



Chapter 1: Order of Operations, Fractions & Percents

ORDER OF OPERATIONS

When evaluating (finding the value of) an expression, the operations must be carried out in a certain order. This order is known as the **order of operations**, and can be easily remembered using the acronym, **BEDMAS**. Note that division and multiplication are equal in the order performed — but they must be done from left to right in the expression. The same is true for addition and subtraction.

B	evaluate B rackets first, then
E	E xponents, then
D	D ivision and
M	M ultiplication, then
A	A ddition and
S	S ubtraction

Examples:

$$\begin{aligned} 3 \times 3 + 4 & \\ &= 3 \times 12 \quad \text{[Multiplication first]} \\ &= 15 \quad \text{[Addition]} \end{aligned}$$

$$\begin{aligned} (3 + 3) \times 4 & \\ &= 6 \times 4 \quad \text{[Brackets first]} \\ &= 24 \quad \text{[Multiplication]} \end{aligned}$$

$$\begin{aligned} 17 - 4^2 - 3 \times 2 + 4 & \\ &= 17 - 16 - 3 \times 2 + 4 \quad \text{[Exponent first]} \\ &= 17 - 16 - 6 + 4 \quad \text{[Multiplication]} \\ &= -1 \quad \text{[Add and subtract from left to right]} \end{aligned}$$

Exercises

Solve the following problems:

- $(3 + 4 \times 4 - 2) \times 2 + 3 \times 4$
- $(3 + 4) \times 4 - (2 + 3 \times 3) + 3 \times 4$
- $-2 \times (3 + 4 \times 4 - 3^2) \times 2 + 3^2 \times 4$
- $(3 + 8 + 4 - 5) \times 2 + 3 \times 4$
- $(3 + 4 \times 4 - 3) \times 2 - 3 + 4(3 \times 3^2)$
- $22 - [(4 + 4 \times 4 - 3) \times 2 + 2] + 4$
- $(4 + 4) \times (4 - 4) + 2 + 3 \times (4 - 2^2)$
- $[48 \div (16 \div 4 \times 3) \times 2 - 5] \times 3$

Solutions

1. 48 2. 32 3. -4 4. 12 5. 137 6. 13 7. 2 8. 60