4.2 Order of Operations

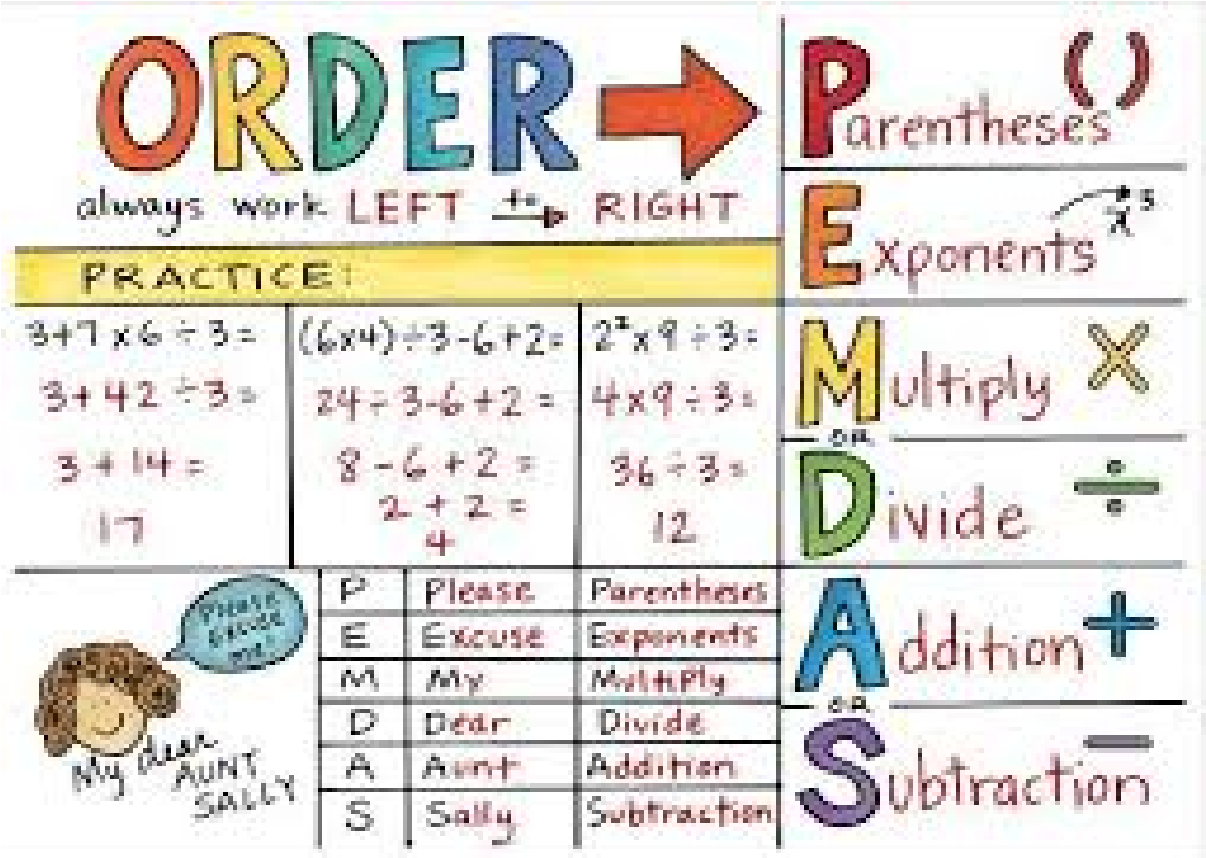
Mathematics agree to follow a set of rules so there is only one correct answer when you simplify an expression. Use the order of operations when you simplify an expression.

1. First perform operations within grouping symbols. (Parentheses, brackets, or fraction bars)

2. Next simplify numbers with exponents.

3. Then multiply or divide from left to right.

4. Finally add or subtract from left to right.



$3\times(3+7)-4^2\div 2$

$=3\times 10-4^2\div 2$

$=3\times 10-16\div 2$

$=30-8$

$=22$

$$\begin{aligned}2\times4^2+5^2\div(26-1)&=2\times4^2+5^2\div(26-1)\\&=2\times4^2+5^2\div(25)\\&=2\times4^2+5^2\div 25\\&=2\times16+25\div 25\\&=2\times16+1\\&=32+1\\&=33\end{aligned}$$

Example: Use the order of operations to simplify. $\begin{array}{r}1.3\\ 12.0\\ \hline 3.3\end{array}$

1.) $18\div 3+4$

$6+4$

10

$\begin{array}{r}11\\ \times\ 33\\ \hline 33\\ 330\\ \hline 363\end{array}$

$\begin{array}{r}1\\ 38.0\\ +\ 36.3\\ \hline 74.3\end{array}$

2.) $5+(36-3)+11\times[1.3+2.0]$

$5+(36-3)+11\times 3.3$

$5+33+11\times 3.3$

$5+33+36.3$

$38.0+36.3$

74.3

Example: Use the order of operations to simplify.

3.) $(50 \div 25)^2 \times 2 + 5 \times 0.3$

$2^2 \times 2 + 5 \times 0.3$

$4 \times 2 + 5 \times 0.3$

$8 + 5 \times 0.3$

$5 \times 3 = 15$

$8.0 + 1.5$

$8.0 + 1.5 = 9.5$

4.) $2^2 \times (15 - 3)$

$2^2 \times 12$

4×12

48

Example: Insert parentheses as needed to make each equation true.

5.) $14 + 6.6 \div (0.2 + 0.4) \stackrel{?}{=} 25$

$14 + 6.6 \div 0.6$

$6 \overline{)66}$

$14 + 11$

25

6.) $5 \times 10^2 \div (41 - 4^2) \stackrel{?}{=} 20$

$5 \times 10^2 \div (41 - 16)$

$5 \times 10^2 \div 25$

$5 \times 100 \div 25$

$500 \div 25$

20