**Functions Date:** \_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Leading Question:** How do we know what the roots of a quadratic will be without solving it?

**The Quadratic Formula**

Consider the quadratic formula given below:

In any quadratic equation

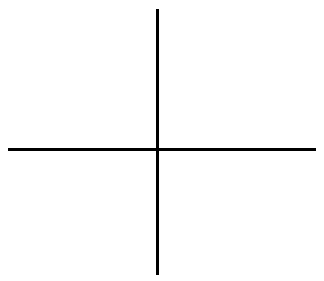
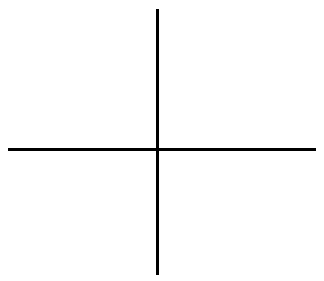
You’ll remember that we use the quadratic formula to calculate the -intercepts of a quadratic function.

Write other words that we use to refer to the -intercepts.

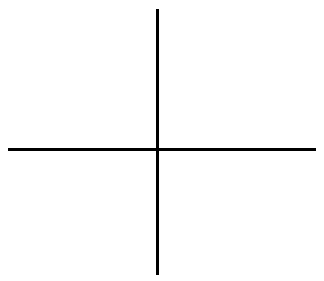
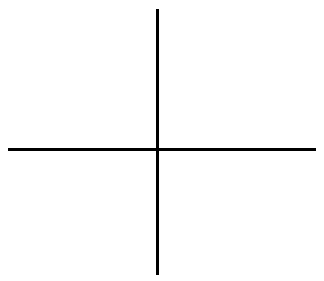
In each of the cases below, the values for, and have already been substituted into the quadratic formula.

Consider each of them and draw a graph of what you think the function will look like. Try and do as few calculations as possible to decide.

a) b)



c) d)



Now make a summary of the three general scenarios we get when referring to the -intercepts of quadratic functions.

Can you think of an easy way to predict which one of the three types mentioned above we’ll get from any quadratic function?

**The Discriminant**

The discriminant forms a part of the quadratic formula, as can be seen below:

We can write it as a formula which reads:

is…

By simply looking at the discriminant, we can predict how many and which type of -intercepts a quadratic function will have. We say that we comment on the **nature of the roots**.

**Example**

Calculate the discriminant for each of the following quadratic functions and try to comment on the nature of the roots.

a) b)

c) d)

We can summarize the different nature of roots scenarios as follows:

**Nature of Roots - Homework**

Calculate the discriminant for each of the following and hence, comment on the nature of the roots.

a) b)

c) d)

e) f)

g) h)

i) j)

**Challenge Question**

Consider the quadratic equation. For which values of will this quadratic equation have non-real roots?