

## *Steps into Algebra*

# SNALPHABET

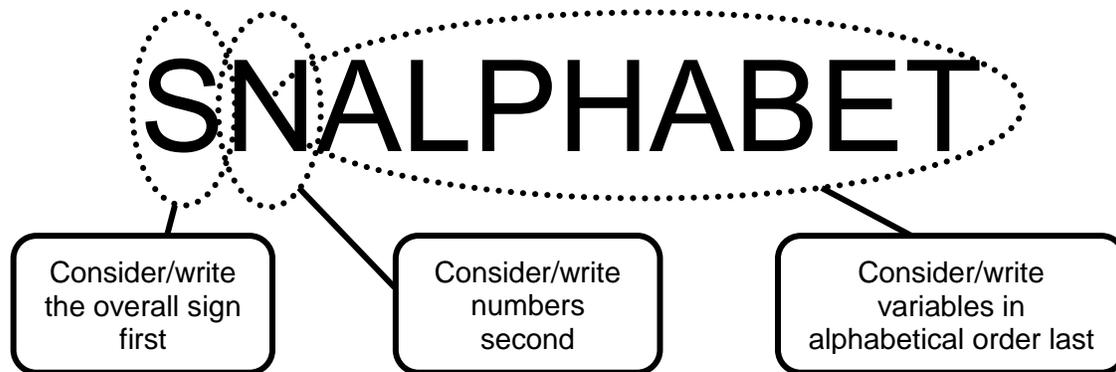
***This guide introduces a simple memory aid to help the ordering and writing of algebraic expressions and equations in mathematics.***

## **What does SNALPHABET mean?**

Many issues arise in mathematics when considering terms in expressions produced by multiplication. These may include:

- Which order do I write the answer in?
- Which order do I do things in?
- What do I do with the minus sign?
- What do I do first?

The word **SNALPHABET** is a useful memory aid which helps to answer these questions.



In short, when carrying out multiplication of algebraic terms or writing individual terms, you consider the *sign* of the term first, any *numbers* second and finally write variables in *alphabetical* order. This will help *you* to write mathematics which is consistent with the way it is written in a majority of textbooks and in lectures. As a result of this your mathematics will be clearer to both yourself and your lecturers. It will also help you to read mathematics in textbooks or elsewhere which will make independent study easier. The SNALPHABET method proves especially useful when multiplying out brackets in algebra.

## Working out the correct sign

One of the most common errors in mathematics (at all levels) is to get the sign of your answer wrong. SNALPHABET can help to overcome this by focussing on the sign at the beginning of your calculation. When you have worked out the sign you do not have to consider it again.

When working out the sign of your calculation with SNALPHABET count the number of negative signs.

If there is zero or an even number of negative signs then the overall result will be positive.

If there are an odd number of negative signs then the overall result will be negative.

## Using SNALPHABET

Here are some examples which show the potential uses of SNALPHABET.

*Example:* Multiply  $6x$  by  $-3x^2$ .

1. Firstly consider the overall *sign*. The first term is positive and the second is negative; there is one negative sign and so the overall sign is negative.
2. Now consider the *numbers*. You have  $6 \times 3 = 18$ . You have already dealt with the signs so there is no need to consider them again.
3. Finally look at the alphabetical part or variables ( $x$ ). You have  $x \times x^2 = x^3$ .
4. Now write the answer as  $(6x) \times (-3x^2) = -18x^3$ .

*Example:* Simplify  $-4xy^2 \times y \times -3z$ .

**SIGN:** You have two negative signs and so the overall sign is positive.

**NUMBER:** You have  $4 \times 1 \times 3 = 12$ .

**ALPHABET:** You have  $x$  (in the first term),  $y^2 \times y = y^3$  (from the first and second terms) and  $z$  (from the third term).

So:

$$-4xy^2 \times y \times -3z = +12xy^3z = 12xy^3z.$$

*Example:* Simplify  $-3p^2 \times -2q^6 \times -4pr^4$ .

**SIGN:** You have three negative signs and so the overall sign is negative.

**NUMBER:** You have  $3 \times 2 \times 4 = 24$ .

**ALPHABET:** You have  $p^2 \times p = p^3$  (from the first and third terms),  $q^6$  (from the second term) and  $r^4$  (from the third term).

So:

$$-3p^2 \times -2q^6 \times -4pr^4 = -24p^3q^6r^4$$

## **Other types of functions**

The SNALPHABET system applies to signs, numbers and variables *only*. Other types of functions which you may see such as the trigonometric functions (sine, cosine and tangent), the exponential function ( $e^x$ ), or the logarithmic function ( $\ln x$ ) are placed *after* the alphabetical part. The exponential function is placed first, then any trigonometric functions (sine then cosine then tangent) and finally the logarithmic function.

*Example:* Simplify  $4x^2 \times -6\cos(2x)$ .

**SIGN:** You have one negative so the overall sign is negative.

**NUMBER:** You have  $4 \times 6 = 24$ .

ALPHABET: You have  $x^2$  in the first term and no alphabetical part to the second term. Note that the  $2x$  is part of the cosine function (cos) and so is not included in SNALPHABET.

So:

$$4x^2 \times -6 \cos(2x) = -24x^2 \cos(2x)$$

Example: Simplify  $3x \sin x \times 2e^{2x} \times x^3$ .

SIGN: You have no negative signs so the overall sign is positive.

NUMBER: You have  $3 \times 2 \times 1 = 6$ .

ALPHABET: You have  $x$  in the first term and  $x^3$  in the third term and so  $x \times x^3 = x^4$ . Again the  $x$  in  $\sin x$  is part of the sine function and so is *not* included in the alphabet consideration.

After the sign, number, alphabet you write the exponential term ( $e^{2x}$ ) and then the trigonometric term ( $\sin x$ ). So:

$$3x \sin x \times 2e^{2x} \times x^3 = 6x^4 e^{2x} \sin x$$

## Want to know more?

If you have any further questions about this topic you can make an appointment to see a [Learning Enhancement Tutor](#) in the [Student Support Service](#), as well as speaking to your lecturer or adviser.

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- 💻 Ask: [ask.let@uea.ac.uk](mailto:ask.let@uea.ac.uk)
- 🔗 Click: <https://portal.uea.ac.uk/student-support-service/learning-enhancement>

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