

Day 1 – Order of Operations Notes

Order of Operations is the order to which you perform operations in a math problem. Order of operations is CRUCIAL for all types of Algebra 1 topics – linear equations, quadratic equations, etc.

Order of Operations

1. Parenthesis or Grouping Symbols
2. Exponents
3. Multiplication or Division – whichever comes first
4. Addition or Subtraction – whichever comes first

Order of Operations - Parenthesis

- Things to Consider
 - Brackets can be used as parenthesis: $3 \times [7 + 1]$
 - You ALWAYS work from inside parenthesis to outside parenthesis: $3 + [4 - (2 \times 1)]$

$$\begin{aligned} \text{a. } & 7 + (8 \times 4) \\ & = 7 + 32 \\ & = \boxed{39} \end{aligned}$$

$$\begin{aligned} \text{b. } & 3(20 - 14) + (9 \div 1) \\ & = 3(6) + 9 \\ & = 18 + 9 \\ & = \boxed{27} \end{aligned}$$

$$\begin{aligned} \text{c. } & [(5 + 2) - 2] \times 6 \\ & = [7 - 2] \times 6 \\ & = 5 \times 6 \\ & = \boxed{30} \end{aligned}$$

Order of Operations - Exponents

- Things to Consider
 - Any integer that has 0 as an exponent is always equal to 1: $5^0 = 1$
 - Any integer that has 1 as an exponent is always equal to itself: $7^1 = 7$
 - The exponent tell you how many times you are multiplying a number times itself: $4^3 = 4 \times 4 \times 4$

$$\begin{aligned} \text{a. } & 4(1 + 3)^2 \\ & = 4(4)^2 \\ & = 4(16) \\ & = \boxed{64} \end{aligned}$$

$$\begin{aligned} \text{b. } & 70 - 3 - (4 \div 2)^2 \\ & = 70 - 3 - (2)^2 \\ & = 70 - 3 - 4 \\ & = 67 - 4 \\ & = \boxed{63} \end{aligned}$$

$$\begin{aligned} \text{c. } & (5 + 2)^2 - 2 + [4^2 + 3] \\ & = 7^2 - 2 + [16 + 3] \\ & = 49 - 2 + 19 \\ & = 47 + 19 \\ & = \boxed{66} \end{aligned}$$

Order of Operations - Multiplication & Division

- Things to Consider
 - You multiply or divide depending on whichever operation comes first as you work from left to right.

$$\begin{aligned} \text{a. } & 7 \div 1 \times 3 \\ & = 7 \times 3 \\ & = \boxed{21} \end{aligned}$$

$$\begin{aligned} \text{b. } & 2^2 \cdot (4 \times 3) \\ & = 2^2 \cdot 12 \\ & = 4 \cdot 12 \\ & = \boxed{48} \end{aligned}$$

$$\begin{aligned} \text{c. } & 6 \div 2[1 + (3 \times 2)] \\ & = 6 \div 2[1 + 6] \\ & = 6 \div 2(7) \\ & = 3 \cdot 7 \\ & = \boxed{21} \end{aligned}$$

Order of Operations - Multiplication & Division

- Things to Consider
 - You add or subtract depending on whichever operation comes first as you work from left to right.

$$\begin{aligned} \text{a. } & 3 \times 5 - 8 \div 4 + 6 \\ & = 15 - 8 \div 4 + 6 \\ & = 15 - 2 + 6 \\ & = 13 + 6 \\ & = \boxed{19} \end{aligned}$$

$$\begin{aligned} \text{b. } & 6 + 2(4 + 1)^2 \\ & = 6 + 2(5)^2 \\ & = 6 + 2(25) \\ & = 6 + 50 \\ & = \boxed{56} \end{aligned}$$

$$\begin{aligned} \text{c. } & 3^2 \div 3 + 4 \times 4 - 2 \\ & = 9 \div 3 + 4 \times 4 - 2 \\ & = 3 + 4 \times 4 - 2 \\ & = 3 + 16 - 2 \\ & = 19 - 2 \\ & = \boxed{17} \end{aligned}$$

Order of Operations - Fractions

- Things to Consider
 - Simplify everything in the numerator using order of operations
 - Simplify everything in the denominator using order of operations
 - Divide to find answer

$$\begin{aligned} \text{a. } & \frac{(2+3)^2 + 3}{2+15 \div 3} \\ & = \frac{(5)^2 + 3}{2+5} \\ & = \frac{25+3}{7} \\ & = \frac{28}{7} \\ & = \boxed{4} \end{aligned}$$

$$\begin{aligned} \text{b. } & \frac{(3-3)-4}{12 \div 4 + 1^4} \\ & = \frac{9-4}{12 \div 4 + 1} \\ & = \frac{5}{3+1} \\ & = \boxed{\frac{5}{4}} \end{aligned}$$