

Common Denominators: connections within and beyond mathematics.

Mathematics Association Annual Conference 2017

Spreadsheets in action with students 15-18

Session 5 I

Date Sun 9th April

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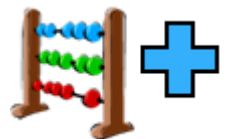


Spreadsheets for KS 4 and 5

Spreadsheet challenges will be set giving delegates opportunity to use formulae in spreadsheets for generating number grids, investigating series, mathematical modelling, including optimisation problems, statistical concepts and calculus.

Issues relating to spreadsheet algebra including iteration, absolute and relative references will also be considered alongside technology considerations, e.g. tablets and Geogebra.

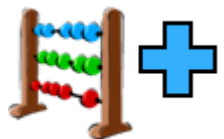
Bring your own device (laptop, tablet, etc.) with spreadsheet loaded.



Use of technology

8. The use of technology, in particular mathematical and statistical graphing tools and spreadsheets, must permeate the study of AS and A level mathematics. Calculators used must include the following features:

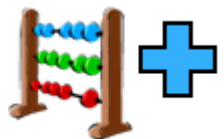
- an iterative function
- the ability to compute summary statistics and access probabilities from standard statistical distributions



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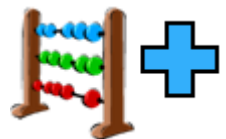
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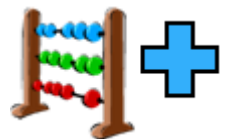
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Use of data in statistics

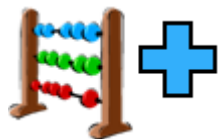
9. AS and A level mathematics specifications must require students to:

- become familiar with one or more specific large data set(s) in advance of the final assessment (these data must be real and sufficiently rich to enable the concepts and skills of data presentation and interpretation in the specification to be explored)
- use technology such as spreadsheets or specialist statistical packages to explore the data set(s)
- interpret real data presented in summary or graphical form
- use data to investigate questions arising in real contexts



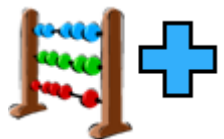
Getting started

- Mental arithmetic activity
- Multiplication grid
- Relative or Absolute
- Conditional formatting
- Keyboard short cuts



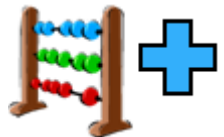
Challenges 1: Absolute and relative references

- Optimisation
- Iteration
- 12x12 multiplication square
- Other grids
 - 1-100.
 - prime numbers in 6 column table of natural numbers
- Pascal's triangle
- Find the smallest number such that the product of the first n primes plus 1 is not prime (based on Euler's infinity of the primes)
- Find the next number after 1729 that can be expressed as the sum of two cubes in more than one way (based on Ramanajun's observation on Hardy's taxi)



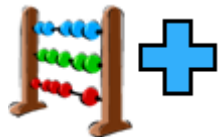
Going Further

- Iteration and optimisation with fixed and absolute references
- =SUM(\$B\$2:B17)
- On a 10x10 multiplication square what number would be in the cell with formula J\$7*\$C12?
- Modelling exponentials ...



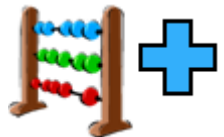
Challenges 2: Iteration and infinite series

- Arithmetic progression
- Geometric progression
- Infinite series
- Compound interest
- Paying off a mortgage
- Iteration including Newton Raphson
- Medication



Simulation and representation

- Statistics and probability
- links with Geogebra and Autograph



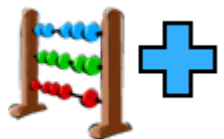
Challenges 3: Statistics and probability linking with Geogebra and Autograph

- Generating random numbers
- Activity – all six numbers on a die
- Random sampling
- Bivariate data e.g. male and female well or unwell?
- Generating a random sample of 20 from a large data set to compare birth rate per 1000 with GDP per capita (US\$) with the MEI LDS.



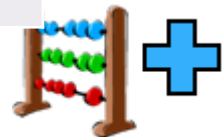
Data Sets for the new A levels : Key Points

- Each awarding body will supply one or more datasets; questions will be set which assume **familiarity with the dataset**.
- Students must be familiar with both the data and its **context**; they need to know the origin of the data and how it might have been collected.
- **Technology** must be used to explore the data set.
- Increased emphasis on **interpretation** over calculation and being able to select the correct representation or model



The Data Sets

Body	Format	Description of data	Lifetime
Edexcel	Spreadsheet with multiple sheets.	Met Office weather for 5 different stations over 2 different time periods along with 3 international weather stations	Until further notice
MEI	Single sheet spreadsheet	2012 Olympics Medals and demographic data by country	3 data sets will be used in rotation. Other 2 sets available in June.
OCR	Spreadsheet with 4 sheets	Methods of Travel by Local Authority	Until further notice
AQA	Spreadsheet with multiple sheets.	Selected data from the family food survey by region.	Until further notice



In the exam:

- Students should be expected to **interpret** output from a spreadsheet or statistical software.
- Students should be expected to **interpret and explain** terminology which has been introduced via the data set.
- Students should be asked to **explain** what effect missing data would have on a model that has been derived.
- Students should be asked to explain how they would collect data and to describe the drawbacks and advantages of particular sampling methods.

