



Order of Operations

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When performing mathematical calculations, it is critical to know the correct order in which each operation should be done. Whether you are adding or subtracting multiplying or dividing, or if you are using exponents and parenthetical expressions, you must perform the calculations in the correct order, or you may end up with an incorrect answer. At times the results could be devastating.

PEMDAS

To remember the correct order calculations should be performed, remember PEMDAS. PEMDAS stands for **P**arentheses – **E**xponents – **M**ultiplication – **D**ivision – **A**ddition – **S**ubtraction. Reading from left to right, it tells us the correct order to do our calculations.

Parentheses – Perform all calculations located within parentheses.

Exponent – Evaluate any exponents (radicals) which are present

Multiplication – Perform all multiplication

Division – Perform all division

Addition – Perform all addition

Subtraction – Perform all subtraction

Take note that multiplication and division are grouped together and addition and subtraction are as well. That is because they are considered to be on the same operational level.

An easy way of recalling the order is to know the phrase: **P**lease **E**xcuse **M**y **D**ear **A**unt **S**ally. The first letter of each word corresponds to the first letter of a particular operation.

Word	First Letter	Corresponds to
Please	P	Parentheses
Excuse	E	Exponents
My	M	Multiplications
Dear	D	Division
Aunt	A	Addition
Sally	S	Subtraction



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Example 1: $(4 + 5) \times 2$

$(4 + 5) \times 2$ Since $4 + 5$ is inside the parentheses, we do that calculation first
 $(9) \times 2$ Perform the calculation $4 + 5 = 9$
 9×2 Because 9 is the only thing inside the parentheses, we can remove them
18 Perform the calculation $9 \times 2 = 18$

Example 2: $(6 - 4 \times 3)^2$

$(6 - 4 \times 3)^2$ Since $6 - 4 \times 3$ is inside the parentheses, we do that calculation first
 $(6 - 12)^2$ Looking at PEMDAS, we see we must do the multiplication first
 $(-6)^2$ Then we subtract
36 Now that all the calculations inside are completed, we take the power

Example 3: $\left[\frac{(2+7)(3-1)}{2}\right]^2$

$\left[\frac{(2+7)(3-1)}{2}\right]^2$ We must first perform calculation inside the inner most parentheses.
So, in this case, we will add $2 + 7$ and subtract $3 - 1$

Next, we will perform the multiplication inside the brackets
 $\left[\frac{(9)(2)}{2}\right]^2$ (which are treated the same as parentheses).
In this case, we multiply 9×2

$\left[\frac{18}{2}\right]^2$ The final operation we must perform inside the brackets is division.
Divide $8 \div 2$

$[9]^2$ Finally, we apply the exponent

81 And get the final Answer



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Example 4: $\sqrt{(7 + 6 \times 10) - 3} + 5$

$\sqrt{(7 + 6 \times 10) - 3} + 5$	Begin by performing the calculations under the radical sign
$\sqrt{(7 + 60) - 3} + 5$	Multiply 6 and 10
$\sqrt{(67) - 3} + 5$	Add 7 and 60
$\sqrt{64} + 5$	Subtract 67 and 3
$8 + 5$	Take the square root of 64
13	Add 8 and 5

Example 5: $[(4 + 6) \times 7] + 6 \div 4$

$[(4 + 6) \times 7] + 6 \div 4$	Start with the innermost parentheses
$[(10) \times 7] + 6 \div 4$	Add 4 and 6
$(70) + 6 \div 4$	Multiply 10 and 7
$76 \div 4$	Add 70 and 6
19	Divide 76 by 4

Example 6: $42 \div 6 \times [75 \div (5 + 100 \div 5)]$

$42 \div 6 \times [75 \div (5 + 100 \div 5)]$	Begin with the innermost parentheses
$42 \div 6 \times [75 \div (5 + 20)]$	Divide 100 by 5
$42 \div 6 \times [75 \div (25)]$	Add 5 and 20
$42 \div 6 \times [3]$	Divide 75 by 25. Now complete the operations in the order they appear
7×3	Divide 7 by 6
21	Multiply 7 and 3