

Exemplar Informational Texts: Science, Mathematics, and Technical Subjects – Circumference: Eratosthenes and the Ancient Quest to Measure the Globe

**Nicastro, Nicholas. *Circumference: Eratosthenes and the Ancient Quest to Measure the Globe*. New York: St. Martin's Press, 2008. (2008)
From "The Astrolabe"**

The astrolabe (in Greek, "star reckoner") is a manual computing and observation device with myriad uses in astronomy, time keeping, surveying, navigation, and astrology. The principles behind the most common variety, the planispheric astrolabe, were first laid down in antiquity by the Greeks, who pioneered the notion of projecting threedimensional images on flat surfaces. The device reached a high degree of refinement in the medieval Islamic world, where it was invaluable for determining prayer times and the direction of Mecca from anywhere in the Muslim world. The astrolabe was introduced to Europe by the eleventh century, where it saw wide use until the Renaissance.

The fundamental innovation underlying the astrolabe was the projection of an image of the sky (usually the northern hemisphere, centered on Polaris) on a plane corresponding to the earth's equator. This image, which was typically etched on a brass plate, was inserted into a round frame (the mater) whose circumference was marked in degrees or hours. Over the plate was fitted a lattice-work disk, the rete, with pointers to indicate the positions of major stars. A metal hand, similar to those on a clock, was hinged with the rete at the center of the instrument, as was a sighting vane (the alidade) for determining the angular height of the stars or other features, such as mountaintops. The entire device was usually not more than six to eight inches in diameter and half an inch thick.

One common use of the astrolabe was to determine the time of day, even after dark.

Other uses included determination of sunrise, and sunset times for any date past or future, predicting eclipses, finding important stars or constellations, and measuring the height of earthbound objects and the circumference of the earth. For this and other reasons, the astrolabe has been called "the world's first personal computer."