

$(JF^2)^2!$

2015, March 21

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The Saros cycle

The Greek astronomer, Meton (c. 400 B.C.) noted that the Moon exhibits the same phases on the same day of the month (eg. New Moon on March 20) at intervals of 18.6 years; this is known as the Metonic cycle.

A similar phenomenon, also due to the regression of the nodes of the lunar orbit (see our discussion in class), is the Saros cycle. Similar solar and lunar eclipses take place at intervals of 223 synodic months (18 years 10 days); since the precise Saros interval is 6585.32 days, we must wait three Saros cycles to see an eclipse repeat at the same place on Earth.

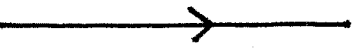
⊛ Nodes: the points at which the orbit of the Moon, a planet, comet or asteroid, cuts the plane of the Ecliptic (the plane of the solar system).

When the body moves from the South to the North of the Ecliptic, it passes the ascending node and from the North to the South side it passes the descending node.

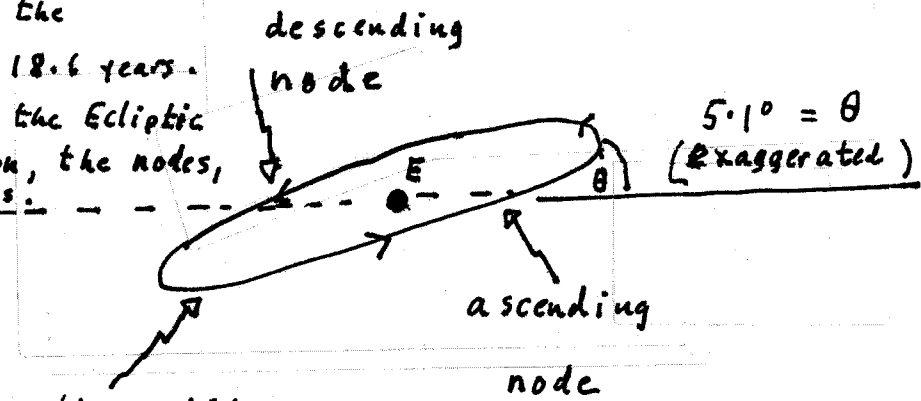
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From "nōdus" — knot

the direction of light from the sun

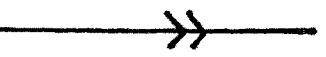


Eclipses occur when the shadow of the Moon falls upon the Earth, or when the shadow of the Earth falls upon the Moon. In the first case, the Sun is eclipsed; in the second, the Moon. Once every month, the Moon is in conjunction with the Sun. Nevertheless, eclipses of the Sun do not occur every month. If the Moon lies above or below the Ecliptic, its shadow would not fall upon the Earth, even if the order of the three is Sun — Moon — Earth. Similarly, when the order is Sun — Earth — Moon a lunar eclipse will not be observed if the Moon is below or above the plane of the Ecliptic. In effect, the attraction of the Sun causes the lunar orbit to gyrate in such a way that the perpendicular to the orbital plane describes a cone once in 18.6 years. The inclination of the orbit of the Moon to the Ecliptic remains at 5.1° , but the points of intersection, the nodes, slide westward, the regression of the nodes.



the plane of the Solar System (the Ecliptic), or the line joining the centres of the Earth and the Sun.

the orbit of the Moon around the Earth. Its inclination to the Ecliptic is 5.1° . The diagram, for the sake of clarity, is exaggerated.



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