ISAAC NEWTON, 1642-1727, BY D. W. HUTCHINGS. pdf

1: Late seventeenth century scientists. - Boston University Libraries

CHAPTER 6 ISAAC NEWTON, D. W. HUTCHINGs O N E of the great difficulties in the study of the history of science is that of clearing one's mind of long-accepted and familiar ideas, so putting oneself on equal terms with early scientists.

Newton, Isaac English physicist and mathematician who was born into a poor farming family. Luckily for humanity, Newton was not a good farmer, and was sent to Cambridge to study to become a preacher. At Cambridge, Newton studied mathematics, being especially strongly influenced by Euclid , although he was also influenced by Baconian and Cartesian philosophies. Newton was forced to leave Cambridge when it was closed because of the plague, and it was during this period that he made some of his most significant discoveries. With the reticence he was to show later in life, Newton did not, however, publish his results. Newton suffered a mental breakdown in and was still recovering through In response to a letter from Hooke , he suggested that a particle, if released, would spiral in to the center of the Earth. Hooke wrote back, claiming that the path would not be a spiral, but an ellipse. Newton, who hated being bested, then proceeded to work out the mathematics of orbits. Again, he did not publish his calculations. Newton then began devoting his efforts to theological speculation and put the calculations on elliptical motion aside, telling Halley he had lost them Westfall , p. Halley , who had become interested in orbits, finally convinced Newton to expand and publish his calculations. Newton devoted the period from August to spring to this task, and the result became one of the most important and influential works on physics of all times, Philosophiae Naturalis Principia Mathematica Mathematical Principles of Natural Philosophy , often shortened to Principia Mathematica or simply "the Principia. Finally, Book III consisted of applications of his dynamics, including an explanation for tides and a theory of lunar motion. To test his hypothesis of universal gravitation, Newton wrote Flamsteed to ask if Saturn had been observed to slow down upon passing Jupiter. The surprised Flamsteed replied that an effect had indeed been observed, and it was closely predicted by the calculations Newton had provided. Newton also correctly formulated and solved the first ever problem in the calculus of variations which involved finding the surface of revolution which would give minimum resistance to flow assuming a specific drag law. Newton invented a scientific method which was truly universal in its scope. Newton presented his methodology as a set of four rules for scientific reasoning. These rules were stated in the Principia and proposed that 1 we are to admit no more causes of natural things such as are both true and sufficient to explain their appearances, 2 the same natural effects must be assigned to the same causes, 3 qualities of bodies are to be esteemed as universal, and 4 propositions deduced from observation of phenomena should be viewed as accurate until other phenomena contradict them. These four concise and universal rules for investigation were truly revolutionary. By their application, Newton formulated the universal laws of nature with which he was able to unravel virtually all the unsolved problems of his day. Newton went much further than outlining his rules for reasoning, however, actually describing how they might be applied to the solution of a given problem. The analytic method he invented far exceeded the more philosophical and less scientifically rigorous approaches of Aristotle and Aquinas. This analysis consists of making experiments and observations, and in drawing general conclusions from them by induction This is the method of analysis: However, he did not publish his work on calculus until afterward Leibniz had published his. This led to a bitter priority dispute between English and continental mathematicians which persisted for decades, to the detriment of all concerned. Newton discovered that the binomial theorem was valid for fractional powers, but left it for Wallis to publish which he did, with appropriate credit to Newton. Newton formulated a theory of sound, but derived a speed which did not agree with his experiments. Newton therefore fudged his theory until agreement was achieved Engineering and Science, pp. In his "experimentum crucis" crucial experiment , he found that the image produced by a prism was oval-shaped and not circular, as current theories of light would require. He observed a half-red, half-blue string through a prism , and found the ends to be disjointed. Newton also formulated a system of chemistry in Query 31 at the end of Optics. In this corpuscular theory, "elements" consisted of different arrangements of atoms, and atoms consisted of small, hard, billiard ball-like particles. He explained chemical reactions in terms of the chemical affinities of the participating substances. Newton

devoted a majority of his free time later in life after to fruitless alchemical experiments. Newton was extremely sensitive to criticism, and even ceased publishing until the death of his arch-rival Hooke. It was only through the prodding of Halley that Newton was persuaded at all to publish the Principia Mathematica. In the latter portion of his life, he devoted much of his time to alchemical researches and trying to date events in the Bible. During the exhumation, it was discovered that Newton had massive amounts of mercury in his body, probably resulting from his alchemical pursuits. Newton was appointed Warden of the British Mint in Newton was knighted by Queen Anne. However, the act was "an honor bestowed not for his contributions to science, nor for his service at the Mint, but for the greater glory of party politics in the election of " Westfall , p. Newton singlehandedly contributed more to the development of science than any other individual in history. He surpassed all the gains brought about by the great scientific minds of antiquity, producing a scheme of the universe which was more consistent, elegant, and intuitive than any proposed before. Newton stated explicit principles of scientific methods which applied universally to all branches of science. This was in sharp contradistinction to the earlier methodologies of Aristotle and Aquinas , which had outlined separate methods for different disciplines. Although his methodology was strictly logical, Newton still believed deeply in the necessity of a God. His theological views are characterized by his belief that the beauty and regularity of the natural world could only "proceed from the counsel and dominion of an intelligent and powerful Being. Although earlier philosophers such as Galileo and John Philoponus had used experimental procedures, Newton was the first to explicitly define and systematize their use. His methodology produced a neat balance between theoretical and experimental inquiry and between the mathematical and mechanical approaches. Newton mathematized all of the physical sciences, reducing their study to a rigorous, universal, and rational procedure which marked the ushering in of the Age of Reason. Thus, the basic principles of investigation set down by Newton have persisted virtually without alteration until modern times. They form the foundation on which the technological civilization of today rests. The principles expounded by Newton were even applied to the social sciences, influencing the economic theories of Adam Smith and the decision to make the United States legislature bicameral. It is therefore no exaggeration to identify Newton as the single most important contributor to the development of modern science.

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2: Isaac Newton - Wikipedia

ISAAC NEWTON / r I ^HE three hundredth anniversary of the birth of Sir Isaac Newton I fell at a time when world circumstances prevented all possibility.

It is, rather, an abstraction from experience 2. Newton thus broke with Descartes, for whom the basic laws of physics were necessary truths grounded in metaphysics c. Method of analysis and synthesis or composition 1. Idea is to deduce consequences that go beyond original inductive evidence. Jupiter and its moons 3. He did not simply generalize that all prisms would split light into colors the same way. Losee interprets Newton as following two different methods, at least in the Principia, JL 81 1. For Newton, his three laws of motion were his axioms. Newton introduced a distinction between an axiom system and its empirical application JL 81 1. Descartes, for instance, did not have this distinction. He lacked the second of the three steps. Scholium on Absolute Space and Time A. This scholium appears near the beginning of the Principia, right after his definitions of key terms such as quantity of motion and centripetal force B. Absolute versus relative MM 1. Space MM , q. Motion MM 1. Bucket experiment see chart JL 77 1. Nevertheless, Newton thought that we could distinguish relative from true motion in the same way on the supposition of the traditional concentric spheres model of the universe MM 1. Newton added the tied globes experiment to show that it could be done 1. What we have here a clever model of the earth-sun system, in which it is now possible to attribute the annual motion to the earth rather than to the stars G.

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3: Research References for Isaac Newton - Sir Isaac Newton Online

CHAPTER 6 - ISAAC NEWTON, D.W. HUTCHINGS. Pages Publisher Summary. This chapter presents the work of Isaac Newton. It was during his final.

Retrieved November 15, , from https: Innys for the Royal Society , Reprinted in Hall Based on the fourth edition of Cohen, assisted by R. Contains the publications in the dispute on light and colours as they appeared in the Philosophical Transactions of the Royal Society. Second revised edition Cambridge University Press, 7 vols. Cambridge University Press; repr. Contains most early papers and fragments leading to the Principia, with commentary and analysis. Cambridge University Press, 8 vols. Cohen, with assistance of A. Harvard University Press, 2 vols. University of California Press. References and further reading Bricker P. Among the many excellent collections inspired by the th anniversary of the first edition of the Principia, this one is especially focused on philosophy. Dictionary of Scientific Biography, New York: Standing on the Shoulders of Giants: The history of the priority dispute over the calculus; includes Newton Adventurer in Thought, Oxford: The best concise biography of Newton. University of Pittsburgh Press. The Creation of Ideas in Physics: Studies for a Methodology of Theory Construction, Dordrecht: University of Chicago Press. This classic collection contains papers still relevant to most sections. Philosophy of Science Association, vol. University of Delaware Press. A Biography of Isaac Newton, Cambridge: The most thorough intellectual biography of Newton, also available abridged as The Life of Isaac Newton,

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4: Newton - Isaac Newton Bibliography - Scientific Revolution - Dr Robert A. Hatch

Isaac Newton, , by Sullivan, J. W. N and a great selection of similar Used, New and Collectible Books available now at www.enganchecubano.com

Early life of Isaac Newton Isaac Newton was born according to the Julian calendar , in use in England at the time on Christmas Day, 25 December NS 4 January [1] "an hour or two after midnight", [6] at Woolsthorpe Manor in Woolsthorpe-by-Colsterworth , a hamlet in the county of Lincolnshire. His father, also named Isaac Newton, had died three months before. Born prematurely , Newton was a small child; his mother Hannah Ayscough reportedly said that he could have fit inside a quart mug. Newton disliked his stepfather and maintained some enmity towards his mother for marrying him, as revealed by this entry in a list of sins committed up to the age of His mother, widowed for the second time, attempted to make him a farmer, an occupation he hated. Motivated partly by a desire for revenge against a schoolyard bully, he became the top-ranked student, [12] distinguishing himself mainly by building sundials and models of windmills. He set down in his notebook a series of " Quaestiones " about mechanical philosophy as he found it. In , he discovered the generalised binomial theorem and began to develop a mathematical theory that later became calculus. Soon after Newton had obtained his BA degree in August , the university temporarily closed as a precaution against the Great Plague. In April , he returned to Cambridge and in October was elected as a fellow of Trinity. However, by the issue could not be avoided and by then his unconventional views stood in the way. His studies had impressed the Lucasian professor Isaac Barrow , who was more anxious to develop his own religious and administrative potential he became master of Trinity two years later ; in Newton succeeded him, only one year after receiving his MA. Famous Men of Science. Most modern historians believe that Newton and Leibniz developed calculus independently, although with very different notations. Occasionally it has been suggested that Newton published almost nothing about it until , and did not give a full account until , while Leibniz began publishing a full account of his methods in His work extensively uses calculus in geometric form based on limiting values of the ratios of vanishingly small quantities: Starting in , other members of the Royal Society accused Leibniz of plagiarism. During that time, any Fellow of a college at Cambridge or Oxford was required to take holy orders and become an ordained Anglican priest. However, the terms of the Lucasian professorship required that the holder not be active in the church presumably so as to have more time for science. Newton argued that this should exempt him from the ordination requirement, and Charles II , whose permission was needed, accepted this argument. From to , Newton lectured on optics. Thus, he observed that colour is the result of objects interacting with already-coloured light rather than objects generating the colour themselves. As a proof of the concept, he constructed a telescope using reflective mirrors instead of lenses as the objective to bypass that problem. In late , [44] he was able to produce this first reflecting telescope. It was about eight inches long and it gave a clearer and larger image. In , the Royal Society asked for a demonstration of his reflecting telescope. He verged on soundlike waves to explain the repeated pattern of reflection and transmission by thin films Opticks Bk. However, later physicists favoured a purely wavelike explanation of light to account for the interference patterns and the general phenomenon of diffraction. In his Hypothesis of Light of , Newton posited the existence of the ether to transmit forces between particles. The contact with the Cambridge Platonist philosopher Henry More revived his interest in alchemy. He was the last of the magicians. Had he not relied on the occult idea of action at a distance , across a vacuum, he might not have developed his theory of gravity. In , Newton published Opticks , in which he expounded his corpuscular theory of light. He considered light to be made up of extremely subtle corpuscles, that ordinary matter was made of grosser corpuscles and speculated that through a kind of alchemical transmutation "Are not gross Bodies and Light convertible into one another, In the same book he describes, via diagrams, the use of multiple-prism arrays. Also, the use of these prismatic beam expanders led to the multiple-prism dispersion theory. Science also slowly came to realise the difference between perception of colour and mathematisable optics. Newton had committed himself to the doctrine that refraction without colour was impossible. He therefore thought that the object-glasses of telescopes must for ever remain

imperfect, achromatism and refraction being incompatible. This inference was proved by Dollond to be wrong. The Principia was published on 5 July with encouragement and financial help from Edmond Halley. In this work, Newton stated the three universal laws of motion. Together, these laws describe the relationship between any object, the forces acting upon it and the resulting motion, laying the foundation for classical mechanics. They contributed to many advances during the Industrial Revolution which soon followed and were not improved upon for more than years. Many of these advancements continue to be the underpinnings of non-relativistic technologies in the modern world. He used the Latin word gravitas weight for the effect that would become known as gravity , and defined the law of universal gravitation. Here Newton used what became his famous expression "hypotheses non-fingo" [60]. With the Principia, Newton became internationally recognised. Cubic plane curve Newton found 72 of the 78 "species" of cubic curves and categorized them into four types. Newton also claimed that the four types could be obtained by plane projection from one of them, and this was proved in , four years after his death. Later life of Isaac Newton In the s, Newton wrote a number of religious tracts dealing with the literal and symbolic interpretation of the Bible. A manuscript Newton sent to John Locke in which he disputed the fidelity of 1 John 5: His first biographer, Sir David Brewster , who compiled his manuscripts for over 20 years, interpreted Newton to be questioning the veracity of passages referring to this, but never denying the doctrine of the Trinity as such. John â€”were published after his death. He also devoted a great deal of time to alchemy see above. Newton was also a member of the Parliament of England for Cambridge University in â€”90 and â€”2, but according to some accounts his only comments were to complain about a cold draught in the chamber and request that the window be closed. Newton became perhaps the best-known Master of the Mint upon the death of Thomas Neale in , a position Newton held for the last 30 years of his life. As Warden, and afterwards Master, of the Royal Mint, Newton estimated that 20 percent of the coins taken in during the Great Recoinage of were counterfeit. Counterfeiting was high treason , punishable by the felon being hanged, drawn and quartered. Despite this, convicting even the most flagrant criminals could be extremely difficult. However, Newton proved equal to the task. Newton successfully prosecuted 28 coiners. It is a matter of debate as whether he intended to do this or not. The French writer and philosopher Voltaire.

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5: Newton, Isaac (â€“) - Routledge Encyclopedia of Philosophy

Newton died in at the age of 84, and was buried in Westminster Abbey; burial there is considered one of the highest honors in Great Britain that can be bestowed upon a person. Scientist. An English scientist, astronomer, and mathematician, he is considered one of the greatest names in the history of human thought.

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6: Sir Isaac Newton in whose name we issue this Award.

Sir Isaac Newton (-) From `A Short Account of the History of Mathematics' (4th edition,) by W. W. Rouse Ball. The mathematicians considered in the last chapter commenced the creation of those processes which.

M Bartolozzi and R Franci, A fragment of the history of algebra: D Bertoloni Meli, Public claims, private worries: J Blaquier, Sir Isaac Newton: C A Chant, Isaac Newton: B P Copenhaver, Jewish theologies of space in the scientific revolution: C Dilworth, Boyle, Hooke and Newton: M J Duck, Newton and Goethe on colour: M Feingold, Newton, Leibniz, and Barrow too: J Gascoigne, The universities and the scientific revolution: A R Hall, Newton and the absolutes: A R Hall, Beyond the fringe: A R Hall, Newton in France: P M Harman, Newton to Maxwell: J W Herivel, Newtonian studies. The originals of the two propositions discovered by Newton in December ? R C Hovis, What can the history of mathematics learn from philosophy? P Kitcher, Fluxions, limits, and infinite littlenesse: T Lai, Did Newton renounce infinitesimals? J A Lohne, Hooke versus Newton: Origins, accuracy, and influence, Sudhoffs Arch. M Miller, Isaac Newton: H Nakajima, Two kinds of modification theory of light: M Panza, Eliminating time: S Pierson, Two mathematics, two Gods: B Pourciau, Reading the master: A Prince, The phenomenalism of Newton and Boscovich: V F Rickey, Isaac Newton: R Rynasiewicz, By their properties, causes and effects: A E Shapiro, Beyond the dating game: G Solinas, Newton and Buffon. S K Stein, Exactly how did Newton deal with his planets? F Steinle, Was ist Masse? L Stewart, Seeing through the scholium: F J Tipler, The sensorium of God: O U Vonwiller, Galileo and Newton: R Weinstock, Long-buried dismantling of a centuries-old myth: R Weinstock, Dismantling a centuries-old myth: R S Westfall, Technical Newton: D T Whiteside, How forceful has a force proof to be?

7: Newton, Isaac () -- from Eric Weisstein's World of Scientific Biography

Research genealogy for Isaac Newton of Woolsthorpe Grantham, Lincolnshire, England, as well as other members of the Newton family, on Ancestry.

8: Newton, Isaac, - Social Networks and Archival Context

Get this from a library! Isaac Newton, a memorial volume. [W J Greenstreet; Mathematical Association.] -- A collection of articles by various writers.

9: ISAAC NEWTON ()

After long service at the Mint and as president of the Royal Society, Newton died on 20 Mar. and was buried in Westminster Abbey, lamented by observers of all political persuasions as 'the greatest man' of his generation.

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