isaac newton: beyond the apple tree

who was isaac newton?

Sir Isaac Newton (1642-1727) was a mathematician and physicist who is remembered as one of the greatest intellects of history. He was born in Woolsthorpe, England, where he spent his school years before attending Cambridge University in 1661, where he remained as a professor until 1696.

He would go on to make his greatest works during that period. Particularly, between 1665-1666, he reached the height of his career, in which he prepared much of his Principia. During this time, there was a plague that forced him into isolation. He published his major work, Optiks, in 1704, and he was knighted one year later.

To this date, Newton remains buried in Westminster Abbey, London, and is remembered for his history-changing contributions to numerous fields. Although he is remembered for the infamous apple anecdote, Sir Isaac Newton went beyond the apple tree: his work in mathematics, history, optics, astronomy, chemistry, and even theology revolutionized human understanding of the universe forever.

Anecdotes

Once Newton created this theory around integral calculus he chose not to publish it as he believed it was too radical, in 1684 Leibiniz published a work discussing integral calculus. Both of these mathematicians developed similar solutions. Both received credit. Leibiniz for its publication and Newton for discovery, but later own Newton decided to accuse Leibiniz of plagiarism. This caused a scandal which remained in the carries of both of these men.

Newton's theory of gravity is stated to have come from the infamous incident of the apple, which actually occurred while he was quarantining in isolation. In fact, after the Bubonic Plague hit Cambridge, Newton retreated to the countryside and developed most of his greatest accomplishments.

contributions to mathematics

Calculus: The calculation of instantaneous rates of change and the summation of infinitely small factors to determine a whole.

This branch of mathematics was created during the 17th century by Isaac Newton and Gottfried Wilhelm Leibniz. Nowadays calculus is an entry point for studying economics, physics, and biology among other fields.

differential calculus: The initial problem that led Newton into creating calculus was to represent and calculate the average slope of a curve. As a curve is constantly varying there was no method to identify one point on it. Newton went on to calculate the derivative of function f(x) which provides the slope of any given point in a curve. This part of calculus is known as differential calculus.

integral calculus: Newton also contributed to integral calculus. He is responsible for figuring out how to calculate the total area bounded by a curve within two well defined boundaries. This was done by creating infinitely thin vertical slabs in a graph to approximate an answer. This is known as integral calculus.

$$f(x) = x^r \text{ is } x^{r+1}/_{r+1}$$

other contributions to mathematics: Newton is also responsible for other contributions in math. He created the generalized binomial theorem. This theorem describes the algebraic expansion of powers of a binomial. Newton is also responsible for contributing to the theory of finite differences, creating a method capable of finding accurately the roots of a function, and using infinite power series confidently among others.

optics & theory of light: The corpuscular theory of light: which was largely developed by Isaac Newton, states that light is not made of waves, going against the mindset of the time. Instead, Newton held light to be made of small particles, or "corpuscles", which are perfectly elastic, weightless, and rigid.

Newton also found that white light is essentially made of a mixture of infinitely varied color rays, corresponding to the colors of the rainbow. Newton was able to determine this through his studies of light through a glass prism. Newton also determined that color, rather than being a property of objects, is a property of light itself. After all, he concluded that each color has a unique angle of refraction through his studies with the prism, and objects are actually the color of the light that illuminates them.

contributions to physics

Physics: The branch of science that deals with the structure, behavior, and motion of matter through space and time, as well as with energy and force. It seeks to understand the functioning of the universe through the observation and analysis of the interactions between its fundamental constituents.

the three laws of motion: The three laws of motion, perhaps Newton's most well-known work, are essentially the groundwork for our understanding of physics and retain an important degree of validity even to this date.

the first law, or the law of inertia: states that if an object is at rate or moving at a constant speed and in a straight line. it will continue to be at rest or to move unless another, unbalanced force acts on it.

the second law: states that force equals the differential change in momentum per unit of time (momentum being the mass of an object multiplied by its velocity). Thus, momentum is a vector quantity, which means that it has both magnitude and direction. So, a force applied on an object can change the magnitude and direction of its momentum. However, if the mass is constant, force can also be understood as the product of mass and acceleration (the change of velocity over time).

F=m*a

the third law, or the action and reaction law: The third law states that when there is an interaction between two bodies or objects, they will apply forces to each other will be equal in magnitude and opposite in direction.

the law of universal gravitation: according to the story, when Newton saw an apple fall from a tree, he concluded that the same force pulling the apple to the ground was also the same force pulling the moon to the Earth: gravity. This lead to the law of universal gravitation, which states that any particle of the universe attracts any other with a force that varies directly as the product of the mass and inversely as the square of the distance between them.

$$F = G\frac{m_1 m_2}{r^2}$$

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