3}}{4_{\times 3}}-\frac{1\times 6}{2\times 6}=\frac{10}{12}+\frac{27}{12}-\frac{6}{12}=\frac{31}{12}$

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

$=\frac{6}{25}+\left(\frac{4}{3}+\frac{6}{3}\right)\times\frac{1}{2}$

$=\frac{6}{25}+\frac{\cancel{10}^{5}}{3}\times\frac{1}{\cancel{2}1}$

$=\frac{6_{\times 3}}{25_{\times 3}}+\frac{5_{\times 25}}{3_{\times 25}}$ CD = 75

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

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) $6y-x^2-y$

$=6(-2)-(4)^2-(-2)$

$=-12-16+2$

$=-26$

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

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

$=(6)(2)$

$=12$

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?

$=4+4\div 2\times 4$

$=4+2\times 4$

$=4+8$

$=12$

∴ 

Success Criteria:

- I can BEDMAS
- I can solve multi-step questions using the proper order of operations
- I can safely substitute numbers into parentheses/brackets