

Glossary

Aggregation notation (see place notation): A method of writing numbers that depends upon numerals with fixed values that are to be added up to provide the desired total value, for example, Roman numerals.

Ancilla: Latin for “handmaiden”; compare the English derivative *ancillary*. Used in the history of science to describe the status of the natural sciences relative to theology in the Middle Ages, as enunciated most influentially in the writings of St. Augustine and other Patristics.

Anima motrix: Literally, “motive soul”; according to Johannes Kepler, a motive power located in the sun that pushes the planets around in their orbits.

Archeus: A term coined by Paracelsus but further developed by Van Helmont. In the latter author, the *archeus* was a guiding spiritual principle that maintained the processes and functions of living bodies.

Astrolabe: An observational and calculating instrument, originally of Hellenistic origin but developed in the Arabic world, which allows for the measurement of elevations, the calculation of local time and the rising and setting of bright stars and the sun on any day, and astrological information.

Carolingian: Of or relating to the period or culture under Charlemagne.

Circumscription: In geometry, the practice of drawing one figure as tightly as possible around another; for example, a circle circumscribed around an isosceles triangle touches it at three points.

Collegio Romano: The Roman College of Jesuits, opened in 1565 in Rome; it was both an educational institution and seminary, as well as a place where notable Jesuits carried out natural philosophical studies.

Condemnation of 1277: An order issued in 1277 by Etienne Tempier, the bishop of Paris, banning the masters of the University of Paris from holding or defending 219 propositions considered false, many of them deriving from Aristotle or contrary to Christian teaching on free will, God’s omnipotence, and so on.

Corpus: Latin for *body*, in literary terms, the *body of writings* produced by an author.

Council of Trent: A highly significant meeting of Catholic theologians and hierarchy that took place in the northern Italian city of Trento from 1545 to 1563. The purpose was to address the problem of Protestantism by internal reforms, regularization of doctrine, and measures to prevent further schism.

Creatio ex nihilo: “Creation out of nothing,” an article of Christian faith stressing that God alone is eternal and is the creator of everything.

Deferent: The primary orbit of a planet around its center of motion; the deferent carries the epicycle.

Demiurge: Plato's craftsman god, an eternal but not omnipotent being who organized (equally eternal) matter into the world using the Forms as the blueprint.

Determinism: The idea that future events are pre-determined; there is no free will.

Dualism (Cartesian dualism): The idea that the human being is composed of two distinct entities, a material body and an immaterial soul.

Eccentric: A planetary orbit that is not centered on the geometrical center of the cosmos.

Epicycle: The secondary orbit of a planet, centered on the primary orbit (deferent) around the center of motion. The deferent carries the epicycle; the epicycle carries the planet.

Epistēmē: Greek for "knowledge," specifically the knowledge of what and why a thing is (for example, in medicine, *epistēmē* would be knowledge of the disposition of the internal organs and their functions; compare *technē*).

Epistemology: The study of knowledge; epistemology studies what we know (or can know) and how we know it (or think we know it).

Error of the double truth: An error condemned in 1277 that holds that the same proposition may be true in theology but false in philosophy.

Experimentum crucis: A term used by Newton, literally "experiment of the crossroads," to describe an experiment that allows one to decide definitively between two competing theories.

Forms, Plato's theory of: The notion that material objects are but dim reflections or shadows of idealized immaterial Forms that exist outside of the physical world; these Forms are eternal and unchanging and are vaguely remembered by us from the time before our birth.

Geocentric: Literally, "earth-centered"; used to refer to the Aristotelian, Ptolemaic, and Tyconic systems in which the earth is at the center of the cosmos.

Geokinetic: Literally, "earth moving"; used to refer to cosmic systems in which the earth is in motion, such as the Copernican system.

Geostatic: Literally, "earth stationary"; used to refer to cosmic systems in which the earth is at rest.

Gnōmōn: A stick or pole fixed vertically in the ground for the purposes of measurement, surveying, or astronomical study. For example, the length of the

gnōmōn and the shadow it casts can be used to calculate the elevation of the sun above the horizon. The spine in the center of a sundial is also called a *gnōmōn*.

Hadīth: An accepted and attested saying of the Prophet Muhammed.

Heliocentric: Literally, "sun-centered"; used to refer to the Copernican system. (Actually, Copernicus' system has the sun slightly off center and is more rigorously labeled heliostatic, that is, with a stationary sun.)

Hellenistic: An adjective describing the Greek-dominated world and culture created by Alexander's conquests.

Hexameral literature: Theological writings that comment on the first chapter of Genesis (the "Six Days" of Creation), an important locus for natural philosophical inquiry during the Middle Ages.

House of Wisdom (Bayt al-Hikmah): An institution founded in Baghdad in the eighth or ninth century; it presumably included a depository of records and texts and appears to have been a locus of scholarly activity.

Humanism: A broad-based intellectual movement of the Renaissance characterized by a love of classical antiquity; an interest in texts, textual purity, and elegant literary style; contempt for Scholasticism; and an interest in active civic life.

Hylomorphism: The Aristotelian doctrine that everything is composed of matter (prime matter, or *hylē*) together with form (*morphē*); the matter is the amorphous stuff out of which the thing is made, while form is the constellation of all the qualities of the thing.

Impetus: In medieval physics, the "impressed motion" of an object that keeps it in motion after it has lost contact with the mover. Akin (but not identical) to the modern idea of momentum.

Ius ubique docendi: "The right of teaching anywhere," a right bestowed on recipients of a master's degree in the Middle Ages, guaranteeing them the right to take up residence and offer classes at any university.

Jesuits: The Society of Jesus, a religious order of priests founded by St. Ignatius Loyola and officially recognized in 1540. Their origin and work was initially tied closely with the Counter Reformation; Jesuits paid particular attention to education and scholarly pursuits.

Kinematics: A branch of physics dealing with the study of moving bodies.

Libri naturales: A term given to certain books of Aristotle's that dealt specifically with natural phenomena, such as *On the Heavens*, the *Physics*, the writings on animals, and other (sometimes spurious) works.

Loadstone: A naturally magnetic iron mineral, known today as magnetite.

Madrasa: An Islamic school, generally connected to a mosque.

Magus: A practitioner or student of natural magic.

Mechanical philosophy: A collection of worldviews popular in the seventeenth century, characterized by the vision of the world as a machine in which the sole basis for natural phenomena was matter and motion.

Mercury-Sulphur theory: A theory on the composition of metals, proposed in the writings attributed to Jabir ibn-Hayyan, which states that metals are produced in the earth from the combination of two ingredients called Mercury and Sulphur.

Mesopotamia (lit. “between the rivers”): The area between the Tigris and Euphrates rivers, now largely within Iraq, home to several important civilizations during the first and second millennia B.C.

Minima naturalia: The smallest possible piece of a substance that retains the qualities of the substance.

Monism: The philosophical position that all the varied substances seen in the world are actually, at their fundament, composed of the same stuff.

Mozarabs: Christians of the Iberian peninsula who lived under Muslim rule.

Natural magic: A body of knowledge dealing with the deployment of connections or sympathies/antipathies between objects in the natural world toward useful ends.

Natural place (natural motion): The Aristotelian idea that the four elements have specific places (based on their relative weights) in the sublunary world and move naturally toward those places.

Naturalism: The idea that phenomena in the natural world should be explained using natural causes, not the recourse to miraculous or direct interventions by God.

Occult quality: The hidden qualities of a thing (as opposed to the manifest qualities, namely, those that are recognizable by the senses).

Ontology: The study of being; ontology studies what exists and how it exists.

Parallax: An optical phenomena wherein objects that are closer to the viewer change their positions relative to objects that are further away when the vantage point of the viewer changes.

Philosophers’ Stone: A substance prepared in the alchemical laboratory by a secret process which, when cast upon a quantity of molten metal, transmutes it in a few minutes into pure gold (or silver). The Philosophers’ Stone is first mentioned in the writings of Hellenistic Egypt (c. 300 A.D.) and was a chief pursuit of alchemists down to the 18th century.

Place notation (see aggregation notation): A method of writing numbers that depends upon numerals whose individual values are given by a combination of

their inherent values and their places in the overall numeral (that is, whether in the “tens place” or the “hundreds place”), for example, Arabic numerals.

Platonic solids, or the “perfect polyhedra”: The five solid bodies that are composed entirely of identical faces which are regular polygons, namely, the tetrahedron (triangular faces), the cube (square faces), the octahedron (triangular faces), the dodecahedron (pentagonal faces), and the icosahedron (triangular faces).

Plenum: Latin for “full”; a description of the world in which there is no void space—the universe is absolutely full of matter. A view held by Aristotle and Descartes, among others.

Pluralism: The philosophical position that there is more than one material substratum for the varied substances seen in the world.

Presocratic: Dating from before the time of Socrates (d. 399 B.C.), particularly to refer to a miscellaneous assemblage of Greek thinkers of the sixth to fourth centuries B.C.

Prime matter: In Aristotle’s natural philosophy, the entirely quality-less “stuff” (*hylē*) of which everything is made; prime matter becomes a particular substance or object when wedded to a form (see hylomorphism).

Prisca sapientia: “Original wisdom,” the mass of knowledge which some believed that God had imparted to figures of great antiquity—often biblical patriarchs, such as Adam, Seth, Solomon, and others—and which had become gradually lost or corrupted over time.

Qibla: The direction Muslims face during formal prayer: originally toward Jerusalem but soon changed toward Mecca.

Quadrivium: The four mathematical arts of the classical Roman educational system (the seven liberal arts): arithmetic, geometry, astronomy, and music.

Reductionism: The idea that a maximum number of phenomena or a maximum amount of data should be explained by the minimum number of principles.

Retrograde motion: The backward (east to west) motion through the zodiac that the superior planets (Mars, Jupiter, and Saturn) appear to have during part of the year. It is caused (in modern terms) when the earth “laps” these planets in its annual journey around the sun.

Saving the phenomena: The idea, particularly important in pre-modern astronomy, that the prime function of theoretical systems is to explain the observed phenomena, rather than being necessarily literally true representations of the natural world.

Scholasticism: The philosophy and method of “the Schools,” namely the medieval university, based heavily on Aristotelian writings and logical principles and incorporating a formalized methodology of questions and responses.

Scriptoria: The workshop, usually at a monastic center, used for the copying of manuscripts.

Seminal reasons (*rationes seminales*): Active principles implanted in the world that organize matter into specific forms.

The Sentences: Four books of theological questions and answers written in the mid-twelfth century by Peter Lombard; nearly all subsequent medieval theologians wrote an orderly commentary on the *Sentences*. “Sentences” is a translation of the Latin *sententiae*, which is actually better rendered as “opinions.”

Sexagesimal: A mathematical system using a base of sixty, rather than ten as in our modern decimal notation.

Signatures (doctrine of signatures): The notion that God had “marked” natural objects with signs (“signatures”) that gave clues to their otherwise hidden powers, correspondences, and natures.

Substantial forms: In scholastic philosophy, the sum total of the qualities of a thing that make it what it is.

Syriac: A Semitic language of the Levant, the official language of several Christian liturgies and of the Nestorians.

Technē: Greek for craft or art; specifically, knowledge of how to do or produce something (for example, in medicine, *technē* would be the knowledge of how to perform a particular operation or cure a particular illness; compare *epistēmē*).

Transmutation: In alchemy, the conversion of one metal into another, usually a base metal (lead, tin, mercury, copper, or iron) into a noble one (gold or silver). See Philosophers’ Stone.

Tridentine: Of or relating to the Council of Trent.

Trivium: The three verbal arts of the classical Roman educational system (the seven liberal arts): grammar, rhetoric, and dialectic (or logic).

Tychonic system: A cosmological system proposed by Tycho Brahe in 1588 as an alternative to the Ptolemaic and Copernican systems. According to the Tychonic system, the earth is located at the center, the moon and sun move in orbits around the earth, but the planets revolve on orbits around the sun.

Zodiac: A narrow band in the sky to which the motions of the planets, sun, and moon are restricted. This band is traditionally divided into twelve constellations—the “natal” constellations, Aries to Pisces—and into twelve astrological “houses”—regions that govern particular aspects of terrestrial existence.