

Order of Operations & Exponents

Exponent review:

- $3^2 = 3 \times 3 = 9$
- $2^3 = 2 \times 2 \times 2 = 8$
- $4^3 = 4 \times 4 \times 4 = 64$
- $10^4 = 10 \times 10 \times 10 \times 10 = 10,000$
- $-3^2 = -3 \times 3 = -9$
- $(-5)^2 = (-5)(-5) = 25$

Order of Operations Rules:

1. If any operations are enclosed in parentheses, brackets or absolute value bars, do those operations first
2. If any numbers have exponents do that next
3. Perform all multiplication and division in order from left to right
4. Perform all addition and subtraction in order from left to right

P.E.M.D.A.S. (Please Excuse My Dear Aunt Sally)

- Parentheses
- Exponents
- Multiplication
- Division
- Addition
- Subtraction

Examples:

- $5 + 2(3) = 11$
 - $5 + (6) = 11$
- $2(3 + 5) = 16$
 - $2(8) = 16$
- $-2[4 + (-5 + 2)] = -2$
 - $-2[4 + (-3)]$
 - $-2 \times 1 = -2$
- $14 \div 2 \times 7 + 6 = 55$
 - $14 \div 2 = 7$
 - $(7 \times 7) + 6 = 49 + 6$
 - $49 + 6 = 55$
- $\frac{2(4-5)}{2(2)+1} = \frac{2(-1)}{4+1} = \frac{-2}{5}$
- $\frac{3(-5+1)}{12(3)+|-5+2|(-3-1)} =$
 - $\frac{3(-4)}{36+|-3|(-4)}$
 - $\frac{-12}{36+3(-4)} = \frac{-12}{36-12} = \frac{-12}{24} = \frac{-1}{2}$

Solving Linear Equations

- An equation is a math statement containing expressions on both sides of an “equal to” (=) sign. Those expressions may have constants, variables and operations.
 - Constant- value never changes
 - Variable- value is not known
 - Operations- symbol used to know what operation is being used (+, ÷, −, ×)
 - Examples:
 $2 + 6 = 8$
 $x - 6 = 13$
 $\frac{1}{x^2} = \frac{2y}{z^3} + 1$
 $1 + 1 = 3$ (contradiction – always false)
- A solution to an equation is a number (or set of numbers) that when replaced for the variable(s) makes the equation a true statement.
 - Example: -3 is a solution to $2x + 10 = 4$ because $2(-3) + 10 = -6 + 10 = 4$
- Two equations are said to be equivalent equations if they have the same solution.
 - Example: $x + 1 = 6$ and $x = 5$ (both have solution $x = 5$)
- Example of equation with no solution: $(x - x = 1)$ – this is called a contradiction
- Example of an equation with infinite number of solutions ($x = x$) – this is called an identity
- The Addition Property of Equality – for any real number a , b , and c
 - If $a = b$, then $a + c = b + c$
- The Multiplication Property of Equality – for any real numbers a , b , and c
 - If $a = b$ then $(a \times c) = (b \times c)$
- A linear equation of a single variable: any equation that may be expressed in this form
 - $ax + b = c$
 - a , b , c are real numbers coefficients and x is the variable
 - Examples of linear equations:
 - $3x + 5 = \frac{1}{2}$ ($a = 3$, $b = 5$, $c = \frac{1}{2}$)
 - $-x + 7x = 9 + 2x$
 - $4x = 9$ same as above equation