

MEI®

Mathematics
Education
Innovation

Over 50 years
at the forefront
of Mathematics
Education

CASIO®



Student tasks for integrating technology into the new maths A levels

Tom Button

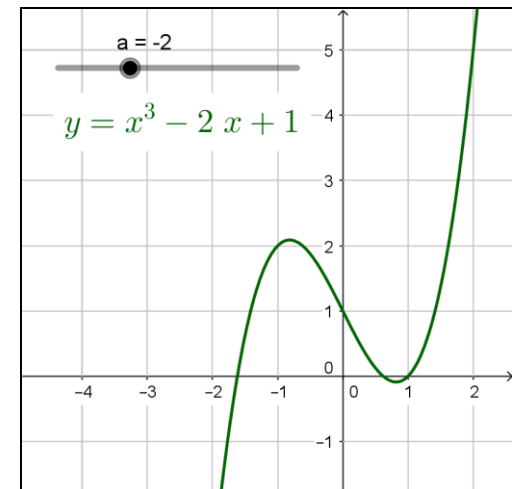
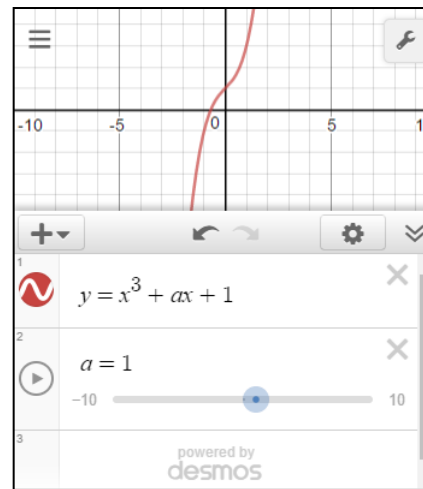
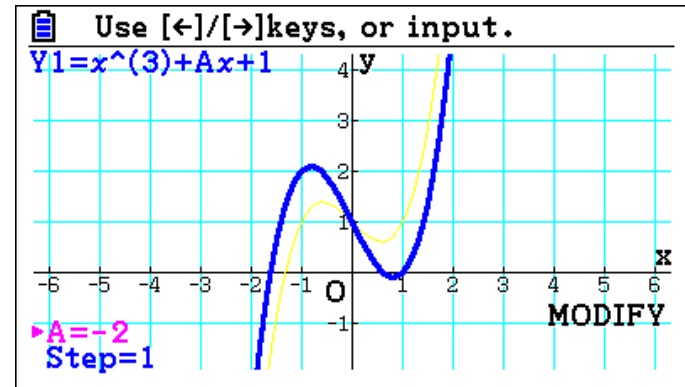
tom.button@mei.org.uk

Starter activity

Plot the graph of

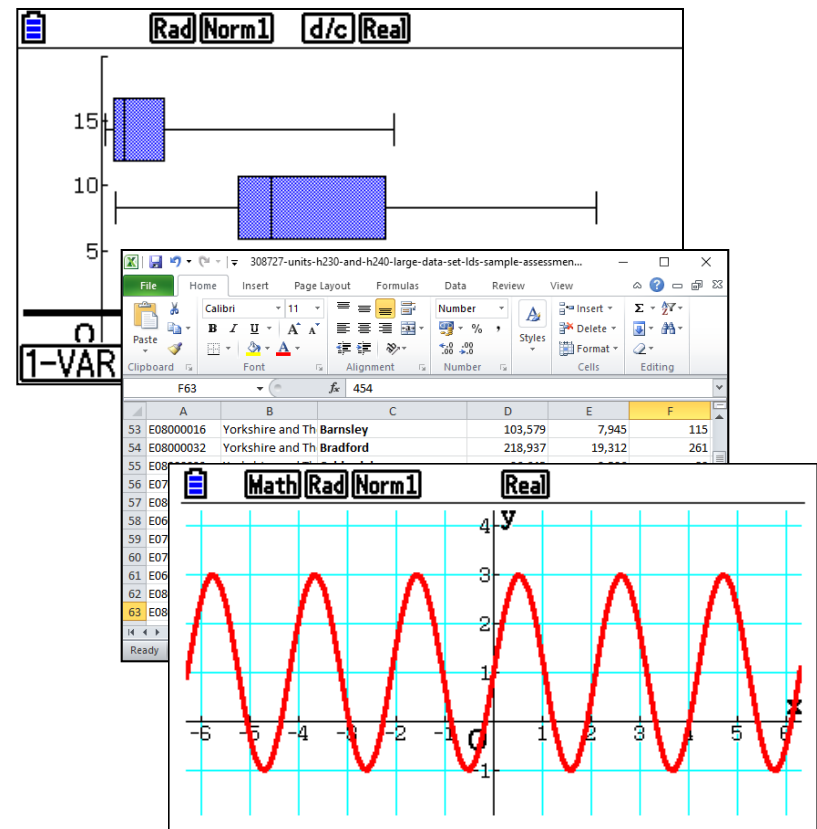
$$y = x^3 + ax + 1$$

What questions can
 you ask about this
 function?



Ofqual guidance for awarding organisations

“The use of technology, in particular mathematical and statistical graphing tools and spreadsheets, must permeate the study of AS and A level mathematics.”



Classroom tasks

A series of tasks, each in 4 parts:

- Construction
- Exploration
- Question
- Extension

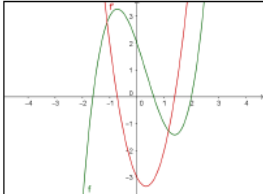
Available for:

- Casio
- Desmos
- GeoGebra

MEI GeoGebra Tasks for AS Pure

Task 6: Differentiation – Exploring the gradient on a curve

1. In the input bar enter a cubic function: e.g. $f(x)=x^3-x^2-3x+2$
2. Plot the gradient function by entering $f'(x)$ in the input bar.

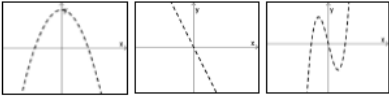


Question for discussion

- How is the shape of the gradient graph related to the shape of the original graph? Verify your comments by trying some other functions for $f(x)$.

Problem

Change your function in GeoGebra so that it has the following gradient functions:



Extension Task

Find the point on the function $f(x) = x^3 - 6x^2 + 9x - 1$ where the tangent has its maximum downwards slope. Investigate the point with maximum downwards slope for other cubic functions.

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Find the point on the function $f(x) = x^3 - 6x^2 + 9x - 1$ where the tangent has its maximum downwards slope. Investigate the point with maximum downwards slope for other cubic functions.

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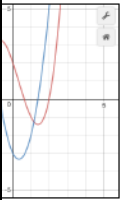
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AS Pure

the gradient on a curve


click or use the dial
press = max = dial



What is the shape of the gradient graph?

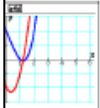
$f'(x)$

one of the following graphs:




graph

The derivative is in



of the tangent to the

following graphs:



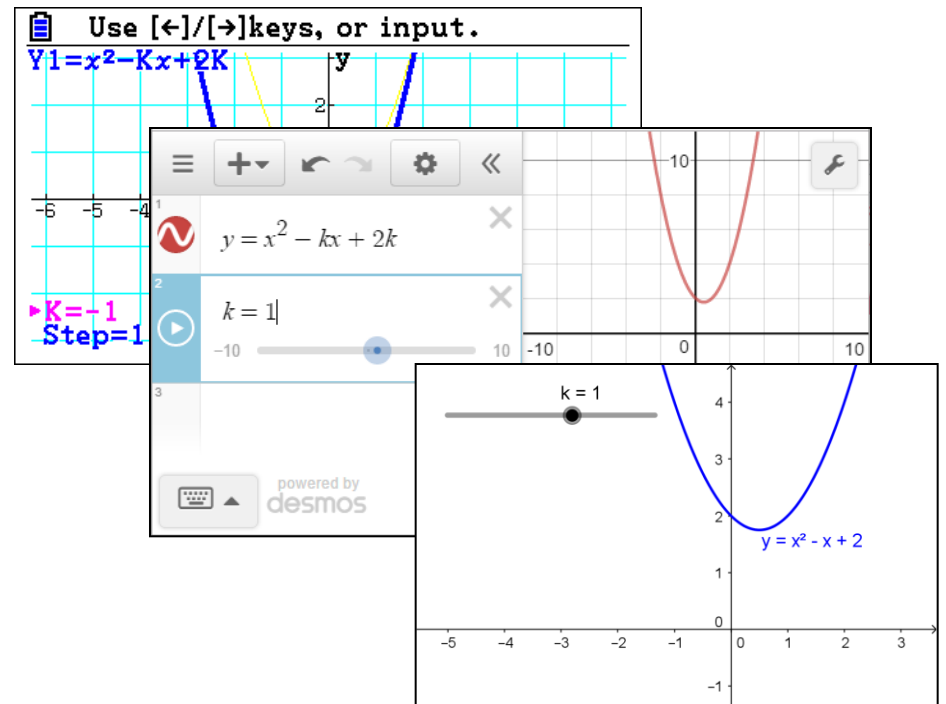
SAM question (MEI paper 1)

Determine the values of k for which part of the graph of $y = x^2 - kx + 2k$ appears below the x -axis. [4]

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Would students who have used graphing technology during their study be better prepared for this question?



Resources

The screenshot shows the MEI website with a navigation menu (About Us, Contact, Teachers, Students, Universities, Employers, News and Events) and a search bar. The main content area is titled "Integrating Technology Into Your Scheme of Work" and includes a table of suggested resource activities and other technology tasks for AS/A level Mathematics. A sidebar on the right contains sections for "Get Set for the 2017 exams & more", "Stay Informed", and "Popular maths".

Unit	Suggested resource activity from MEI schemes of work	Other technology tasks
0 Problem solving (AS)	Problem-solving with GeoGebra	GeoGebra Construction Problems
1 Surds and Indices (AS)	Summation Power Maze	
2 Quadratic functions (AS)	Enter $y=ax^2+bx+c$ into a graph plotter and vary a , b and c .	Graphs of quadratic functions (Desmos) Graphs of quadratic functions (GeoGebra)
3 Equations and inequalities (AS)	Intersection of a line and a curve	Intersection of a line and a curve (GeoGebra) Quadratic inequalities (GeoGebra) Intersection of a line and a curve (Desmos) Intersection of a line and a curve (GeoGebra) Quadratic inequalities (GeoGebra)
4 Coordinate geometry (AS)	Equation of a circle	Coordinate Geometry (Autograph) Perpendicular lines (GeoGebra) Equations of circles (Desmos) Perpendicular lines (GeoGebra) Solution of trig equations (GeoGebra)

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- mei.org.uk/casio-networks
- mei.org.uk/desmos-tasks
- mei.org.uk/geogebra-tasks

About MEI

- Registered charity committed to improving mathematics education
- Independent UK curriculum development body
- We offer continuing professional development courses, provide specialist tuition for students and work with employers to enhance mathematical skills in the workplace
- We also pioneer the development of innovative teaching and learning resources