# A great man

Science, Physics

January 4, 1643 is the time when our great mathematician and physicist, Isaac Newton, was born. His hometown was Woolsthorpe, Lincolnshire, England. His father was a noble farmer but unfortunately he died before Isaac Newton was born. After his father's death, his mother was married again, thus he was left with his grandparent's custody. He went to Cambridge University to study in 1661. During that year, he became interested in various fields includingmathematics. He was also become interested in optics, astronomy and physics but in 1665 a plague epidemic came in the University that forces Newton to go back to his hometown.

During his two years in Cambridge, he already thought about gravity and in fact began to study optics and mathematics particularly calculus. After the plague, he returned to Cambridge. He became a second Lucasian Professor of Mathematics. In 1668, he made a reflecting telescope which attracts the attention of the scientific community and eventually he became a member of the famous Royal Society. His passion in optics andsciencewas manifested by his series of experiments in the composition of light which resulted to the discovery of the various behavior of light.

He published " The Opticks" which consists of concepts of light and color1704. Aside from " The Opticks", he also published several paper works in history, theology and alchemy. One of his greatest works is the " Philosophiae Naturalis Principia Mathematica" (Mathematical Principles of NaturalPhilosophy). This works is all about how force and gravity were applied to all objects in the universe. In 1689, he was elected to become the MP for Cambridge University and in 1696; he became the warden of the Royal Mint in London.

In 1703, he was elected as the President of the Royal Society. Before he died, he has contributed a lot of concepts, discoveries, theories and ideas on different field such as optics, physics, astronomy and mathematics. His interest in mathematics was first manifested during his undergraduate year in Cambridge University. During this time he became accustomed to various mathematical works of several mathematicians like Descartes and John Wallis. His works in mathematics include the proof and improvement of the so called “ binomial theorem”.

Newton was not first to discover the formula ((a + b) n) behind the binomial theorem. In fact an Islamic mathematician namely al-Karaji made a binomial coefficient table up to n= 5. Also, another Muslim mathematician namely Omar Khayyam established a method of finding nth roots using the binomial expansion. Also in Europe, a century ago, Blaise Pascal has presented his concepts of how to generate binomial coefficients. Those discoveries by various mathematicians, including Pascal, were only applicable to positive values of n.

Newton on the other hand, discovered the formula for (a+b)n that would work for any real. He arrived at this formula: (a+b)n = an + nan-1b + [n(n-1)an-2b2] / 2! + [n(n-1)(n-2)an-3b3] / 3! + . . . + bn His finding about the binomial expansion was; for values of n element of the interval (-1, 1), the formula (a+b)n generates an infinite, converging series. Newton’s discovery of binomial expansion/series was a great help in calculating pi ( ). As we all know, a binomial series recurs repeatedly which becomes a very useful instrument for mathematical analysis.

The method of fluxions was Newton’s greatest discovery in calculus. In 1671, two years before Leibnitz established his own concepts about calculus, Newton started to study fluxions which is basically include concepts, notations and ideas on Calculus. His works on calculus was well established during 1665 in which he presented symbolisms for partial derivatives which is now an important method in calculus. The idea of binomial theorem and knowledge about infinite series gave Newton a solid idea on derivatives and integrals of functions.

As a result of his studies, he showed that integral and derivatives can be expressed as a binomial expansion of infinite series particularly the power series. Newton discussed and solved problem using Method of fluxions. The problems include differentiation of algebraic function, integration of algebraic functions using inverse method, first-order differential equations, optimization problem which includes the locating the maxima and minima of a given function and lastly drawing tangent line of functions at any point. Moreover, with the aid of fluxion, Newton developed a geometric idea of “ first and last” ratio of lines.

In 1660, Newton became interested to study the nature of light and vision. In fact because of his fascination on light, he actually stared directly on the sun and poked the sides of his eyeballs by a small knife to observe activities and behavior of light and which risked blinding himself. These kinds of wild experiments and other sensible ones gave way to the formulation of theories about nature, behavior of the spectrum of light. Furthermore, Newton made its great leap in the scientific world when he published his “ New Theory about Light and Colors” in the Royal Society’s journal.

As a result of his various experiments, he forced to conclude that Light is a heterogeneous mixture of refrangible rays meaning light is not a homogenous entity. When he passed a white light on a glass prism, he observed that spectrum of colors were formed in opposite walls which explained the property of light known as refraction. In line with the study of optics, he constructed a reflecting telescope, the first, to overcome the distortions of chromatic dispersion. One of his greatest contributions in the field of physics was his Law of Universal Gravitation.

Isaac Newton made a comparison of the moon acceleration to the object's acceleration on Earth. He believed that gravitational forces were accountable for the acceleration of each other. He made a vital conclusion that gravity depends mainly on distance. From his comparison, he concluded that the gravitational force of attraction between the Earth and other objects is inversely proportional to distance between the center of the earth and the object. In other words, if the object is near the center of the earth, the gravitational force of attraction is high and vise versa.

But there are other factors, aside from distance that affects the magnitude of the gravitational force. Newton knew that mass is the other factor that affects the gravity or acceleration of an object. Another important conclusion was drawn and that the gravitational force exerted by the earth on the object is directly proportional to the mass of the object. Newton's law of universal gravitation was applied outside earth, hence gravity is really universal. With this finding, Newton was included in the gravity hall of fame. Also, with the aid of Law of Universal Gravitation, the three laws of motion were formulated.

The formulation of these three laws, particularly the second law of motion allows numerical computations of how velocity changes when force acts on it. Newton left several manuscripts and paper works about alchemy and chemistry. Most of these were part of books, bibliographies, dictionaries and many other sources however; we could count in our fingers the original one from them. He began his experiments in 1669. He wanted to know the truth about alchemical obscurity and mysticism and the nature of and structure of all matter that he believed that God created all of these.

Newton’s notable contribution on chemistry is his publication of an incomplete theory of chemical force. One of his written works is Opticks, which is first written in English. This was his most remarkable works on theories in light and color. In Opticks, he proved and explained through experiment and logical reasoning and which includes numerous axioms, theorems, propositional statements and lots of definitions. He integrated his mathematical reasoning in his works and eventually Opticks turned out to be the basis of all experimental physics.

The Opticks contained findings that light like sound is composed of waves. He obtained several criticisms from other scientist like Robert Hooke and Christian Huygens. But Newton insisted that light was composed of discrete particles that move in straight lines. Furthermore, Newton combined the ideas that light is a particle and at the same time a wave. Again, from this result he received criticisms from Hooke and other scientists. Principia, his most remarkable, notable work and considered his masterpiece was divided in three books.

The first book of the Principia contains eight definitions and three axioms. The three axioms were later known as the Three Laws of Motion. These laws were the main parts of Book I of Principia and in fact all discussions of Newton in his Book I were based on these. In the Book II of Principia, he tacked motion of fluids and other bodies. On this book, he questioned Descartes and Kepler ideas about the vortex theory. In his Book III which was subtitled the System of the World, he showed how he arrived on his famous Law of Universal Gravitation.

The Principia was considered the most influential and greatest scientific piece during Newton's era. His laws of motion and universal gravitation were his two most popular discoveries but Newton still believes that there is a supreme being that governs and makes these phenomena possible and that is God. Newton was a religious person. In fact he has written more on religion than in natural science. As a summary, Newton was a remarkable scientist in the history of the world making remarkable scientific advancements and discoveries in mathematics, physics, astronomy, optics, alchemy, chemistry and even in the religion.

In mathematics, he contributed a lot of ideas on analytical geometry, algebra and calculus. His discovery of the binomial formula and method of fluxions were very significant in the advancement of various topics in mathematics. In physics, astronomy and optics, he made several findings and discoveries like the theories of light, Universal gravitation, laws of motion, ideas on fluid mechanics and invention of reflecting telescope. His book, " Opticks", became the basis of many experiments in physics because of the employment of scientific method in his own experiments.

Newton also has some contribution in alchemy and chemistry although some written works were in question. Newton was a great mathematician, a great physicist, a great astronomer and a great believer of God. Although all his works were scientific, he did deny the existence of a divine being. He was really a religious person and I think this was the reason why Sir Isaac Newton was successful in hiscareer. We owed a lot to Newton so let us thanked him for his great contribution in humanity. Work Cited “ Hatch, Robert A. ” 1999. Sir Isaac Newton. 1 December 2007,

ufl. edu/users/rhatch/pages/01-Courses/current-courses /08sr-newton. htm>. “ Henderson, Tom”. 2007. Newton's Law of Universal Gravitation. 1 December 2007, . Newton, Sir Isaac. 1 December 2007, . Sir Isaac Newton's Invention of the Calculus Fluxions and Infinite Series. 1 December 2007, . “ Smoller, Laura. ” June 2001. Applications: Web-Based Precalculus. 1 December 2007 < http://ualr. edu/lasmoller/newton. html >.