What is mathematics? What is a mathematician?

Peter Rowlett

Sheffield Hallam University

`p.rowlett@shu.ac.uk`

Source

▶ We are following somewhat from chapters 2 and 5 of Jackie Stedall's *The History of Mathematics: A Very Short Introduction*.

What is maths?

▶ Stedall:

> when as a school teacher I found myself in a single morning delivering lessons on percentages, circle theorems, and differential calculus, I was forced to ask myself how this unlikely collection of topics had come together under the single heading of 'mathematics'.

What is maths?

▶ The word has its origin in the Greek word *mathemata*, which meant 'what has been learned', at some times in a general way, at other times specifically in astronomy, arithmetic or music.

▶ Other cultures had similar concepts, linked to topics including measurement/geometry, calendrical calculations, calculation of profit and the distribution of resources.

▶ The medieval university curriculum comprised the quadrivium (arithmetic, geometry, astronomy and music) and the trivium (grammar, logic and rhetoric).

What is maths?

▶ Maths doesn't always have a good reputation.

▶ John of Salisbury in the 12th century associated the foretelling of the future from the positions of the stars and planets with chiromancy (palm-reading) and augury (interpreting the flight of birds) as a source of evil linked with demons.

▶ It is also at various times associated with astrology.

What is maths?

▶ Arithmetic and geometry remain central to modern mathematics, but astronomy and music became their own disciplines around the 17th century.

▶ Over time, other subjects based on arithmetic and geometry spin off into their own disciplines, including parts of geography, perspective, architecture and navigation.

▶ This has carried on — computer science was part of mathematical logic in the mid-20th century until it become its own discipline.

▶ And the lines between applied maths and many other disciplines (e.g. computer science, physics and engineering) remain blurred.

'Mathematician'

▶ Given that we have no clear definition of 'mathematics' for much of history, who do we count as a 'mathematician'?

▶ Bede (c.672–735) was a writer on the Bible and a church historian, but also wrote on the Moon and its cycles, calculation of the spring equinox, the date of Easter,[1] the planets and zodiac and the use of the astrolabe. Was Bede a mathematician?

---

[1]Easter had to fall on the first Sunday following a full Moon after the spring equinox, so required calculation of solar and lunar cycles.

'Mathematician'

▶ Early academic jobs we might think are mathematical were in 'Geometry' and 'Astronomy'.

▶ Some of this persists — Cambridge has the Lucasian Professor of Mathematics, but the Oxford equivalent is the Savilian Professor of Geometry.

'Mathematician'

▶ Isaac Newton held was the Lucasian Professor of Mathematics.
▶ His work included development of the calculus and mechanics (his laws of motion), but also work on gravity, optics and much else.
▶ Was he a mathematician or a physicist?

'Mathematician'

▶ Alan Turing was clearly a mathematician, doing work in formal mathematical logic.

▶ However, much of that work today would be considered computer science, a discipline that didn't exist then.

▶ Should Turing be considered a mathematician or computer scientist?

'Mathematician'

▶ The term 'mathematician' started to be used in English from around 1570 onwards, more consistently for arithmetic and geometry (and astrology) from 1660.

▶ Stedall says: "one thing is certain: the history of mathematics is not the history of mathematicians".

How did those doing mathematics earn a living?

▶ Often by doing maths alongside an occupation: Cardano was a physician, Fermat a lawyer.

▶ Fermat is often described as an 'amateur mathematician'; in fact, the idea is meaningless as there were so few 'professional mathematicians'.

▶ Others, at certain times, placed themselves under a rich patron, perhaps principally employed for another purpose, e.g. to calculate dates based on astronomical events, but allowed to practice maths more widely (e.g. at one point Euler managed publication of calendars and maps for Frederick the Great).

How did those doing mathematics earn a living?

▶ Stedall writes about the transition from patronage to profession by highlighting:

  ▶ Harriot (1560–1621) was engaged by Walter Raleigh as a patron and worked on matters of navigation.
  ▶ Oughtred (1574–1660) worked under patronage teaching maths to the sons of aristocrats, but later was convinced by his patron to publish and sell textbooks on mathematics.
  ▶ Briggs (1561–1630) was employed to lecture at Cambridge, then to give public lectures on maths at Gresham College in London, and later to an academic position at Oxford.

▶ Now, a mathematician is likely to be employed in education, finance or industry.

Implications for your research

▶ Be aware that the history of mathematics is not a history of mathematicians.

▶ Indeed, the meaning of 'mathematics' has changed over time.

▶ In fact, despite the current situation, for much of history mathematics was developed by people who wouldn't identify as mathematicians.

▶ This week's investigation:
  ▶ Investigate a person or topic in an adjacent field where mathematics is used.
  ▶ Could be historic or modern.
  ▶ Is the field part of mathematics? Is the person a mathematician?