Science has progressed continuously for the past 600 years, accountancy is more or less the same as it was 800 years ago.

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Time Line for Development of Modern Science

Nicolaus Copernicus … 1473-1543

Nicolaus Copernicus (/kəˈpɜrnɪkəs/;[1] Polish: Mikołaj Kopernik [miˈkɔwaj kɔˈpɛrɲik] (listen); German: Nikolaus Kopernikus; 19 February 1473 – 24 May 1543) was a Renaissance mathematician and astronomer who formulated a model of the universe that placed the Sun rather than the Earth at the center of the universe.[a] The publication of this model in his book De revolutionibus orbium coelestium (On the Revolutions of the Celestial Spheres) just before his death in 1543 is considered a major event in the history of science, triggering the Copernican Revolution and making an important contribution to the Scientific Revolution.

Copernicus was born and died in Royal Prussia, a region that had been a part of the Kingdom of Poland since 1466. He was a polyglot and polymath who obtained a doctorate in canon law and also practiced as a physician, classics scholar, translator, governor, diplomat, and economist. Like the rest of his family, he was a third order Dominican.[3] In 1517 he derived a quantity theory of money – a key concept in economics – and in 1519 he formulated a version of what later became known as Gresham's law.[4]

Galileo Galilei … 1564-1642

Galileo Galilei (Italian pronunciation: [galiˈlɛːo galiˈlɛi]; 15 February 1564[3] – 8 January 1642), was an Italian astronomer, physicist, engineer, philosopher, and mathematician who played a major role in the scientific revolution during the Renaissance. Galileo has been called the 'father of observational astronomy',[4] the 'father of modern physics',[5][6] and the 'father of science'.[7] His contributions to observational astronomy include the telescopic confirmation of the phases of Venus, the discovery of the four largest satellites of Jupiter (named the Galilean moons in his honour), and the observation and analysis of sunspots. Galileo also worked in applied science and technology, inventing an improved military compass and other instruments.

Galileo's championing of heliocentrism and Copernicanism was controversial within his lifetime, when most subscribed to either geocentrism or the Tychonic system.[8] He met with opposition from astronomers, who doubted heliocentrism due to the absence of an observed stellar parallax.[8] The matter was investigated by the Roman Inquisition in 1615, and they concluded that it

could only be supported as a possibility, not as an established fact.[8][9] Galileo later defended his views in Dialogue Concerning the Two Chief World Systems, which appeared to attack Pope Urban VIII and thus alienated him and the Jesuits, who had both supported Galileo up until this point.[8] He was tried by the Inquisition, found 'vehemently suspect of heresy', forced to recant, and spent the rest of his life under house arrest.[10][11] It was while Galileo was under house arrest that he wrote one of his finest works, Two New Sciences. Here he summarized the work he had done some forty years earlier, on the two sciences now called kinematics and strength of materials.[12][13]

Antoine-Laurent de Lavoisier … 1743-1749

Antoine-Laurent de Lavoisier (also Antoine Lavoisier after the French Revolution; 26 August 1743 – 8 May 1794;[1] French pronunciation: [ɑ̃twan lɔʁɑ̃ də lavwazje]) was a French nobleman and chemist central to the 18th-century chemical revolution and had a large influence on both the history of chemistry and the history of biology.[2] He is widely considered in popular literature as the 'father of modern chemistry'.[3] This label, however, is more a product of Lavoisier's eminent skill as a self-promoter and underplays his dependence on the instruments, experiments, and ideas of other chemists.[4]

It is generally accepted that Lavoisier's great accomplishments in chemistry largely stem from his changing the science from a qualitative to a quantitative one. Lavoisier is most noted for his discovery of the role oxygen plays in combustion. He recognized and named oxygen (1778) and hydrogen (1783) and opposed the phlogiston theory. Lavoisier helped construct the metric system, wrote the first extensive list of elements, and helped to reform chemical nomenclature. He predicted the existence of silicon (1787)[5] and was also the first to establish that sulfur was an element (1777) rather than a compound.[6] He discovered that, although matter may change its form or shape, its mass always remains the same.

Lavoisier was a powerful member of a number of aristocratic councils, and an administrator of the Ferme Générale. The Ferme générale was one of the most hated components of the Ancien Régime because of the profits it took at the expense of the state, the secrecy of the terms of its contracts, and the violence of its armed agents.[7] All of these political and economic activities enabled him to fund his scientific research. At the height of the French Revolution, he was accused by Jean-Paul Marat of selling adulterated tobacco and of other crimes, and was eventually guillotined a year after Marat's death.

Sir Isaac Newton … 1642-1726

Sir Isaac Newton PRS (/ˈnjuːtən/;[9] 25 December 1642 – 20 March 1726/7[1]) was an English physicist and mathematician (described in his own day as a 'natural philosopher') who is widely recognised as one of the most influential scientists of all time and as a key figure in the scientific revolution. His book Philosophiæ Naturalis Principia Mathematica ('Mathematical Principles of Natural Philosophy'), first published in 1687, laid the foundations for classical mechanics. Newton made seminal contributions to optics, and he shares credit with Gottfried Leibniz for the development of calculus.

Newton's Principia formulated the laws of motion and universal gravitation, which dominated scientists' view of the physical universe for the next three centuries. By deriving Kepler's laws of planetary motion from his mathematical description of gravity, and then using the same

principles to account for the trajectories of comets, the tides, the precession of the equinoxes, and other phenomena, Newton removed the last doubts about the validity of the heliocentric model of the Solar System. This work also demonstrated that the motion of objects on Earth and of celestial bodies could be described by the same principles. His prediction that Earth should be shaped as an oblate spheroid was later vindicated by the measurements of Maupertuis, La Condamine, and others, which helped convince most Continental European scientists of the superiority of Newtonian mechanics over the earlier system of Descartes.

Newton built the first practical reflecting telescope and developed a theory of colour based on the observation that a prism decomposes white light into the many colours of the visible spectrum. He formulated an empirical law of cooling, studied the speed of sound, and introduced the notion of a Newtonian fluid. In addition to his work on calculus, as a mathematician Newton contributed to the study of power series, generalised the binomial theorem to non-integer exponents, developed a method for approximating the roots of a function, and classified most of the cubic plane curves.

Newton was a fellow of Trinity College and the second Lucasian Professor of Mathematics at the University of Cambridge. He was a devout but unorthodox Christian and, unusually for a member of the Cambridge faculty of the day, he refused to take holy orders in the Church of England, perhaps because he privately rejected the doctrine of the Trinity. Beyond his work on the mathematical sciences, Newton dedicated much of his time to the study of biblical chronology and alchemy, but most of his work in those areas remained unpublished until long after his death. In his later life, Newton became president of the Royal Society. Newton served the British government as Warden and Master of the Royal Mint.

Michael Faraday … 1791-1867

Michael Faraday /ˈfæ.rəˌdeɪ/ FRS (22 September 1791 – 25 August 1867) was an English scientist who contributed to the fields of electromagnetism and electrochemistry. His main discoveries include those of electromagnetic induction, diamagnetism and electrolysis.

Although Faraday received little formal education, he was one of the most influential scientists in history. It was by his research on the magnetic field around a conductor carrying a direct current that Faraday established the basis for the concept of the electromagnetic field in physics. Faraday also established that magnetism could affect rays of light and that there was an underlying relationship between the two phenomena.[1][2] He similarly discovered the principle of electromagnetic induction, diamagnetism, and the laws of electrolysis. His inventions of electromagnetic rotary devices formed the foundation of electric motor technology, and it was largely due to his efforts that electricity became practical for use in technology.

As a chemist, Faraday discovered benzene, investigated the clathrate hydrate of chlorine, invented an early form of the Bunsen burner and the system of oxidation numbers, and popularised terminology such as anode, cathode, electrode, and ion. Faraday ultimately became the first and foremost Fullerian Professor of Chemistry at the Royal Institution of Great Britain, a lifetime position.

Faraday was an excellent experimentalist who conveyed his ideas in clear and simple language; his mathematical abilities, however, did not extend as far as trigonometry or any but the simplest algebra. James Clerk Maxwell took the work of Faraday and others, and summarized it in a set of equations that is accepted as the basis of all modern theories of electromagnetic phenomena. On

Faraday's uses of the lines of force, Maxwell wrote that they show Faraday 'to have been in reality a mathematician of a very high order – one from whom the mathematicians of the future may derive valuable and fertile methods.'[3] The SI unit of capacitance is named in his honour: the farad.

Albert Einstein kept a picture of Faraday on his study wall, alongside pictures of Isaac Newton and James Clerk Maxwell.[4] Physicist Ernest Rutherford stated; 'When we consider the magnitude and extent of his discoveries and their influence on the progress of science and of industry, there is no honour too great to pay to the memory of Faraday, one of the greatest scientific discoverers of all time'.[5]

James Clerk Maxwell … 1831-1879

James Clerk Maxwell FRS FRSE (13 June 1831 – 5 November 1879) was a Scottish[2][3] scientist in the field of mathematical physics.[4] His most notable achievement was to formulate the classical theory of electromagnetic radiation, bringing together for the first time electricity, magnetism, and light as manifestations of the same phenomenon. Maxwell's equations for electromagnetism have been called the 'second great unification in physics'[5] after the first one realised by Isaac Newton.

With the publication of A Dynamical Theory of the Electromagnetic Field in 1865, Maxwell demonstrated that electric and magnetic fields travel through space as waves moving at the speed of light. Maxwell proposed that light is an undulation in the same medium that is the cause of electric and magnetic phenomena.[6] The unification of light and electrical phenomena led to the prediction of the existence of radio waves.

Maxwell helped develop the Maxwell–Boltzmann distribution, a statistical means of describing aspects of the kinetic theory of gases. He is also known for presenting the first durable colour photograph in 1861 and for his foundational work on analysing the rigidity of rod-and-joint frameworks (trusses) like those in many bridges.

His discoveries helped usher in the era of modern physics, laying the foundation for such fields as special relativity and quantum mechanics. Many physicists regard Maxwell as the 19th-century scientist having the greatest influence on 20th-century physics. His contributions to the science are considered by many to be of the same magnitude as those of Isaac Newton and Albert Einstein.[7] In the millennium poll—a survey of the 100 most prominent physicists—Maxwell was voted the third greatest physicist of all time, behind only Newton and Einstein.[8] On the centenary of Maxwell's birthday, Einstein described Maxwell's work as the 'most profound and the most fruitful that physics has experienced since the time of Newton'.[9]

Dmitri Ivanovich Mendeleev … 1834-1907

Dmitri Ivanovich Mendeleev[3] (/ˌmɛndəlˈeɪəf/;[4] Russian: Дми́трий Ива́нович Менделе́ев; IPA: [ˈdmʲitrʲɪj ɪˈvanəvʲɪtɕ mʲɪndʲɪˈlʲejɪf] (listen); 8 February 1834 – 2 February 1907 O.S. 27 January 1834 – 20 January 1907) was a Russian chemist and inventor. He formulated the Periodic Law, created his own version of the periodic table of elements, and used it to correct the properties of some already discovered elements and also to predict the properties of eight elements yet to be discovered.

Marie Skłodowska Curie … 1867-1934

Marie Skłodowska Curie (/ˈkjʊri, kjʊˈriː/;[2] French: [kyʁi]; Polish: [kʲiˈri]; 7 November 1867 – 4 July 1934), born Maria Salomea Skłodowska [ˈmarja salɔˈmɛa skwɔˈdɔfska], was a Polish and naturalized-French physicist and chemist who conducted pioneering research on radioactivity. She was the first woman to win a Nobel Prize, the first person and only woman to win twice, the only person to win twice in multiple sciences, and was part of the Curie family legacy of five Nobel Prizes. She was also the first woman to become a professor at the University of Paris, and in 1995 became the first woman to be entombed on her own merits in the Panthéon in Paris.

She was born in Warsaw, in what was then the Kingdom of Poland, part of the Russian Empire. She studied at Warsaw's clandestine Floating University and began her practical scientific training in Warsaw. In 1891, aged 24, she followed her older sister Bronisława to study in Paris, where she earned her higher degrees and conducted her subsequent scientific work. She shared the 1903 Nobel Prize in Physics with her husband Pierre Curie and with physicist Henri Becquerel. She won the 1911 Nobel Prize in Chemistry.

Her achievements included a theory of radioactivity (a term that she coined[3][4][5]), techniques for isolating radioactive isotopes, and the discovery of two elements, polonium and radium. Under her direction, the world's first studies were conducted into the treatment of neoplasms, using radioactive isotopes. She founded the Curie Institutes in Paris and in Warsaw, which remain major centres of medical research today. During World War I, she established the first military field radiological centres.

While a French citizen, Marie Skłodowska Curie (she used both surnames)[6][7] never lost her sense of Polish identity. She taught her daughters the Polish language and took them on visits to Poland.[8] She named the first chemical element that she discovered – polonium, which she isolated in 1898 – after her native country.[a]

Curie died in 1934, aged 66, at a sanatorium in Sancellemoz (Haute-Savoie), France, due to aplastic anemia brought on by exposure to radiation while carrying test tubes of radium in her pockets during research, and in the course of her service in World War I mobile X-ray units that she had set up.[9]

Albert Einstein … 1879-1955

Albert Einstein (/ˈaɪnstaɪn/;[3] German: [ˈalbɐrt ˈaɪnʃtaɪn] (listen); 14 March 1879 – 18 April 1955) was a German-born theoretical physicist. He developed the general theory of relativity, one of the two pillars of modern physics (alongside quantum mechanics).[2][4]:274 Einstein's work is also known for its influence on the philosophy of science.[5][6] Einstein is best known in popular culture for his mass–energy equivalence formula E = mc2 (which has been dubbed 'the world's most famous equation').[7] He received the 1921 Nobel Prize in Physics for his 'services to theoretical physics', in particular his discovery of the law of the photoelectric effect, a pivotal step in the evolution of quantum theory.[8]

Near the beginning of his career, Einstein thought that Newtonian mechanics was no longer enough to reconcile the laws of classical mechanics with the laws of the electromagnetic field. This led to the development of his special theory of relativity. He realized, however, that the principle of relativity could also be extended to gravitational fields, and with his subsequent theory of gravitation in 1916, he published a paper on general relativity. He continued to deal

with problems of statistical mechanics and quantum theory, which led to his explanations of particle theory and the motion of molecules. He also investigated the thermal properties of light which laid the foundation of the photon theory of light. In 1917, Einstein applied the general theory of relativity to model the large-scale structure of the universe.[9][10]

He was visiting the United States when Adolf Hitler came to power in 1933 and, being Jewish, did not go back to Germany, where he had been a professor at the Berlin Academy of Sciences. He settled in the U.S., becoming an American citizen in 1940.[11] On the eve of World War II, he endorsed a letter to President Franklin D. Roosevelt alerting him to the potential development of 'extremely powerful bombs of a new type' and recommending that the U.S. begin similar research. This eventually led to what would become the Manhattan Project. Einstein supported defending the Allied forces, but largely denounced the idea of using the newly discovered nuclear fission as a weapon. Later, with the British philosopher Bertrand Russell, Einstein signed the Russell–Einstein Manifesto, which highlighted the danger of nuclear weapons. Einstein was affiliated with the Institute for Advanced Study in Princeton, New Jersey, until his death in 1955.

Einstein published more than 300 scientific papers along with over 150 non-scientific works.[9] [12] On 5 December 2014, universities and archives announced the release of Einstein's papers, comprising more than 30,000 unique documents.[13][14] Einstein's intellectual achievements and originality have made the word 'Einstein' synonymous with 'genius'.[15]

Lise Meitner … 1878-1968

Lise Meitner (7 November 1878 – 27 October 1968) was an Austrian physicist who worked on radioactivity and nuclear physics.[4] Meitner was part of the Hahn-Meitner-Strassmann team that worked on 'transuranium-elements' from 1935 onward, which led to the radiochemical discovery of the nuclear fission of uranium and thorium in December 1938, an achievement for which her colleague Otto Hahn was awarded the Nobel Prize for Chemistry in 1944.[5] Meitner is often mentioned as one of the most glaring examples of women's scientific achievement being overlooked by the Nobel committee.[6][7][8]

A 1997 Physics Today study concluded that Meitner's omission was 'a rare instance in which personal negative opinions apparently led to the exclusion of a deserving scientist' from the Nobel.[9] Element 109, meitnerium, is named in her honour.[10][11][12]

Time Line for Development of Accountancy

Unknown author … 1211

Some eight hundred years ago the seed of modern bookkeeping was sown in Florence, Italy. Fragments dated 1211 of the account book of a Florentine banker present the earliest known evidence of the double entry system.1

Benedetto Cotrugli … 1416-1469

Benedetto Cotrugli (Croatian: Benedikt "Beno" Kotruljević; 1416–1469) was a Ragusan merchant, economist, scientist, diplomat and humanist. He is believed to have written the first double entry bookkeeping book in 1458

Luca Paciolo … 1445-1517

Frater Luca Bartolomes Pacioli was born about 1445 at Borgo San Sepulcro in Tuscany. He was a 'Renaissance man' in the true sense of the expression, acquiring an amazing knowledge of diverse technical subjects - religion, business, military science, mathematics, medicine, art, music, law and language. He believed (with his time) in the interrelatedness of these widely varying disciplines and in the special importance of those, such as mathematics and accounting, which exhibit harmony and balance. In 1494 he published a book on mathematics which included 36 chapters explaining double entry bookkeeping. In his book, Summa, he wrote 'we describe the method employed in Venice.' Paciolo thus made no claim to the invention of the double entry system, but its inclusion in his book has resulted in his being generally recognized as the author of the first published double entry bookkeeping text.

Takeaway

Science has progressed over the last few hundred years in an amazing way, with each generation of scientists building on what their predecessors have discovered. In contrast the double entry concept of accountancy has changed very little in an even longer time period.

At one time in history the idea of double entry accounting was a part of 'mathematics', it has not been the subject of scientific inquiry for centuries, rather it has been 'gamed' more and more to be a tool for the management of companies and markets.

The idea of True Value Accounting is being developed in the same spirit that double entry accounting was developed many hundreds of years ago

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