

Order of Operations - PEMDAS

Operations

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"Operations" means things like add, subtract, multiply, divide, squaring, etc. If it isn't a number it is probably an operation.

But, when you see something like ...

$$7 + (6 \times 5^2 + 3)$$

... what part should you calculate first?

Start at the left and go to the right?
Or go from right to left?

Warning: Calculate them in the wrong order, and you will get a wrong answer !

So, long ago people agreed to always follow certain rules when doing calculations, and they are:

Order of Operations

Do things in Parentheses First. Example:

$$\begin{array}{l} \checkmark \quad 6 \times (5 + 3) = 6 \times 8 = \mathbf{48} \\ \times \quad 6 \times (5 + 3) = 30 + 3 = 33 \text{ (wrong)} \end{array}$$

Exponents (Powers, Roots) before Multiply, Divide, Add or Subtract. Example:

$$\begin{array}{l} \checkmark \quad 5 \times 2^2 = 5 \times 4 = \mathbf{20} \\ \times \quad 5 \times 2^2 = 10^2 = 100 \text{ (wrong)} \end{array}$$

Multiply or Divide before you Add or Subtract. Example:

$$\begin{array}{l} \checkmark \quad 2 + 5 \times 3 = 2 + 15 = \mathbf{17} \\ \times \quad 2 + 5 \times 3 = 7 \times 3 = 21 \text{ (wrong)} \end{array}$$

Otherwise just go left to right. Example:

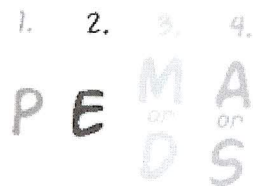
$$\begin{array}{l} \checkmark \quad 30 \div 5 \times 3 = 6 \times 3 = \mathbf{18} \\ \times \quad 30 \div 5 \times 3 = 30 \div 15 = 2 \text{ (wrong)} \end{array}$$

How Do I Remember ? PEMDAS !

- P** Parentheses first
- E** Exponents (ie Powers and Square Roots, etc.)
- MD** Multiplication and Division (left-to-right)

AS Addition and **S**ubtraction (left-to-right)

Note: Multiply and Divide rank equally. Add and Subtract rank equally.



After you have done "P" and "E", just go from left to right doing any "M" **or** "D" as you find them.

Then go from left to right doing any "A" **or** "S" as you find them.



You can remember by saying "**P**lease **E**xercise **M**y **D**ear **A**unt **S**ally".

Note: in the UK they say BODMAS (Brackets, Orders, Divide, Multiply, Add, Subtract), and in Canada they say BEDMAS (Brackets, Exponents, Divide, Multiply, Add, Subtract). It all means the same thing! It doesn't really matter how you remember it, just so long as you get it right.

Examples

Example: How do you work out $3 + 6 \times 2$?

Multiplication before **A**ddition:

First $6 \times 2 = 12$, then $3 + 12 = 15$

Example: How do you work out $(3 + 6) \times 2$?

Parentheses first:

First $(3 + 6) = 9$, then $9 \times 2 = 18$

Example: How do you work out $12 / 6 \times 3$?

Multiplication and **D**ivision rank equally, so just go left to right:

First $12 / 6 = 2$, then $2 \times 3 = 6$

Oh, yes, and what about $7 + (6 \times 5^2 + 3)$?

$$7 + (6 \times 5^2 + 3)$$

$$7 + (6 \times 25 + 3)$$

$$7 + (150 + 3)$$

$$7 + (153)$$

$$7 + 153$$

$$160$$

Start inside *Parentheses*, and then use *Exponents* First

Then *Multiply*

Then *Add*

Parenthesis completed, last operation is an *Add*

DONE !