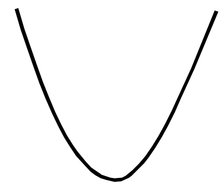
Graph sketching

Here are a few basic **rules** for sketching non-linear (curved) graphs - this is *not* the same as plotting graphs

1 Draw with a soft **pencil** so you can rub out mistakes - *never* draw with a pen or coloured pencil
2 Use a **ruler** for the coordinate axes - *never* draw straight lines freehand
3 Sketch graphs on **plain** (lined) paper - *never* sketch graphs on graph paper or squared paper
4 Occupy an approximately **square** space - *never* try to make a graph fit an A4 sheet or any other non-square shape
5 Draw the curve **before** you draw the coorduinate axes - *never* try to fit the curve into a given position
6 Draw curves from the **inside** (turn the paper round if necessary) and make sure the curve is **smooth**

The example used here is the general quadratic curve $\boldsymbol{y} = \boldsymbol{a}\boldsymbol{x}^2 + \boldsymbol{b}\boldsymbol{x} + \boldsymbol{c}$.



The curve representing a quadratic function is a **parabola** which will be this way up:
when a is a positive number. (The curve will be inverted if a is a negative number.)

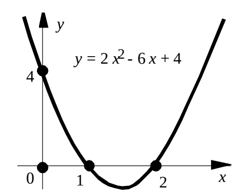
There is no need to change this shape for quadratic functions with different coefficients.
This is because sketch graphs, unlike plotted graphs, are **not drawn to scale**.

Now think about an actual function with specific coefficients, for example: $f(x) = 2x^2 - 6x + 4$

The graph of this function is: $y = 2x^2 - 6x + 4$ and the sketch of this graph looks exactly the same as the one above.
Now you have to put the axes in the right places. To do this you need to know about **intercepts**.

The curve crosses the x-axis when y = 0 and it crosses the y-axis when x = 0

When x = 0, f (0) = 4 and when y = 0, $2x^2 - 6x + 4 = 0$. Solving this quadratic equation will give you two values of x
(You may be given these values and asked to show that y = 0 at those points on the curve.) In this example, x = 1 or 2.



So this curve has to cross the y-axis at y = 4 and the x-axis at x = 1 and x = 2, as shown here:
The axes are **not** calibrated (marked with scales) - graph sketches are **not** drawn to scale

Now try an ‘inverted’ curve - sketch the graph of $f(x) = -x^2 + 4x - 3$
Remember to draw the curve first - make it occupy a square and make it smooth!
Then find the values of the intercepts so you can draw the axes in the right places

Finally, remember that, unless the domain is restricted, the curve you draw is only **part** of an infinitely-extending parabola.