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Chapter 1 : Mathematics - Mathematics in the 17th and 18th centuries | calendrierdelascience.com

Get this from a library! The educational significance of sixteenth century arithmetic from the point of view of the present time,. [Lambert L Jackson].

University of Michigan , B. Historian, educator, and writer. University of Manitoba, Winnipeg, Canada, lecturer, , assistant professor, , associate professor, , and professor of history, â€". The Conquest of Poverty: Brill Leiden, Netherlands , The Cold War and the New Imperialism: Henry Heller is a historian whose primary interests are the French Renaissance and Reformation, as well as early modern Europe. The author is known for going against many established interpretations of history and has written extensively on these topics, including in his book, Iron and Blood: Civil Wars in Sixteenth-Century France. In this book, Heller focuses on how the civil wars in France in the late sixteenth century resulted from social tension increasing over decades. He goes on to explain how these wars were primarily the result of hostilities between nobles and commoners over economic issues. David Potter wrote in the English Historical Review that the book "raises anew some important problems. In his reexamination of sixteenth- and early seventeenth-century France, the author discusses his view that the era was influenced by a surprising degree of technological, scientific, and economic innovation. Truant in Labor History. Penelope Gouk commented in the English Historical Review: Heller explores how the economic power of Italian merchants, bankers, and ecclesiastics resulted in a hostile reaction from many French people, primarily humanists, lawyers, and nobles. According to the author, this hostility spread to the Huguenots and the urban Catholic population. Bernstein in the Canadian Journal of History. For example, the author presents his belief that there is an essential continuity between this xenophobia and those that animated the French national experience in later times. Heller argues that the rise of the central state altered how the French looked at who should or should not be a member of their community. He analyzes these constructions of identity and explores their impact on politics and society. It is also a major contribution to the study of ethnic relations in general. A Global History, , Heller outlines the massive changes that occurred in global politics, economics, and society during the specified period. He also clarifies and addresses the dilemmas of the present. He also discusses decolonization, national liberation movements, s upheavals, and the global economic crisis. These and other issues are presented as part of the American neoliberal revolution in American government. The author begins by discussing the period at the end of World War II when the war itself mobilized the political and social aspirations of millions. He describes how the contest for global dominance between the United States and the Soviet Union drew in the entire world and how the global order was shaken by revolutions in China, Cuba, Vietnam, and elsewhere. These changes, he argues, have created political, economic, and financial hegemony problems for the United States. In The Bourgeois Revolution in France, , the author goes against the dominant revisionist interpretation of the French Revolution , which sees the revolution as a cultural and ideological conflict primarily fostered by intellectuals and extremists. Instead, Heller reasserts the view that the revolution was a capitalist bourgeois revolt. Using Marxist theories of transition from feudalism to capitalism and the latest historical scholarship, Heller challenges the main arguments and contentions of the revisionist school while presenting a narrative of the causes and unfolding of the revolution. Farr, review of Iron and Blood: Civil Wars in Sixteenth-Century France, p. English Historical Review, April, , N. Sutherland, review of The Conquest of Poverty, p. European History Quarterly, October, , J. Salmon, review of Iron and Blood, p. French Historical Studies, fall, , Mack P. Holt, review of Iron and Blood, p. Review of New Books, fall, , Francis X. A Global History, Collins, review of Labour, Science, and Technology in France, , p. Journal of Interdisciplinary History, summer, , Kristen B. Neuschel, review of Iron and Blood, p. Labor History, August, , Cynthia M. Truant, review of Labour, Science, and Technology in France, , p. Renaissance Quarterly, spring, , Pamela O. Long, review of Labour, Science, and Technology in France, , p. Mentzer, review of Labour, Science, and Technology in France, , p. Social History , May, , M. Greengrass, review of Iron and Blood, pp. Technology and Culture, April 1, , M. University of Manitoba, History Department Web site,http: Cite this article Pick a style below, and copy the text for your bibliography.

Chapter 2 : Mathematics - Mathematics in the Islamic world (8thâ€“15th century) | calendrierdelascience.co

The educational significance of sixteenth century arithmetic from the point of view of the present time. by Jackson, Lambert L. (Lambert Lincoln),

Instead boys learned farming or other trades from their fathers. Girls learned sewing, cooking and other skills from their mothers. Boys from wealthy families sometimes learned to be scribes. They learned by copying and memorizing and discipline was strict. Teachers beat naughty boys. The boys learned reading and writing and also mathematics. Some girls were taught to read and write at home. Education in Ancient Greece In ancient Greece girls learned skills like weaving from their mothers. Many girls also learned to read and write at home. Boys from better off families started school when they were seven. Boys from a rich family were escorted to school by a slave. The boys learned reading, writing and arithmetic as well as poetry and music. The Greeks also believed that physical education was very important so boys did dancing and athletics. Discipline was severe in Ancient Greek schools and children were often beaten. In Sparta children were treated very harshly. At the age of 7 boys were removed from their families and sent to live in barracks. They were treated severely to turn them into brave soldiers. They were deliberately kept short of food so they would have to steal - teaching them stealth and cunning. They were whipped for any offence. Spartan girls learned athletics and dancing - so they would become fit and healthy mothers of more soldiers. Education in Rome In rich Roman families children were educated at home by a tutor. Other boys and girls went to a primary school called a ludus at the age of 7 to learn to read and write and do simple arithmetic. Boys went to secondary school where they would learn geometry, history, literature and oratory the art of public speaking. Teachers were often Greek slaves. The teachers were very strict and they frequently beat the pupils. Children wrote on wax tablets with a pointed bone stylus. Adults wrote on a form of paper called papyrus, which was made from the papyrus plant. Upper class children were educated. Among the Medieval poor the better-educated priests might teach some children to read and write - a little. In many towns there were grammar schools where middle class boys were educated. They got their name because they taught Latin grammar. Boys worked long hours in the grammar schools and discipline was severe. Boys were beaten with rods or birch twigs. There were also chantry schools. Some men left money in their wills to pay for a priest to chant prayers for their soul after their death. When he was not praying the priest would educate local children. During the Middle Ages education gradually became more common. By the 15th century perhaps a third of the population of England could read and write. From the early 13th century England had two universities at Oxford and Cambridge. At them students learned seven subjects, grammar, rhetoric the art of public speaking , logic, astronomy, arithmetic, music and geometry. Education in 16th Century England Education flourished in the 16th century. Many rich men founded grammar schools. The school day began at 6 am in summer and 7 am in winter people went to bed early and got up early in those days. Lunch was from 11am to 1pm. School finished at about 5 pm. Boys went to school 6 days a week and there were few holidays. In the 16th century many children learned to read and write with something called a hornbook. It was not a book in the modern sense. Instead it was a wooden board with a handle. The paper was usually protected by a thin slice of animal horn. Discipline in Tudor schools was savage. The teacher often had a stick with birch twigs attached to it. Boys were hit with the birch twigs on their bare buttocks. Of course many Tudor boys did not go to school at all. If they were lucky they might get a 7-year apprenticeship and learn a trade. Some craftsmen could read and write but few laborers could. As for girls, in a rich family a tutor usually taught them at home. In a middle class family their mother might teach them. Upper class and middle class women were educated. However lower class girls were not. Education in the 17th Century There was little change in education in the 17th century. In well off families both boys and girls went to a form of infant school called a petty school. However only boys went to grammar school. Upper class girls and sometimes boys were taught by tutors. Middle glass girls might be taught by their mothers. Moreover during the 17th century boarding schools for girls were founded in many towns. In them girls were taught subjects like writing, music and needlework. Education in the 18th Century In the early 18th century charity schools were founded in many English towns. Boys from well off families went to grammar schools. Nevertheless Laura Bassi became professor of anatomy at Bologna University in Meanwhile non-conformists or dissenters Protestants who did not belong to the Church of England were not allowed to attend most public schools. Instead they went to their own dissenting academies. Radcliffe Camera in Oxford University Education in 19th Century England In the 19th century education greatly improved for both boys and girls. In the early 19th century there were dame schools for very young children. They were run by women who taught a little reading, writing and arithmetic. However many dame schools were really a child minding service. Nevertheless in the 19th century Friedrich Froebel and Maria Montessori invented more progressive methods of educating infants. Girls from upper class families were taught by a governess. Boys were often sent to public schools like Eton. In Victorian public schools boys were taught the classics like Latin but little else. Science and technical subjects were neglected. Public schools also placed great emphasis on character building through sports and games. Middle class boys went to grammar schools. At the beginning of the 19th century a man named Joseph Lancaster invented a new method of educating the working class. In the Lancaster system the most able pupils were made monitors and they were put in charge of other pupils. The monitors were taught early in the day before the other children arrived. When they did the monitors taught them. Its schools were called National Schools. In Britain the state did not take responsibility for education until Forsters Education Act laid down that schools should be provided for all children. If there were not enough places in existing schools then board schools were built. In school was made compulsory for 5 to 10 year olds. However school was not free, except for the poorest children until when fees were abolished. From children were required to go to school until they were They were the first American women to gain bachelor degrees. In Britain women were first awarded degrees in Education in the 20th Century Education vastly improved during the 20th century. In children sometimes left school when they were only 12 years old. However in the minimum school leaving age was raised to

Chapter 3 : A Brief History of Education

The Educational Significance of Sixteenth Century Arithmetic: From the Point of View of the Present Time is a history text written by Dr. Lambert Lincoln Jackson. The work is an examination of the early teaching of arithmetic in the United States.

Jump to navigation Jump to search In mathematics , division by two is when a number is divided by two. Some cultures, like the ancient Egyptians , thought this was a different operation than division. Binary numeral system In a binary number system , there are only two digits: All other numbers are represented with those two digits. For example, "one" is 1, "two" is 10, "three" is 11, "four" is , and so on. Most of the time people use a number system with ten digits the numbers 0 through 9. This is called the decimal number system. Division by two in binary is very easy. It is done by dropping the last digit on the right of the number. This is called a " bit shift operation. Since binary is decimal 4, and binary 10 is decimal 2, this makes sense. Another example is performing a bit shift operation on This would leave us with , but we dropped a 1 from the end, not a zero. This also makes sense because in binary is 13 in decimal. If we divide 13 by 2, we get 6 with a remainder of 1 we have 1 left over. Bit Computers use the binary number system to store information. Information is broken up into tiny pieces called bits. Each bit is either a 0 or a 1. Because of this, the fastest and easiest way for a computer to do division is by a bit shift operations -- division by two. Replacing regular division with bit shifts is a way to do program optimization. Program optimization is trying to make a program faster and more efficient. Both of these versions will give us the answer 9.

Chapter 4 : Petrus Ramus (Stanford Encyclopedia of Philosophy)

[PDF]Free Educational Significance Of Sixteenth Century Arithmetic From The Point Of View Of The Present Time download Book The Eldest Daughter Effect How Firstborn Women Like Oprah Winfrey Sheryl Sandberg JK Rowling And BeyoncÃ© Harness Their Strengths.

With the gradual rise of more complex civilizations in the river valleys of Egypt and Babylonia, knowledge became too complicated to transmit directly from person to person and from generation to generation. To be able to function in complex societies, man needed some way of accumulating, recording, and preserving his cultural heritage. So with the rise of trade, government, and formal religion came the invention of writing, by about BC. Because firsthand experience in everyday living could not teach such skills as writing and reading, a place devoted exclusively to learning--the school--appeared. And with the school appeared a group of adults specially designated as teachers--the scribes of the court and the priests of the temple. The children were either in the vast majority who continued to learn exclusively by an informal apprenticeship or the tiny minority who received formal schooling. The method of learning was memorization, and the motivation was the fear of harsh physical discipline. On an ancient Egyptian clay tablet discovered by archaeologists, a child had written: In the 1st century AD, the historian Flavius Josephus wrote: The main concern was the study of the first five books of the Old Testament--the Pentateuch--and the precepts of the oral tradition that had grown up around them. At age 13, brighter boys could continue their studies as disciples of a rabbi, the "master" or "teacher. Ancient Greece The Greek gods were much more down-to-earth and much less awesome than the remote gods of the East. Because they were endowed with human qualities and often represented aspects of the physical world--such as the sun, the moon, and the sea--they were closer to man and to the world he lived in. The Greeks, therefore, could find spiritual satisfaction in the ordinary, everyday world. They could develop a secular life free from the domination of a priesthood that exacted homage to gods remote from everyday life. The goal of education in the Greek city-states was to prepare the child for adult activities as a citizen. The nature of the city-states varied greatly, and this was also true of the education they considered appropriate. The goal of education in Sparta, an authoritarian, military city-state, was to produce soldier-citizens. On the other hand, the goal of education in Athens, a democratic city-state, was to produce citizens trained in the arts of both peace and war. The boys of Sparta were obliged to leave home at the age of 7 to join sternly disciplined groups under the supervision of a hierarchy of officers. From age 7 to 18, they underwent an increasingly severe course of training. They walked barefoot, slept on hard beds, and worked at gymnastics and other physical activities such as running, jumping, javelin and discus throwing, swimming, and hunting. They were subjected to strict discipline and harsh physical punishment; indeed, they were taught to take pride in the amount of pain they could endure. At 18, Spartan boys became military cadets and learned the arts of war. At 20, they joined the state militia--a standing reserve force available for duty in time of emergency--in which they served until they were 60 years old. The typical Spartan may or may not have been able to read. But reading, writing, literature, and the arts were considered unsuitable for the soldier-citizen and were therefore not part of his education. Music and dancing were a part of that education, but only because they served military ends. Unlike the other Greek city-states, Sparta provided training for girls that went beyond the domestic arts. The girls were not forced to leave home, but otherwise their training was similar to that of the boys. They too learned to run, jump, throw the javelin and discus, and wrestle. The Athenians apparently made sport of the physique prized in Spartan women, for in a comedy by the Athenian playwright Aristophanes a character says to a Spartan girl: How lovely thou art, how blooming thy skin, how rounded thy flesh! Thou mightest strangle a bull. In Athens the ideal citizen was a person educated in the arts of both peace and war, and this made both schools and exercise fields necessary. Other than requiring two years of military training that began at age 18, the state left parents to educate their sons as they saw fit. The schools were private, but the tuition was low enough so that even the poorest citizens could afford to send their children for at least a few years. Boys attended elementary school from the time they were about age 6 or 7 until they were 13 or Part of their training was gymnastics. The younger boys learned to move gracefully, do calisthenics, and play ball and other games. The older boys learned running, jumping, boxing, wrestling, and discus and javelin throwing. The boys also learned to play the lyre and sing, to count, and to read and write. But it was literature that was at the heart of their schooling. As soon as their pupils could write, the teachers dictated passages from Homer for them to take down, memorize, and later act out. Teachers and pupils also discussed the feats of the Greek heroes described by Homer. The education of mind, body, and aesthetic sense was, according to Plato, so that the boys "may learn to be more gentle, and harmonious, and rhythmical, and so more fitted for speech and action; for the life of man in every part has need of harmony and rhythm. The wealthier boys continued their education under the tutelage of philosopher-teachers. Until about BC there were no permanent schools and no formal courses for such higher education. But gradually, as groups of students attached themselves to one teacher or another, permanent schools were established. It was in such schools that Plato, Isocrates, and Aristotle taught. The boys who attended these schools fell into more or less two groups. Those who wanted learning for its own sake studied with philosophers like Plato who taught such subjects as geometry, astronomy, harmonics the mathematical theory of music , and arithmetic. Those who wanted training for public life studied with philosophers like Isocrates who taught primarily oratory and rhetoric. In democratic Athens such training was appropriate and necessary because power rested with the men who had the ability to persuade their fellow senators to act. Most Athenian girls had a primarily domestic education. The most highly educated women were the hetaerae, or courtesans, who attended special schools where they learned to be interesting companions for the men who could afford to maintain them. As the Roman poet Horace said, "Captive Greece took captive her rude conqueror and brought the arts to Latium. If the father himself were educated, the boy would learn to read and would learn Roman law, history, and customs. When the boy was older, he sometimes prepared himself for public life by a kind of apprenticeship to one of the orators of the time. He thus learned the arts of oratory firsthand by listening to the debates in the Senate and in the public forum. The element introduced into Roman education by the Greeks was book learning. When they were 6 or 7 years old, boys and sometimes girls of all classes could be sent by their parents to the ludus publicus, the elementary school, where they studied reading, writing, and counting. At age 12 or 13, the boys of the upper classes attended a "grammar" school where they learned Latin or Greek or both and studied grammar and literature. Grammar consisted of the study of declensions and conjugations and the analysis of verbal forms. Both Greek and Latin literature were studied. The teacher would read the work and then lecture on it, while the students took notes that they later memorized. At age 16, the boys who wanted training for public service went on to study public speaking at the rhetoric schools. The graded arrangement of schools established in Rome by the middle of the 1st century BC ultimately spread throughout the Roman Empire. It continued until the fall of the empire in the 5th century AD. Although deeply influenced by Greek education, Roman education was nonetheless quite different. For most Greeks, the end of education was to produce a good citizen, and a good citizen meant a well-rounded individual. The goal of Roman education was the same, but for the Romans a good citizen meant an effective speaker. The result was that they disregarded such nonutilitarian Greek studies as science, philosophy, music, dancing, and gymnastics, basing their education instead on literature and oratory. Even their study of literature, with its overemphasis on the technicalities of grammar and its underemphasis on content, had the purpose of producing good orators. When the Roman Republic became an empire, in 31 BC, the school studies lost even their practical value. For then it was not the orator in the Senate but the emperor who had the power. Because of the emphasis on the technical study of language and literature and because the language and literature studied represented the culture of a foreign people, Roman education was remote from the real world and the interests of the schoolboys. Vigorous discipline was therefore necessary to motivate them to study. And the Roman boys were not the last to suffer in this situation. When the empire fell, the education that was originally intended to train orators for the Roman Senate became the model for European education and dominated it until the 20th century. The Romans also left the legacy of their language. For nearly a thousand years after the fall of the empire, Latin continued to be the language spoken in commerce, public service, education, and the Roman Catholic church. Most books written in Europe until about the year were written in Latin. The Middle Ages The invading Germanic tribes that moved into the civilized world of the West and all but destroyed ancient culture provided virtually no formal education for their young. In the early Middle Ages the elaborate Roman school system had disappeared. Mankind in 5th-century Europe might well have reverted almost to the level of primitive education had it not been for the medieval church, which preserved what little Western learning had survived the collapse of the Roman Empire. In the drafty, inhospitable corridors of church schools, the lamp of learning continued to burn low, though it flickered badly. Cathedral, monastic, and palace schools were operated by the clergy in parts of Western Europe. Most students were future or present members of the clergy, though a few lay students were trained to be clerks. Unlike the Greek and Roman schools, which sought to prepare men for this life, the church schools sought to prepare men for life beyond the grave through the contemplation of God during their life on Earth. The schools taught students to read Latin so that they could copy and thereby preserve and perpetuate the writings of the Church Fathers. Students learned the rudiments of mathematics so that they could calculate the dates of religious festivals, and they practiced singing so that they could take part in church services. Unlike the Greeks, who considered physical health a part of education, the church considered the human body a part of the profane world and therefore something to be ignored or harshly disciplined. The students attended schools that were dreary and cold, and physical activity was severely repressed. Schools were un-graded--a 6-year-old and a year-old or an adult for that matter sometimes sharing the same bench. Medieval education can be understood better if one realizes that for thousands of years childhood as it is known today literally did not exist. No psychological distinction was made between child and adult. The medieval school was not really intended for children. Rather, it was a kind of vocational school for clerks and clergymen.

Chapter 5 : The History of Education

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Their namesâ€”located on the map under their cities of birthâ€”can be clicked to access their biographies. Also important were developments in India in the first few centuries ad. Although the decimal system for whole numbers was apparently not known to the Indian astronomer Aryabhata born , it was used by his pupil Bhaskara I in , and by the system had reached northern Mesopotamia, where the Nestorian bishop Severus Sebokht praised its Hindu inventors as discoverers of things more ingenious than those of the Greeks. See South Asian mathematics. Most of the translations were done from Greek and Syriac by Christian scholars, but the impetus and support for this activity came from Muslim patrons. The investigation of such numbers formed a continuing tradition in Islam. Working in the House of Wisdom, he introduced Indian material in his astronomical works and also wrote an early book explaining Hindu arithmetic, the Book of Addition and Subtraction According to the Hindu Calculation. In another work, the Book of Restoring and Balancing , he provided a systematic introduction to algebra , including a theory of quadratic equations. Both works had important consequences for Islamic mathematics. This tradition of service to the Islamic faith was an enduring feature of mathematical work in Islam and one that, in the eyes of many, justified the study of secular learning. Mathematics in the 10th century Islamic scientists in the 10th century were involved in three major mathematical projects: The first of these projects led to the appearance of three complete numeration systems, one of which was the finger arithmetic used by the scribes and treasury officials. This ancient arithmetic system, which became known throughout the East and Europe, employed mental arithmetic and a system of storing intermediate results on the fingers as an aid to memory. Its use of unit fractions recalls the Egyptian system. A second common system was the base numeration inherited from the Babylonians via the Greeks and known as the arithmetic of the astronomers. Although astronomers used this system for their tables, they usually converted numbers to the decimal system for complicated calculations and then converted the answer back to sexagesimals. The third system was Indian arithmetic, whose basic numeral forms, complete with the zero, eastern Islam took over from the Hindus. Different forms of the numerals, whose origins are not entirely clear, were used in western Islam. Also, the arithmetic algorithms were completed in two ways: Several algebraists explicitly stressed the analogy between the rules for working with powers of the unknown in algebra and those for working with powers of 10 in arithmetic, and there was interaction between the development of arithmetic and algebra from the 10th to the 12th century. Although none of this employed symbolic algebra, algebraic symbolism was in use by the 14th century in the western part of the Islamic world. Other parts of algebra developed as well. However, not only arithmetic and algebra but geometry too underwent extensive development. Ibn al-Haytham, for example, used this method to find the point on a convex spherical mirror at which a given object is seen by a given observer. Not only did he discover a general method of extracting roots of arbitrary high degree, but his Algebra contains the first complete treatment of the solution of cubic equations. Omar did this by means of conic sections, but he declared his hope that his successors would succeed where he had failed in finding an algebraic formula for the roots. To this tradition Omar contributed the idea of a quadrilateral with two congruent sides perpendicular to the base , as shown in the figure. The parallel postulate would be proved, Omar recognized, if he could show that the remaining two angles were right angles. In this he failed, but his question about the quadrilateral became the standard way of discussing the parallel postulate. Omar recognized that if he could prove that the internal angles at the top of the quadrilateral, formed by connecting C and D, are right angles, then he would have proved that DC is parallel to AB. Although Omar showed that the internal angles at the top are equal as shown by the proof demonstrated in the figure , he could not prove that they are right angles. That postulate, however, was only one of the questions on the foundations of mathematics that interested Islamic scientists. Another was the definition of ratios. The important step here was less the general idea than the development of the numerical algorithms necessary to effect it. The astrolabe, whose mathematical theory is based on the stereographic projection of the sphere , was invented in late antiquity, but its extensive development in Islam made it the pocket watch of the medievals. In its original form it required a different plate of horizon coordinates for each latitude, but in the 11th century the Spanish Muslim astronomer al-Zarqallu invented a single plate that worked for all latitudes. On the other hand, Muslim astronomers had developed other methods for solving these problems using the highly accurate trigonometry tables and the new trigonometry theorems they had developed. That this was so is, of course, in no small measure due to what the Western mathematicians had learned from their Islamic predecessors during the preceding centuries. European mathematics during the Middle Ages and Renaissance Until the 11th century only a small part of the Greek mathematical corpus was known in the West. Because almost no one could read Greek, what little was available came from the poor texts written in Latin in the Roman Empire, together with the very few Latin translations of Greek works. Of these the most important were the treatises by Boethius , who about ad made Latin redactions of a number of Greek scientific and logical writings. His Arithmetic, which was based on Nicomachus , was well known and was the means by which medieval scholars learned of Pythagorean number theory. Boethius and Cassiodorus provided the material for the part of the monastic education called the quadrivium: Together with the trivium grammar, logic , rhetoric , these subjects formed the seven liberal arts , which were taught in the monasteries, cathedral schools, and, from the 12th century on, universities and which constituted the principal university instruction until modern times. For monastic life it sufficed to know how to calculate with Roman numerals. The principal application of arithmetic was a method for determining the date of Easter , the computus, that was based on the lunar cycle of 19 solar years i. Between the time of Bede died , when the system was fully developed, and about , the computus was reduced to a series of verses that were learned by rote. Until the 12th century, geometry was largely concerned with approximate formulas for measuring areas and volumes in the tradition of the Roman surveyors. About ad the French scholar Gerbert of Aurillac, later Pope Sylvester II , introduced a type of abacus in which numbers were represented by stones bearing Arabic numerals. Such novelties were known to very few. The transmission of Greek and Arabic learning In the 11th century a new phase of mathematics began with the translations from Arabic. Along with philosophy, astronomy, astrology, and medicine , important mathematical achievements of the Greek, Indian, and Islamic civilizations became available in the West. Thus, modern numerals first came into use in universities and then became common among merchants and other laymen. It should be noted that, up to the 15th century, calculations were often performed with board and counters. Some schools were private, while others were run by the community. The universities Mathematics was studied from a theoretical standpoint in the universities. The Universities of Paris and Oxford , which were founded relatively early c. Of particular importance in these universities were the Arabic-based versions of Euclid, of which there were at least four by the 12th century. Of the numerous redactions and compendia which were made, that of Johannes Campanus c. The ratio theory of the Elements provided a means of expressing the various relations of the quantities associated with moving bodies, relations that now would be expressed by formulas. Also in Euclid were to be found methods of analyzing infinity and continuity paradoxically, because Euclid always avoided infinity. Studies of such questions led not only to new results but also to a new approach to what is now called physics. Thomas Bradwardine , who was active in Merton College , Oxford, in the first half of the 14th century, was one of the first medieval scholars to ask whether the continuum can be divided infinitely or whether there are smallest parts indivisibles. Among other topics, he compared different geometric shapes in terms of the multitude of points that were assumed to compose them, and from such an approach paradoxes were generated that were not to be solved for centuries.

Another fertile question stemming from Euclid concerned the angle between a circle and a line tangent to it called the horn angle: For the relation of force, resistance, and the speed of the body moved by this force, Bradwardine suggested an exponential law. Another question having to do with the quantification of qualities, the so-called latitude of forms, began to be discussed at about this time in Paris and in Merton College. Various Aristotelian qualities e. The area of the figure was then considered to represent the quantity of the quality. In the important case in which the quality is the motion of a body, the intensity its speed, and the extension its time, the area of the figure was taken to represent the distance covered by the body. Uniformly accelerated motion starting at zero velocity gives rise to a triangular figure see the figure. Discussions like this certainly influenced Galileo indirectly and may have influenced the founding of coordinate geometry in the 17th century. Basing his work on translated Greek sources, about the German mathematician and astronomer Regiomontanus wrote the first book printed in in the West on plane and spherical trigonometry independent of astronomy. He also published tables of sines and tangents that were in constant use for more than two centuries. The Renaissance Italian artists and merchants influenced the mathematics of the late Middle Ages and the Renaissance in several ways. In the 15th century a group of Tuscan artists, including Filippo Brunelleschi , Leon Battista Alberti , and Leonardo da Vinci , incorporated linear perspective into their practice and teaching, about a century before the subject was formally treated by mathematicians. By an algebraic symbolism had been developed in Italy in which letters were used for the unknown, for its square, and for constants. They were used by Regiomontanus and by Fridericus Gerhart and received an impetus about at the University of Leipzig from Johann Widman. This was suggestive of the idea, explicitly stated by Albert Girard in and proved by Carl Friedrich Gauss in , that an equation of degree n has n roots. Complex numbers , which are implicit in such ideas, were gradually accepted about the time of Rafael Bombelli died , who used them in connection with the cubic. These studies strongly influenced the later developments of analytic geometry , the infinitesimal calculus , and the theory of functions , subjects that were developed in the 17th century.

Chapter 6 : Cantor - 19th Century Mathematics - The Story of Mathematics

In mathematics, division by two is when a number is divided by calendrierdelascience.com cultures, like the ancient Egyptians, thought this was a different operation than division. Some mathematicians up until the 16th century () thought this too.

Contact Us Navigation and Related Instruments in 16th-Century England By the dawn of the sixteenth century, the ancient art of navigation had begun to develop rapidly in response to oceanic explorers who needed to find their positions without landmarks, to determine the locations of their discoveries, and to establish routes between the new-found lands and home. Although the relationship of certain heavenly bodies to time of day and terrestrial directions had been known since ancient times, the first two decades of the sixteenth century saw the rigorous application of astronomy and mathematics to navigation. The new learning met the New World. Tools such as an hourglass, a quadrant, a compass and a nautical chart were vital for effective navigation. Vicki Wallace Navigation is based largely on the spherical coordinates latitude -angular distance north or south of the equator - and longitude - angular distance east or west of a generally accepted reference location, such as the Greenwich Observatory. Finding longitude requires comparing local time, measured by a heavenly body, with the local time at a reference location, kept by a clock. Mechanical time-pieces existed in the Elizabethan era, but until the late eighteenth century they had to be corrected frequently by sun sightings and were therefore almost useless aboard ship. Measuring latitude, on the other hand, does not require an accurate time-piece. Refinement of instruments enabled sixteenth-century mariners to determine latitude with reasonable accuracy. Latitude was therefore extremely important to Elizabethan navigation. Unable to use the latitude-longitude system to the fullest, sixteenth-century navigators supplemented latitude with a rho-theta distance-and-bearing system - dead from deduced reckoning. Beginning at a known or assumed position, the navigator measured, as best he could, the heading and speed of the ship, the speeds of the ocean currents and the leeward downwind drift of the ship, and the time spent on each heading. From this information he could compute the course he had made and the distance he had covered. Dead reckoning, through educated guesswork, is often very accurate. It is still practiced on ships and aircraft, and it lies at the heart of modern doppler and inertial navigational equipment. Errors tend to accumulate in dead reckoning, so its accuracy depends in part on the length of the voyage and the ability of the navigator to use latitude and other information to limit error. But above all else, dead reckoning depends on reliable instruments. Instruments For Measuring Latitude The celestial globe was a mounted sphere depicting the heavens instead of the earth. While many were designed to grace private libraries, some were used as navigational instruments. With the introduction by Gerardus Mercator, in , of practical, affordable sea charts, on which were shown parallels of latitude and meridians of longitude, the costly and delicate celestial globe gradually fell out of use. It required precision that could be difficult on a rocking ship. Polaris was the preferred star for measuring latitude because it is less than one degree from the north celestial pole the point in the heavens directly above the geographic north pole. The astrolabe is an instrument of some antiquity; Persian models dating as far back as the eleventh century have been found, and Chaucer wrote a Treatise on it in the late s. By the Elizabethan era it consisted of a large brass ring fitted with an alidade or sighting rule. The user held the astrolabe by a loop at the top, turned the alidade so that he could sight the star along its length, and read the altitude off the scale engraved on the ring - difficult tasks to perform on the deck of a heaving ship. The consequences of imprecise measurement are serious a latitude reading just one degree off produces an error in position of 60 nautical miles , so mariners often used the astrolabe in pairs, one to sight along the alidade, the other to steady the instrument and take readings. On shore, however, the astrolabe was easier to use and more accurate. The quadrant, shaped like a quarter-circle, was another hand-held instrument of wood or brass. The user measured the altitude of Polaris by sighting through a peephole and taking a reading where a short plumb line intersected the scale on the outer edge of the arc. The cross-staff had developed from the tenth-century Arab kamal. It consisted of a square staff 3. Only one transversal was used at a time, its selection being based upon the height of the heavenly body in the sky - the higher the body, the longer the transversal. The user held on end of the staff to his eye, then slid the transversal onto the far end and moved it back and forth until its upper and lower edges seemed to touch, respectively, the observed body and the horizon. The location of the transversal on the scale was converted by a table into degrees of latitude. Polaris is often obscured by clouds, fog, or daylight, and it is below the horizon for anyone in the Southern Hemisphere. Darkness often makes the horizon hard to find. So navigators learned to use the astrolabe, quadrant, and cross-staff with the sun. A piece of smoked glass was frequently used to keep the user from blinding himself. Under lock and key, for use by the captain and pilot only, were highly prized declination tables or astronomical charts showing calculated heights of the sun above the equator at noon for every day of the year. The Magnetic Compass The foregoing instruments provided invaluable information, but their use depended on the visibility of heavenly bodies. As a result, mariners relied on the magnetic compass, an instrument developed, probably independently, by Chinese in the eleventh century and Europeans in the twelfth. Day or night, fair weather or foul, Northern or Southern hemisphere, the compass always points more or less north. At first compasses seem to have been used mainly to measure wind direction, but mariners soon found them much more beneficial when used for finding headings. A typical sixteenth-century compass consisted of a large magnetized needle fastened to the underside of a circular card on which the several directions were drawn. The compass rose, as it was sometimes called, usually had thirty-two points Sailors learned early in their careers to "box the compass," that is, recite all the points in order. The needle was pivoted on a fine brass pin to enable it to swing freely. The compass card was suspended by gimbals concentric mounting rings , which allowed the card to remain level regardless of the motion of the ship. The mechanism was kept in an open-topped box attached to a small cupboard called a bittacle later binnacle , which was fixed to the deck in front of the helm. A lodestone, or piece of naturally magnetic iron ore, was used to re-magnetize the compass needle. Christopher Columbus said that the compass "always seeks the truth. The magnetic pole is not at the top of the world, but an ever-changing distance away in the Canadian Arctic. Local variations in the magnetic field of the earth produce different errors at different spots. This fact was recognized in the fifteenth century. The North Star gives a good approximation of true north, so compass variation was easy to measure even in the Elizabethan era. Instructions for an Atlantic voyage planned by Sir Humphrey Gilbert in list many pieces of navigational gear, including "An instrument for the variation of the compass. Some mariners mounted the needle on the compass card so as to take local compass variation into account and make the card indicate true north. This practice caused problems, especially when mariners tried to sail unfamiliar vessels or when coasting vessels made transoceanic voyages. Compasses adjusted for the easterly variation found in Great Britain, for example, gave unsatisfactory readings in parts of North America with westerly variation. Using several interchangeable cards with needles mounted at different angles for different degrees of variation did little to reduce confusion. Instruments For Measuring Time Accurate time is essential to dead reckoning. Water-clocks clepsydras and portable sundials suffered obvious disadvantages aboard ship, so the sandglass or hourglass was the timepiece most often used in navigation. The most common glasses were the four-hour and half-hour sizes. Days at sea were divided into six four-hour shifts or watches. At the end of four hours, he turned the four-hour glass. Hence the system of bells and watches still used aboard many vessels. The texture of the sand could affect its rate of flow, as could condensation within the glass, so several glasses were used together for accuracy. The glass was used in combination with the log, a piece of wood attached to a line knotted at uniform intervals. A sailor heaved the log from the stern of the ship and let the line pay out freely as the ship pulled away. When the sailor felt the first knot pass through his fingers, he shouted a signal to another sailor, who turned a one-minute glass. The first sailor counted aloud the number of knots that passed until the sand ran out. A timer of one minute one-sixtieth of an hour , knots spaced one-sixtieth of a nautical mile apart, and simple arithmetic easily gave the speed of the ship in nautical miles per hour "knots". The nocturnal consisted of two concentric plates of brass or wood, the larger divided into twelve equal parts corresponding to the months of the year, the smaller into twenty-four parts corresponding to hours of the day. By lining up a sighting mechanism with Polaris or certain stars in Ursa Major or Ursa Minor, the user could determine the time of night with reasonable accuracy. Other Tools Charts not only gave the mariner an idea of where he was going, but also a means of plotting his past and present positions. Cartographers and mariners endured many of the same problems, such as inability to determine precise longitude. Consequently, most sixteenth-century charts were not very accurate by modern standards. To make matters worse, cartographers often copied from one another, used information from unreliable sources, and relied on their own imaginations to fill in gaps in coverage. The traverse board was used to approximate the course run by a ship during a watch. It consisted of a circular piece of wood on which the compass points had been painted. Eight small holes were evenly spaced along the radius to each point, and eight small pegs were attached with string to the center of the board. Every half-hour one of the pegs was stuck into the next succeeding hole for the compass point closest to the heading the ship had maintained during that half hour. At the end of that watch, a general course was determined from the position of the pegs. With speed information from the long and line, the traverse board served as a crude dead-reckoning computer reminiscent of those used to this day aboard aircraft. Used to find depth and sea-bed characteristics, the lead and line was an ancient, but highly useful navigational aid. It consisted of a sounding lead attached to a line with evenly spaced knots or bits of colored cloth worked into it. The lead was tossed overboard and allowed to sink to the sea floor. Each mark was distinctive, and the distance between successive marks was constant; so water depth could easily be measured "by the mark" or estimated "by the deep". When hauled aboard, the lead, by virtue of tallow packed into a small depression in its bottom, brought up a sample of the sea bed, useful in finding a safe anchorage. Its high-pitched sound was usually audible, even above the howling of the wind, to crewmen working high in the rigging. A good log was sufficiently accurate and comprehensive to allow the navigator to check his dead reckoning.

Chapter 7 : Heller, Henry â€“ | calendrierdelascience.com

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This period was also one of intense activity and innovation in mathematics. Advances in numerical calculation, the development of symbolic algebra and analytic geometry, and the invention of the differential and integral calculus resulted in a major expansion of the subject areas of mathematics. By the end of the 17th century, a program of research based in analysis had replaced classical Greek geometry at the centre of advanced mathematics. In the next century this program would continue to develop in close association with physics, more particularly mechanics and theoretical astronomy. The extensive use of analytic methods, the incorporation of applied subjects, and the adoption of a pragmatic attitude to questions of logical rigour distinguished the new mathematics from traditional geometry. Institutional background Until the middle of the 17th century, mathematicians worked alone or in small groups, publishing their work in books or communicating with other researchers by letter. Marin Mersenne in Paris acted as a clearinghouse for new results, informing his many correspondentsâ€"including Pierre de Fermat , Descartes, Blaise Pascal , Gilles Personne de Roberval , and Galileoâ€"of challenge problems and novel solutions. The official publications sponsored by the academies, as well as independent journals such as the Acta Eruditorum founded in , made possible the open and prompt communication of research findings. Although universities in the 17th century provided some support for mathematics, they became increasingly ineffective as state-supported academies assumed direction of advanced research. Numerical calculation The development of new methods of numerical calculation was a response to the increased practical demands of numerical computation, particularly in trigonometry, navigation, and astronomy. New ideas spread quickly across Europe and resulted by in a major revolution in numerical practice. Simon Stevin of Holland, in his short pamphlet La Disme , introduced decimal fractions to Europe and showed how to extend the principles of Hindu-Arabic arithmetic to calculation with these numbers. His idea was to extend the base positional principle to numbers with fractional parts, with a corresponding extension of notation to cover these cases. In his system the number To the right of the zero are the digits of the fractional part, with each digit succeeded by a circled number that indicates the negative power to which 10 is raised. Stevin showed how the usual arithmetic of whole numbers could be extended to decimal fractions, using rules that determined the positioning of the negative powers of In addition to its practical utility, La Disme was significant for the way it undermined the dominant style of classical Greek geometry in theoretical mathematics. For Euclid , unity, or one, was a special sort of thing, not number but the origin, or principle, of number. The introduction of decimal fractions seemed to imply that the unit could be subdivided and that arbitrary continuous magnitude could be represented numerically; it implicitly supposed the concept of a general positive real number. Tables of logarithms were first published in by the Scottish laird John Napier in his treatise Description of the Marvelous Canon of Logarithms. This work was followed posthumously five years later by another in which Napier set forth the principles used in the construction of his tables. By correlating the geometric sequence of numbers a, a2, a3,â€¦ a is called the base and the arithmetic sequence 1, 2, 3,â€¦and interpolating to fractional values, it is possible to reduce the problem of multiplication and division to one of addition and subtraction. The resulting geometric sequence therefore yielded a dense set of values, suitable for constructing a table. In his work of Napier presented an interesting kinematic model to generate the geometric and arithmetic sequences used in the construction of his tables. Assume two particles move along separate lines from given initial points. The particles begin moving at the same instant with the same velocity. The first particle continues to move with a speed that is decreasing, proportional at each instant to the distance remaining between it and some given fixed point on the line. The second particle moves with a constant speed equal to its initial velocity. Given any increment of time, the distances traveled by the first particle in successive increments form a geometrically decreasing sequence. The corresponding distances traveled by the second particle form an arithmetically increasing sequence. Napier was able to use this model to derive theorems yielding precise limits to approximate values in the two sequences. Kinematic ideas, which appeared frequently in mathematics of the period, provided a clear and visualizable means for the generation of geometric magnitude. The conception of a curve traced by a particle moving through space later played a significant role in the development of the calculus. In Briggs published an extensive table of common logarithms , or logarithms to the base He also devised interpolation procedures of great computational efficiency to obtain intermediate values. Four years later a table of logarithms prepared by Kepler appeared in Marburg. Analytic geometry The invention of analytic geometry was, next to the differential and integral calculus, the most important mathematical development of the 17th century. Two tendencies in contemporary mathematics stimulated the rise of analytic geometry. The first was an increased interest in curves , resulting in part from the recovery and Latin translation of the classical treatises of Apollonius , Archimedes , and Pappus , and in part from the increasing importance of curves in such applied fields as astronomy, mechanics, optics, and stereometry. Pappus had employed an analytic method for the discovery of theorems and the construction of problems; in analysis, by contrast to synthesis, one proceeds from what is sought until one arrives at something known. In the above equation, for example, each of the terms has the dimension of a solid or cube; thus, the constant C, which denotes a plane, is combined with A to form a quantity having the dimension of a solid. Thus, operations on the quantities denoted by the variables are reflected in the algebraic notation itself. This innovation, considered by historians of mathematics to be a major conceptual advance in algebra, facilitated the study of the symbolic solution of algebraic equations and led to the creation of the first conscious theory of equations. The most celebrated of these problems consisted of finding the curve or locus traced by a point whose distances from several fixed lines satisfied a given relation. The title of the paper refers to the ancient classification of curves as plane straight lines, circles , solid ellipses, parabolas, and hyperbolas , or linear curves defined kinematically or by a locus condition. Fermat considered an equation among two variables. One of the variables represented a line measured horizontally from a given initial point, while the other represented a second line positioned at the end of the first line and inclined at a fixed angle to the horizontal. As the first variable varied in magnitude, the second took on a value determined by the equation, and the endpoint of the second line traced out a curve in space. By means of this construction Fermat was able to formulate the fundamental principle of analytic geometry: Whenever two unknown quantities are found in final equality, there results a locus fixed in place, and the endpoint of one of these unknown quantities describes a straight line or a curve. The principle implied a correspondence between two different classes of mathematical objects: In the paper of Fermat showed that, if the equation is a quadratic, then the curve is a conic section â€"that is, an ellipse , parabola , or hyperbola. He also showed that the determination of the curve given by an equation is simplified by a transformation involving a change of variables to an equation in standard form. It was destined to become one of the most influential books in the history of mathematics. Algebra was a tool to be used in this program: If, then, we wish to solve any problem, we first suppose the solution already effected, and give names to all the lines that seem necessary for its constructionâ€"to those that are unknown as well as to those that are known. Then, making no distinction in any way between known and unknown lines, we must unravel the difficulty in any way that shows most naturally the relations between these lines, until we find it possible to express a single quantity in two ways. This will constitute an equation, since the terms of one of these two expressions are together equal to the terms of the other. In the problem of Apollonius, for example, one sought to find the locus of points whose distances from a collection of fixed lines satisfied a given relation. One used this relation to derive an equation, and then, using a geometric procedure involving acceptable instruments of construction, one obtained points on the curve given by the roots of the equation. He stipulated that the parts of the instrument be linked together so that the ratio of the motions of the parts could be knowable. The Archimedean spiral , for example, was generated by a point moving on a line as the line rotated uniformly about the origin. The ratio of the circumference to the diameter did not permit exact determination: He wished to restrict mathematics to the consideration of such curves. His conservatism with respect to what curves were acceptable in mathematics further distinguished him as a traditional thinker. At the time of his death, in , he had been overtaken by events, as research moved away from questions of construction to problems of finding areas then called problems of quadrature and tangents. The geometric objects that were then of growing interest were precisely the mechanical curves that Descartes had wished to banish from mathematics. Following the important results achieved in the 16th century by Gerolamo Cardano and the Italian algebraists, the theory of algebraic equations reached an impasse. The ideas needed to investigate equations of degree higher than four were slow to develop. Van Schooten published a second two-volume translation of the same work in â€” that also contained mathematical appendixes by three of his disciples , Johan de Witt , Johan Hudde , and Hendrick van Heuraet. The Leiden group of mathematicians, which also included Christiaan Huygens , was in large part responsible for the rapid development of Cartesian geometry in the middle of the century. Both men published their researches in the s, Leibniz in in the recently founded journal Acta Eruditorum and Newton in in his great treatise, the Principia. Although a bitter dispute over priority developed later between followers of the two men, it is now clear that they each arrived at the calculus independently. The calculus developed from techniques to solve two types of problems, the determination of areas and volumes and the calculation of tangents to curves. In classical geometry Archimedes had advanced farthest in this part of mathematics, having used the method of exhaustion to establish rigorously various results on areas and volumes and having derived for some curves e. In the early 17th century there was a sharp revival of interest in both classes of problems. The collection was generated by a fixed line moving through space parallel to itself. Cavalieri showed that these collections could be interpreted as magnitudes obeying the rules of Euclidean ratio theory. Cavalieri showed that this proposition could be interpreted in different waysâ€”as asserting, for example, that the volume of a cone is one-third the volume of the circumscribed cylinder see the figure or that the area under a segment of a parabola is one-third the area of the associated rectangle. To establish these results, he introduced transformations among the variables of the problem, using a result equivalent to the binomial theorem for integral exponents. The ideas involved went beyond anything that had appeared in the classical Archimedean theory of content. Although Cavalieri was successful in formulating a systematic method based on general concepts, his ideas were not easy to apply. The derivation of very simple results required intricate geometric considerations, and the turgid style of the Geometria Indivisibilibus was a barrier to its reception. John Wallis presented a quite different approach to the theory of quadratures in his Arithmetica Infinitorum ; The Arithmetic of Infinitesimals. Wallis, a successor to Henry Briggs as the Savilian Professor of Geometry at Oxford, was a champion of the new methods of arithmetic algebra that he had learned from his teacher William Oughtred. Wallis expressed the area under a curve as the sum of an infinite series and used clever and unrigorous inductions to determine its value. Research on the determination of tangents , the other subject leading to the calculus, proceeded along different lines. The method depended upon finding the normal, the line perpendicular to the tangent , using the algebraic condition that it be the unique radius to intersect the curve in only one point. A class of curves of growing interest in the 17th century comprised those generated kinematically by a point moving through space. The famous cycloidal curve, for example, was traced by a point on the perimeter of a wheel that rolled on a line without slipping or sliding see the figure. In his analysis of projectile motion Galileo had shown that the instantaneous velocity of a particle is compounded of two separate motions: If the motion of the generating point of a kinematic curve is likewise regarded as the sum of two velocities, then the tangent will lie in the direction of their sum. Roberval applied this idea to several different kinematic curves, obtaining results that were often ingenious and elegant. His account was short and contained no explanation of the mathematical basis of the new method. It is possible to see in his procedure an argument involving infinitesimals, and Fermat has sometimes been proclaimed the discoverer of the differential calculus. Isaac Barrow , the Lucasian Professor of Mathematics at the University of Cambridge , published in his Geometrical Lectures, a treatise that more than any other anticipated the unifying ideas of the calculus. In it he adopted a purely geometric form of exposition to show how the determinations of areas and tangents are inverse problems. He began with a curve and considered the slope of its tangent corresponding to each value of the abscissa. He then defined an auxiliary curve by the condition that its ordinate be equal to this slope and showed that the area under the auxiliary curve corresponding to a given abscissa is equal to the rectangle whose sides are unity and the ordinate of the original curve.

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Chapter 8 : Division by two - Wikipedia

In binary arithmetic, division by two can be performed by a bit shift operation that shifts the number one place to the right. This is a form of strength reduction optimization. For example, in binary (the decimal number), shifted one place to the right, is (the decimal number 52): the lowest order bit, a 1, is removed.

Education in ancient civilization[edit] The development of writing[edit] Main article: History of Writing Starting in about B. In Egypt fully developed hieroglyphs were in use at Abydos as early as B. One hieroglyphic script was used on stone monuments, [4] other cursive scripts were used for writing in ink on papyrus , [4] a flexible, paper-like material, made from the stems of reeds that grow in marshes and beside rivers such as the River Nile. The Phoenician writing system was adapted from the Proto-Canaanite script in around the 11th century BC, which in turn borrowed ideas from Egyptian hieroglyphics. This script was adapted by the Greeks. A variant of the early Greek alphabet gave rise to the Etruscan alphabet , and its own descendants, such as the Latin alphabet. Other descendants from the Greek alphabet include the Cyrillic script , used to write Russian , among others. The Phoenician system was also adapted into the Aramaic script , from which the Hebrew script and also that of Arabic are descended. In China , the early oracle bone script has survived on tens of thousands of oracle bones dating from around B. Out of more than written characters in use in China in about BC, as many as are identifiable as the source of later standard Chinese characters. The earliest inscriptions which are identifiably Maya date to the 3rd century B. In Chinese civilization, in school the children were not allowed to scribble. They were not to write slanted or sloppy charterers. The Middle East[edit] Further information: In what became Mesopotamia , the early logographic system of cuneiform script took many years to master. Thus only a limited number of individuals were hired as scribes to be trained in its reading and writing. Only royal offspring and sons of the rich and professionals such as scribes, physicians, and temple administrators, were schooled. Later, when a syllabic script became more widespread, more of the Mesopotamian population became literate. Later still in Babylonian times there were libraries in most towns and temples; an old Sumerian proverb averred that "he who would excel in the school of the scribes must rise with the dawn. Vocabularies, grammars, and interlinear translations were compiled for the use of students, as well as commentaries on the older texts and explanations of obscure words and phrases. Massive archives of texts were recovered from the archaeological contexts of Old Babylonian scribal schools, through which literacy was disseminated. The Epic of Gilgamesh , an epic poem from Ancient Mesopotamia is among the earliest known works of literary fiction. Ashurbanipal â€" c. His youthful scholarly pursuits included oil divination, mathematics , reading and writing as well as the usual horsemanship , hunting , chariotry , soldierliness, craftsmanship , and royal decorum. During his reign he collected cuneiform texts from all over Mesopotamia, and especially Babylonia, in the library in Nineveh , the first systematically organized library in the ancient Middle East, [12] which survives in part today. In ancient Egypt , literacy was concentrated among an educated elite of scribes. Only people from certain backgrounds were allowed to train to become scribes, in the service of temple, pharaonic, and military authorities. The rate of literacy in Pharaonic Egypt during most periods from the third to first millennium BC has been estimated at not more than one percent, [13] or between one half of one percent and one percent. In 64 AD the high priest caused schools to be opened. For details of the subjects taught, see History of education in ancient Israel and Judah. Although girls were not provided with formal education in the yeshivah , they were required to know a large part of the subject areas to prepare them to maintain the home after marriage, and to educate the children before the age of seven. Despite this schooling system, it would seem that many children did not learn to read and write, because it has been estimated that "at least ninety percent of the Jewish population of Roman Palestine [in the first centuries AD] could merely write their own name or not write and read at all", [16] or that the literacy rate was about 3 percent. The first separate school was the Nizamiyah school. It was built in in Baghdad. The teaches of Quran the holy book of Muslims claims that Muslims should learn to read, write and explore the universe. Thus, education and schooling sprang up in the ancient Muslim societies. It was originally a mosque that was built in There is mention in the Veda of herbal medicines for various conditions or diseases, including fever, cough, baldness, snake bite and others. The Brahmans were given priority even over Kshatriya as they would dedicate their whole lives to such studies. These texts encouraged an exploratory learning process where teachers and students were co-travellers in a search for truth. The teaching methods used reasoning and questioning. Nothing was labeled as the final answer. Education was free, but students from well-to-do families paid "Gurudakshina," a voluntary contribution after the completion of their studies. Two epic poems formed part of ancient Indian education. The other epic poem, Ramayana , is shorter, although it has 24, verses. It is thought to have been compiled between about BC and AD. The epic explores themes of human existence and the concept of dharma. History of education in China and History of education in Taiwan During the Zhou dynasty BC to BC , there were five national schools in the capital city, Pi Yong an imperial school, located in a central location and four other schools for the aristocrats and nobility, including Shang Xiang. The schools mainly taught the Six Arts: According to the Book of Rites , at age twelve, boys learned arts related to ritual i. Girls learned ritual, correct deportment, silk production and weaving. Confucius BC â€" BC founder of Confucianism , was a Chinese philosopher who made a great impact on later generations of Chinese, and on the curriculum of the Chinese educational system for much of the following years. Later, during the Qin dynasty â€" BC , a hierarchy of officials was set up to provide central control over the outlying areas of the empire. To enter this hierarchy, both literacy and knowledge of the increasing body of philosophy was required: By the end of the Han dynasty AD the Academy enrolled more than 30, students, boys between the ages of fourteen and seventeen years. However education through this period was a luxury. Theoretically, local government authorities were given the task of selecting talented candidates, then categorizing them into nine grades depending on their abilities. In practice, however, only the rich and powerful would be selected. Education in ancient Greece and Education in ancient Rome In the city-states of ancient Greece , most education was private, except in Sparta. For example, in Athens, during the 5th and 4th century BC, aside from two years military training, the state played little part in schooling. Parents could choose a school offering the subjects they wanted their children to learn, at a monthly fee they could afford. At writing school, the youngest students learned the alphabet by song, then later by copying the shapes of letters with a stylus on a waxed wooden tablet. After some schooling, the sons of poor or middle-class families often learnt a trade by apprenticeship, whether with their father or another tradesman. The richest students continued their education by studying with sophists, from whom they could learn subjects such as rhetoric, mathematics, geography, natural history, politics, and logic. The education system of the wealthy ancient Greeks is also called Paideia. In the subsequent Roman empire, Greek was the primary language of science. Advanced scientific research and teaching was mainly carried on in the Hellenistic side of the Roman empire, in Greek. The education system in the Greek city-state of Sparta was entirely different, designed to create warriors with complete obedience, courage, and physical perfection. At the age of seven, boys were taken away from their homes to live in school dormitories or military barracks. There they were taught sports, endurance and fighting, and little else, with harsh discipline. Most of the population was illiterate. The literacy rate in the 3rd century BC has been estimated as around one percent to two percent. Formal schools were established, which served paying students very little in the way of free public education as we know it can be found. The educator Quintilian recognized the importance of starting education as early as possible, noting that "memory â€¦ not only exists even in small children, but is specially retentive at that age". Only the Roman elite would expect a complete formal education. A tradesman or farmer would expect to pick up most of his vocational skills on the job. Higher education in Rome was more of a status symbol than a practical concern. Literacy rates in the

Greco-Roman world were seldom more than 20 percent; averaging perhaps not much above 10 percent in the Roman empire, though with wide regional variations, probably never rising above 5 percent in the western provinces. The literate in classical Greece did not much exceed 5 percent of the population. Prior to their formal establishment, many medieval universities were run for hundreds of years as Christian monastic schools Scholae monasticae , in which monks taught classes, and later as cathedral schools ; evidence of these immediate forerunners of the later university at many places dates back to the early 6th century. Students in the twelfth-century were very proud of the master whom they studied under. They were not very concerned with telling others the place or region where they received their education. Even now when scholars cite schools with distinctive doctrines, they use group names to describe the school rather than its geographical location. Those who studied under Robert of Melun were called the Meludinenses. These people did not study in Melun , but in Paris, and were given the group name of their master. Citizens in the twelfth-century became very interested in learning the rare and difficult skills masters could provide. Monasteries were built all over Ireland and these became centres of great learning see Celtic Church. Northumbria was famed as a centre of religious learning and arts. Initially the kingdom was evangelized by monks from the Celtic Church , which led to a flowering of monastic life, and Northumbria played an important role in the formation of Insular art , a unique style combining Anglo-Saxon, Celtic , Byzantine and other elements. After the Synod of Whitby in AD, Roman church practices officially replaced the Celtic ones but the influence of the Anglo-Celtic style continued, the most famous examples of this being the Lindisfarne Gospels. The Venerable Bede wrote his Historia ecclesiastica gentis Anglorum Ecclesiastical History of the English People, completed in in a Northumbrian monastery, and much of it focuses on the kingdom. Brought into contact with the culture and learning of other countries through his vast conquests, Charlemagne greatly increased the provision of monastic schools and scriptoria centres for book-copying in Francia. Most of the surviving works of classical Latin were copied and preserved by Carolingian scholars. Charlemagne took a serious interest in scholarship, promoting the liberal arts at the court, ordering that his children and grandchildren be well-educated, and even studying himself under the tutelage of Paul the Deacon, from whom he learned grammar, Alcuin, with whom he studied rhetoric, dialect and astronomy he was particularly interested in the movements of the stars , and Einhard, who assisted him in his studies of arithmetic. After the decline of the Carolingian dynasty, the rise of the Saxon Dynasty in Germany was accompanied by the Ottonian Renaissance. Cambridge and many other universities were founded at this time. Cathedral schools and monasteries remained important throughout the Middle Ages; at the Third Lateran Council of the Church mandated that priests provide the opportunity of a free education to their flocks, and the 12th and 13th century renascence known as the Scholastic Movement was spread through the monasteries. These however ceased to be the sole sources of education in the 11th century when universities , which grew out of the monasticism began to be established in major European cities.

Chapter 9 : Average - Wikipedia

The degeneration in practice of the early humanists' educational goals and methods continued during the 16th-century Reformation and its aftermath. The religious conflict that dominated men's thoughts also dominated the "humanistic" curriculum of the Protestant secondary schools.

However, this method for generating means is not general enough to capture all averages. The average y is then the value that, when replacing each member of the list, results in the same function value: This most general definition still captures the important property of all averages that the average of a list of identical elements is that element itself. Compound annual growth rate A type of average used in finance is the average percentage return. It is an example of a geometric mean. The value of R that makes this equation true is 0. This method can be generalized to examples in which the periods are not equal. The average percentage return for the combined period is the single year return, R, that is the solution of the following equation: Moving average Given a time series such as daily stock market prices or yearly temperatures people often want to create a smoother series. An easy way to do this is the moving average: This is the simplest form of moving average. More complicated forms involve using a weighted average. The weighting can be used to enhance or suppress various periodic behavior and there is very extensive analysis of what weightings to use in the literature on filtering. Origin[edit] The first recorded time that the arithmetic mean was extended from 2 to n cases for the use of estimation was in the sixteenth century. From the late sixteenth century onwards, it gradually became a common method to use for reducing errors of measurement in various areas. Using the mean of several measured values, scientists assumed that the errors add up to a relatively small number when compared to the total of all measured values. The method of taking the mean for reducing observation errors was indeed mainly developed in astronomy. In a text from the 4th century, it was written that text in square brackets is a possible missing text that might clarify the meaning: Then we must add up the amount of all of them together, and since the row contains nine terms, we must look for the ninth part of the total to see if it is already naturally present among the numbers in the row; and we will find that the property of being [one] ninth [of the sum] only belongs to the [arithmetic] mean itself Even older potential references exist. There are records that from about BC, merchants and shippers agreed that damage to the cargo and ship their "contribution" in case of damage by the sea should be shared equally among themselves. Etymology[edit] According to the Oxford English Dictionary , "few words have received more etymological investigation. It came to mean the cost of damage sustained at sea. From that came an "average adjuster" who decided how to apportion a loss between the owners and insurers of a ship and cargo. Marine damage is either particular average, which is borne only by the owner of the damaged property, or general average , where the owner can claim a proportional contribution from all the parties to the marine venture. The type of calculations used in adjusting general average gave rise to the use of "average" to mean "arithmetic mean". A second English usage, documented as early as and sometimes spelled "averish", is as the residue and second growth of field crops, which were considered suited to consumption by draught animals "avers". It is unclear in which language the word first appeared. There is earlier from at least the 11th century , unrelated use of the word.