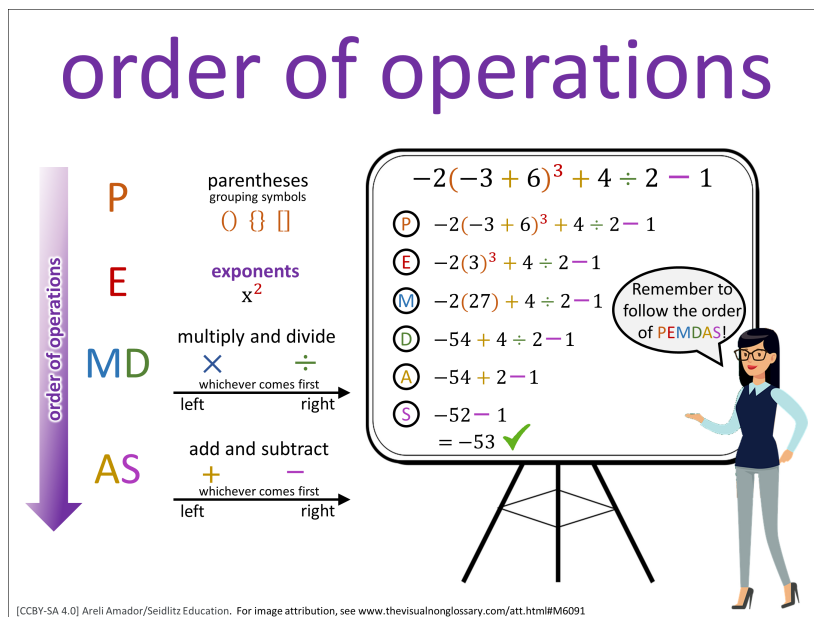


Following the Order of Operations

The purpose for reading is to learn how the order of operations helps us solve expressions step by step.

Pay Attention To:

- Parentheses and how they are used
- When exponents are solved
- The order of multiplication, division, addition, and subtraction
- Words that explain why the order matters
- Steps that change the value of the expression



order of operations

P parentheses
grouping symbols
 $() \{ } []$

E exponents
 x^2

MD multiply and divide
 $\times \div$
left $\rightarrow$ right
whichever comes first

AS add and subtract
 $+$ $-$
left $\rightarrow$ right
whichever comes first

Remember to follow the order of PEMDAS!

$-2(-3 + 6)^3 + 4 \div 2 - 1$

$\textcircled{P} -2(-3 + 6)^3 + 4 \div 2 - 1$
 $\textcircled{E} -2(3)^3 + 4 \div 2 - 1$
 $\textcircled{M} -2(27) + 4 \div 2 - 1$
 $\textcircled{D} -54 + 4 \div 2 - 1$
 $\textcircled{A} -54 + 2 - 1$
 $\textcircled{S} -52 - 1$
 $= -53$ ✓

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When a math problem has many steps, we need to solve it in the right order. The **order of operations** is a list of rules that tells us how to do this. It helps us know what to do first, next, and last.

Look at this expression:

$$3 + 2(4 - 1)^2 - 6 \div 3$$

First, solve what is inside the parentheses: $(4 - 1) = 3$. Now the problem is $3 + 2 \times 3^2 - 6 \div 3$.

Next, do the **exponent**. That means $3 \times 3 = 9$. Now it looks like this: $3 + 2 \times 9 - 6 \div 3$

Now do multiplication and division, from left to right. $2 \times 9 = 18$, and $6 \div 3 = 2$. Now the problem is $3 + 18 - 2$.

Last, do addition and subtraction. $3 + 18 = 21$, then $21 - 2 = 19$.

The **order of operations** helps you know how to do problems in the right steps. That way, you always know what to do next.

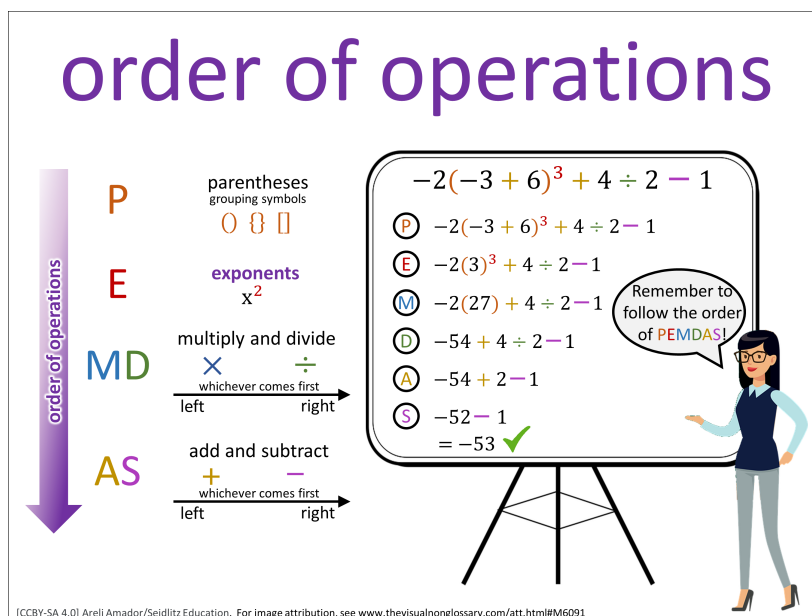


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Remember to follow the order of PEMDAS!

Example expression on whiteboard:
 $-2(-3 + 6)^3 + 4 \div 2 - 1$
 (P) $-2(-3 + 6)^3 + 4 \div 2 - 1$
 (E) $-2(3)^3 + 4 \div 2 - 1$
 (M) $-2(27) + 4 \div 2 - 1$
 (D) $-54 + 4 \div 2 - 1$
 (A) $-54 + 2 - 1$
 (S) $-52 - 1$
 $= -53$ ✓

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When a math expression has more than one operation, solving it in the right order is important. We use a set of rules called the **order of operations** to help us do that. These rules tell us where to start and what to do next so everyone solves the problem the same way.

Let's look at this expression:

$$3 + 2(4 - 1)^2 - 6 \div 3$$

First, we solve anything inside parentheses. Here, we see $(4 - 1)$, which equals 3. So the expression becomes $3 + 2 \times 3^2 - 6 \div 3$.

Next, we handle **exponents**. The 3^2 means 3 times 3, which is 9. Now the expression is $3 + 2 \times 9 - 6 \div 3$.

After that, we move to multiplication and division, working from left to right. $2 \times 9 = 18$ and $6 \div 3 = 2$, so now we have $3 + 18 - 2$.

Last, we do addition and subtraction. $3 + 18 = 21$, and then $21 - 2 = 19$.

By using the **order of operations**, we made sure each part of the expression was solved in the correct sequence. This helps keep expressions clear and consistent. Each step follows the last one and depends on the operations around it. That's why the **order of operations** is important in understanding how expressions work.

When you face expressions that have many steps, using these rules helps you make sense of the whole problem.

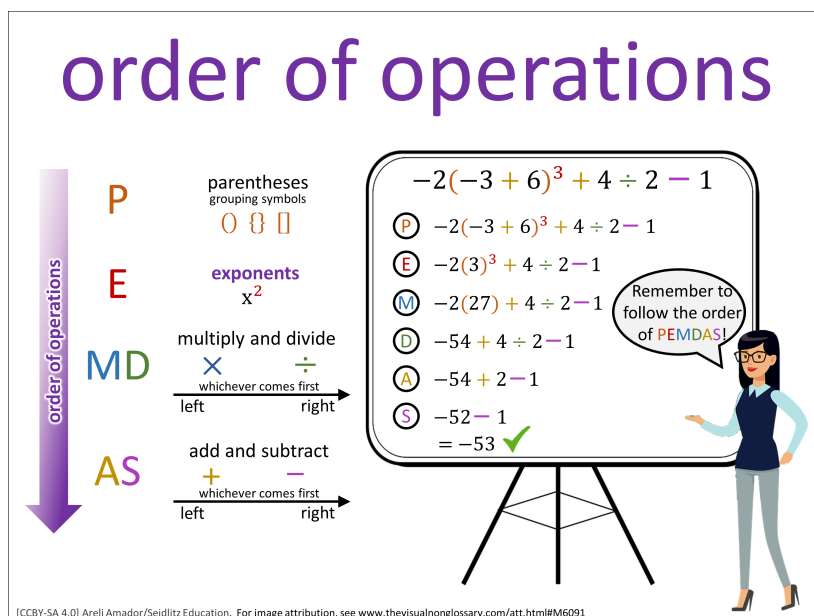


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order of operations

P parentheses grouping symbols $() \{ \} []$

E exponents x^2

MD multiply and divide
 $\times \div$
 whichever comes first
 left right

AS add and subtract
 $+ -$
 whichever comes first
 left right

Remember to follow the order of PEMDAS!

$-2(-3 + 6)^3 + 4 \div 2 - 1$

P $-2(-3 + 6)^3 + 4 \div 2 - 1$

E $-2(3)^3 + 4 \div 2 - 1$

M $-2(27) + 4 \div 2 - 1$

D $-54 + 4 \div 2 - 1$

A $-54 + 2 - 1$

S $-52 - 1 = -53$ ✓

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When evaluating expressions with many steps, the **order of operations** ensures consistency and clarity. These rules explain the order in which to handle parentheses, **exponents**, multiplication, division, addition, and subtraction.

Take this expression:

$$3 + 2(4 - 1)^2 - 6 \div 3$$

Start with the parentheses: $(4 - 1)$ equals 3. Now we have $3 + 2 \times 3^2 - 6 \div 3$.

Next, apply the **exponent**: 3^2 equals 9. Now the expression is $3 + 2 \times 9 - 6 \div 3$.

Then complete multiplication and division, in order from left to right: $2 \times 9 = 18$, and $6 \div 3 = 2$. This simplifies the expression to $3 + 18 - 2$.

Finally, perform **addition and subtraction from left to right**: $3 + 18 = 21$, then $21 - 2 = 19$.

Using the **order of operations** allows us to approach complex expressions with confidence. Each operation builds on the last, and the correct sequence ensures the

expression's meaning is preserved. This structure helps mathematicians communicate their thinking clearly and avoids confusion.

