Isaac Newton

Isaac Newton (1642–1727) was born in the tiny hamlet of Woolsthorpe in Lincolnshire in England. At Trinity College, Cambridge University, he studied contemporary works, such as a Latin edition of Descartes's *La Géométrie* and John Wallis's book on infinite series. Inspired by the latter he produced, while still a student, the infinite series expansion for the **binomial expression** $(p + q)^{m/n}$; the finite version shown on the stamp had been known centuries earlier.

In the 17th century much progress had been made on the two branches of the infinitesimal calculus, now called 'differentiation' and 'integration'. It was gradually becoming realised that these processes are inverse to each other. Around 1666 Newton investigated the rules of calculus and explained for the first time why this inverse relationship holds.

The story of Isaac Newton and the apple is well known. Seeing an apple fall to the ground, he realised that the gravitational force pulling it to earth was the same as that which kept the moon orbiting the earth and the earth orbiting the sun. This planetary motion is governed by a **universal law of gravitation**, the *inverse-square law*: the force of attraction between two objects varies as the product of their masses and inversely as the square of the distance between them.
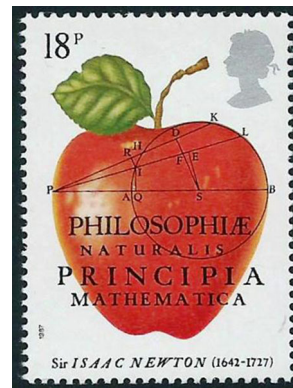
In his ***Principia Mathematica*** (1687), possibly the greatest scientific work of all time, Newton used this law to explain Kepler's laws of **elliptical planetary motion** and account for cometary orbits, the variation of tides, and the flattening of the earth at the poles due to the earth's rotation.
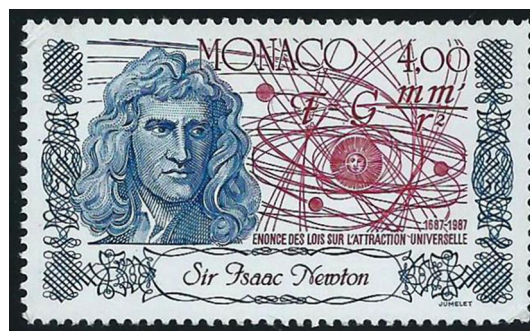

Isaac Newton

Binomial theorem

***Principia* and apple**

Elliptical planetary motion

Law of gravitation

Newton and planets

➤ Column editor's address: **Robin Wilson,** Mathematical Institute, Andrew Wiles Building, University of Oxford, UK
e-mail: r.j.wilson@open.ac.uk