Chapter 1 : Nicolaus Copernicus Essay

Hoyle gives a brief account of Copernicus' personal life in Chapter II. He traces Copernicus' career from his birth in Silesia in to his death in Frauenburg in The development of Copernicus' heliocentric model is carefully investigated from the first publication "Commentariolus" to its culmination in "de revolutionibus".

Nicolaus Copernicus â€" Also Kopernik Polish astronomer and mathematician. Copernicus is one of the extraordinary thinkers credited with inaugurating the Scientific Revolution in the sixteenth century with the publication of his De revolutionibus orbitum coelestium On the Revolutions of the Heavenly Bodies, The revolution in science represents one of the greatest developments in the Western intellectual tradition. Thinkers such as Copernicus, the French philosopher Rene Descartes and the British mathematician Sir Isaac Newton departed radically from classical thought and from the ecclesiastical institutions of the Middle Ages. These thinkers brought about a change in the way people think and perceive both themselves and their place in the universe. Biographical Information Copernicus was born into a well-to-do family in In , Copernicus entered the University of Krakow where he studied mathematics and painting. In , in the midst of his studies, Copernicus experienced two events that helped to shape the rest of his life: Copernicus continued his medical and legal studies, but also pursued his interest in astronomy, being exposed to the Pythagorean doctrines of cosmology taught in Italy. He developed a dissatisfaction with the Ptolemaic system and conceived the idea of a solar system with the sun at the center. While serving in this capacity, Copernicus also developed a system of reform for the currency of the Prussian provinces of Poland presented as De monetae cudendae ratione, , and published in and began to make astronomical observations to test his belief in a heliocentric world system. Copernicus was reluctant to make his ideas public because of their controversial nature. He did allow a summary of the Commentariolus to circulate among scholars. Copernicus published the treatise On the Revolutions of the Heavenly Bodies in Osiander wrote and appended a preface to On the Revolutions of the Heavenly Bodies stating that the heliocentric theory was being presented as a concept to allow for better calculations of planetary positions. The unsigned preface gave the impression that Copernicus himself was undercutting his own theory. In , Copernicus suffered a stroke and paralysis, and continued to decline until his death on May 24, Long before Copernicus, Aristarchus of Samos, a Greek astronomer living around BC, had proposed that the sun was the center of things, but his theory was displaced by the teachings of Claudius Ptolemy c. Ptolemy proposed that the Earth was the center of the universe. In this system, all the planets, including the Sun and Moon which were classified as planets were attached to concentric spheres surrounding and rotating around the Earth. Motions of the planets that presented problems for this geocentric and spherical model were accounted for by means of epicycles or cycles within cycles. Copernicus realized that tables of planetary positions could be calculated more accurately by working from the assumption that the Sun, not the Earth, was the center of the world system and that the planets, including the Earth, moved around the sun. Copernicus was not an especially good astronomical observer. It is said that he never saw the planet Mercury, and he made an incorrect assumption about planetary orbits, believing that they were perfectly circular. According to critic Harold P. The fact that most of the planets appear to change direction periodically is more readily explained by the fact that their orbits are outside that of the Earth. The heliocentric model also explained the absence of such "backward" motion in the planet Venus, whose orbit is inside that of the Earth and therefore smaller. Only a limited number of books were printed. Booksâ€"and in particular scientific texts with numerous illustrationsâ€"were expensive and consequently had limited circulation. The book did achieve a number of converts, but only a few highly advanced mathematicians and astronomers could fully understand it. Copernicus himself dedicated the book to mathematicians and did not seem to think that his findings would appeal to a general readership. A later generation of astronomers building on Copernican theories, including Tycho Brahe and Johannes Kepler, continued to demonstrate that humankind was still learning about what had previously been thought to be a "fixed firmamant" of stars and planets, and Copernicus has grown in regard as

a significant and revolutionary thinker for his times.

Chapter 2 : Free term paper on Copernicus

One of the events that is highlighted in history is the alleged "Copernican Revolution". This is the idea that Nicolaus Copernicus 'corrected' the ancient astronomy of Ptolemy and showed that the earth revolves around the sun.

The original form of his name was Mikolaj Kopernik or Nicolaus Koppernigk. During his life, he was both Cleric and Astronomer. When Copernicus was ten years old his father died. His uncle, Lucas Watzenrode took Copernicus and his brother Andreas under his protection. In he was sent by his uncle to the cathedral school of Wloclawek where he received a good standard humanist education. In Copernicus entered the University of Krakow, where he became interested in the study of astronomy. While a student at the University of Krakow, he discovered several logical contradictions in the existing astronomical system taught at that time, which put the earth at the center of the universe. His uncle Lucas Watzenrode was still determined that Copernicus should have a career in the Church and indeed this was a profession which would allow security for someone wanting to pursue leaning. So that he might have the necessary qualifications Copernicus decided to go to the University of Bologna to take a degree in canon law. Each student contributed to the "German Nation" an amount they could afford and the small contribution that Copernicus made indicates his poor financial position at that time. During while he was there his uncle put his name forward for the position of canon at Frauenburg Cathedral. Copernicus then received official notification of his appointment as a canon and of the comfortable income he would receive without having to return to carry out any duties. At Bologna University Copernicus studied Greek, mathematics and astronomy in addition to his official course of canon law. He rented rooms at the house of the astronomy professor Domenico Maria de Novara. Copernicus began to undertake research with him and assisted him in making observations. Together, the two men observed the Moon eclipse the star Aldebaran. Later when studying medicine and religious law at Bologna University, he pursued further investigations of the movements of celestial bodies, especially the moon. His direct observations, coupled with research based on various Greek and Latin astronomical writings, prompted him to originate the Copernican system of the structure of the universe. This theory placed the sun at the center of the solar system and the earth in orbit around it. He visited Rome in for the great jubilee celebration and stayed there for a year lecturing to scholars on mathematics and astronomy. He returned to Frauenburg in the spring of and was officially installed as a canon of the Ermland Chapter. He had not completed his degree in canon law at Bologna so he requested his uncle, Bishop of Ermland that he would return to Italy both to take a law degree and to study medicine. Copernicus promised to study medicine, and would some day advise bishop and also the members of the Chapter. He set off again for Italy, going to Padua. Copernicus had another reason to return to Italy, which he certainly did not disclose, and that was to continue his studies of astronomy. Padua was famous for its medical school and while he was there Copernicus studied both medicine and astronomy. As a result of his studies in Krakow and Padua, Copernicus may be said to have mastered all the knowledge of the day in mathematics, astronomy, medicine, and theology.

Chapter 3 : References for Copernicus

Nicolaus Copernicus Essay - Nicolaus Copernicus Nicolaus Copernicus, who lived from until , is known for his idea that the sun is motionless at the center of the universe and that the earth and other planets all revolve around it.

The city, on the Vistula River, had been an important inland port in the Hanseatic League. However, fighting between the Order of the Teutonic Knights and the Prussian Union in alliance with the Kingdom of Poland ended in , and West Prussia, which included Torun, was ceded to Poland, and Torun was declared a free city of the Polish kingdom. Thus the child of a German family was a subject of the Polish crown. In Copernicus enrolled in the University of Cracow. He assumed the post two years later, and his financial situation was secure for life. While at Bologna he lived with the astronomy professor Domenico Maria Novara and made his first astronomical observations. Humanism began to infiltrate the Italian universities in the fifteenth century. Copernicus may have studied with him, for Copernicus translated into Latin the letters of the seventh-century Byzantine author Theophylactus Simocatta MW 27â€”71 from the edition of a collection of Greek letters produced by the Venetian humanist printer Aldus Manutius. Aldus had dedicated his edition to Urceo. Copernicus had his translation printed in , his only publication prior to the On the Revolutions De revolutionibus. Copernicus left Bologna for Frombork in without having obtained his degree. The chapter then approved another leave of absence for Copernicus to study medicine at the University of Padua. The medical curriculum did not just include medicine, anatomy, and the like when Copernicus studied it. The actual uses of astrology in medical diagnosis and treatment by learned physicians were many and various. It is true that astrology required that medical students acquire some grounding in astronomy; nevertheless, it is likely that Copernicus studied astrology while at the University of Padua. Instead he matriculated in the University of Ferrara, from which he obtained a doctorate in canon law. But he did not return to his chapter in Frombork; rather he went to live with his uncle in the episcopal palace in Lidzbark-Warminski Heilsberg in German. Although he made some astronomical observations, he was immersed in church politics, and after his elderly uncle became ill in , Copernicus was his attending physician. Rosen , â€”35 reasonably conjectured that the bishop may have hoped that his nephew would be his successor, but Copernicus left his uncle because his duties in Lidzbark-Warminski interfered with his continuing pursuit of his studies in astronomy. He took up residence in his chapter of Frombork in and stayed there the rest of his life. Not that leaving his uncle and moving to Frombork exempted Copernicus from continued involvement in administrative and political duties. He was responsible for the administration of various holdings, which involved heading the provisioning fund, adjudicating disputes, attending meetings, and keeping accounts and records. In response to the problem he found with the local currency, he drafted an essay on coinage MW â€” in which he deplored the debasement of the currency and made recommendations for reform. His manuscripts were consulted by the leaders of both Prussia and Poland in their attempts to stabilize the currency. He was a leader for West Prussia in the war against the Teutonic Knights, which lasted from â€” He was physician for the bishop his uncle had died in and members of the chapter, and he was consulting physician for notables in East and West Prussia. Nevertheless, Copernicus began to work on astronomy on his own. Sometime between and he wrote an essay that has come to be known as the Commentariolus MW 75â€” that introduced his new cosmological idea, the heliocentric universe, and he sent copies to various astronomers. He continued making astronomical observations whenever he could, hampered by the poor position for observations in Frombork and his many pressing responsibilities as canon. Nevertheless, he kept working on his manuscript of On the Revolutions. In a young mathematician named Georg Joachim Rheticus â€” from the University of Wittenberg came to study with Copernicus. Rheticus brought Copernicus books in mathematics, in part to show Copernicus the quality of printing that was available in the German-speaking cities. Most importantly, he convinced Copernicus to publish On the Revolutions. Rheticus oversaw most of the printing of the book, and on 24 May Copernicus held a copy of the finished work on his deathbed. Aristotle accepted the idea that there were four physical

elements â€" earth, water, air, and fire. He put the earth in the center of the universe and contended that these elements were below the moon, which was the closest celestial body. There were seven planets, or wandering stars, because they had a course through the zodiac in addition to traveling around the earth: Beyond that were the fixed stars. But observers realized that the heavenly bodies did not move as Aristotle postulated. The earth was not the true center of the orbits and the motion was not uniform. And in an age without professional astronomers, let alone the telescope, Ptolemy did a good job plotting the courses of the heavenly bodies. Not all Greek astronomical ideas followed this geocentric system. Pythagoreans suggested that the earth moved around a central fire not the sun. Archimedes wrote that Aristarchus of Samos actually proposed that the earth rotated daily and revolved around the sun. Swerdlow and Neugebauer 46â€"48 stressed that the thirteenth-century Maragha school was also important in finding errors and correcting Ptolemy: In addition, Ragep, , has shown that a theory for the inner planets presented by Regiomontanus that enabled Copernicus to convert the planets to eccentric models had been developed by the fifteenth-century, Samarqand-trained astronomer ali Qushji â€" He noted that Ptolemy showed the moon to be at various times twice as far from the earth as at other times, which should make the moon appear twice as big. Had he done so during his lecture in Rome, such a radical theory would have occasioned comment, but there was none, so it is likely that he adopted this theory after His first heliocentric writing was his Commentariolus. It was a small manuscript that was circulated but never printed. Thus, Copernicus probably adopted the heliocentric theory sometime between and It is impossible to know exactly why Copernicus began to espouse the heliocentric cosmology. Despite his importance in the history of philosophy, there is a paucity of primary sources on Copernicus. Sadly, the biography by Rheticus, which should have provided scholars with an enormous amount of information, has been lost. Yet the widespread [planetary theories], advanced by Ptolemy and most other [astronomers], although consistent with the numerical [data], seemed likewise to present no small difficulty. Goddu â€"84 has plausibly maintained that while the initial motivation for Copernicus was dissatisfaction with the equant, that dissatisfaction may have impelled him to observe other violations of uniform circular motion, and those observations, not the rejection of the equant by itself, led to the heliocentric theory. Blumenberg has pointed out that the mobility of the earth may have been reinforced by the similarity of its spherical shape to those of the heavenly bodies. As the rejection of the equant suggests a return to the Aristotelian demand for true uniform circular motion of the heavenly bodies, it is unlikely that Copernicus adopted the heliocentric model because philosophies popular among Renaissance humanists like Neoplatonism and Hermetism compelled him in that direction. Most importantly, we should bear in mind what Swerdlow and Neugebauer 59 asserted: Copernicus arrived at the heliocentric theory by a careful analysis of planetary models â€" and as far as is known, he was the only person of his age to do so â€" and if he chose to adopt it, he did so on the basis of an equally careful analysis. In the Commentariolus Copernicus listed assumptions that he believed solved the problems of ancient astronomy. Although the Copernican model maintained epicycles moving along the deferrent, which explained retrograde motion in the Ptolemaic model, Copernicus correctly explained that the retrograde motion of the planets was only apparent not real, and its appearance was due to the fact that the observers were not at rest in the center. The work dealt very briefly with the order of the planets Mercury, Venus, earth, Mars, Jupiter, and Saturn, the only planets that could be observed with the naked eye , the triple motion of the earth the daily rotation, the annual revolution of its center, and the annual revolution of its inclination that causes the sun to seem to be in motion, the motions of the equinoxes, the revolution of the moon around the earth, and the revolution of the five planets around the sun. In a sense it was an announcement of the greater work that Copernicus had begun. He received some discouragement because the heliocentric system seemed to disagree with the Bible, but mostly he was encouraged. Fear of the reaction of ecclesiastical authorities was probably the least of the reasons why he delayed publishing his book. His administrative duties certainly interfered with both the research and the writing. He was unable to make the regular observations that he needed and Frombork, which was often fogged in, was not a good place for those observations. Moreover, as Gingerich , 37 pointed out, [Copernicus]

was far from the major international centers of printing that could profitably handle a book as large and technical as De revolutionibus. On the other [hand], his manuscript was still full of numerical inconsistencies, and he knew very well that he had not taken complete advantage of the opportunities that the heliocentric viewpoint offeredâ€¦Furthermore, Copernicus was far from academic centers, thereby lacking the stimulation of technically trained colleagues with whom he could discuss his work. The manuscript of On the Revolutions was basically complete when Rheticus came to visit him in The work comprised six books. Book 1 set out the order of the heavenly bodies about the sun: After Saturn, Jupiter accomplishes its revolution in 12 years. The Mars revolves in 2 years. In the fifth place Venus returns in 9 months. This established a relationship between the order of the planets and their periods, and it made a unified system. This may be the most important argument in favor of the heliocentric model as Copernicus described it. As Aristotle had asserted, the earth was the center toward which the physical elements gravitate. Nevertheless, he did write in book 5 when describing the motion of Mercury: Rheticus was a professor of mathematics at the University of Wittenberg, a major center for the student of mathematics as well as for Lutheran theology. In Rheticus took a leave of absence to visit several famous scholars in the fields of astronomy and mathematics. This further encouraged Copernicus to publish his Revolutions, which he had been working on since he published the Commentariolus. He dealt with such topics as the motions of the fixed stars, the tropical year, the obliquity of the ecliptic, the problems resulting from the motion of the sun, the motions of the earth and the other planets, librations, longitude in the other five planets, and the apparent deviation of the planets from the ecliptic. He asserted that the heliocentric universe should have been adopted because it better accounted for such phenomena as the precession of the equinoxes and the change in the obliquity of the ecliptic; it resulted in a diminution of the eccentricity of the sun; the sun was the center of the deferents of the planets; it allowed the circles in the universe to revolve uniformly and regularly; it satisfied appearances more readily with fewer explanations necessary; it united all the spheres into one system. The Narratio prima was printed in in Gdansk then Danzig ; thus, it was the first printed description of the Copernican thesis. Rheticus sent a copy to Achilles Pirmin Gasser of Feldkirch, his hometown in modern-day Austria, and Gasser wrote a foreword that was published with a second edition that was produced in in Basel. He pointed to the difficulty of calendar reform because the motions of the heavenly bodies were inadequately known. Rheticus returned to Wittenberg in and the following year received another leave of absence, at which time he took the manuscript of the Revolutions to Petreius for publishing in Nuremberg. Rheticus oversaw the printing of most of the text. However, Rheticus was forced to leave Nuremberg later that year because he was appointed professor of mathematics at the University of Leipzig. He left the rest of the management of printing the Revolutions to Andrew Osiander â€” , a Lutheran minister who was also interested in mathematics and astronomy. Though he saw the project through, Osiander appended an anonymous preface to the work. In it he claimed that Copernicus was offering a hypothesis, not a true account of the working of the heavens: This clearly contradicted the body of the work. Both Rheticus and Giese protested, and Rheticus crossed it out in his copy. But Rheticus was the only Wittenberg scholar who accepted the heliocentric idea. Robert Westman a, â€”67; , chap. One of these was Erasmus Reinhold â€” , a leading astronomer at Wittenberg who became dean and rector.

Chapter 4 : Nicolaus Copernicus (Stanford Encyclopedia of Philosophy)

Nicolaus Copernicus. An Essay on His Life and Work. Science 10 May Vol. , Issue , pp. Nicolaus Copernicus. An Essay on His Life and Work.

It has been equated it with the initiation of "the scientific revolution. On account of geographical and historical uncertainties, it remains a matter of dispute whether Copernicus was German or Polish. When Copernicus was ten years old, his father, a wealthy businessman and copper trader, died. Little is known of his mother, Barbara Watzenrode, who appears to have predeceased her husband. Copernicus had a brother and two sisters: This science soon fascinated him, as shown by his books, which were later carried off as war booty by the Swedes during "The Deluge," to the Uppsala University Library. His bishop-uncle financed his education and wished for him to become a bishop as well. However, while studying canon and civil law at Ferrara, Copernicus met the famous astronomer, Domenico Maria Novara da Ferrara. Copernicus attended his lectures and became his disciple and assistant. Copernicus went to Rome , where he observed a lunar eclipse and gave some lectures in astronomy or mathematics. It is uncertain whether Copernicus was ordained a priest; he may only have taken minor orders, which sufficed for assuming a chapter canonry. It appears that he visited Frombork in As soon as he arrived, he requested and obtained permission to return to Italy to complete his studies at Padua with Guarico and Fracastoro and at Ferrara with Giovanni Bianchini , where in he received his doctorate in canon law. It has been supposed that it was in Padua that he encountered passages from Cicero and Plato about opinions of the ancients on the movement of the Earth, and formed the first intuition of his own future theory. His collection of observations and ideas pertinent to his theory began in He made astronomical observations and calculations through the rest of his life, but always in his spare time and never as a profession. Copernicus worked for years with the Prussian Diet on monetary reform and published some studies about the value of money. As governor of Warmia, he administered taxes and dealt out justice. During these years, he also traveled extensively on government business and as a diplomat on behalf of the prince-bishop of Warmia. In , he made his Commentariolusâ€”a short, handwritten text describing his ideas about the heliocentric hypothesisâ€”available to friends. Thereafter, he continued gathering evidence for a more detailed work. During the war between the Teutonic Order and the Kingdom of Poland â€” , Copernicus successfully defended Allenstein Olsztyn at the head of royal troops besieged by the forces of Albert of Brandenburg. From many parts of the continent, Copernicus received invitations to publish. Despite the insistence of many, Copernicus kept delaying the final publication of his book, probably out of fear of criticism for his revolutionary work by the establishment. He was still completing his masterpiece even if he was not convinced that he wanted to publish it when in , Georg Joachim Rheticus, a great mathematician from Wittenberg, arrived in Frombork. Philipp Melanchthon had arranged for Rheticus to visit several astronomers and study with them. He supposedly woke from a stroke-induced coma, looked at his book, and died peacefully. The find came after a year of searching, and the discovery was announced only after further research, on November 3, The grave was in poor condition, and not all the remains were found. The archaeologists hoped to find relatives of Copernicus in order to attempt DNA identification. The Copernican heliocentric system Much has been written about earlier heliocentric theories. Philolaus fourth century B. In the third century B. His work about a heliocentric system has not survived, so one may only speculate about what led him to his conclusions. It is notable that, according to Plutarch, a contemporary of Aristarchus, accused him of impiety for "putting the Earth in motion. He says, "Bhumukha sarvato golah" Earth is round. The work of the fourteenth-century Arab astronomer Ibn al-Shatir contains findings similar to those of Copernicus, and it has been suggested that Copernicus might have been influenced by them. Copernicus cited Aristarchus and Philolaus in an early manuscript of his book that survives, stating: Inspiration came to Copernicus not from observation of the planets but from reading two authors. In Cicero , he found an account of the theory of Hicetas. These authors had proposed a moving Earth that revolved around a central Sun. The

Ptolemaic system As Copernicus was developing his heliocentric model, the prevailing theory in Europe was that created by Ptolemy in his Almagest, dating from about C. The Ptolemaic system drew on many previous theories that viewed Earth as a stationary center of the universe. Stars were embedded in a large outer sphere, which rotated relatively rapidly, while the planets dwelt in smaller spheres betweenâ€”a separate one for each planet. To account for certain anomalies, such as the apparent retrograde motion of many planets, a system of epicycles was used, in which a planet was thought to revolve around a small axis while also revolving around the Earth. Some planets were assigned "major" epicycles for which retrograde motion could be observed and "minor" epicycles that simply warped the overall rotation. This had an overall effect of making certain orbits "wobble," a fact that greatly bothered Copernicus because such wobbling rendered implausible the idea of material "spheres" in which the planets rotated. In the end, astronomers could still not get observation and theory to match up exactly. The book marks the beginning of the shift away from a geocentric view of the universe. Copernicus held that the Earth is another planet revolving around the fixed Sun once a year , and turning on its axis once a day. He also gave a clear account of the cause of the seasons: He added another motion to the Earth, by which the axis is kept pointed throughout the year at the same place in the heavens; since Galileo Galilei , it has been recognized that for the Earth not to point to the same place would have been a motion. Although Copernicus put the Sun at the center of the celestial spheres, he placed it near but not at the exact center of the universe. Copernicus was aware of this and could not present any observational "proof" in his manuscript, relying instead on arguments about what would be a more complete and elegant system. From publication until about , few astronomers were fully convinced of the Copernican system, though the book was relatively widely circulated around five hundred copies are known to still exist, which is a large number by the scientific standards of the time. The Copernican system can be summarized in seven propositions, as Copernicus himself collected them in a Compendium of De revolutionibus that was found and published in There is no one center in the universe. The center of the universe is near the Sun. The distance from the Earth to the Sun is imperceptible compared with the distance to the stars. The rotation of the Earth accounts for the apparent daily rotation of the stars. The apparent annual cycle of movements of the Sun is caused by the Earth revolving around the Sun. The apparent retrograde motion of the planets is caused by the motion of the Earth, from which one observes. Whether these propositions were "revolutionary" or "conservative" was a topic of debate in the late twentieth century. Thomas Kuhn argued that Copernicus merely transferred "some properties to the Sun many astronomical functions previously attributed to the Earth. This was apparently written to soften any religious backlash against the book. Then, in a lengthy introduction, Copernicus dedicated the book to Pope Paul III, explaining his ostensible motive in writing the book as relating to the inability of earlier astronomers to agree on an adequate theory of the planets, and noting that if his system increased the accuracy of astronomical predictions, it would allow the Church to develop a more accurate calendar. At that time, a reform of the Julian Calendar was considered necessary and was one of the major reasons for Church funding of astronomy. The work itself was then divided into six books: The heliocentric model is almost universally considered to be one of the most important scientific hypotheses in history, as well as being of extraordinary importance in the history of human knowledge altogether. It came to mark the starting point of modern astronomy and modern science, and it is often known as the Copernican revolution ; it is considered the start of "the scientific revolution. Besides its importance to science, astronomy , and cosmology, the Copernican revolution also had profound implications for religion , theology, and philosophy. Jose Wudka described it thus: It is hard to [over]estimate the importance of this work: All the reassurances of the cosmology of the Middle Ages were gone, and a new view of the world, less secure and comfortable, came into being. A second assumption was that the place of human beings as children of Godâ€”an assertion made by both Jewish and Christian doctrineâ€”and thus the highest or most important beings in the cosmos except for those who held angels to be higher than humans , requires that Earth as the dwelling place of humans be at the center of the universe. A third assumption was that philosophy, logic, and theology are paramount in importance, superior to natural science and its methods. A fourth assumption had to

do with falling bodies: A fifth was that, if the Earth moved, then things thrown into air above the Earth would be "left behind" and not fall to Earth as the Earth moved. A sixth was that, if the Earth moved, this would be a contradiction of scripture , which says that Joshua commanded the Sun and Moon not the Earth to be still and cease moving across the sky Josh Today we know that each of those assumptions was incorrect. We now know that the principle of inertia means that moving things will continue to move unless some force stops them. At the same time, it needs to be understood that the place of humans in the universe as the children of God does not depend on the physical location of the Earth, or the size or prominence of the Sun, or the prominence of the Milky Wayâ€”the galaxy in which Earth is situatedâ€”in the cosmos. The claim in Joshua may be interpreted as a figure of speech rather than as a literal event. The notion of a "Copernican Revolution" became important in philosophy as well as science. For one thing, philosophy of science had to recognize and account for the fact that science does not grow in a smooth and continuous pattern. Instead, there are occasional revolutions in which one scientific pattern or paradigm is overthrown by another. Later, in the twentieth century, American historian and philosopher of science Thomas Kuhn made scientific revolutions and the notion of a "paradigm" and "paradigm shift" central points in his monumental and highly influential work, The Structure of Scientific Revolutions. German philosopher Immanuel Kant captured the transcendent rationalism of the Copernican revolution, postulating that it was human rationality that was the true interpreter of observed phenomena. In addition, he referred to his own work as being a "Copernican revolution" in philosophy. More recent philosophers, too, have found continuing validity and philosophical meaning in Copernicanism. Conversation with God by Jan Matejko The Copernican heliocentric system was rejected for theological and philosophical reasons by the Catholic and Lutheran churches of his day. This may not have been the first time in human history when a clash between religion and science occurred, but it was the most significant one up to that time. That clashâ€”often referred to as a warfare between science and religionâ€—continues in some form, with sometimes waxing and sometimes waning intensity, to this day. An important result of the Copernican revolution was to encourage scientists and scholars to take a more skeptical attitude toward established dogma. Based on the work of Copernicus and others, some have argued that "science could explain everything attributed to God," and that there was no need to believe in an entity God who grants a soul , power, and life to human beings. Others, including religious scientists, have taken the view that the laws and principles of nature, which scientists strive to discover, originated from the Creator, who works through those principles. Copernicus himself continued to believe in the existence of God. Copernicanism was also used to support the concept of immanenceâ€”the view that a divine force or divine being pervades all things that exist. This view has since been developed further in modern philosophy.

Chapter 5 : Nicolaus Copernicus - New World Encyclopedia

Nicolaus Copernicus's Life and Work - Nicolaus Copernicus was a polish astronomer and a cleric. At the age of ten his father died and his uncle took him in along with his brothers and sisters.

Some just wonder while others attempt to solve this mystery. One of the people who had endeavored to solve it was Nicolaus Copernicus. Copernicus was born in the present day town of Torun, Poland in February of While still a young boy, Copernicus was put in custody of his uncle when his father died. His uncle made sure that his nephew got the best education they could obtain. This is how Copernicus was able to enter the University of Krakow, which was well known for its mathematics, and astronomy programs. After finishing in Krakow, he was inspired to further his education by going to the University of Bologna in Italy. While there, he roomed with Domenico Maria de Novara, the mathematics professor. In , Copernicus lectured in Rome and in the next year, obtained permission to study medicine at Padua. Before returning to Poland, he received a doctorate in canon law from the University of Ferrara. Copernicus lived with his uncle in his bishopric palace. While he stayed there he published his first book which was a translation of letters written by the 7th century writer, Theophylactus of Simocatta. After that he wrote an astronomical discourse that laid the foundation of his heliocentric theory; the theory that the sun is the center of our solar system. However, it was years before it was published. After leaving his uncle, he wrote a treatise on money, and began the work for which he is most famous, On the Revolution of the Celestial Spheres, which took him almost 15 years to write. It is ironic that what he devoted a good part of his life would not be published until he was on his deathbed. His Theory To understand the contribution Copernicus made to the astrological community, you first need to understand the theory that had been accepted at the time of Copernicus. The question of the arrangement of the planets arose about BC. At this time the Mesopotamians believed that the earth was at the center of the universe and that other heavenly bodies moved around the earth. This belief was synonymously known as geocentric. They believed this, but they had no scientific proof to support it. It was not until the 2nd century that the famous astronomer, Ptolemy, gave an explanation for the movement of the stars across the sky that the geocentric theory began to become creditable. That was the theory that existed at the time of Copernicus. Copernicus was not the first one to come up with the idea of a sun-centered heliocentric universe. Not too long after Ptolemy theorized about the movement of the stars there was a man by the name of Aristarchus of Samos. He was the first one to propose the idea of a sun-centered universe. It may seem weird but the calculations that Copernicus made were not much more accurate than his predecessors, however most of his theory was accepted, while the radical ones were omitted. The one concept that was not liked was that the earth moved around the sun. To deal with this dilemma, Tycho Brahe met Copernicus and Ptolemy halfway by making the earth a stationary object while the planets orbited the sun in the center. The rotating earth idea was not revived until the English philosopher Isaac Newton started explaining celestial mechanics.

Chapter 6 : Essay on Science Reports. Research Paper on Nicolaus Copernicus

Early Life of Nicolaus Copernicus: Nicolaus Copernicus is the latin name for this famous astronomer's real name. His real name was Mikolaj Koppernigk, but lets just stick with Nicolaus Copernicus in this essay.

Throughout history people have always looked up at the sky and wondered about the universe. Some just wonder while others attempt to solve this mystery. One of the people who had endeavored to solve it was Nicolaus Copernicus. Copernicus was born in the present day town of Torun, Poland in February of While still a young boy, Copernicus was put in custody of his uncle when his father died. His uncle made sure that his nephew got the best education they could obtain. This is how Copernicus was able to enter the University of Krakow, which was well known for its mathematics, and astronomy programs. After finishing in Krakow, he was inspired to further his education by going to the University of Bologna in Italy. While there, he roomed with Domenico Maria de Novara, the mathematics professor. In , Copernicus lectured in Rome and in the next year, obtained permission to study medicine at Padua. Before returning to Poland, he received a doctorate in canon law from the University of Ferrara. Copernicus lived with his uncle in his bishopric palace. While he stayed there he published his first book which was a translation of letters written by the 7th century writer, Theophylactus of Simocatta. After that he wrote an astronomical discourse that laid the foundation of his heliocentric theory; the theory that the sun is the center of our solar system. However, it was years before it was published. After leaving his uncle, he wrote a treatise on money, and began the work for which he is most famous, On the Revolution of the Celestial Spheres, which took him almost 15 years to write. It is ironic that what he devoted a good part of his life would not be published until he was on his deathbed. To understand the contribution Copernicus made to the astrological community, you first need to understand the theory that had been accepted at the time of Copernicus. The question of the arrangement of the planets arose about BC. At this time the Mesopotamians believed that the earth was at the center of the universe and that other heavenly bodies moved around the earth. This belief was synonymously know as geocentric. They believed this, but they had no scientific proof to support it. It was not until the 2nd century that the famous astronomer, Ptolemy, gave an explanation for the movement of the stars across the sky, that the geocentric theory began to become creditable. That was the theory that existed at the time of Copernicus. Copernicus was not the first one to come up with the idea of a sun-centered heliocentric universe. Not too long after Ptolemy theorized about the movement of the stars there was a man by the name of Aristarchus of Samos. He was the first one to propose the idea of a sun-centered universe. The stipulations of Copernicus"s theory are: It may seem weird but the calculations that Copernicus made were not much more accurate than his predecessors, however most of his theory was accepted, while the radical ones were omitted. The one concept that was not liked was that the earth moved around the sun. To deal with this dilemma, Tycho Brahe met Copernicus and Ptolemy halfway by making the earth a stationary object while the planets orbited the sun in the center. The rotating earth idea was not revived until the English philosopher Isaac Newton started explaining celestial mechanics.

Chapter 7 : Nicolaus Copernicus - Essay

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One of them was from this book. Hoyle goes into some detail about the Copernican and Ptolemaic systems and compares them. Hoyle is a better science writer than he is a biographer! The shortness of the book is rather misleadingâ€”chapte When I was presented with a whole list of quote mines by a geocentrist that seemed to say the sun went around the earth, I knew I had to check them out. The shortness of the book is rather misleadingâ€”chapter IV is pretty math intensive and takes some time to get through. I found the math not particularly high level but it was complex and I sooned tired of following it. I likely will return to this book after I learn more math. To return to geocentrism, yes, the book does indeed say what the geocentrists said it says. Here are the relevant sections: This is certainly so for the purely kinematical problem of describing the planetary motions. It is also possible to take any point as the center even in dynamics, although a recognition of this freedom of choice had to await the present century [20th]. Scientists of the nineteenth century felt the heliocentric theory to be established when they determined the first stellar parallaxes. But, kinematically speaking, we can always give to the stars epicyclic motions similar to the ones we found for the planets in Chapter IV. Indeed, if we wish to consider the Earth to be at rest, it will be necessary to give an annual epicyclic motion to every object in the distant universe, as well as to the planets of the solar system. We cannot dismiss such a procedure simply on the grounds of inconvenience or absurdity. If our feeling that the Earth really goes around the Sun, not the Sun around the Earth, has any objective validity, there must be some important physical property, expressible in precise mathematical terms, which emerges in the heliocentric picture but not in a geocentric one. What can this property be? The situation which now emerges is that to obtain results that agree with observation we must choose the Sun as the center. But instead of adding further support to the heliocentric picture of the planetary motions, the Einstein theory goes in the opposite direction, giving increased respectability to the geocentric picture. The relation of the two pictures is reduced to a mere coordinate transformation, and it is the main tenet of the Einstein theory that any two ways of looking at the world which are related to each other by a coordinate transformation are entirely equivalent from a physical point of view. The two theories, when improved by adding terms involving the square and higher powers of the eccentricities of the planetary orbits, are physically equivalent to one another. What we can say, however, is that we would hardly have come to recognize that this is so if scientists over four centuries or more had not elected to follow the Copernican point of view. The Ptolemaic system would have proved sterile because progress would have proven too difficult.

Chapter 8 : Nicolaus Copernicus - Wikipedia

Nicolaus Copernicus's and his Adventures in life Nicolaus Copernicus was a Polish mathematician and astronomer who got his name after his father. He was born on February 19th in Torun, Poland and died on May 24th in Frombork (Frauenburg).

A Armitage, The World of Copernicus The Founder of Modern Astronomy S L Chapin, Nicolaus Copernicus: F Hoyle, Nicolaus Copernicus: An Essay on His Life and Work H Wussing, Nicolaus Copernicus Leipzig, P Barker, Copernicus, the orbs, and the equant, Pierre Duhem: N Bonev, The great achievement of Nicolaus Copernicus J Casanovas, Copernicus and the Gregorian calendar reform, in Copernicus and the Copernican question in Italy from the sixteenth to the nineteenth century Florence, , C Cristescu, Nicolaus Copernicus: Biography Romanian , Gaz. A 78 , J Drewnowski, A new source concerning the unsuccessful canonical proceedings against Nicolaus Copernicus Polish , Kwart. O Gingerich, Did Copernicus owe a debt to Aristarchus? I, Synthese 83 2 , A study of parameters, Arch. An accuracy test, Arch. Medizin 11 1 , A , The evidence of his university textbook and disputations, Isis 87 2 , Nauk , O Neugebauer, On the planetary theory of Copernicus, in Vistas in astronomy 10 Oxford, , Nauk 3 , E Rosen, No edition of Copernicus in or , J. E Rosen, Three Copernican Treatises. The Commentariolus of Copernicus. The Letter against Werner. Madrid 1 26 , Geburtstag Cologne, , Vestis 6 , Aristarchos and Copernicus, Isis 33 , R S Westman, Proof, poetics, and patronage: H Wussing, Nicolaus Copernicus: E Zilsel, Copernicus and mechanics, J. Ideas 1 ,

Chapter 9 : Nicolaus Copernicus: Biography & Heliocentrism â€“ SchoolWorkHelper

Nicolaus Copernicus later moved to Frombork (Frauenburg) and stayed there the rest of his life. Even though Frombork was a poor position for observations, he still made astronomical ones whenever he could.

Together with the house at no. They soon became one of the wealthiest and most influential patrician families. He was a bitter opponent of the Teutonic Order, [21] [22] and its Grand Master once referred to him as "the devil incarnate". He was a friend and key advisor to each ruler, and his influence greatly strengthened the ties between Warmia and Poland proper. He also spoke Polish , [27] Greek and Italian. There survive a few documents written by Copernicus in German. The Nuremberg Chronicle , published in , describes of the town of Nysa population as plebs rustica polonici ydeomatis As was common in the period, the spellings of both the toponym and the surname vary greatly. Copernicus "was rather indifferent about orthography ". On the title page of De revolutionibus, Rheticus published the name in the genitive , or possessive , case as "Nicolai Copernici". It is unclear whether he was ever ordained a priest. Plaque on portico commemorates Copernicus. During his three-year stay at Bologna, between fall and spring , Copernicus seems to have devoted himself less keenly to studying canon law he received his doctorate in law only after seven years, following a second return to Italy in than to studying the humanities â€”probably attending lectures by Filippo Beroaldo , Antonio Urceo , called Codro, Giovanni Garzoni , and Alessandro Achillini â€”and to studying astronomy. He met the famous astronomer Domenico Maria Novara da Ferrara and became his disciple and assistant. Copernicus the humanist sought confirmation for his growing doubts through close reading of Greek and Latin authors Pythagoras , Aristarchos of Samos , Cleomedes , Cicero , Pliny the Elder , Plutarch , Philolaus , Heraclides , Ecphantos , Plato , gathering, especially while at Padua , fragmentary historic information about ancient astronomical, cosmological and calendar systems. Here, too, however, he continued his astronomical work begun at Bologna, observing, for example, a lunar eclipse on the night of 5â€"6 November According to a later account by Rheticus , Copernicus alsoâ€"probably privately, rather than at the Roman Sapienza â€"as a "Professor Mathematum" professor of astronomy delivered, "to numerous After on 28 July receiving from the chapter a two-year extension of leave in order to study medicine since "he may in future be a useful medical advisor to our Reverend Superior [Bishop Lucas Watzenrode] and the gentlemen of the chapter" , in late summer or in the fall he returned again to Italy, probably accompanied by his brother Andrew [56] and by Canon Bernhard Sculteti. This time he studied at the University of Padua , famous as a seat of medical learning, andâ€"except for a brief visit to Ferrara in Mayâ€"June to pass examinations for, and receive, his doctorate in canon lawâ€"he remained at Padua from fall to summer It was probably the Padua years that saw the beginning of his Hellenistic interests. There also seems to be evidence that it was during his Padua stay that the idea finally crystallized, of basing a new system of the world on the movement of the Earth. No doubt it was soon after at latest, in fall that he left Italy for good to return to Warmia. He made one of Venus, with an error of minutes. Four were made of Mars, with errors of 2, 20, 77, and minutes. Four observations were made of Jupiter, with errors of 32, 51, and 25 minutes. He made four of Saturn, with errors of 31, 20, 23 and -4 minutes. They are of three kindsâ€"moral," offering advice on how people should live; "pastoral", giving little pictures of shepherd life; and "amorous", comprising love poems. They are arranged to follow one another in a regular rotation of subjects. Copernicus had translated the Greek verses into Latin prose, and he now published his version as Theophilacti scolastici Simocati epistolae morales, rurales et amatoriae interpretatione latina, which he dedicated to his uncle in gratitude for all the benefits he had received from him. With this translation, Copernicus declared himself on the side of the humanists in the struggle over the question whether Greek literature should be revived. The Commentariolus, which Copernicus consciously saw as merely a first sketch for his planned book, was not intended for printed distribution. The Commentariolus would appear complete in print for the first time only in It was only in early June that the chapter gave Copernicus an "external curia"â€"a house outside the defensive walls of the cathedral mount. In he purchased

the northwestern tower within the walls of the Frombork stronghold. Copernicus conducted astronomical observations in â€”16 presumably from his external curia; and in â€”43, from an unidentified "small tower" turricula , using primitive instruments modeled on ancient onesâ€”the quadrant , triquetrum , armillary sphere. At Frombork Copernicus conducted over half of his more than 60 registered astronomical observations. Some of the observations that he made in this period may have had a connection with a proposed reform of the Julian calendar made in the first half of at the request of the Bishop of Fossombrone , Paul of Middelburg. While there, he wrote a manuscript, Locationes mansorum desertorum Locations of Deserted Fiefs , with a view to populating those fiefs with industrious farmers and so bolstering the economy of Warmia. When Olsztyn was besieged by the Teutonic Knights.