1.2: Apply Order of Operations

Goals: *Use order of operations to evaluate algebraic expressions

---

What are the order of operations? What is the most common mistake made from using this acronym?

PEMDAS - *Multiplication is NOT always before division. Addition is NOT always before subtraction!

****THINGS TO REMEMBER****

- Multiply and divide in order from left to right
- Add and subtract in order from left to right
- Grouping symbols (parenthesis) work most inside to outside. Parenthesis cannot go away until there is only 1 number inside!)
- After performing one step, rewrite entire problem

Evaluate the following expressions:

Ex: $27 \div 3^2 \cdot 2 - 3$

$27 \div 9 \cdot 2 - 3$
$3 \cdot 2 - 3$
$6 - 3$
3

Ex: $20 - 4^2$

$20 - 16$
4

Ex: $2 \cdot 3^2 + 4$

$2 \cdot 9 + 4$
$18 + 4$
22

Ex: $32 \div 2^3 + 6$

$32 \div 8 + 6$
$4 + 6$
10

Ex: $15 + 6^2 - 4$

$15 + 36 - 4$
$51 - 4$
47

Ex: $7(13 - 8)$

$7(5)$
35

Ex: $24 - (3^2 + 1)$

$24 - (9 + 1)$
$24 - (10)$
14

Ex: $2[30 - (8 + 13)]$

$2[30 - (21)]$
$2[9]$
18

Ex: $6 + 12 \div 3 \cdot 4^2$

$6 + 12 \div 3 \cdot 16$
$6 + 4 \cdot 16$
$6 + 64$
70

Ex: $24 \div (4 - 1)$

$24 \div (3)$
8

Ex: $48 - (6 + 5^2)$

$48 - (6 + 25)$
$48 - (31)$
17

Ex: $3[32 \div (2 + 6)]$

$3[32 \div (8)]$
$3[4]$
12

Ex: What is the answer to: $\frac{8+4}{5-2}$? 4

Can you rewrite that same expression using ÷ for division rather than a fraction bar and get the same answer?

$(8 + 4) \div (5 - 2)$ *Fraction bars act like parenthesis. Group things on top, then on bottom.

<u>Evaluate the expression</u>:

Ex: $\frac{9x}{3(x+2)}$ when $x = 4$

$\frac{9(4)}{3(4+2)}$

$\frac{36}{3(6)}$

$\frac{36}{18}$

2

Ex: $y^2 - 3$ when $y = 8$

$8^2 - 3$

$64 - 3$

61

Ex: $12 - y - 1$ when $y = 8$

$12 - 8 - 1$

$4 - 1$
3

Ex: $\frac{10y+1}{y+1}$ when $y = 8$

$\frac{10(8)+1}{8+1}$

$\frac{80+1}{9}$

$\frac{81}{9}$

9

Ex: $\frac{10x}{2(x+2)}$ when $x = 3$

$\frac{10(3)}{2(3+2)}$

$\frac{30}{2(5)}$

$\frac{30}{10}$

3

Ex: John had 4 copies of a science report made to give his lab partners. In each copy there were 20 black-and-white pages and 5 color pages. He paid a copy center to make of a color page and *b* is the cost of a black-and-white page. What is the total cost for John and bind the copies? His cost, in dollars, is given by the expression **4(5*c* + 20*b*)** where *c* is the cost if a color page costs $2 and a black-and-white page costs $0.05?

4[5(2) + 20(0.05)]
4[10 + 1]
4[11]
$44

How much did each report cost? How do you know?

$11. If the total cost for 4 reports is $44, then each report must cost $11.