

## **Scottish Curriculum**

### **Topics that can be usefully taught using Autograph**

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**SQA: National 5 Mathematics**

**SQA: Higher Mathematics**

**SQA: Advanced higher Mathematics**

**SQA: Higher Applications of Mathematics**

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**Autograph 5 (PC desktop) and Web-Autograph  
are both free for all to download from the  
Complete Maths link:**

**[www.completemaths.com/autograph](http://www.completemaths.com/autograph)**

**Topics in red, for the time being,  
require the PC Desktop version of Autograph**

# Scotland (SQA): TOPICS FOR AUTOGRAPH

## National 5 Mathematics

“[N5-course-Spec-Mathematics.pdf](#)”

### Algebraic skills

Linear equations:

- Straight Line:  $y-b=m(x-a)$
- Gradient; intercept
- Linear inequalities
- Simultaneous equations

Completing the Square:

$$x^2+bx+c \Rightarrow (x+p)^2+q$$

Graphs:

$$y = kx^2; y = k(x+p)^2 + q; y=(ax-m)(bx-n)$$

Quadratic:

- turning point; axis of symmetry
- Roots; quadratic formula; discriminant

### Geometric skills

Two points:

$$m = (y_2-y_1)/(x_2-x_1)$$

Circle:

- length of arc; area of sector

Volume:

- sphere, cone, pyramid

Pythagoras in 2D and 3D

Quadrilaterals, triangles, polygons, circles

Circle properties

Vectors in 2D and 3D:

- add, subtract; magnitude

### Trigonometric skills

Trig graphs:

- amplitude, phase angle; Period

$$\cos^2x + \sin^2x = 1; \tan x = \sin x/\cos x$$

### Statistical skills

Data:

- Inter-Quartile Range, Standard Deviation

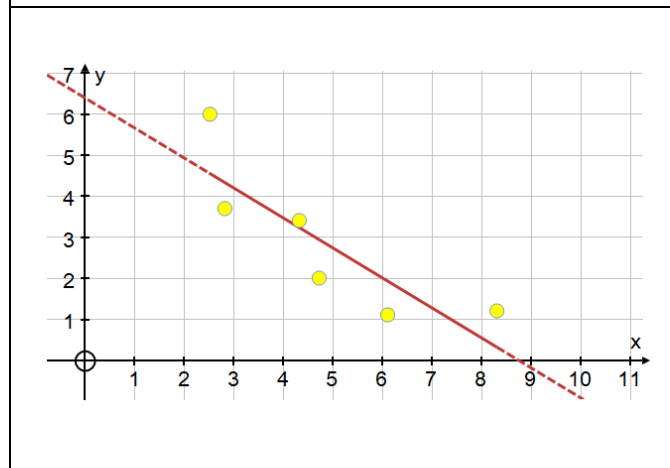
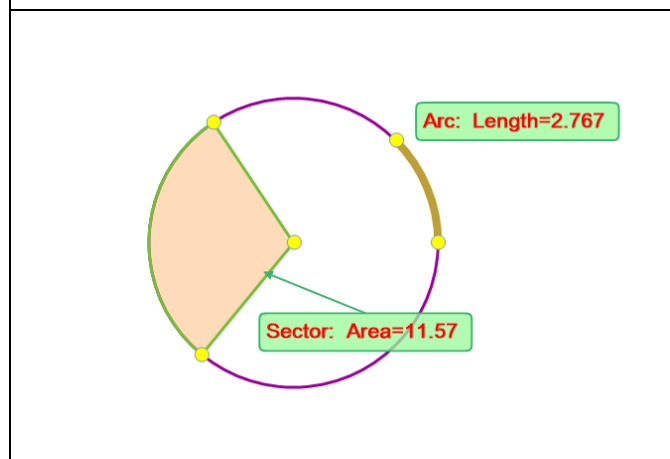
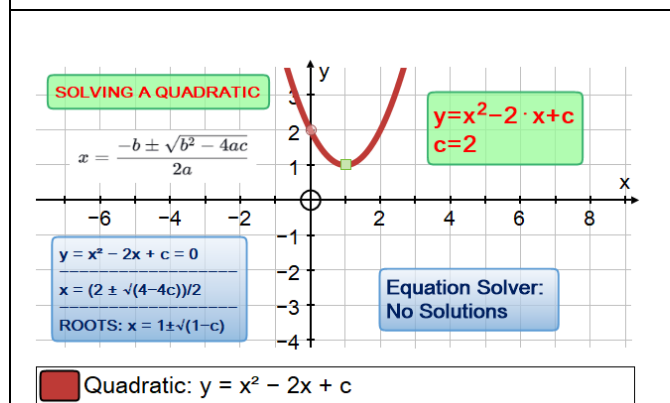
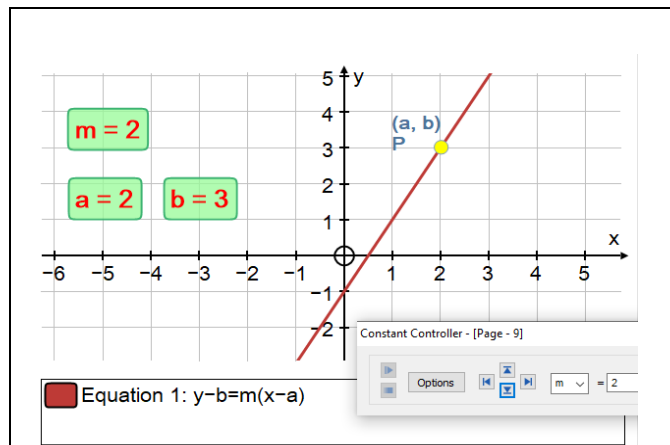
Scattergraph:

- best-fitting straight line

HELP MENU: F4

Autograph Resources: [www.tsm-resources.com](http://www.tsm-resources.com)

Data, images, links, etc



# Scotland (SQA): TOPICS FOR AUTOGRAPH

## Higher Mathematics

"[Higher Course Spec Mathematics.pdf](#)"

### Algebraic and Trigonometric skills

Factorising cubic or quartic polynomials

Trig: addition and double angle formulae

$a\cos x + b\sin x \Rightarrow k\cos(x \pm \alpha)$  or  $k\sin(x \pm \alpha)$

### Transformation of graphs:

$kf(x)$ ,  $f(kx)$ ,  $f(x) + k$ ,  $f(x+k)$

Sketching 1<sup>st</sup> derivative;  $f'(x)$  from  $f(x)$

Completing the square:

$ax^2 + bx + c \Rightarrow a(x+p)^2 + q$

### Composite and inverse functions

$f(x)$ ,  $g(x)$ ,  $f(g(x))$ ;  $f^{-1}(x)$

Quadratic inequalities

Logarithmic and exponential functions

Reduction to linear form from  $y = ax^b$  or  $y = ab^x$

Simultaneous linear/non-linear or 2 non-linear

Trig graphs in degrees and radians

Vectors in 2D and 3D: subdivision

Scalar product; angle between two vectors

### Calculus Skills

Differentiating:

powers of  $x$ ,  $k\sin x$ ,  $k\cos x$

Equation of tangent

Sketching curves, stationary points

Integrating:

powers of  $x$ ,  $p\sin x$ ,  $(px+q)^n$

Definite integrals, area under curve

$\cos^2 x = (1 + \cos 2x)/2$ ;  $\sin^2 x = (1 - \cos 2x)/2$

### Differential Equations: $dy/dx = f(x)$

Area between two curves

### Algebraic and geometric skills

Parallel and perpendicular lines

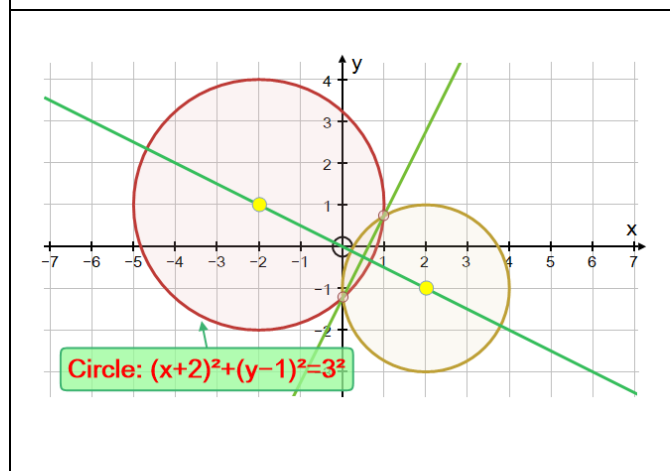
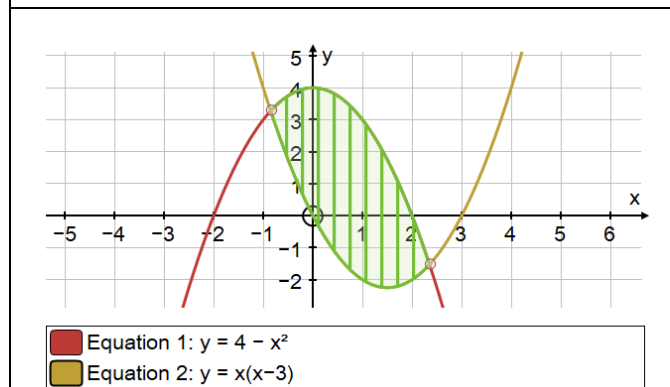
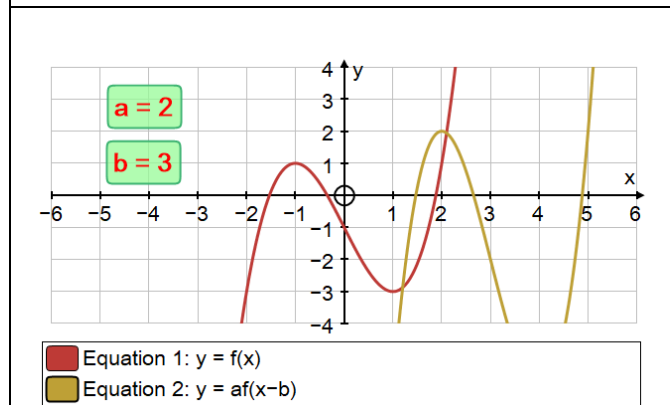
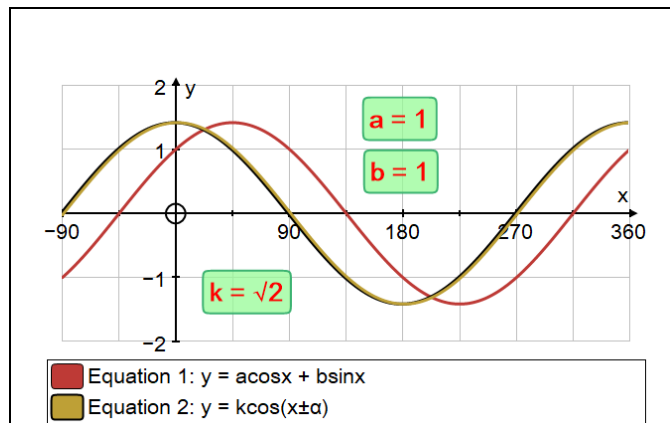
Equation of a circle

Intersection of circles, circle and line

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Data, images, links, etc



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**Scotland (SQA):**  
**TOPICS FOR AUTOGRAPH**  
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**Advanced Higher Mathematics**  
["AHCourseSpecMathematics.pdf"](#)

**Calculus skills**

- Differentiating  $e^x$  and  $\ln x$
- Inverse trig functions
- Implicit differentiation
- Second derivative
- Differentiating parametric functions
- Integration:

- volumes of revolution about either axis
- Area to either axis

**1<sup>st</sup> Order Differential Equations**

- $dy/dx = g(x)h(y)$
- $dy/dx = g(x)/h(y)$
- $dy/dx + P(x) = f(x)$

**2<sup>nd</sup> Order Differential Equations**

- $ay'' + by' + cy = f(x)$
- Discriminant of auxiliary equation

**Algebra skills**

- Graphing:
  - finding asymptotes
  - Points of inflection; stationary points
  - Domain and range
  - Modulus function
  - Inverse function
  - Translations and reflections
- Maclaurin expansion

**Matrix skills**

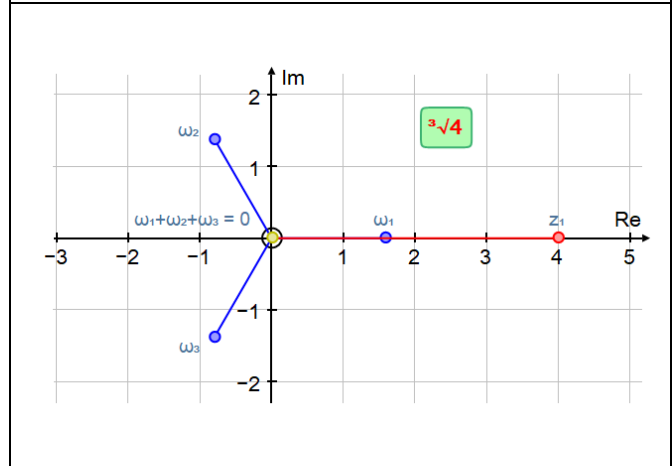
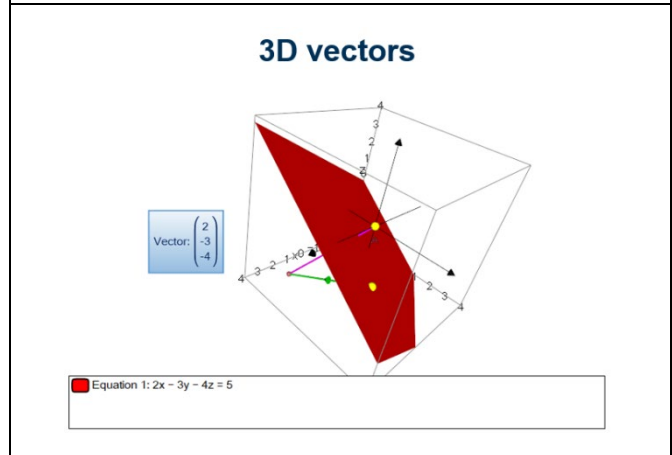
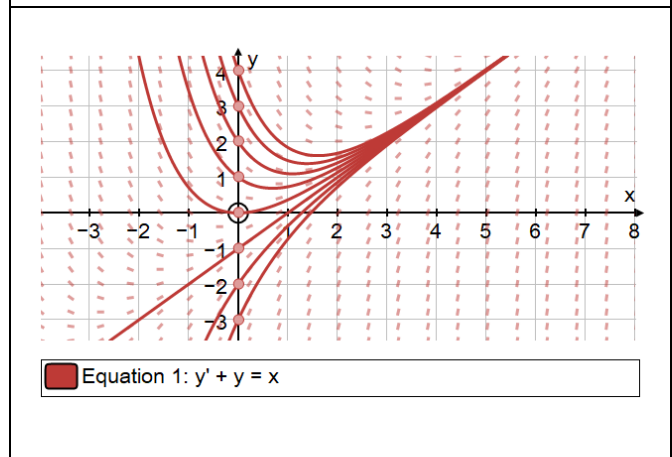
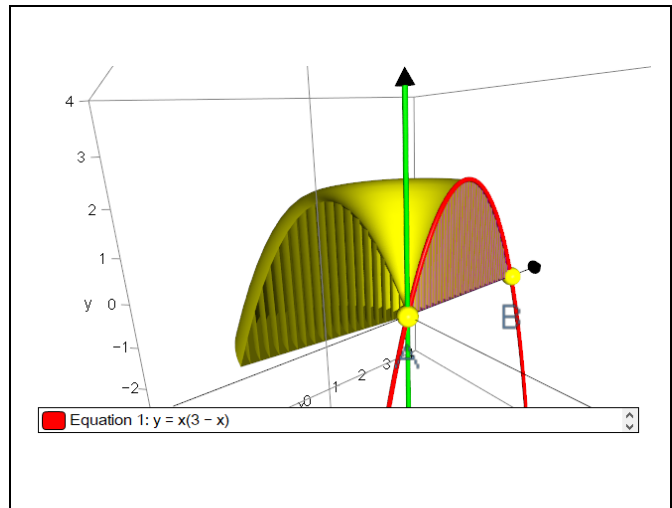
- Transformations
  - Rotation, reflection. Dilation; combinations

**Vector skills (3D)**

- Scalar triple product
- 3D lines: angle between two lines/intersect
- Vector equation of a plane
- Intersection of a line and plane
- Intersection of 2 or 3 planes
- Angle between line and plane
- Angle between 2 planes

**Complex Number skills**

- Add, subtract, multiply, divide; square root
- Argand diagram; modulus and argument
- De Moivre's theorem; nth root; Locus



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# Scotland (SQA): TOPICS FOR AUTOGRAPH

## Higher Applications of Mathematics

[https://www.sqa.org.uk/files\\_ccc/higher-course-spec-applications-of-mathematics.pdf](https://www.sqa.org.uk/files_ccc/higher-course-spec-applications-of-mathematics.pdf)

### Mathematical Modelling

Graphs and charts  
Using software effectively  
Editing and sorting data

### Statistics and Probability

Types of data  
Populations and samples  
Outliers

Stem-and-leaf diagrams  
Box Plots

Frequency tables  
Histograms

Symmetry, normality, skewness  
Mean, median, Inter-quartile range

Correlation and linear regression  
Scatter plots  
Pearson's PMCC

Seasonality

Normal distribution  
Hypothesis test  
Confidence intervals

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