

Mathematics: Who needs it anyway?

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The Questions

- Why is mathematics important?
- Are there enough good people trained in mathematical sciences for industry now and in future?
- How well is the UK placed compared to other countries in terms of the maths skills of our graduates?
- What might industry and commerce do to stimulate more interest in maths among potential students?
- What might the education sector do ?

Some Opinions

- “Low interest in Maths set to cripple British industry”
 - John Roulston (Tech. Director BAE Systems)
 - Tony McWalter MP
- “Alone of the developed world, Britain has been reducing the maths studied by its brightest pupils and encouraging schools to minimise the numbers learning any substantial amount of maths”
 - Alison Wolf (quoted in IOD policy paper – *Education and Training: a Business Blueprint for Reform*)

Personal View

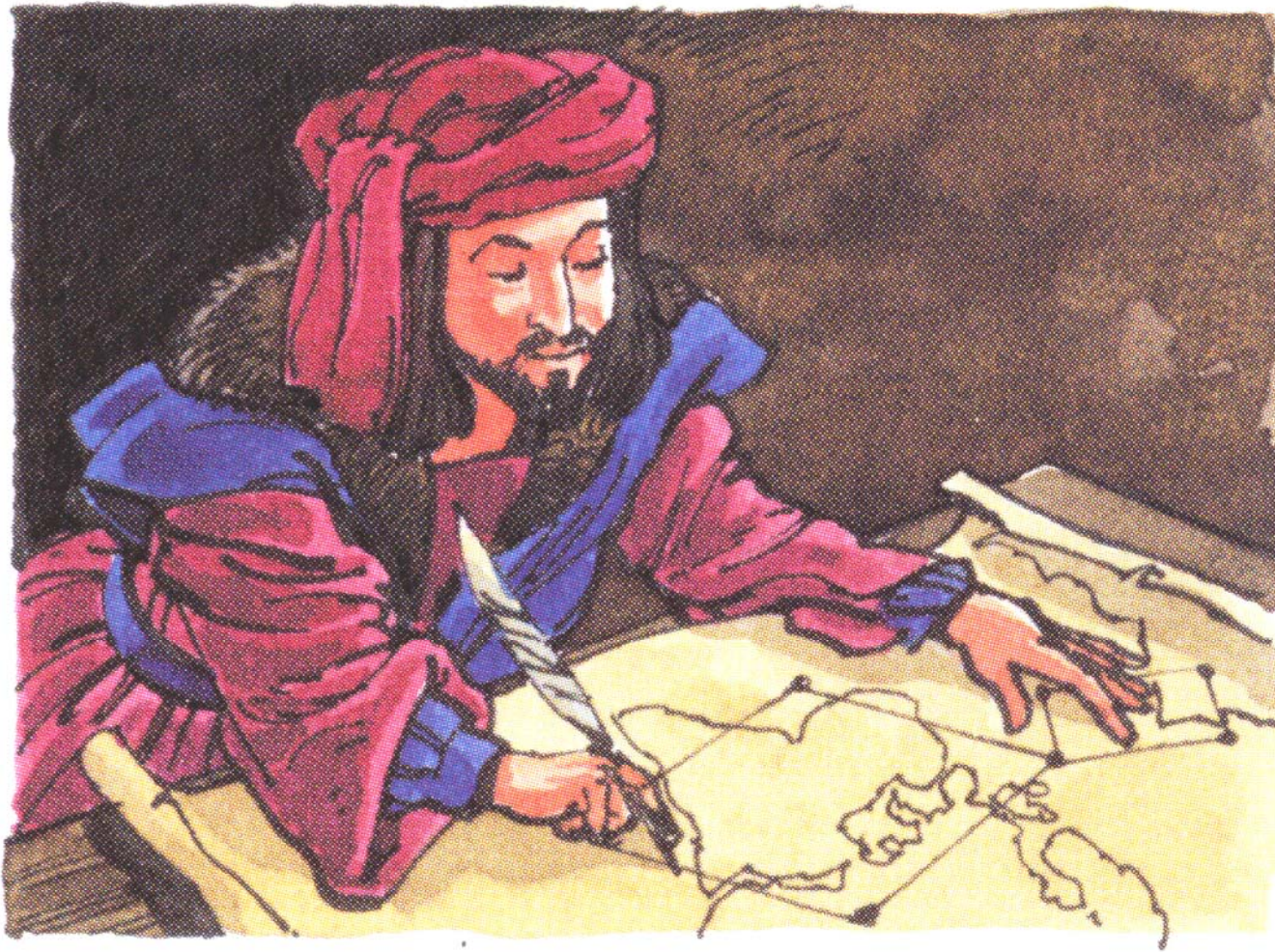
- Lower mathematics skills causing problems in SET
- Engineering maths much stronger in France, Germany ...
- Motivation for studying maths is vital
- Teachers need to be more aware of applications
 - important role for NCET and RMCs
 - better liaison with SETNET
- Need much more inspiring career advice (NICEC)
 - CMS careers project (IMA, LMS, RSS)
 - important challenge for industry

Burdened by Mathematics?

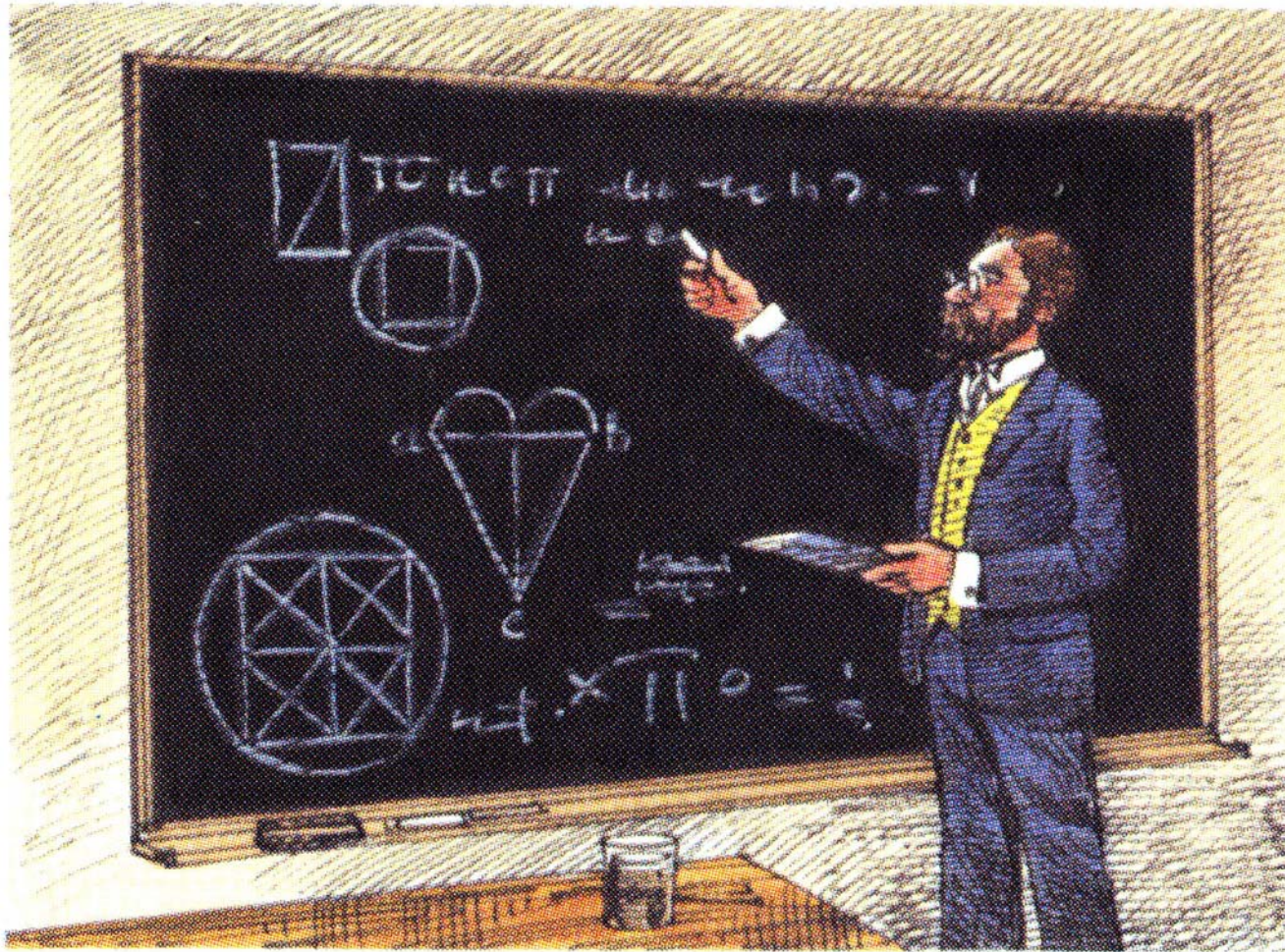




Maths in the Stone Age was hard and boring.



Maths in the Renaissance focused on squares.



19th Century Mathematics was dusty and abstract.

but Mathematics Today

- is fun (and always has been – even before sudoku!)
- leads to exciting discoveries
- is at the heart of everything we do in the computer age
- is in great demand from employers

Who Needs It?

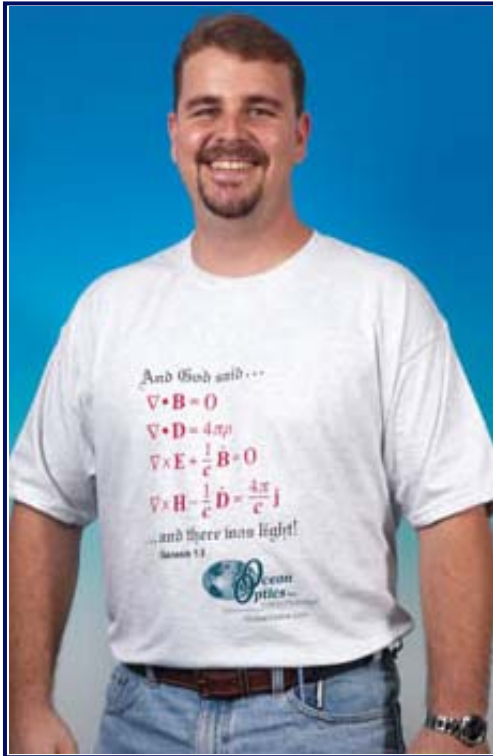
- Maths is the language of science and technology
 - fundamental discipline
 - mathematical skills are widely deployable
 - interface with other scientific disciplines is vital
- Essential for all branches of engineering
- Underpins all computing and communications
- Very important for financial modelling and planning

Some Application Areas

- Aerodynamics, hydrodynamics
- Electronic and structural materials
- Aircraft / missile / torpedo guidance,
 - control theory, dynamics
- Communication networks
 - coding, cryptography, queuing
- Computer science
 - Boolean algebra, mathematical logic
- Signal, speech, image processing

Mathematics Works

- Maxwell's equations



- Been there, done that

- Spinning top



Digital Signal Processing

- Application of computer technology to
 - Radar and sonar, satellite communications
 - Mobile telephones, CD players, video cameras
 - Digital TV and radio broadcasting
 - Internet applications
 - Navigation using Global Positioning Satellite (GPS)
 - Medical diagnostics (ECG, EEG, CT scans, MRI etc)
- Extract signals from interference and noise
- Coding and cryptography for data security etc

Foetal Heartbeat Analysis



Coding and Cryptography

- Cryptography
 - secure communications over internet
 - credit card transactions, e-commerce
- Error correction coding (ECC)
 - audio CD, DVD players, CD ROM
 - satellite communications, space probes
 - semiconductor memory, magnetic disks
 - bar codes, dot codes, ISBN code
- Finite fields, number theory (apologies to Hardy)

Smart Antenna for Mobile Comms.

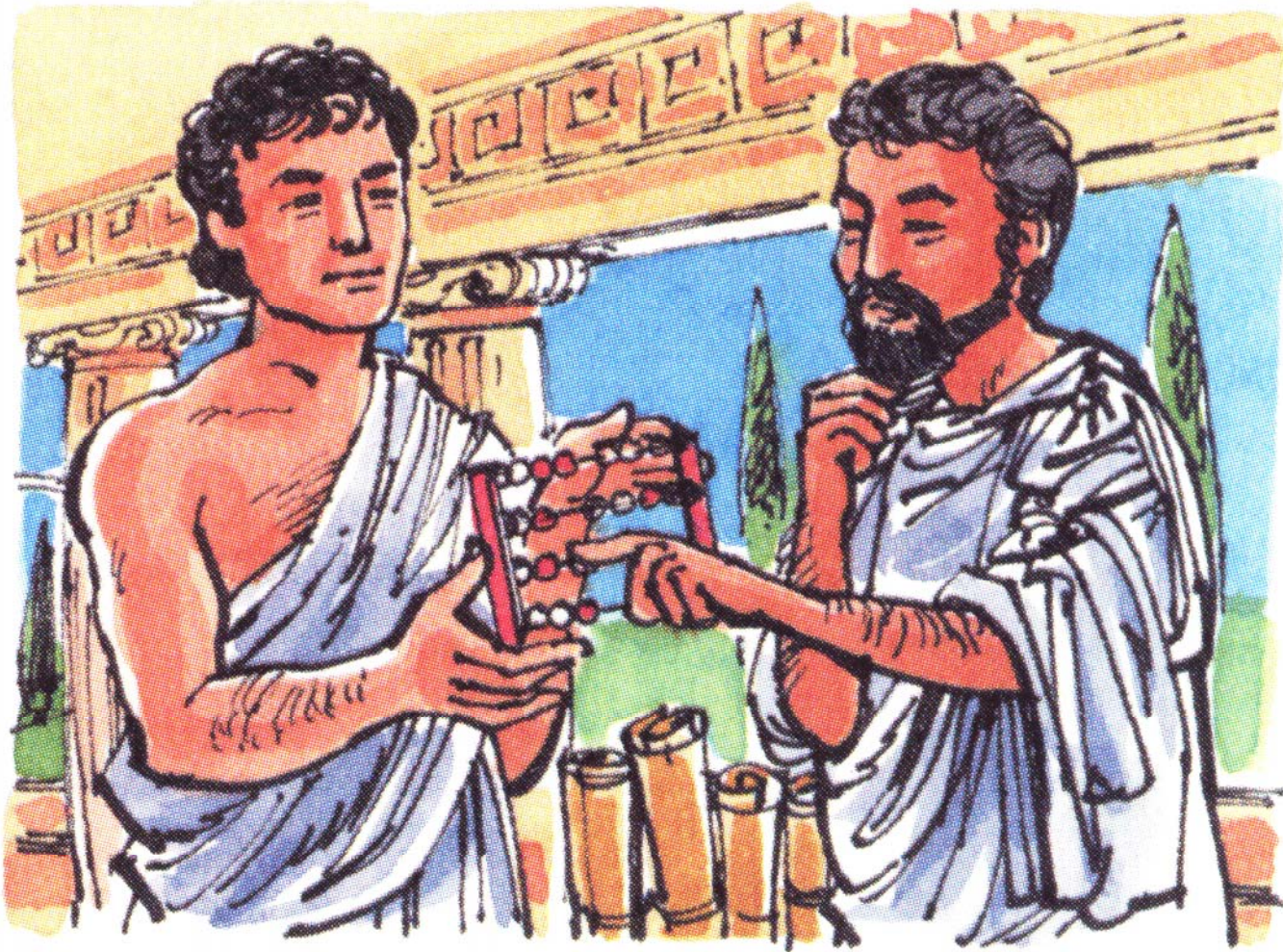


Maths in your Mobile Telephone

- Smart antennas to reduce interference
- Mathematical method for recovering distorted or garbled messages (dynamic programming)
- Dedicated computer in every handset
 - designed by electronic engineers
 - programmed by computer scientists
 - really creative task required a mathematician
- Network design and traffic analysis

A Degree in Mathematics

- Will take you anywhere you want to go
 - physical sciences and engineering
 - biology and the life sciences
 - financial management
 - teaching of mathematics
- Will help you to get a great job
- Will be really interesting and great fun!
- Visit www.mathscareers.org.uk for more information



MATHS IN ANCIENT GREECE WAS LIMITED TO MEN.

but not any longer

- Mathematics is a great career for women
- For more information visit
 - www.ima.org.uk
 - www.lms.ac.uk
 - www.rss.org.uk

Acknowledgements

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