Option: mathematics

Level: master degree

Module: English

Note: In case you want to ask for something do not hesitate to contact me by email that founded below.

An overview of the history of mathematics

Mathematics starts with counting. It is not reasonable, however, to suggest that early counting was mathematics. Only when some record of the counting was kept and, therefore, some representation of numbers occurred can mathematics be said to have started.

In Babylonia mathematics developed from 2000 BC. Earlier a place value notation number system had evolved over a lengthy period with a number base of 60. It allowed arbitrarily large numbers and fractions to be represented and so proved to be the foundation of more high powered mathematical development.

Number problems such as that of the Pythagorean triples (a,b,c)(a,b,c) with a^{2}+b^{2} = c^{2}$a2+b2=c2$ were studied from at least 1700 BC. Systems of linear equations were studied in the context of solving number problems. Quadratic equations were also studied and these examples led to a type of numerical algebra.

.

Notation and communication

there are many major mathematical discoveries but only those which can be understood by others lead to progress. However, the easy use and understanding of mathematical concepts depends on their notation.

For example, work with numbers is clearly hindered by poor notation. Try multiplying two numbers together in Roman numerals. What is MLXXXIV times MMLLLXIX? Addition of course is a different matter and in this case Roman numerals come into their own, merchants who did most of their arithmetic adding figures were reluctant to give up using Roman numerals.

What are other examples of notational problems. The best known is probably the notation for the calculus used by Leibniz and Newton. Leibniz's notation lead more easily to extending the ideas of the calculus, while Newton's notation although good to describe velocity and acceleration had much less potential when functions of two variables were considered. British mathematicians who patriotically used Newton's notation put themselves at a disadvantage compared with the continental mathematicians who followed Leibniz.

Let us think for a moment how dependent we all are on mathematical notation and convention. Ask any mathematician to solve ax = b*ax*=*b* and you will be given the answer x = b/a*x*=*b*/*a*. I would be very surprised if you were given the answer a = b/x*a*=*b*/*x*, but why not. We are, often without realising it, using a convention that letters near the end of the alphabet represent unknowns while those near the beginning represent known quantities.

It was not always like this: Harriot used a*a* as his unknown as did others at this time. The convention we use (letters near the end of the alphabet representing unknowns) was introduced by Descartes in 1637. Other conventions have fallen out of favour, such as that due to Viète who used vowels for unknowns and consonants for knowns.

Of course ax = b*ax*=*b* contains other conventions of notation which we use without noticing them. For example the sign "=" was introduced by Recorde in 1557. Also ax*ax* is used to denote the product of a*a* and x*x*, the most efficient notation of all since nothing has to be written!

How we view history

We view the history of mathematics from our own position of understanding and sophistication. There can be no other way but nevertheless we have to try to appreciate the difference between our viewpoint and that of mathematicians centuries ago. Often the way mathematics is taught today makes it harder to understand the difficulties of the past.

There is no reason why anyone should introduce negative numbers just to be solutions of equations such as x + 3 = 0*x*+3=0. In fact there is no real reason why negative numbers should be introduced at all. Nobody owned -2 books. We can think of 2 as being some abstract property which every set of 2 objects possesses. This in itself is a deep idea. Adding 2 apples to 3 apples is one matter. Realising that there are abstract properties 2 and 3 which apply to every sets with 2 and 3 elements and that 2 + 3 = 5 is a general theorem which applies whether they are sets of apples, books or trees moves from counting into the realm of mathematics.

Negative numbers do not have this type of concrete representation on which to build the abstraction. It is not surprising that their introduction came only after a long struggle. An understanding of these difficulties would benefit any teacher trying to teach primary school children. Even the integers, which we take as the most basic concept, have a sophistication which can only be properly understood by examining the historical setting.

Email : fellachetari7@gmail.com

Brilliant discoveries

It is quite hard to understand the brilliance of major mathematical discoveries. On the one hand they often appear as isolated flashes of brilliance although in fact they are the culmination of work by many, often less able, mathematicians over a long period.

For example the controversy over whether Newton or Leibniz discovered the calculus first can easily be answered. Neither did since Newton certainly learnt the calculus from his teacher Barrow. Of course I am not suggesting that Barrow should receive the credit for discovering the calculus, I'm merely pointing out that the calculus comes out of a long period of progress starting with Greek mathematics.

Now we are in danger of reducing major mathematical discoveries as no more than the luck of who was working on a topic at "the right time". This too would be completely unfair (although it does go some why to explain why two or more people often discovered something independently around the same time). There is still the flash of genius in the discoveries, often coming from a deeper understanding or seeing the importance of certain ideas more clearly.

Email : fellachetari7@gmail.com