

Order of Operations

“Please Excuse My Dear Aunt Sally!” **THE WHOLE TRUTH ABOUT AUNT SALLY**

Actually, Aunt Sally is a mean little old lady who carries a pointy umbrella.

If you mess up the order of operations, she gives you a poke in the ribs with her umbrella.

Please	=	P	for Parenthesis. This includes parenthesis (), brackets [], and braces { }, absolute value , and fractions bars with multiple terms in the numerator or denominator
Excuse	=	E	for exponents, which includes square roots.
My	=	M	for multiplication.
Dear	=	D	for division.
Aunt	=	A	for addition.
Sally	=	S	for subtraction.

- Step 1:** Do what is inside the ***parentheses*** (grouping symbols).
- Step 2:** Do ***exponents*** and/or ***square roots***.
- Step 3:** As you scan from ***left*** to ***right***, do any ***multiplication*** or ***division*** as you encounter them.
- Step 4:** After you have completed the multiplications and/or divisions, scan from ***left*** to ***right*** again and perform any ***addition*** or ***subtraction*** as you encounter them.

This is the meaning of ‘**Please Excuse My Dear Aunt Sally!**’!

Remember, Aunt Sally is still that mean little old lady who’ll poke you with her pointy umbrella anytime you mess up the order of operations. Order of operations problems will also be found involving fractions, decimals, and signed numbers. It is a very important concept. In order to remember the sequence of operations to follow, we sometime use a ***MNEMONIC***. A mnemonic is a fancy name we give to a device which aids memory. Or, consider it as something stupid which helps you remember something important.

Or you can use the ACRONYM – PEMDAS! This word is formed by using the first letters of the phrase ‘**Please Excuse My Dear Aunt Sally!**’.

Example #1

$4 + 8 \cdot 6$ As you scan from *left* to *right*, you encounter **addition** and **multiplication**.

PE M DAS Do the **multiplication** first.

PE M D AS $4 + 48$ Then, you do **addition**.

52 is the answer.

Example #2

$(4 + 8) \cdot 6$ As you scan from *left* to *right*, you encounter a set of **parentheses**.

P E M D A S You must do what is inside the **parentheses** first.

PE M D A S $(12) \cdot 6$ Now we do **multiplication**.

72 is the answer.

Example #3

$18 \div 2 \cdot 3$ As you scan from *left* to *right*, you encounter **division** followed by **multiplication**.

PE M D A S You must do the **division** first.

PE M D A S $9 \cdot 3$ Then, you do **multiplication**.

27 is the answer.

Example #4

$4 \cdot 12 \div 3$ As you scan from *left* to *right*, you encounter **multiplication** followed by **division**.

PE M D A S This time, you do the **multiplication** first.

PE M D A S $48 \div 3$ Now, you do **division**.

16 is the answer.