A-level maths

A level Mathematics and Further Mathematics

Some of these are the same, which ones?

x^{-1}

$\frac{4}{9}$

$\left(\frac{3}{2}\right)^{-2}$

$2x^{-4}$

$\frac{1}{2x^4}$

$\frac{2}{x^4}$

$-4x^2$

$\left(\frac{2}{3}\right)$

x^7

$-x$

$\frac{1}{x}$

What does the course look like?

A-level Maths papers

	Paper 1	Paper 2	Paper 3
Time	2 hours	2 hours	2 hours
Marks	100	100 (two sections of 50 marks)	100 (two sections of 50 marks)
Content from	Assesses the following content only: • Proof • Algebra and functions • Coordinate geometry • Sequences and series • Trigonometry • Exponentials and logarithms • Differentiation • Integration • Numerical methods.	May assess any content from paper 1. Will assess the following: • Vectors • Quantities and units in mechanics • Kinematics • Forces and Newton's law • Moments.	May assess any content from paper 1. Will assess the following: • Statistical sampling • Data presentation and interpretation • Probability • Statistical distributions • Statistical hypothesis testing.

More info

- **All exams are at the end of year 13**
- **All exams are calculator papers**
- **You do not get a choice regarding Mechanics/Stats- everyone does both! You will do a little bit of each on in both years amongst your Core work**
- **We recommend the Casio Class Whiz fx-991EX calculator. You will need this calculator (or more advanced) for stats work.**
- **Graphical calculators are useful but not essential (and a lot more expensive)**

Pure maths

- This is the name given to a lot of the maths you have studied up to this point. Many of the topics you will look at in A-levels you have already done at GCSE, for example:
- **Surds**
- **Quadratics**
- **Simultaneous Equations**
- **Trigonometry**
- **Indices**
- **Equations and Inequalities**

- Some (but not all!) of these topics will be studied in greater depth than at GCSE.

Pure maths

- Other topics will be new to you (you may recognise some of these if you did GCSE further maths)
- **Differentiation and Integration**
- **Coordinate Geometry**
- **Series**
- **Exponentials and Logarithms**

Mechanics

- This is a bit like GCSE/AS level physics, and quite different to GCSE maths. It involves:
  - **STATICS/ FORCES**
  - **KINEMATICS- the study of motion**

    displacement, speed, acceleration
  - **VECTORS**
  - **MOMENTUM**
  - **NEWTON'S LAWS**
  - **PROJECTILES**

Statistics

- Much of this you saw at GCSE, but will be taken into greater depth at A-level:
  - Sampling
  - Data Presentation and interpretation (e.g. cumulative frequency/box plots)
  - Statistical distributions
  - Probability
  - Hypothesis testing
  - Large data sets

Are you smarter than an 8 year old?

- What is the sum of the numbers 1 to 100?

- Show workings!

Proof

Let $S = 1 + 2 + 3 + 4 + 5 + ... + 100$

Reverse the sum $S = 100 + 99 + 98 + 97 + ... 3 + 2 + 1$

Add the 2 sums $2S = 101 + 101 + 101 + ... + 101$

$2S = 100 \times 101$

$S = 5050$

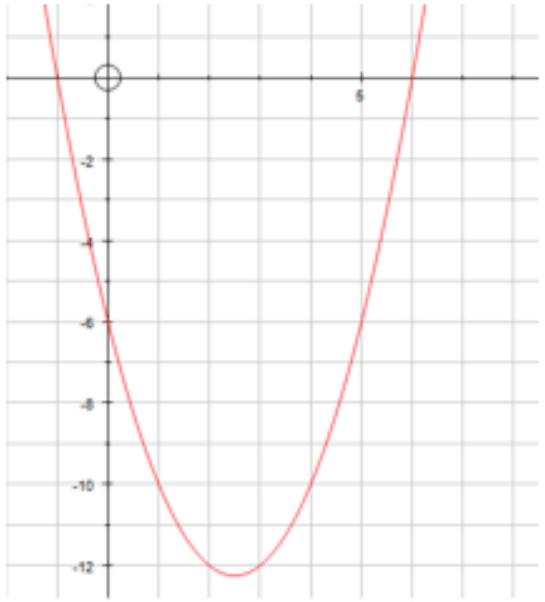
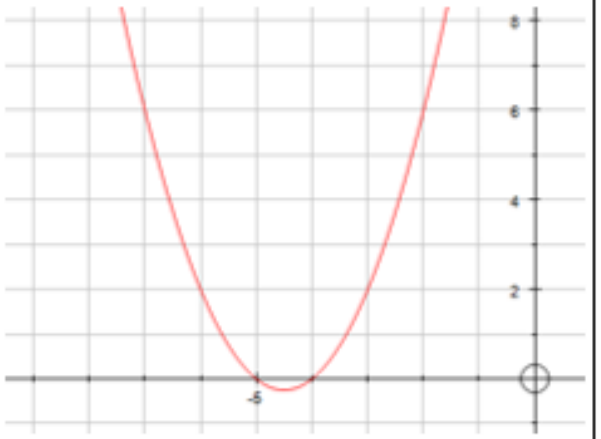
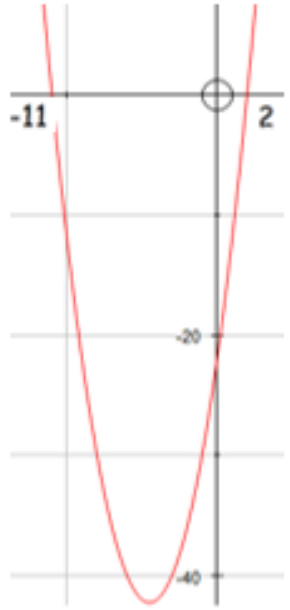
Carl Gauss was just 8 years old when he solved that problem back in 1885!!!

- Can you find out other things that Gauss helped to discover about mathematics?

- There is an ‘in our time’ podcast on him on the BBC sounds app.

Quadratic matching activity

- Can you match the correct graph with its factorised form, completed square form, and quadratic formula?

Quadratic Graph 	Quadratic Graph 	Quadratic Graph 	Quadratic Graph 
Completed Square	Completed Square $(x - 2.5)^2 - 0.25$	Completed Square $(x + 4.5)^2 - 0.25$	Completed Square $(x - 2.5)^2 - 12.25$
Factorised Quadratic $(x + 4)(x + 5)$	Factorised Quadratic	Factorised Quadratic $(x - 6)(x + 1)$	Factorised Quadratic $(x - 2)(x - 3)$
Quadratic Formula	Quadratic Formula $\frac{5 \pm \sqrt{25 + 24}}{2}$	Quadratic Formula $\frac{5 \pm \sqrt{25 - 24}}{2}$	Quadratic Formula $\frac{-9 \pm \sqrt{81 - 80}}{2}$

Maths at A-level

- Maths is a very enjoyable, but extremely challenging A-level.
- You can expect to receive 2 homeworks per week (one from each side of the course).
- In addition to this you are expected to complete your own independent work.
- There is a fantastic maths team who are always willing to put the time in to help you out.
- You can usually find someone at break or lunch in the maths office.
- After school help sessions run at least once a week.

Another problem for you...

- You are given 8 balls. One is slightly heavier than the others.
- You are given a set of scales, which can hold as many balls as you like.
- What is the minimum number of weighings needed to find which is the heavy ball?

The answer is not 3!!!

- Can you do better?

- The answers to all problems here are available from Mr Barnhurst, along with the answers to any queries about the course.
- Email barnhurst@qegs.email