# Maths skills – M2.1 Understand and use symbols =, ‹, ‹‹, ››, ›, α, ~

### Tutorials

Learners may be tested on their ability to:

* use these symbols appropriately and correctly in their given contexts
* understand these symbols in the contexts of formulae given.

### Understanding symbols

There are many mathematical symbols that you need to understand and be able to use in lots of different biological contexts. You will know that this symbol (=) means ‘equal to’ and if you see this symbol (~), it means approximately equal to.

This symbol (<) means ‘less than’ and is used to show that the value on the left side of the symbol is smaller than the value on the right side of the symbol. Likewise, its opposite is (>), which means greater than. Basically the open side of each indicates the bigger number and the pointed side indicates the smaller number. If a value is much less than or much greater than another, then you use these symbols: ( << ), ( >> ).

|  |  |
| --- | --- |
| = | Equals |
| ~ | Approximately equal to |
| < | Less than |
| > | Greater than |
| << | Much less than |
| >> | Much greater than |
| α | Proportional to |

Finally, this symbol (∝) means “proportional to”. If two quantities *A* and *B* are *directly proportional* then the appropriate mathematical statement is *A* ∝ *B*

When A gets bigger, so does B.

*A* ∝ *B*

If the two quantities are *inversely proportional* then the appropriate relationship between *A* and *B* is *A* ∝ 

A is proportional to one over B. When A gets bigger, B gets smaller.

*A* ∝ 

### Using symbols

You might report that use of fertilizers on agricultural land was found to be proportional to algal growth in surrounding water bodies, or, fertilizer use was proportional to algal growth.

Use of fertilizers ∝ Algal growth

In the same study you might find that fertilizer use, F, on the agricultural land was inversely proportional to available oxygen, O, in surrounding waters, or fertilizer use was inversely proportional to oxygen availability.

*F* ∝ 

Use of nitrogen fertilizer, NF, was greater than the use of organic fertilizer, OF.

NF > OF

But the growth of algae next to land using nitrogen fertilizer Gn was approximately equal to growth next to land with organic fertilizer, Go.

Gn  ~ Go

These symbols are important when reporting relationships between two or more parts of a study. In biology though, information like this would be supported with data and specific relationships would be reported, but for general accounts of a biological scenario, these symbols might be used. You need to be able to recognise and understand all of these symbols when they are used in biological contexts.

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