APPENDIX H
ACTIVITY #3 – THE EQUATION OF TIME

Observers will find it least complicated to begin Activity #3 with the values of Declination and Hour Angles from Activity #2.

The system of reckoning time is based on some basic definitions and concepts:
- The "Celestial Meridian" is the great circle on the Celestial Sphere, which contains both the north and south celestial poles and the observer's zenith. It intersects the observer's horizon at true north (0° azimuth) and true south (180° azimuth). Objects on the Celestial Sphere appear to culminate (i.e., they reach maximum altitude) when they pass through the Celestial Meridian.
- A "solar day" is that duration between successive culminations of the Sun (i.e., between successive solar maximum altitudes). This duration varies throughout the year because the speed of the Sun appears to vary throughout the year. The "solar day" is the basis of "sundial time."
- A "mean solar day" is a day based on the average motion of the Sun such that the Sun returns to the same point in the Sky when the Earth completes one revolution around the Sun (see below). The "mean solar day" is the basis of "clock time."
- A "year" is the time required for the Earth to complete one revolution around the Sun. This time is usually measured relative to the stars, and is referred to as a *Sidereal Year*, which is equivalent to approximately 365¼ mean solar days.

The Equation of Time is the difference between actual solar time, as indicated by the actual position of the Sun in the sky, and "Clock Time," which is based on the average movement of the Sun. By convention, the Equation of Time is positive when the Sun is west of Celestial Meridian (i.e., "fast"), and negative when the Sun is east of the Celestial Meridian (i.e., "slow").

As the mean Sun takes 24 clock hours to go from noon-to-noon (i.e., 360° of _perceived_ rotation around the Earth's axis of rotation), the Hour Angle may be used to calculate the Equation of Time.

Equation of Time = (Hour Angle) * (60 clock minutes) / (15° of *perceived* rotation)
(in clock minutes)

Observer's should report the plot of the Equation of Time (in clock minutes) vs. Day of the Year (Jan 1 is Day #1).

Additional Links