

Order of Operations

Order of Operations refers to which operations should be performed and in which order.

1. **P**arentheses (inside out)
2. **E**xponents
3. **M**ultiplication and **D**ivision (left to right)
4. **A**ddition and **S**ubtraction (left to right)

To remember the order of operations, you can think of **PEMDAS**, “**P**lease **E**xcuse **M**y **D**ear **A**unt **S**ally.”

This means that you should do what is possible within parentheses first (if parentheses are enclosed within other parentheses, work from the inside out), then exponents, then multiplication and division (from left to right), and the addition and subtraction (from left to right).

Examples:

<p>#1</p> $4 + 5 \times 6$ $= 4 + 30$ $= 34$ <p style="text-align: right;">Multiply Add</p>	<p>#5</p> $45 - 2^3 \times 3 + 7$ $= 45 - 8 \times 3 + 7$ $= 45 - 24 + 7$ $= 21 + 7$ $= 28$ <p style="text-align: right;">Exponents Multiply Subtract Add</p>
<p>#2</p> $9(6 + 5)$ $= 9(11)$ $= 99$ <p style="text-align: right;">Parentheses Multiply</p>	<p>#6</p> $72 \div 2 \times 3 + 4 \times 2^3 - 3^3$ $= 72 \div 2 \times 3 + 4 \times 8 - 27$ $= 36 \times 3 + 4 \times 8 - 27$ $= 108 + 32 - 27$ $= 140 - 27$ $= 113$ <p style="text-align: right;">Exponents Divide Multiply, left to right Add Subtraction</p>
<p>#3</p> $2(3 + 5) + 7 \times 4$ $= 2(8) + 7 \times 4$ $= 16 + 28$ $= 44$ <p style="text-align: right;">Parentheses Multiply, left to right Add</p>	<p>#7</p> <p>Simplify the numerator and denominator separately, then divide, if possible.</p> $= \frac{2(7 + 8) + 2}{3 \times 5 + 1}$ <p style="text-align: right;"><u>Parentheses</u> Multiply</p> $= \frac{2(15) + 2}{15 + 1}$ <p style="text-align: right;"><u>Multiply</u> Add</p>
<p>#4</p> $3 \times 4 \div 2 \times 7 + 5$ $= 12 \div 2 \times 7 + 5$ $= 6 \times 7 + 5$ $= 42 + 5$ $= 47$ <p style="text-align: right;">Multiply Divide Multiply Add</p>	$= \frac{30 + 2}{16}$ <p style="text-align: right;"><u>Add</u> 16</p> $= \frac{32}{16}$ <p style="text-align: right;">Divide</p> $= 2$