

## 10.3: Some Additional Angles

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The sum of the two angles  $\Omega$  and  $\omega$  is often given the symbol  $\varpi$  (a form of the Greek letter pi), and is called (not entirely accurately) the *longitude of perihelion*. It is the sum of two angles measured in different planes.

The angle  $v$ , measured from perihelion to the planet, is the *true anomaly* of the planet at some time. We imagine, in addition to the true planet, a “mean” planet, which moves at constant angular speed  $2\pi/P$ , so that the angle from perihelion to the mean planet at time  $t$  is  $M = \frac{2\pi(t-T)}{P}$ , which is called the *mean anomaly* at time  $t$ . The words “true” and “mean” preceding the word “anomaly” refer to the “true” planet and the “mean” planet.

The angle  $\theta = \omega + v$ , measured from FIND SYMBOL, is the *argument of latitude* of the planet at time  $t$ .

The angle  $l = \Omega + \theta = \Omega + \omega + v = \varpi + v$  measured in two planes, is the *true longitude* of the planet. This is a rather curious term, since, being measured in two planes, it is not really the true longitude at all. The word “true” refers to the “true” planet rather than to the longitude.

Likewise the angle  $L = \Omega + \omega + M = \varpi + M$  is the *mean longitude* (i.e. the “longitude” of the “mean” planet.).

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