

When working with equations involving different operations, there are certain rules you must follow to get the correct answer. For example, you must multiply before you can add. These rules are called the *Order Of Operations*. A common way to remember the order of operations is by this sentence: Please Excuse My Dear Aunt Sally. Each letter represents an operation. P – parenthesis, E – exponents, M – multiplication, D – division, A – addition, S – subtraction. Each one must be followed in the order of the sentence. See below.

The order of operations follows:

Parentheses: (), []: starting from the inside and working your way outside.

Exponents: starting from the inside and working your way outside.

Multiplication or Division: from left to right

Addition or Subtraction: from left to right

Look at the following examples:

Ex [1] $2 + 3 * 7 =$ _____

- a) According to the order of operations, we must first multiply then add.
- b) $3 * 7 = 21$.
- c) $2 + 21 = 23$.
- d) The answer is 23.

Ex [2] $10 - 5 - 3 - 1 =$ _____

- a) According to the order of operations, we must subtract from left to right.
- b) $10 - 5 - 3 - 1 = (10 - 5) - 3 - 1$.
- c) $10 - 5 - 3 - 1 = 5 - 3 - 1$.
- d) $10 - 5 - 3 - 1 = (5 - 3) - 1$.
- e) $10 - 5 - 3 - 1 = 2 - 1$.
- f) $10 - 5 - 3 - 1 = 1$.
- g) The answer is 1.

Ex [3] $2 \times (8 - 3) =$ _____

- a) According to the order of operations, we should do what is inside the () first.
- b) $2 \times (8 - 3) = 2 \times 5$.
- c) $2 \times (8 - 3) = 10$.
- d) The answer is 10.

Ex [4] $20 - [2 \times (5 - 3)^3] =$ _____

- a) According to the order of operations, we should do what is inside the () first.
- b) $20 - (2 \times (5 - 3)^3) = 20 - (2 \times (2)^3)$.
- c) $20 - (2 \times (5 - 3)^3) = 20 - (2 \times 8)$.
- d) $20 - (2 \times (5 - 3)^3) = 20 - 16 = 4$.
- e) The answer is 4.

Ex [5] $(3^2)^2 =$ _____

- a) According to the order of operations, we should calculate the exponents from the inside to the outside.
- b) $(3^2)^2 = 9^2$
- c) $(3^2)^2 = 81$.
- d) The answer is 81.

Ex [6] $60 \div 4 \div 5 =$ _____

- a) According to the order of operations, we must divide from left to right.
- b) $60 \div 4 \div 5 = (60 \div 4) \div 5$.
- c) $60 \div 4 \div 5 = 15 \div 5$.
- d) $60 \div 4 \div 5 = 3$.
- e) The answer is 3.

Sometimes, we can change the order a little to help with calculating the answer. See below:

Ex [7] $32 \times 114 \div 8 =$ _____

- a) Since the order of operations says we can divide or multiply in the same step we can change this equation a little to make it easier.
- b) Think of this as being $32 \div 8 \times 114$.
- c) $32 \times 114 \div 8 = (32 \div 8) \times 114$.
- d) $32 \times 114 \div 8 = 4 \times 114$.
- e) $32 \times 114 \div 8 = 456$.
- f) The answer is 456.

Ex [8] $6 \times 4 \times 8 \div 2 \div 3 =$ _____

- a) To change this equation think of this as being $6 \div 3 \times 4 \div 2 \times 8$. Now the problem is much easier.
- b) $6 \times 4 \times 8 \div 2 \div 3 = (6 \div 3) \times (4 \div 2) \times 8$.
- c) $6 \times 4 \times 8 \div 2 \div 3 = 2 \times 2 \times 8$.
- d) $6 \times 4 \times 8 \div 2 \div 3 = 4 \times 8$.
- e) $6 \times 4 \times 8 \div 2 \div 3 = 32$.