

Glossary

almanac: A list of solstices, equinoxes and various lunar and planetary phenomena (e. g. syzygies, first and last visibilities, retrogradations) that occur during a year.

altitude: One of the horizontal coordinates. It is measured in degrees perpendicularly north (+*h*) or south (−*h*) of the horizon. The measurement starts from the horizon.

altitude circle: Any great circle on the celestial sphere that goes through the poles (i. e. the zenith and the nadir) of the horizon and cuts perpendicularly the horizon.

apogee: The point on the path of a celestial body around the Earth or the point on a celestial body's eccentric or epicycle that is the furthest from the Earth.

apparent motion: The motion of a celestial body in the sky as seen from the Earth.

appearance: A phenomenon, i. e. an apparent event (sc. in the heaven).

apsidal line: The straight line that joins the apogee of a circle to the diametrically opposite perigee – the apogee and the perigee are also called the “apsides”.

arcus visionis: The smallest negative altitude of the Sun for which Mercury/Venus/Mars/Jupiter/Saturn is visible just above the (eastern or western) horizon. The value of the *arcus visionis* is reckoned always positive, is different for each planet and varies with the geographical latitude of the observation place.

ascension: One of the equatorial coordinates. It is measured in hours (from 0h to 24h) eastward along the celestial equator. The measurement starts from the meridian that cuts perpendicularly the celestial equator at the vernal equinoctial point (Aries 0°).

azimuth: One of the horizontal coordinates. It is measured in degrees eastward along the horizon. The measurement usually starts from the north point of the horizon

conjunction: The angular distance of 0° between two celestial bodies, that is, the celestial bodies have the same ecliptic longitude.

- **conjunction, inferior:** This applies only to Mercury and Venus. Mercury/Venus is in conjunction with the Sun when it is in retrograde motion. This occurs when Venus/Mercury traverses the perigee part of its epicycle.
- **conjunction, mean:** The angular distance of 0° between two mean planets, that is, two planets are said to be in mean conjunction when they have the same mean ecliptic longitude.
- **conjunction, superior:** This applies only to Mercury and Venus. Mercury/Venus is in conjunction with the Sun when it is in direct motion. This occurs when Venus/Mercury traverses the apogee part of its epicycle.
- **conjunction, true:** The angular distance of 0° between two true planets, that is, two planets are said to be in true conjunction when they have the same true ecliptic longitude.

coordinates: A set of numbers used for the determination of the position or motion of a body on a map, graph, etc.

- **coordinates, ecliptic:** A set of numbers (λ , β) used for the determination of the position or motion of a celestial body with respect to the ecliptic: λ longitude, β latitude.
 - **coordinates, equatorial:** A set of numbers (α , δ) used for the determination of the position or motion of a celestial body with respect to the celestial equator: α ascension, δ declination.
 - **coordinates, horizontal:** A set of numbers (a , h) used for the determination of the position or motion of a celestial body with respect to the local horizon: a azimuth, h altitude.
- culmination:** The moment when a celestial body crosses the meridian of an observation place.
- declination:** One of the equatorial coordinates. It is measured in degrees perpendicularly north (+ δ) or south (– δ) of the celestial equator. The measurement starts from the celestial equator.
- deferent:** Any circle, either eccentric to or homocentric with the Earth, which carries another circle, i. e. an epicycle.
- direct motion:** The apparent motion of a celestial body towards the subsequent zodiac signs.
- eccentric circle/eccenter:** Any circle encompassing the Earth whose center is not the center of the Earth.
- eccentricity:** The linear distance between the center of the universe, where the Earth lies, and the center of an eccenter.
- ecliptic:** The great circle on the celestial sphere which is the projection of the Sun's path as seen from the Earth onto the surface of the celestial sphere. In Greek texts, the ecliptic is called the “circle through the middles (of the zodiac signs)”.
- elongation:** The angular distance between the Sun and another celestial body, under the assumption that they both lie in the plane of the ecliptic, i. e. the absolute difference between their ecliptic longitudes.
- epicycle:** Any circle whose center moves along the circumference of another circle encompassing the Earth. In Greek astronomical models, the size of the latter, i. e. the so-called deferent, is always greater than the size of the epicycle.
- ephemerides:** In a narrow sense, an astronomical table that lists day-by-day positions of a celestial body. In a broad sense, an astronomical table that lists either positions of a celestial body at equidistant time intervals (e. g. month-by-month positions) or the times and positions of successive occurrences of the same appearance related to some celestial body (e. g. conjunctions of the Sun with the Moon, planetary stations) over a great time interval.
- equant, circle:** In the Ptolemaic models for Mercury, Venus, Mars, Jupiter and Saturn, an eccentric circle other than the eccentric deferent of a planet's epicycle around which the epicycle center is supposed to perform a uniform motion.

equant, point: The point with respect to which the epicycle center of Mercury/Venus/Mars/Jupiter/Saturn performs a uniform motion. This point is neither the center of the eccentric deferent nor the center of the universe.

equator, celestial: The great circle on the celestial sphere that is at an equal distance from either pole of the celestial sphere, that is, the celestial equator is perpendicular to the axis of the celestial sphere. The celestial equator lies in the same plane as the terrestrial equator.

equinoctial point (vernal, autumnal): One of the two points where the ecliptic cuts the celestial equator. The vernal equinoctial point lies at Aries 0° . The autumnal equinoctial point lies at Libra 0° .

equinox (vernal, autumnal): The time when the Sun is located at one equinoctial point. The vernal equinox is the time when the Sun reaches the vernal equinoctial point. The autumnal equinox is the time when the Sun reaches the autumnal equinoctial point.

great circles: Any circle on the celestial sphere which cuts it into two equal hemispheres. The ecliptic, the equator, the meridian, the horizon and the altitude circle are great circles.

horizon: Any great circle on the celestial sphere which cuts it into an upper (i. e. above the plane of the horizon) visible hemisphere and a lower (i. e. below the plane of the horizon) invisible hemisphere. The horizon varies with the geographical latitude of the place of observation (local horizon).

hour, equinoctial: $1/24$ of a mean day. It is a constant unit of time.

hour, seasonal: $1/12$ of daytime or nighttime. Since daytime and nighttime vary in the course of the year, seasonal hour is a varying unit of time.

hypothesis, astronomical: In Greek astronomical contexts, the term “hypothesis” (ὕποθεσις) has two meanings: 1. A geometrical-kinematic explanatory system consisting of circles, typically eccentric(s) and/or epicycle (i. e. eccentric, epicyclic, eccentrepicyclic hypothesis). 2. A geometrical-kinematic system of circles together with the numerical values assigned to specific components of it (see “parameter”); in other words, an astronomical model. – When I use the term “model”, I refer in particular to the second meaning.

latitude, ecliptic: One of the ecliptic coordinates. It is measured in degrees perpendicularly north ($+\beta$) or south ($-\beta$) of the plane of the ecliptic. The measurement starts from the ecliptic.

latitude, geographic: One of the geographic coordinates. (These are used for the determination of a position on the Earth’s surface. Longitude is the other geographic coordinate.) It is measured in degrees perpendicularly north ($+\varphi$) or ($-\varphi$) south to the plane of the terrestrial equator. The measurement starts from the terrestrial equator.

limit (northern, southern): One of the two points on a circle oblique to the ecliptic which are the furthest from the plane of the ecliptic to the north and south. The two limits are at diametrically opposite positions, and at a distance of 90° from either

node. In the case of a fixed inclination of the oblique circle to the ecliptic, the northern limit is the limit that has positive latitude, whereas the southern limit is the limit that has negative latitude. For the sense in which the limits are called “northern” and “southern” in the case of a non-fixed inclination of the oblique circle to the ecliptic, see the comments on *Hyp.* V § 95. The solstitial points are sometimes called “limits” – in this case, the limits are said with respect to the plane of the celestial equator.

longitude, ecliptic: One of the ecliptic coordinates. It is measured in degrees eastward along the ecliptic. The measurement (normally) starts from the vernal equinoctial point.

longitude, sidereal: A celestial coordinate similar to the ecliptic longitude. It is also measured in degrees eastward along the ecliptic, but the reference point for the measurement is not the vernal equinoctial point but a specific fixed star.

meridian, celestial: Any great circle on the celestial sphere that goes through the poles of the celestial sphere (i. e. the northern and the southern celestial pole) and cuts perpendicularly the celestial equator. Every celestial meridian corresponds to a specific terrestrial meridian (local meridian).

model, astronomical: See the second sense of “hypothesis, astronomical”, i. e. a system of circles together with its parameters.

motion in breadth: (Strictly speaking, a non-technical term, but one frequently used by ancient authors.) The motion of a celestial body with respect to its varying angular distance from a specific plane of reference, i. e. the plane of the celestial equator or the plane of the ecliptic or the plane of the horizon.

motion in depth: (Strictly speaking, a non-technical term, but one frequently used by ancient authors.) The motion of a celestial body with respect to its varying linear distance from the Earth.

motion towards the preceding zodiac signs: The westward motion along the ecliptic, i. e. in the direction of decreasing longitude.

motion towards the subsequent zodiac signs: The eastward motion along the ecliptic, i. e. in the direction of increasing longitude.

nodal line: The line which joins the two nodes of an oblique circle, i. e. the line at which the plane of the ecliptic and the plane of the oblique circle intersect one another.

node (ascending, descending): One of the two points of intersection between the ecliptic and a circle oblique to the ecliptic. The nodes are at diametrically opposite positions and at a distance of 90° from either limit of the oblique circle. In the case of a fixed inclination of the oblique circle to the ecliptic, the node which the epicycle passes by in order to be found to the north of the plane of the ecliptic is the ascending node. The node which the epicycle passes by in order to be found to the south of the plane of the ecliptic is the descending node. For the sense in which the nodes are called ascending and descending in the case of a non-fixed inclination of the oblique circle to the ecliptic, see the comments on *Hyp.* V § 95.

opposition: The angular distance of 180° between two celestial bodies, that is, the celestial bodies lie at diametrically opposite longitudinal positions.

- **opposition, mean:** The angular distance of 180° between two mean planets, that is, two planets are said to be at mean opposition when their mean ecliptic longitudes are 180° apart.

parallax: The difference between the apparent position of a celestial body as seen from the surface of the Earth and its true position as if it were seen from the center of the Earth.

parameter: The numerical value for a specific component of an astronomical hypothesis. Parameters are determined on the basis of observations. In the context of ancient astronomy we do not find a strict equivalent of the term “parameter” in its modern sense.

- **parameter, angular:** The numerical value referring to the constant angular speed at which either a celestial body performs a specific kind of motion or a component (e.g. node, apogee) of an astronomical hypothesis moves.
- **parameter, linear:** The numerical value referring to the linear distance between two components of an astronomical hypothesis (e.g. eccentricity).

perigee: The point on the path of a celestial body around the Earth or the point on a celestial body’s eccentric or epicycle that is the closest to the Earth.

period of invisibility/visibility: The number of successive days during which one of the five planets is invisible/visible to an observer, while the Sun is above/below the horizon.

period of return: The time taken by a celestial body to return to the same specific position.

- **period of return in anomaly (anomalous period):** The time taken by a celestial body to return to the same distance from the Earth, i.e. to the same angular speed.
- **period of return in elongation (synodic period):** The time taken by a celestial body to return to the same relative position with respect to the Sun.
- **period of return in latitude (draconitic period):** The time taken by a celestial body to return to the same latitudinal position.
- **period of return in longitude (tropical period):** The time taken by a celestial body to return to the same longitudinal position.
- **period of return sidereal:** The time taken by a celestial body to return to the same position along the ecliptic with respect to a specific fixed star.

period relations: The arithmetical correlation between two or more sorts of periods of return which refer either to the same celestial body or to different celestial bodies.

phase: Any particular appearance of the Moon or a planet or a fixed star with respect to their apparent position relative to the Sun.

planets: In a broad sense, the “wandering” celestial bodies/stars (i.e. the Sun, the Moon, Mercury, Venus, Mars, Jupiter and Saturn) as opposed to the “non-wandering” celestial bodies/stars, i.e. the so-called fixed stars. In a narrow sense, Mercury, Venus, Mars, Jupiter and Saturn; the so-called five planets.

- **planets, inferior (inner):** Mercury and Venus.
- **planet, mean:** The fictitious planet, as opposed to the true planet, which is supposed to move uniformly around a circle homocentric with or eccentric to the Earth at an angular speed equal to the mean angular speed in longitude of the true planet. The mean planet is represented by the center of the epicycle of the true planet.
- **planets, superior (outer):** Mars, Jupiter and Saturn.

precession (precessional motion): The slow eastward motion of the sphere of the fixed stars around the poles of the ecliptic, i. e. their eastward motion with respect to the solstitial and equinoctial points.

progression: The direct motion.

retrogradation (retrograde motion): The apparent motion of Venus, Mercury, Mars, Jupiter and Saturn towards the preceding zodiac signs.

retrograde arc: The arc of Venus'/Mercury's/Mars'/Jupiter's/Saturn's epicycle that is traversed by the planet when the planet appears to have a retrograde motion in the sky.

rising, evening: In the case of a fixed star or an outer planet, the date when it is seen to rise for the last time in the evening after sunset. In the case of an inner planet, the date when it is first seen as an evening star after sunset at the western horizon, after a period of invisibility.

rising, morning: The date when a fixed star or one of the five planets is seen to rise for the first time at dawn before sunrise, after a period of invisibility.

setting, evening: The date when a fixed star or one of the five planets is seen to set for the last time in the evening after sunset.

setting, morning: In the case of a fixed star or an outer planet, the date when it is seen to set for the first time at dawn before sunrise. In the case of an inner planet, the date when it is last seen as a morning star before sunset at the eastern horizon.

solstice (summer, winter): The time when the Sun is located at one of the two solstitial points. Summer solstice is the time when the Sun reaches the summer solstitial point. Winter solstice is the time when the Sun reaches the winter solstitial point.

solstitial point (summer, winter): One of the two points of the ecliptic where the Sun reaches its northernmost and southernmost position with respect to the celestial equator. Either of the solstitial points is at a distance of 90° from either of the equinoctial points. The northern solstitial point is called "summer solstitial point" and lies at Cancer 0° . The southern solstitial point is called "winter solstitial point" and lies at Capricorn 0° .

sphaera recta: The case in which the celestial equator is perpendicular to the horizon: then, the celestial poles lie exactly at the horizon.

sphaera obliqua: The case in which the celestial equator is inclined to the horizon: then, one of the celestial poles lies above the horizon.

station (first, second): The position in the sky where a planet that exhibits retrograde motion appears to stand still and shifts either from direct motion to retrograde motion (first station) or from retrograde motion to direct motion (second station).

stationary point (first, second): One of the two points on Venus'/Mercury's/Mars'/Jupiter's/Saturn's epicycle at which the planet lies when it appears to be stationary in the sky. The so-called first stationary point corresponds to the first station, while the so-called second stationary point corresponds to the second station.

synodic appearance: Any particular appearance of the Moon or a planet with respect to their apparent position relative to the Sun.

synodic cycle: Any cycle of synodic appearances of the Moon or one of the five planets.

synodic period: The period of a single synodic cycle, i. e. the time interval between one specific synodic appearance and the next synodic appearance of the same kind.

syzygy: The alignment of the Sun and the Moon, i. e. the Sun and the Moon are either in conjunction or in opposition.

turning: The reversal of direction of the Sun's motion from northward to southward and vice versa.

turning point: The solstitial point or limit of the Sun's path.

uniform motion: The motion of a body in a circular path at a constant angular speed.

visibility, first: The first appearance of a fixed star or one of the five planets in the nocturnal sky after a period during which it was not visible at all, that is, the first visibility marks the change from a period of invisibility to a period of visibility.

visibility, last: The last appearance of a fixed star or one of the five planets in the nocturnal sky after a period during which it was visible, that is, the last visibility marks the change from a period of visibility to a period of invisibility.

zenith: The visible pole of the horizon, i. e. the point of the sky that is directly above one's head.

zenith distance: The angular distance between a celestial body and the zenith, as seen from the Earth.

zodiac circle: The circular band of fixed stars extending to the north and to the south of the ecliptic (i. e. the ecliptic is supposed to lie in the middle of the zodiac circle), against the background of which the Sun, the Moon and the five planets appear to move. The breadth of the zodiac circle was taken to be 12° .

zodiac constellation: A group of specific stars lying in the zodiac circle.

zodiac sign: Each of the twelve equal parts into which the zodiac is divided. Each zodiac sign equals 30° and was named after the zodiac constellation which lied within it. In antiquity, the zodiac constellations and the zodiac signs almost coincided.

