ORDER OF OPERATIONS #20

The **ORDER OF OPERATIONS** establishes the necessary rules so that expressions are evaluated in a consistent way by everyone.

1. Circle the terms in the expression. A term is each part (a number, a variable, a product or a quotient of numbers and variables) of the expression that is separated by addition (+) or subtraction (–) symbols unless the sum or difference is inside parentheses.

2. Simplify each term until it is one number by:
   - evaluating each exponential number.
   - performing the operations inside the parentheses.
   - multiplying and dividing from left to right.

3. Finally, perform all addition and subtraction from left to right.

Example 1

- Circle the terms.
- Simplify each term until it is one number.
- Add the terms going from left to right.

$7 + 3 \cdot 8$

$(7) + (3 \cdot 8)$

$7 + 24$

31

Example 2

- Circle the terms.
- Simplify each term until it is one number.
  - Evaluate 2^2.
  - Subtract 2 from 5.
  - Multiply within each term, left to right.
  - Add the numbers.

$2^2 \cdot 4 + 4(5-2) + 7$

$(2^2 \cdot 4) + (4(5-2)) + (7)$

$(4 \cdot 4) + (4(3)) + (7)$

$16 + 12 + 7$

35

Example 3

- Circle the terms.

$7 - 9 \div 3^2 + 4(4+3) - 7$

$(7) - (9 \div 3^2) + (4(4+3)) - (7)$

- Simplify each term until it is one number.
  - Evaluate 3^2 first.
  - Add 4 + 3 in the parentheses.
  - Multiply and divide left to right in each term.
  - Add and subtract the numbers from left to right.

$$\textcircled{7} - \textcircled{9 \div 9} + \textcircled{4(7)} - \textcircled{7}$$
$$\textcircled{7} - \textcircled{1} + \textcircled{28} - \textcircled{7}$$
$$27$$

Example 4

- Circle the terms.

- Simplify each term until it is one number.
  - Subtract the numerator.
  - Evaluate 3^2.
  - Divide.
  - Add or subtract the numbers from left to right.

$$18 + \frac{12-2}{5} - 3^2 + 18 \div 6$$
$$\textcircled{18} + \textcircled{\frac{12-2}{5}} - \textcircled{3^2} + \textcircled{18 \div 6}$$
$$\textcircled{18} + \textcircled{\frac{10}{5}} - \textcircled{9} + \textcircled{3}$$
$$18 + 2 - 9 + 3$$
$$14$$

Problems

Circle the terms, then simplify each expression.

1. $7 \cdot 3 + 5$
2. $8 \div 4 + 3$
3. $2(12-4)+4$
4. $4(9+3)+10 \div 2$
5. $24 \div 3 + 7(9+1) - 4$
6. $\frac{12}{3} + 5 \cdot 4^2 - 2(12-5)$
7. $\frac{20}{3+2} + 9 \cdot 2 \div 3$
8. $\frac{4+24}{7} + 5^2 - 27 \div 9$
9. $3^2 + 8 - 16 \div 4^2 \cdot 2$
10. $16 - 4^2 + 4 - 2^2$
11. $5(19 - 3^2) + 5 \cdot 3 - 7$
12. $(6-2)^2 + (8+1)^2$
13. $4^2 + 8(2) \div 4 + (6-2)^2$
14. $\frac{16}{2^2} + \frac{7 \cdot 3}{7}$
15. $3(8-2)^2 + 10 \div 5 - 6 \cdot 5$
16. $18 \div 2 + 7 \cdot 8 \div 2 - (9-4)^2$
17. $\frac{24}{3} + 16 - 12 \div 3 - (3+5)^2$
18. $22 \cdot 2 \div 4 - (7+3)^2 + 3(7-2)^2$
19. $\left(\frac{22+3}{5}\right)^2 + 4^2 - (2 \cdot 3)^2$
20. $5^2 - \left(\frac{40+4}{4}\right)^2 + (3 \cdot 4)^2$