Gutscher

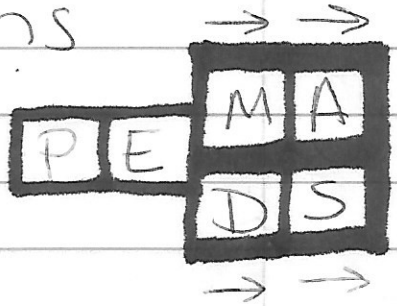
Order of Operations

Which one is correct?

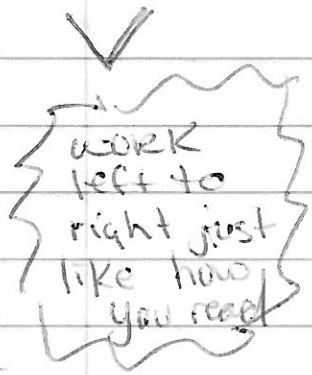
$3 + 5 \times 2$	OR	$3 + 5 \times 2$
16 ↑		13 ↑
Wrong		Correct

It is easy for students to get multi-step problems incorrect

- You must follow the Order of Operations OR PEMDAS



1. Do grouping Symbols like parentheses first
2. Do exponents
3. * Multiplication OR Division in order of left to Right →
4. * Adding OR Subtraction in order of left to Right



multiplication symbols $4(5)=20$

$\times \cdot ()$

$4 \times 5 = 20 \quad 4 \cdot 5 = 20$

Tips:- Box what you are working on

- rewrite after each step

$$40 - 3 \cdot 5 + \boxed{(10 \div 2)^2} - 10$$

$$40 - 3 \cdot 5 + \boxed{(5)^2} - 10$$

$$40 - \boxed{3 \cdot 5} + 25 - 10$$

$$\boxed{40 - 15} + 25 - 10$$

$$\boxed{25 + 25} - 10$$

$$\boxed{50 - 10}$$

$$40$$

Order of Operation Breakdown

1) Do work inside parentheses $(10 \div 2)$ $\downarrow 5$
2) Do exponents $(5)^2 = 25$
3) Do multiplication $3 \cdot 5 = 15$
4) Add or Subtract from left to right

$$(40 - 15) + 25 - 10$$

$$\downarrow$$

$$(25 + 25) - 10$$

$$\downarrow$$

$$(50 - 10)$$

$$\downarrow$$

$$40$$

Guided Notes - Order of Operations

Warm-up continuation:

I. Using paper and pencil, work with a partner to simplify the expressions.

a. $4 + 3 \times 2 =$

b. $5 + 4^2 + 24 \div 6 =$

II. Using a calculator, enter the following expressions and record the answer. Compare your answers with your answers above. *If there were any differences, why?*

a. $4 + 3 \times 2 =$ 10

b. $5 + 4^2 + 24 \div 6 =$ 25

What is a numerical expression?	A numerical expression includes only numbers and operational symbols
What does it mean to simplify?	To simplify is to find an equivalent expression that is simpler than the original
What is the order of operations?	Order of operations is a series of steps to solve numerical expressions. 1. Perform operations in **grouping symbols** first 2. Find the values of the number with **exponents** 3. **Multiply or divide** from left to right as ordered in the problem. 4. **Add or subtract** from left to right as ordered in the problem.
Helpful Hint: The following chart resembles a hopscotch board. It is to remind you that when you land on multiplication/division, or addition/subtraction, both of your legs are touching a box which means that you must do whichever one comes first from left to right.	G E | X ÷ | + -
$9 + 12 \times 2$	multiply 1st.... then add $9 + 12 \cdot 2$ $9 + 24 \Rightarrow 33$
$4 \times 3^2 + 8 - 16$ $4 \cdot 9 + 8 - 16$ $36 + 8 - 16 \rightarrow 44 - 16 \Rightarrow 28$	exponent 1st. Then multiply ... then add and subtract
$5 + 12 \div 6 - 3$ $5 + 2 - 3$ $7 - 3$ 4	Divide 1st... then add and subtract

We do not follow the phrase "please excuse my dear Aunt Sally." It leads to mistakes

$3 \times 8 = 24$
$3 \cdot 8 = 24$
$3(8) = 24$

Multiplication Symbols
( ) x •

PE MA DS

Work from left to Right for M and D and A and S

Order of Operations

PE M A D S → →

Practice 1: $4^2 + 48 \div (10-4)$ $4^2+48\div 6$ $16+48\div 6$ $16+8$	$16+8=24$
Practice 2: $81 \div (9 \times 9) + 4^3$	$81\div(9\times9)+4^3$ $81\div 81+64$ $1+64=65$ see even teachers make mistakes
Practice 3: $61 + 5 \times 10 \div 2 - 70$	$61+5\times10\div2-70$ $61+50\div2-70$ $61+25-70$ $86-70 \Rightarrow 16$
Practice 4: $(2^2 + 18) + 3 - 5 \times 4$ $(4+18)+3-5\times4$	$(4+18)+3-5\times4$ $22+3-5\times4$ $22+3-20$ $25-20=5$
Practice 5: $21 \div (3+4) \times 9 - 2^3$	$21\div(3+4)\times9-2^3$ $21\div 7\times9-8$ $3\times9-8$ $27-8 \Rightarrow 19$
Practice 6: Regina bought 5 carved wooden beads for \$3 each and 8 glass beads for \$2 each. Write and evaluate the expression. $5 \times \$3 + 8 \times \$2$	$5\cdot3+8\cdot2$ $15+16$ 31
Practice 7: Tyler walked 2 miles a day for the first week of his exercise plan. Then he walked 3 miles for the next nine days. How many miles did Tyler walk? $2\times7+3\times9$	$2\cdot7+3\cdot9$ $14+27$ 41