Nicolaus Copernicus

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Nicolaus Copernicus

**Nicolaus Copernicus** (in [Latin](http://www.academickids.com/encyclopedia/index.php/Latin); [Polish](http://www.academickids.com/encyclopedia/index.php/Polish_language) *Mikołaj Kopernik*, [German](http://www.academickids.com/encyclopedia/index.php/German_language) *Nikolaus Kopernikus*); [February 19](http://www.academickids.com/encyclopedia/index.php/February_19), [1473](http://www.academickids.com/encyclopedia/index.php/1473) – [May 24](http://www.academickids.com/encyclopedia/index.php/May_24), [1543](http://www.academickids.com/encyclopedia/index.php/1543)) was a [Polish](http://www.academickids.com/encyclopedia/index.php/Poland) [astronomer](http://www.academickids.com/encyclopedia/index.php/Astronomer), [mathematician](http://www.academickids.com/encyclopedia/index.php/Mathematician) and [economist](http://www.academickids.com/encyclopedia/index.php/Economist) who developed the [heliocentric](http://www.academickids.com/encyclopedia/index.php/Heliocentrism) ([Sun](http://www.academickids.com/encyclopedia/index.php/Sun)-centered) [theory](http://www.academickids.com/encyclopedia/index.php/Theory) of the [solar system](http://www.academickids.com/encyclopedia/index.php/Solar_system) in a form detailed enough to make it scientifically useful. His main occupations and services rendered were in [Royal Prussia](http://www.academickids.com/encyclopedia/index.php/Royal_Prussia) as church [canon](http://www.academickids.com/encyclopedia/index.php/Canon), governor and administrator, [jurist](http://www.academickids.com/encyclopedia/index.php/Jurist), [astrologer](http://www.academickids.com/encyclopedia/index.php/Astrologer) and as a doctor. Astronomy was actually a byproduct, a hobby of his. His theory about the [Sun](http://www.academickids.com/encyclopedia/index.php/Sun) as the center of the [solar system](http://www.academickids.com/encyclopedia/index.php/Solar_system), turning over the traditional [geocentric theory](http://www.academickids.com/encyclopedia/index.php/Geocentric_theory) (that placed [Earth](http://www.academickids.com/encyclopedia/index.php/Earth) at the center of the [Universe](http://www.academickids.com/encyclopedia/index.php/Universe)), is considered one of the most important [discoveries](http://www.academickids.com/encyclopedia/index.php/Discovery_%28observation%29) ever, and is the fundamental starting point of modern [astronomy](http://www.academickids.com/encyclopedia/index.php/Astronomy) and modern science itself, (it inaugurated the [scientific revolution](http://www.academickids.com/encyclopedia/index.php/Scientific_revolution)). His theory affected many other aspects of human life as well, opening the door to young astronomers everywhere to challenge the facts and never take anything at face value.

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Biography

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Copernicus was born in [1473](http://www.academickids.com/encyclopedia/index.php/1473) in the city of [Toruń](http://www.academickids.com/encyclopedia/index.php/Torun) in [Poland](http://www.academickids.com/encyclopedia/index.php/Poland). His father Nikolas, a citizen of [Krak󷼃racow](http://www.academickids.com/encyclopedia/index.php?title=Krak%F3%B7%BC%83racow&action=edit) (at that time the capital of Poland), moved there in [1460](http://www.academickids.com/encyclopedia/index.php/1460) and became a respected citizen of Toruń as well, once the war with Teutonic Knights was over. He was ten years of age when his father, a wealthy businessman and [copper](http://www.academickids.com/encyclopedia/index.php/Copper) trader, died. Little is known of his mother, Barbara Watzenrode, but she appears to have predeceased her husband. His maternal uncle, [Lucas Watzenrode](http://www.academickids.com/encyclopedia/index.php/Lucas_Watzenrode), a church [canon](http://www.academickids.com/encyclopedia/index.php/Canon) and later the [Prince-Bishop](http://www.academickids.com/encyclopedia/index.php/Prince-Bishop) governor of [Warmia](http://www.academickids.com/encyclopedia/index.php/Warmia), raised him and his three other siblings after the death of Copernicus' father. His brother Andrew became canon in [Frombork](http://www.academickids.com/encyclopedia/index.php/Frombork). A sister, Barbara, became a [Benedictine](http://www.academickids.com/encyclopedia/index.php?title=Benedictine&action=edit) nun and the other sister, Katharina, married a businessman and city councillor, Barthel Gertner.

In [1491](http://www.academickids.com/encyclopedia/index.php/1491) Copernicus entered the [Jagiellonian University](http://www.academickids.com/encyclopedia/index.php/Jagiellonian_University) in [[Krak󷝝, and here he encountered [astronomy](http://www.academickids.com/encyclopedia/index.php/Astronomy) for the first time, thanks to his teacher [Albert Brudzewski](http://www.academickids.com/encyclopedia/index.php/Albert_Brudzewski). This [science](http://www.academickids.com/encyclopedia/index.php/Science) soon fascinated him, as his books (stolen by Swedes during [The Deluge](http://www.academickids.com/encyclopedia/index.php/The_Deluge), and now in [Uppsala](http://www.academickids.com/encyclopedia/index.php/Uppsala)'s library) show. After four years and a brief stay in [Toruń](http://www.academickids.com/encyclopedia/index.php/Torun), he moved to [Italy](http://www.academickids.com/encyclopedia/index.php/Italy), where he studied [law](http://www.academickids.com/encyclopedia/index.php/Law) and [medicine](http://www.academickids.com/encyclopedia/index.php/Medicine) at the universities of [Bologna](http://www.academickids.com/encyclopedia/index.php/Bologna) and [Padua](http://www.academickids.com/encyclopedia/index.php/Padua). His uncle financed his education and wished for him to become a [bishop](http://www.academickids.com/encyclopedia/index.php/Bishop) as well. However, while studying [canon](http://www.academickids.com/encyclopedia/index.php/Canon_law) and [civil law](http://www.academickids.com/encyclopedia/index.php/Civil_law) at [Ferrara](http://www.academickids.com/encyclopedia/index.php/Ferrara), he met his teacher [Domenico Maria Novara da Ferrara](http://www.academickids.com/encyclopedia/index.php/Domenico_Maria_Novara_da_Ferrara), a famous [astronomer](http://www.academickids.com/encyclopedia/index.php/Astronomer). He followed his lessons and became a disciple and assistant.

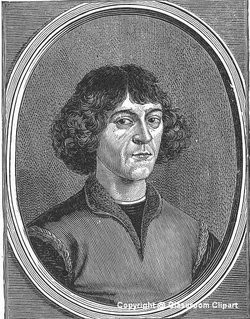
The first observation Copernicus made in [1497](http://www.academickids.com/encyclopedia/index.php/1497) together with Domenico Novara, are recorded in *De revolutionibus orbium coelestium*.

In [1497](http://www.academickids.com/encyclopedia/index.php/1497) his uncle was ordained the bishop of Warmia and Copernicus was named a canon in the Frombork [cathedral](http://www.academickids.com/encyclopedia/index.php/Cathedral), but he waited in Italy for the great [Jubilee](http://www.academickids.com/encyclopedia/index.php/Roman_Jubilee) of [1500](http://www.academickids.com/encyclopedia/index.php/1500), so he went to [Rome](http://www.academickids.com/encyclopedia/index.php/Rome), where he could observe a lunar [eclipse](http://www.academickids.com/encyclopedia/index.php/Eclipse) and where he gave some lessons of astronomy or maths (unfortunately nothing of this remains to us).

He would have then visited Frombork only in [1501](http://www.academickids.com/encyclopedia/index.php/1501). As soon as he reached this town, he asked and obtained permission to return to Italy to complete his studies in Padua (with Guarico and Fracastoro) and in Ferrara (with Bianchini), where in [1503](http://www.academickids.com/encyclopedia/index.php/1503) received his doctoral degree in canon law. It has been supposed that it was in Padua that he gained access to those passages of [Cicero](http://www.academickids.com/encyclopedia/index.php/Cicero) and [Plato](http://www.academickids.com/encyclopedia/index.php/Plato) about the opinion of Ancients on the movement of the Earth, having the first intuition of his theory. His collection of observations and ideas on the theory started in [1504](http://www.academickids.com/encyclopedia/index.php/1504).

Having left Italy at the end of his studies, he came to live and work in Frombork. Some time before his return to [Warmia](http://www.academickids.com/encyclopedia/index.php/Warmia), he had received a position at the Collegiate Church of the Holy Cross in [Breslau (Wrocław)](http://www.academickids.com/encyclopedia/index.php/Wroclaw), [Silesia](http://www.academickids.com/encyclopedia/index.php/Silesia), which he held for many years until he resigned a few years prior to his death, when he progressively became ill. Throughout his lifetime he made astronomical observations and calculations, but always in his spare time and never as a profession.

Copernicus worked for years with Prussian diet on monetary reform and published some studies about the value of [money](http://www.academickids.com/encyclopedia/index.php/Money); as a governor of [Warmia](http://www.academickids.com/encyclopedia/index.php/Warmia), he administered taxes and dealt out justice. It was at this time that Copernicus came up with one of the earliest iterations of the theory now known as [Gresham's Law](http://www.academickids.com/encyclopedia/index.php/Gresham%27s_Law). During these years he also travelled extensively on government [business](http://www.academickids.com/encyclopedia/index.php/Business) and as a [diplomat](http://www.academickids.com/encyclopedia/index.php/Diplomat), on the behalf of the [Prince-Bishop](http://www.academickids.com/encyclopedia/index.php/Prince-Bishop) of Warmia.

[](http://www.academickids.com/encyclopedia/index.php/Image:Copernicus_22.jpg)

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In [1514](http://www.academickids.com/encyclopedia/index.php/1514) he made his "Commentariolus"—a short, handwritten text describing his ideas about the heliocentric hypothesis—available to his friends. From there he continued gathering evidence for a more detailed work.

During the war between [Teutonic Order](http://www.academickids.com/encyclopedia/index.php/Teutonic_Order) and Kingdom of Poland ([1519](http://www.academickids.com/encyclopedia/index.php/1519)–[1524](http://www.academickids.com/encyclopedia/index.php/1524)) Copernicus successfully defended [Olsztyn](http://www.academickids.com/encyclopedia/index.php/Olsztyn) on the head of royal troops besiged by the troops of [Albert of Brandenburg](http://www.academickids.com/encyclopedia/index.php/Albert_of_Brandenburg).

In [1533](http://www.academickids.com/encyclopedia/index.php/1533) Albert Widmanstadt delivered a series of lectures in Rome outlining Copernicus' theory. In [1536](http://www.academickids.com/encyclopedia/index.php/1536) his work was already in a definitive form, and some rumours about his theory had reached the scientists of all [Europe](http://www.academickids.com/encyclopedia/index.php/Europe). From many parts of the continent, Copernicus received invitations to publish it, but he felt quite apprehensive of persecution for his revolutionary work by the establishment of the time. The [cardinal](http://www.academickids.com/encyclopedia/index.php/Cardinal_%28Catholicism%29) Nicola Schoenberg of [Capua](http://www.academickids.com/encyclopedia/index.php/Capua) wrote him asking him to communicate his ideas more widely and requested a copy for himself; "Therefore, learned man, without wishing to be inopportune, I beg you most emphatically to communicate your discovery to the learned world, and to send me as soon as possible your theories about the Universe, together with the tables and whatever else you have pertaining to the subject." Some have proposed that this note may have made Copernicus nervous of publication whereas others have suggested that the church wanted to ensure that his ideas were published.

Copernicus was still completing his work (even if he was not convinced to publish it), when in [1539](http://www.academickids.com/encyclopedia/index.php/1539) [Georg Joachim Rheticus](http://www.academickids.com/encyclopedia/index.php/Georg_Joachim_Rheticus), a great [mathematician](http://www.academickids.com/encyclopedia/index.php/Mathematician) at [Wittenberg](http://www.academickids.com/encyclopedia/index.php/Wittenberg), directly arrived in Frombork. [Philipp Melanchthon](http://www.academickids.com/encyclopedia/index.php/Philipp_Melanchthon) had arranged with several astronomers for Rheticus to visit and study with them. Rheticus became a disciple of Copernicus' and stayed with him for two years, in which he wrote a book, *Narratio prima*, in which he included the essence of the theory.

In [1542](http://www.academickids.com/encyclopedia/index.php/1542), in the name of Copernicus, Rheticus published a treatise on [trigonometry](http://www.academickids.com/encyclopedia/index.php/Trigonometry) (later included in the second book of *De revolutionibus*). Under the strong pressure from Rheticus, and having seen that the first general reception of his work had not been favorable, Copernicus finally agreed to give the book to his close friend [Tiedemann Giese](http://www.academickids.com/encyclopedia/index.php?title=Tiedemann_Giese&action=edit), (the [bishop](http://www.academickids.com/encyclopedia/index.php/Bishop) of [Chelmno Land](http://www.academickids.com/encyclopedia/index.php/Chelmno_Land), to be delivered to Rheticus for printing at [Nuremberg](http://www.academickids.com/encyclopedia/index.php/Nuremberg).

Legend says that the first printed copy of *De revolutionibus* was put in Copernicus's hands the same day of his death, so that he could say goodbye to his *opus vitae*. He allegedly awoke from his [stroke](http://www.academickids.com/encyclopedia/index.php/Stroke) induced [coma](http://www.academickids.com/encyclopedia/index.php/Coma), looked at his book, and died peacefully.

Copernicus was buried in the [Frombork](http://www.academickids.com/encyclopedia/index.php/Frombork) Cathedral. However, a group of archaeologists searching for the body of Copernicus in [2004](http://www.academickids.com/encyclopedia/index.php/2004) failed to find the corpse of the astronomer. They found, however, several interesting graves from various time periods. The search for the body of Copernicus will continue in [2005](http://www.academickids.com/encyclopedia/index.php/2005).

See also [discussion about Copernicus' nationality](http://www.academickids.com/encyclopedia/index.php/Copernicus%27_nationality).

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The Copernican heliocentric system

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**Earlier theories**

Much has been written about earlier heliocentric theories. [Philolaus](http://www.academickids.com/encyclopedia/index.php/Philolaus) ([4th century BC](http://www.academickids.com/encyclopedia/index.php/4th_century_BC)) was one of the first to suppose a movement of the Earth, probably inspired by [Pythagoras](http://www.academickids.com/encyclopedia/index.php/Pythagoras)'s theories on a spherical Globe.

[Aristarchus](http://www.academickids.com/encyclopedia/index.php/Aristarchus) of [Samos](http://www.academickids.com/encyclopedia/index.php/Samos) ([3rd century BC](http://www.academickids.com/encyclopedia/index.php/3rd_century_BC)) developed some theories by [Heraclides Ponticus](http://www.academickids.com/encyclopedia/index.php/Heraclides_Ponticus) (already talking about a revolution of our planet on its axis) to propose what is, to the best of our knowledge, the first serious model of a heliocentric solar system. Unfortunately, his work about his heliocentric hypothesis did not survive, so we can 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".

Indian mathematicians, astronomers and physicians, most notably [Aryabhata](http://www.academickids.com/encyclopedia/index.php/Aryabhata) and [Bhaskara I](http://www.academickids.com/encyclopedia/index.php?title=Bhaskara_I&action=edit), also predate Copernicus' discoveries, by about 1000 years. The work of the [14th century](http://www.academickids.com/encyclopedia/index.php/14th_century) Muslim astronomer [Ibn al-Shatir](http://www.academickids.com/encyclopedia/index.php?title=Ibn_al-Shatir&action=edit) contains results similar to those of Copernicus, and it has even been suggested that Copernicus might have been influenced by them.

Copernicus cited Aristarchus and Philolaus in an early manuscript of his book which has survived, stating: "Philolaus believed in the mobility of the earth, and some even say that Aristarchus of Samos was of that opinion." For reasons unknown he crossed out this passage before publication of his book.

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**Copernican Theory**

Copernicus' major theory was published in the book *De revolutionibus orbium coelestium* ("On the Revolutions of the Heavenly Spheres") in the year of his death [1543](http://www.academickids.com/encyclopedia/index.php/1543), even though he had arrived at it several decades earlier.

This book marks the beginning of the shift from a [geocentric](http://www.academickids.com/encyclopedia/index.php/Geocentric_universe) (and [anthropocentric](http://www.academickids.com/encyclopedia/index.php/Anthropocentrism)) universe with the Earth at its center. Copernicus held that the Earth is another [planet](http://www.academickids.com/encyclopedia/index.php/Planet) revolving around the fixed sun once a [year](http://www.academickids.com/encyclopedia/index.php/Year), and turning on its [axis](http://www.academickids.com/encyclopedia/index.php/Axis) once a [day](http://www.academickids.com/encyclopedia/index.php/Day). He arrived at the correct order of the known planets and explained the precession of the [equinoxes](http://www.academickids.com/encyclopedia/index.php/Equinox) correctly by a slow change in the position of the Earth's rotational axis. He also gave a clear account of the cause of the seasons: that the Earth's axis is not perpendicular to the plane of its orbit. He added another motion to the Earth, by which the axis is kept pointed throughout the year at the same place in the heavens; from the time of Galileo it has been recognized that for it *not* to point to the same place would be a motion.

He also replaced [Ptolemy](http://www.academickids.com/encyclopedia/index.php/Ptolemy)'s [equant](http://www.academickids.com/encyclopedia/index.php/Equant) circles with epicycles. This is the main source of the statement that his system had even more epicycles than Ptolemy's. With this change his system had only uniform circular motions, correcting what seemed to be a defect in Ptolemy's system. Unfortunately, uniform circular motion is not what happens in the solar system, which runs on elliptical [orbits](http://www.academickids.com/encyclopedia/index.php?title=Orbit&action=edit); and this model was no more precise in predicting [ephemerides](http://www.academickids.com/encyclopedia/index.php/Ephemerides) than the then current tables based on Ptolemy's model. Furthermore, he badly underestimated the size of the solar system, like most of the astronomers of the time.

The system nevertheless had a large influence on scientists such as [Galileo](http://www.academickids.com/encyclopedia/index.php/Galileo_Galilei), [Tycho Brahe](http://www.academickids.com/encyclopedia/index.php/Tycho_Brahe), and [Johannes Kepler](http://www.academickids.com/encyclopedia/index.php/Johannes_Kepler), who adopted, championed and (especially in Kepler's case) improved the model. Galileo's observation of the [phases](http://www.academickids.com/encyclopedia/index.php/Moon_phase) of [Venus](http://www.academickids.com/encyclopedia/index.php/Venus_%28planet%29) produced, however, the first observational evidence for Copernicus' theory.

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 [1878](http://www.academickids.com/encyclopedia/index.php/1878):

1. Orbits and celestial spheres do not have a unique, common, center.
2. The center of the Earth is not the center of the Universe, but only the center of the Earth's mass and of the lunar orbit.
3. All the planets move along orbits whose center is the Sun, therefore the Sun is the center of the World. (Copernicus was never certain whether the Sun moved or not, claiming that the center of the World is 'in the Sun, or near it.')
4. The distance between the Earth and the Sun, compared with the distance between the Earth and the fixed stars, is very small.
5. The daytime movement of the Sun is only apparent, and represents the effect of a rotation that the Earth makes every 24 hours around its axis, always parallel to itself.
6. The Earth (together with its [Moon](http://www.academickids.com/encyclopedia/index.php/Moon), and just like the other planets) moves around the Sun, so the movements that the Sun seems making (its apparent moving during daytime, and its annual moving through the Zodiac) are nothing else than effects of the Earth's real movements.
7. These movements of the Earth and of the other planets around the Sun, can explain the stations, and all the particular characteristics of the planets' movements.

These propositions represent the exact contrary of what the dominant geocentric propositions stated.

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**De Revolutionibus Orbium Coelestium**

*Main article:* [*De Revolutionibus Orbium Coelestium*](http://www.academickids.com/encyclopedia/index.php?title=De_Revolutionibus_Orbium_Coelestium&action=edit)*.*

The work of Copernicus, "On the Revolution of Celestial Spheres" ([1543](http://www.academickids.com/encyclopedia/index.php/1543)), dedicated to the [Pope Paul III](http://www.academickids.com/encyclopedia/index.php/Pope_Paul_III), is divided into 6 books.

The first book contains a general vision of the heliocentric theory, and a summarized exposition of his idea on the World.

The second book is mainly theoretical and reports the principles of spherical astronomy and a list of stars (as a basis for the arguments developed in the following books).

The third book is mainly dedicated to the apparent movements of the Sun and to related phenomena.

The fourth book contains a similar description of the Moon and its orbital movements.

The fifth and the sixth books contain the concrete exposition of the new system.

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Copernicus and Copernicanism

Copernicus' theories have an extraordinary relevance in the history of human knowledge. Many authors suggest that only [Euclidean](http://www.academickids.com/encyclopedia/index.php/Euclid) [geometry](http://www.academickids.com/encyclopedia/index.php/Geometry), [Charles Darwin](http://www.academickids.com/encyclopedia/index.php/Charles_Darwin)'s [Evolutionism](http://www.academickids.com/encyclopedia/index.php/Evolutionism), or [Newton](http://www.academickids.com/encyclopedia/index.php/Isaac_Newton)'s [physics](http://www.academickids.com/encyclopedia/index.php/Physics) could have a similar influence on human [culture](http://www.academickids.com/encyclopedia/index.php/Culture) in general and on [science](http://www.academickids.com/encyclopedia/index.php/Science) in particular.

Many meanings have been seen in his theory, quite apart from its scientific value. His work cut across science and [religion](http://www.academickids.com/encyclopedia/index.php/Religion), [dogmatism](http://www.academickids.com/encyclopedia/index.php/Dogmatism) and freedom of scientific investigation. His academic standing is often compared with [Galileo Galilei](http://www.academickids.com/encyclopedia/index.php/Galileo_Galilei).

When his work was published, it contradicted then accepted religious dogma: the suggestion being that there is no need for an entity ([God](http://www.academickids.com/encyclopedia/index.php/God)) that from outside could give a [soul](http://www.academickids.com/encyclopedia/index.php/Soul), a power and a life to the World and to Human beings when science can explain everything attributed to Him.

However, Copernicanism also opened a way to [immanence](http://www.academickids.com/encyclopedia/index.php/Immanence), the view that the divine force, or the divine being, pervades through all things that exist, which has been developed further in modern philosophy. Immanentism also leads into [subjectivism](http://www.academickids.com/encyclopedia/index.php?title=Metaphysical_subjectivism&action=edit): the theory that perception creates reality, and that there is no underlying, true, reality that exists independent of perception. Accordingly some find that Copernicanism demolished the foundations of mediaeval science and [metaphysics](http://www.academickids.com/encyclopedia/index.php/Metaphysics).

One of the consequences of Copernicanism is that scientific laws must not necessarily coincide with appearance. This contrasts with [Aristotle](http://www.academickids.com/encyclopedia/index.php/Aristotle)'s system, which placed much more value on knowledge gained from the senses.

Copernicus' innovation was a scientific revolution. Some say "the" revolution [[1]](http://www.anselm.edu/homepage/dbanach/timel.htm) (*http://www.anselm.edu/homepage/dbanach/timel.htm*). [Immanuel Kant](http://www.academickids.com/encyclopedia/index.php/Immanuel_Kant), for instance, caught the symbolic character of Copernicus' revolution (of which he put in evidence the transcendental [rationalism](http://www.academickids.com/encyclopedia/index.php/Rationalism)) postulating that human rationality was the real legislator of observed phenomena. More recent philosophers also have found Copernicanism to remain valid and retain valuable philosophical meaning.

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Discussion

Copernicus' lived in early [16th century](http://www.academickids.com/encyclopedia/index.php/16th_century) Prussia and Poland, and was influenced by the cultural, religious, and social contexts of life at the time. He was well educated. At the [[University of Krak󷝝, which he attended in [1491](http://www.academickids.com/encyclopedia/index.php/1491) and [1492](http://www.academickids.com/encyclopedia/index.php/1492), Copernicus studied both mathematics and astronomy in common with all university students of that time. There is evidence that his interest in these subjects continued after he had left [[Krak󷝝.

The Earth-centered [Ptolemaic cosmology](http://www.academickids.com/encyclopedia/index.php/Ptolemaic_cosmology) had been the accepted model of the universe since the [2nd century BC](http://www.academickids.com/encyclopedia/index.php/2nd_century_BC). Ptolemy's model explained each planet's circular motion individually and was the first model of the universe to explain some of the eccentric behaviour of the planets. It maintained that all planetary motion, and the motion of the Moon, the Sun, and the stars was circular, around a stationary Earth.

An accurate calculation of the astronomical year was important to a clergyman, like Copernicus, allowing him to forecast properly the various festivals that comprised the liturgical calendar. The mathematical confusion that Copernicus said caused him to develop an alternative to the geocentric model derived from an inadequate reconciliation of the Aristotelian model and amendments to it by Ptolemy.

The Ptolemaic geocentric model was complicated and inconsistent in Copernicus' estimations and observations, including one in [1497](http://www.academickids.com/encyclopedia/index.php/1497) of the star [Aldebaran](http://www.academickids.com/encyclopedia/index.php/Aldebaran), that did not coincide with predictions made by Ptolemy. Nor did the Ptolemaic model explain [precession](http://www.academickids.com/encyclopedia/index.php/Precession). Precession is the phenomenon by which the Earth's axis "wobbles". This characteristic of the Earth's movement is apparent only with observation over long periods of time. In Copernicus' view, Ptolemy's explanation failed to provide an accurate mathematical description of the universe. His heliocentric universe theory accomplished this by dispensing with individual explanations for the motion of each planet, and replacing them with a description that applied to all the planets, including the Earth.

Copernicus' mathematical experience engendered in his thought a desire for a simpler and more elegant model of the universe. He was acquainted with ideas espoused by other classical authors. Some of the ideas expressed by [Philalaus](http://www.academickids.com/encyclopedia/index.php?title=Philalaus&action=edit) ([5th century BC](http://www.academickids.com/encyclopedia/index.php/5th_century_BC)) and [Heraclides](http://www.academickids.com/encyclopedia/index.php/Heraclides) ([4th century BC](http://www.academickids.com/encyclopedia/index.php/4th_century_BC)), proposed cosmological models in which the Earth moved. [Aristarchus](http://www.academickids.com/encyclopedia/index.php/Aristarchus) ([3rd century BC](http://www.academickids.com/encyclopedia/index.php/3rd_century_BC)) proposed an openly heliocentric model of the universe. Heraclides' description of the revolutions of [Mercury](http://www.academickids.com/encyclopedia/index.php/Mercury_%28planet%29) and [Venus](http://www.academickids.com/encyclopedia/index.php/Venus_%28planet%29) around the Sun might have led Copernicus to consider that the other planets, including the Earth, did the same.

Elegance was a consequence of the overall simplicity of Copernicus' cosmology and much of this seeming simplicity resulted from his retention of circular orbits for the planets around the central Sun. Copernicus used the eccentrics, epicycles, and equants of Ptolemaic cosmology, but added three kinds of motion to describe the observed behaviour of the Earth:

* Annual motion — the yearly orbit around the Sun
* Daily rotation — the motion around a tilted axis that results in day and night
* Precession — the axial wobble mentioned earlier that explains why the position of the fixed stars seems to change over long periods of time.

Until [1543](http://www.academickids.com/encyclopedia/index.php/1543), the year that Copernicus died, and the year in which his *de Revolutionibus* was published, and for many years afterwards, Copernicus' description of the motion of the Earth was not ratified by empirical evidence. In his unauthorized and anonymous preface to *de Revolutionibus*, Andreas Osiander was technically correct when he made reference to "the hypothesis of this work". However, its consistency with the observed behaviour of the universe in a time before the telescope made more detailed observation and the gathering of more accurate measurements practicable, gave the Copernican model its strongest support. Not much more than a century later, [Kepler](http://www.academickids.com/encyclopedia/index.php/Kepler) had certainly despatched the circular orbits of the planets and replaced them with ellipses, but the Copernican heliocentric universe was still intact.

In his own preface to his work, dedicated to Pope Paul III, Copernicus took care to point out that his motives for developing a cosmology that included a moving, rather than a stationary, Earth, were inspired by his dissatisfaction with the mathematical and astronomical descriptions of the geocentric model, and were not intended to defy the written Word. "Mathematics", he says, "is written for mathematicians". Copernicus seems to have been benefited from the attitude of the bishops who were his superiors in the church - [Johann Dantiscus](http://www.academickids.com/encyclopedia/index.php?title=Johann_Dantiscus&action=edit) and [Tiedmann Giese](http://www.academickids.com/encyclopedia/index.php?title=Tiedmann_Giese&action=edit). Both preferred, at least initially, to promote tolerance of differing views within the church rather than open discord, and both encouraged Copernicus' publication of his scientific beliefs. However, the lenient attitudes in [Chelmno](http://www.academickids.com/encyclopedia/index.php/Chelmno), where Copernicus carried out much of his work, began to change and might have contributed to Copernicus' isolation in the last years of his life. For orthodox Catholics, the Copernican model of the universe might have seemed too radically different from the geocentric model, sustained as it was by its agreement with many scriptural references. They might not have been ready to change to an understanding of the Bible as a source only of moral and [spiritual](http://www.academickids.com/encyclopedia/index.php/Spirituality), rather than [scientific](http://www.academickids.com/encyclopedia/index.php/Science), wisdom.

As far as Copernicus was concerned, the Sun, a distinctive element in classical thought, held the central and most important position in the universe, gave added credence to his cosmology. His reverence for the sun can be seen in the most famous passage of *de Revolutionibus*:

"In the center of all rests the Sun. For who would place this lamp of a very beautful temple in another or better place then this from which it can illuminate everything at the same time? As a matter of fact, not unhappily do some call it the lantern; others, the mind, and still others, the pilot of the world. Trismegistus calls it a 'visible God'; Sophocles' Electra, 'that which gazes upon all things.' And so the Sun, as if resting on a kingly throne, governs the family of stars which wheel around."

In this discussion of Copernicus' reasons for discarding such a long-held belief as the geocentric cosmology of Ptolemy, we can see that the Copernican revolution was simmering against a background revolution of theological thought — the Reformation. Neo-Platonic and classical ideas formed the intellectual environment in which Copernicus worked. Although not holding ordained office within the Catholic Church, Copernicus was devout and unwilling to be openly defiant of the Church's teaching, but, in common with supporters of the Reformation, Copernicus was criticizing orthodox theory and belief. His reasons for doing so lay in his dissatisfaction with the inadequacies of the geocentric model, in his strong belief in the truth of the solution to the problem that he developed, its elegance and relative simplicity, and its coincidence with observation and with the classical ideals to which he had subscribed since his youth.

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Quotes

[**Goethe**](http://www.academickids.com/encyclopedia/index.php/Johann_Wolfgang_von_Goethe):

"Of all discoveries and opinions, none may have exerted a greater effect on the human spirit than the doctrine of Copernicus. The world had scarcely become known as round and complete in itself when it was asked to waive the tremendous privilege of being the center of the universe. Never, perhaps, was a greater demand made on mankind - for by this admission so many things vanished in mist and smoke! What became of our Eden, our world of innocence, piety and poetry; the testimony of the senses; the conviction of a poetic - religious faith? No wonder his contemporaries did not wish to let all this go and offered every possible resistance to a doctrine which in its converts authorized and demanded a freedom of view and greatness of thought so far unknown, indeed not even dreamed of."

**Copernicus**:

For I am not so enamored of my own opinions that I disregard what others may think of them. I am aware that a philosopher's ideas are not subject to the judgement of ordinary persons, because it is his endeavor to seek the truth in all things, to the extent permitted to human reason by God. Yet I hold that completely erroneous views should be shunned. Those who know that the consensus of many centuries has sanctioned the conception that the earth remains at rest in the middle of the heaven as its center would, I reflected, regard it as an insane pronouncement if I made the opposite assertion that the earth moves.

For when a ship is floating calmly along, the sailors see its motion mirrored in everything outside, while on the other hand they suppose that they are stationary, together with everything on board. In the same way, the motion of the earth can unquestionably produce the impression that the entire universe is rotating.

“Therefore alongside the ancient hypotheses, which are no more probable, let us permit these new hypotheses also to become known, especially since they are admirable as well as simple and bring with them a huge treasure of very skillful observations. So far as hypotheses are concerned, let no one expect anything certain from astronomy, which cannot furnish it, lest he accept as the truth ideas conceived for another purpose, and depart from this study a greater fool than when he entered it. Farewell.”

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University

Copernicus was honoured by Poland when the [Nicolaus Copernicus University in Toruń](http://www.academickids.com/encyclopedia/index.php/Nicolaus_Copernicus_University_in_Torun), established [1945](http://www.academickids.com/encyclopedia/index.php/1945), was named after him.

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Reference

DC Goodman, CA Russell, eds. *The Rise of Scientific Europe 1500-1800*. Bath, UK: Hodder &

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