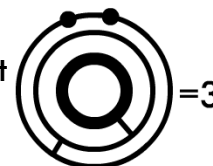# Gallifreyan Math (by Loren Sherman)

Disclaimer: this was written back in high school, so there's nothing past calculus.
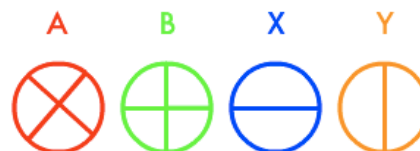
Numbers:

Numbers are covered in the main guide. To write numbers in different bases, add that many filled-in dots on the perimeter of the number.
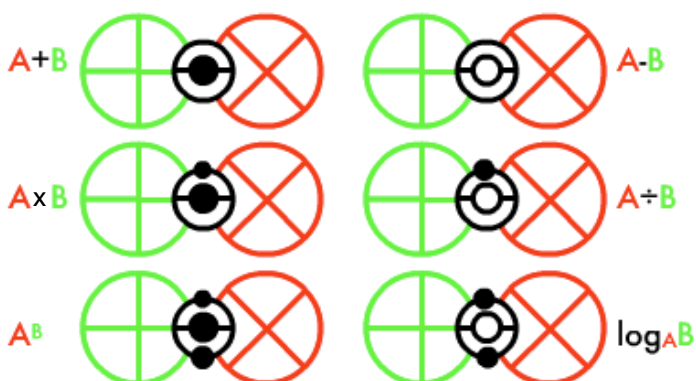
=3

Variables:

Variables don't have to be letters. They can be any design you can fit in a circle, so long as that design isn't also a mathematical symbol. In this guide, the variables are as follows (color-coded for ease of use):
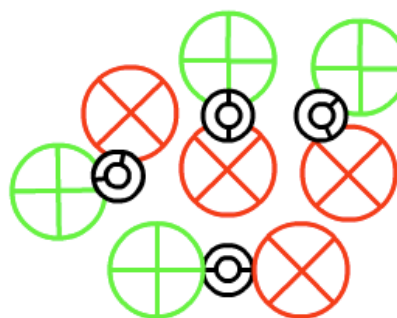
Variables don't have to be simple like these ones, but they must be consistent.

A   B   X   Y

Operations:

The basic operations are as follows:

$A+B$

$A-B$

$A \times B$
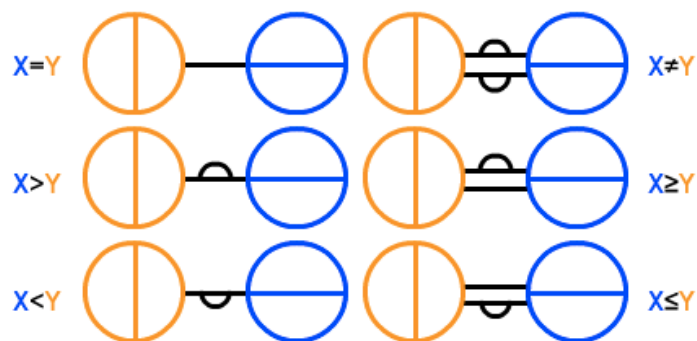
$A \div B$

A^B

$\log_A B$

These operations are read counterclockwise from the bottom, just like words. So $A-B$ could just as well be any of the following:

Equality:

To express the relationship between two expressions, connect them with one of these:

$X=Y$

$X \neq Y$

$X>Y$

$X \geq Y$

$X<Y$

$X \leq Y$

Notice how the third row is redundant; none of these lines have to be horizontal, or even straight, but if you turn the image so that the semicircle is facing up, the larger number will always be on the right.

## Parentheses and Order of Operations:

Order of operations is determined purely by the Gallifreyan equivalent of parentheses, which is simply a larger circle, centered on the operation it contains. As an example, here's a slightly modified Pythagorean Theorem, or $((A^2)+(B^2))^{(1/2)}=X$:
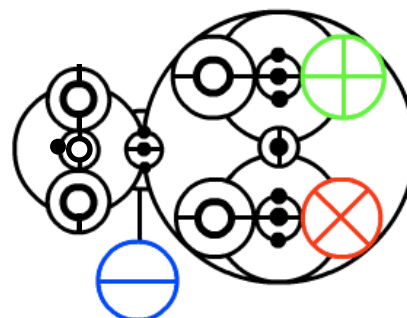
It would be simpler to write (1/2) as 0.5, but it was necessary to demonstrate that parentheses do not have to entirely enclose the things they contain.

Functions:
These are rather similar to parentheses, except the containing circle has the symbol of the function on it. In Gallifreyan, A(X) (assuming for the moment that A is a function rather than a variable), looks something like the symbol to the right. Inverse functions are denoted by two dots, as shown on the far right.
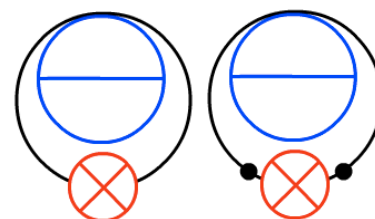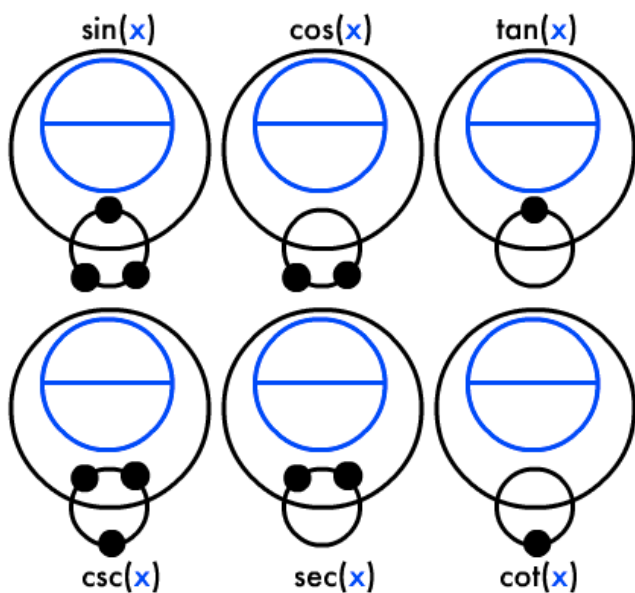
Trigonometric Functions:
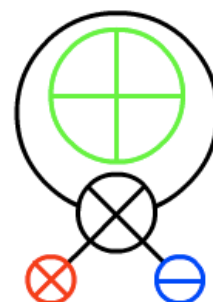These are easy to remember if you keep this triangle in mind:
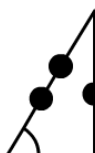
(for instance, sine is opposite over hypotenuse, or •/••)

sin(x)   cos(x)   tan(x)

csc(x)   sec(x)   cot(x)

Limits:
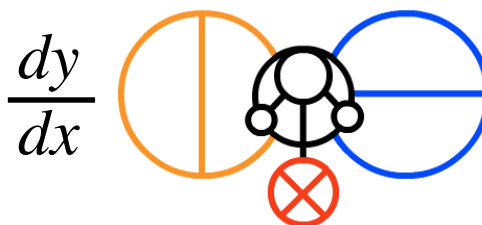The limit of B as X approaches A is written like this:
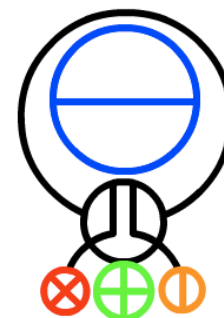
Here are the limits to the right:

and to the left:

Calculus:
The derivative of Y with respect to X at A is written like so (only fill in A if you're taking the derivative at a certain point):

$$\frac{dy}{dx}$$

The integral of Y with respect to X from A to B is written like so (leave A and B blank for an indefinite integral):
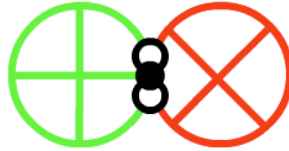
$$\int_a^b y\,dx$$

Summation:

$$\sum_{Y=A}^{B} X$$

Scientific Notation:
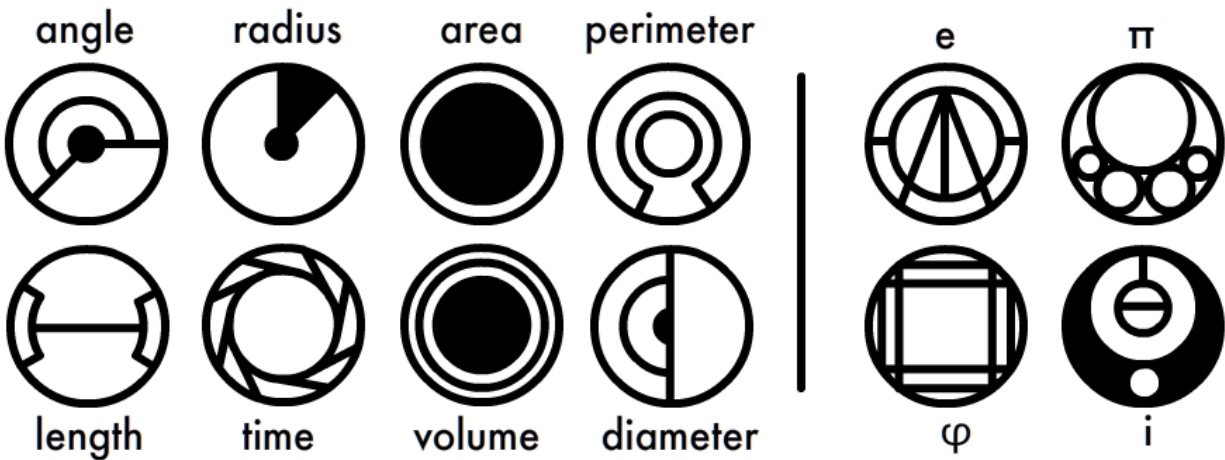A*10^B is denoted as follows:

Common Variables and Constants
The X and Y used in this guide are standard, as they resemble the X and Y axes.
Variables will also often resemble a letter of the Gallifreyan alphabet.
Here are some other common variables and constants:

angle   radius   area   perimeter   e   π

length   time   volume   diameter   φ   i

Of course, these are only a few. Recommendations are welcome.
If there's anything that needs clarifying or anything I should add, email me at
lorenzosherman@gmail.com.