

# Isaac Newton, Standing on Shoulders of Others

English Scientist and Mathematician

**Born: Woolsthorpe, Lincolnshire, Dec 25, 1642, Died: London, March 20, 1727**

Newton was a Christmas baby by the Julian Calendar, but by our present day Gregorian Calendar, he was born on January 4, 1643. Newton, who went on to be one of the, if not the, greatest intellect that has ever lived, started life precariously. He was born posthumously and premature and barely held onto life. His mother remarried when he was three, and he was left with his grandparents. His father had died three months before he was born.

At school, he was curious about the world around him, inventive (kites, sundials, waterclocks, etc) but showed no signs of being unusually bright. His teachers had comments such as “inattentive, and idle”. He seemed a bit slow in his studies until his mid-teens. In the late 1650’s he was removed from school to work on his mother’s farm, where he failed terribly! His Uncle, a member of Trinity College, Cambridge, noticed his potential scholarship, and had him enrolled at Cambridge in 1660. Five years later, he graduated, again without any particular distinction.

The plague had hit London, and Newton retired to the farm to be kept out of harm’s way. There he began to think, working on the Binomial Theorem and the beginnings of Calculus. In the eighteen months that he was back on the farm he studied mechanics, mathematics, optics and gravitation. Now, one of the things I believe about three types of people (the genius, the inventor, and the entrepreneur) is that they can take an ordinary occurrence and ask a brilliant question about it, (Why did that happen? How can I use that idea to make a machine? How can use that idea to make money? Etc). He observed an apple fall to the ground, looked up and saw the moon, and asked himself, “Self, why did the apple fall, and the moon doesn’t?). From this simple question, he was led down the path to discovering the Universal Laws of Gravitation. Now, I know the “apple” story is debated, I am taking information from Isaac Asimov’s *Encyclopedia of Science and Technology*, and Stephen Hawking’s *God Created the Integers*. Both authors refer to the “apple” story as having some merit. Hawking states, “that a falling apple had ‘occasioned’ his foray into gravitational contemplation, and he is believed to have performed his pendulum experiments then.”

Newton’s calculations about the moon’s rate of fall was seven-eighths of what was observed. He was unsure of his theory and put this aside for fifteen years. Newton concentrated on optics, showing how white light could be broken up into colours. His discovery garnered him some fame, and in 1667 he returned to Cambridge, where he stayed for thirty years. Two years later, his mathematics professor gave way to him, and at the age of 27, he became Lucasian professor of Mathematics. He only gave about eight lectures a year, (very poorly ones) and spent the rest of the year of research. He was elected to the Royal Society in 1672.

Newton never married, and was childish about receiving criticism. At this time, Newton was discovering what was to become “the Calculus”, but being afraid of controversy and criticism, he delayed publishing his findings. The German, Leibniz, independently worked on his Calculus, and although Newton and Leibniz were friendly, nationalism came to the forefront about who should be given credit. Leibniz’s notations were more convenient, but the English mathematicians refused to use them and were delayed for over a century!

Newton carried on with his work and in 1668 invented the reflecting telescope, an advance in optics that made a sharper image as there was no chromatic aberration. At this time, Newton began again to work on his gravitational theories, this time with better data as to the size of the Earth, and with the addition of Calculus. He published his theories in 1687 called *Philosophiae Naturalis Principia Mathematica*, (“Mathematical Principles of Natural Philosophy”). It was written in Latin and it took 42 years to be translated into English in 1729. It has been considered the greatest scientific work ever written.

I am running out of time here, and will add some more later.