Symbols

$x > y$	x greater than y
$x < y$	x less than y
$x \geq y$	x greater than or equal to y
$x \leq y$	x less than or equal to y

The rules of inequalities

These are the same as for equations i.e that whatever you do to one side of the equation(add/subtract, multiply/divide by quantities) you must do to the other.

However, their are **two** exceptions to these rules.

When you **multiply each side by a negative quantity**

'**<**' becomes '**>**', or '**>**' becomes '**<**' .

That is, the **inequality sign is reversed**.

Similarly, when you **divide each side by a negative quantity**

< becomes **>**, or **>** becomes**<** .

That is, the **inequality sign is reversed**.

Examples

$-\frac{x}{2} < 6$

multiplying each side by -2

$\frac{-2}{-2}x > -12$ (note $<$ to $>$)

$x > -12$

$-5x > 4$

dividing each side by -5

$\frac{-5}{-5}x < \frac{4}{-5}$ (note $>$ to $<$)

$x < \frac{4}{-5}$

$x < -\frac{4}{5}$

Inequalities with one variable

Example #1 - Find all the integral values of x where,

$$6 \geq x > -5$$

The values of x lie equal to and less than 6 but greater than -5, but not equal to it.

The integral(whole numbers + or - or zero) values of x are therefore:

6, 5, 4, 3, 2, 1, 0, -1, -2, -3, -4

Example #2 - What is the range of values of x where,

$$x^2 \geq 144$$

Since the square root of 144 is +12 or -12(remember two negatives multiplied make a positive), x can have values between 12 and -12.

In other words the value of x is less than or equal to 12 and more than or equal to -12. This is written:

$$12 \geq x \geq -12$$

Inequalities with two variables - Solution is by arranging the equation into the form

Ax + By = C

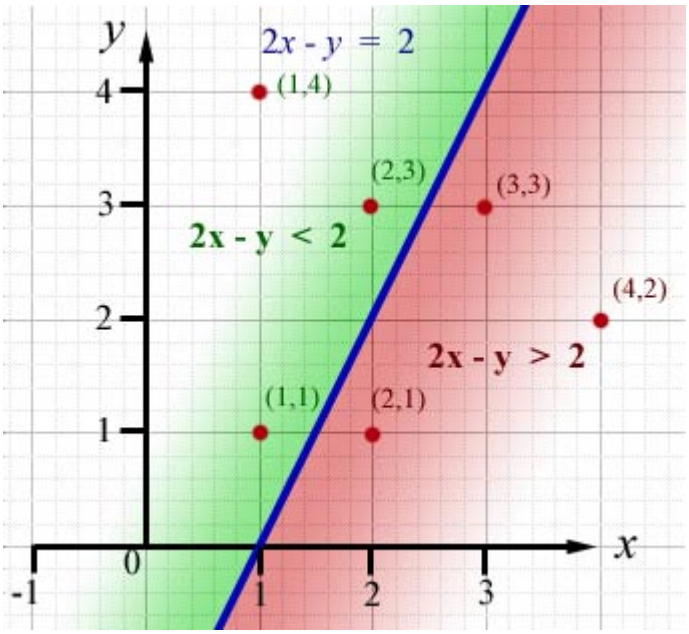
Then, above the line of the equation, **Ax + By < C**

and below the line, **Ax + By > C**

Consider the graph of -2x + y = -2

note - the first term **A** must be made positive by multiplying the whole equation by -1

The equation **-2x + y = -2** becomes **2x - y =2**



look at the points(red) and the value of **2x - y** for each. The table below summarises the result.

point(x,y)	2x - y	value	more than 2 ?	above / below curve
(1,1)	2(1)-(1)	1	no - less	**above**
(1,4)	2(1)-(4)	-2	no - less	**above**
(2,3)	2(2)-(3)	1	no - less	**above**
(3,3)	2(3)-(3)	3	yes - more	**below**
(2,1)	2(2)-(1)	3	yes - more	**below**
(4,2)	2(4)-(2)	6	yes - more	**below**