

## Order of Operations - BODMAS

- B** Brackets first
- O** Orders (ie Powers and Square Roots, etc.)
- DM** Division and **M**ultiplication (left-to-right)
- AS** Addition and **S**ubtraction (left-to-right)

### Operations

"**Operations**" mean things like add, subtract, multiply, divide, squaring, etc. If it isn't a number it is probably an operation.

But, when you see something like...

$$7 + (6 \times 5^2 + 3)$$

... what part should you calculate first?

**BODMAS** is the agreed order of handling this sort of calculation. Everyone follows the same plan so we all get the same answer to the same question.

Computer programs such as **Excel** also follow this plan when handling calculations.

Order of Operations

**Do things in Brackets First.** Example

✓  $6 \times (5 + 3) = 6 \times 8 = 48$

✗  $6 \times (5 + 3) = 30 + 3 = 33$  (wrong)

**Powers and Roots before Multiply, Divide, Add or Subtract.** Example:

✓  $5 \times 2^2 = 5 \times 4 = 20$

✗  $5 \times 2^2 = 10^2 = 100$  (wrong)

**Multiply or Divide before you Add or Subtract.** Example:

$$\begin{array}{l}
 \checkmark \quad 2 + 5 \times 3 = 2 + 15 = 17 \\
 \times \quad 2 + 5 \times 3 = 7 \times 3 = 21 \text{ (wrong)}
 \end{array}$$

Otherwise just go left to right. Example:

$$\begin{array}{l}
 \checkmark \quad 30 \div 5 \times 3 = 6 \times 3 = 18 \\
 \times \quad 30 \div 5 \times 3 = 30 \div 15 = 2 \text{ (wrong)}
 \end{array}$$

Check the following calculations by hand and C# programs to test the output.

Use variables to assign initial values before running the operations. The answer should be output to the console screen.

	Expected answer	C# output
1. $1 + 5 \div 2$		
2. $2^2 \div 3$		
3. $(1 + 4) \div 2$		
4. $12 \div 3 + 1$		
5. $4 + 3^2 \div 2$		
6. $1 + 3 \div 2 + 1$		
7. $3^2 \div 2^2$		
8. $1 + 4 \div 2 * 3$		
9. $2 + 8 \div 2 * 3$		
10. $7 + (6 \times 5^2 + 3)$		