

Notes on Time and Astronomy

Measuring Days by the Sun

Apparent Solar Time: This is also called Sundial Time. This is time measured by the actual motion of the Sun across the sky as seen from your location. Noon occurs when the sun reaches the local meridian. Locations east of you have an apparent time that is later than yours; western location have an apparent time that is earlier than yours. Since the orbit of the Sun is not a perfect circle the rate of Apparent Solar Time varies through the year.

Local Mean Solar Time (LMT): LMT is time based of the motion of a fictional average or “mean” Sun. Using the average motion of the Sun keeps the rate of LMT constant. LMT varies from Apparent Solar Time by up to 16 min at certain times of the year. The LMT of the Greenwich meridian is called Universal Time (UT).

Standard Time: This is time measured by time zones. The Earth is divided into 24 zones. Each zone is 15 degrees of longitude wide. Every clock in the same zone keeps the LMT for the meridian in the middle of the zone. The time zone for the western half of Kentucky is the “S” zone also known as the Central Time Zone. The middle of the Central Time Zone is longitude 90 degrees west. The Central Time Zone is 6 hours behind UT.

Daylight Savings Time: The idea behind daylight savings time is to advance Standard Time by one hour to give more daylight to the end of the day. Areas that use Daylight Savings Time begin using it at 2 am on the first Sunday in April and return to Standard Time at 2 am on the last Sunday in October.

International Date Line: Standard Time advances by one hour per zone as you travel east and goes back one hour for each zone you travel west. A traveler could travel far enough to go into yesterday or move into tomorrow! To keep this from happening the Earth has an International Date Line. Any person crossing it from east to west gains one day. Crossing the line from west to east causes you to lose one day.

Julian days: measuring the number of days between any two days can be extremely difficult. For this reason the date January 1 4713 BC was designated as Julian day Number 1. Each day since then has been given a consecutive number increasing by one each day.

Beyond the Day

The Week: The days of the week are named after the Sun, Moon and naked eye planets. In many languages

Day (English)	Origin	French	Spanish
Monday	Moon	Lundi	Lunes
Tuesday	Mars-Anglo-Saxon Tiw	Mardi	Martes
Wednesday	Mercury- Anglo-Saxon Woden	Mercredi	Miercoles
Thursday	Jupiter- Anglo-Saxon Thor	Jeudi	Jueves
Friday	Venus- Anglo-Saxon Frica	Vendredi	Viernes
Saturday	Saturn	Samedi	Sabado
Sunday	Sun	Dimanche	Domingo

The traditional first day of the week was once Sunday. The civil calendar now starts with Monday.

Lunar Month: Also called a Synodic Month. It is the time it takes for the Moon to go through a full range of phases. A Lunar Month is about 29.5 days long. Some societies arrange calendars to have alternating

Lunar Months of 29 and 30 days. Many cultures define the Lunar Month to start on the first day a Crescent Moon can be seen.

Lunar Year: Some calendars try to match the Lunar Month with the Solar year by making a year of 12 Lunar Months. A year of 12 Lunar Months is only 354 days long. The Islamic calendar ignores the difference. The Jewish calendar mixes short years with extra long years to keep the calendar more or less matched with the seasons.

Tropical Year: A Tropical Year is the time it takes for the Sun to travel from one Vernal Equinox to the

Event	Date	By Sunrise	By Time	By Noon Sun
Vernal Equinox	March 21	Due East	12 hr Day and Night	Midway Between Extremes
Summer Solstice	June 21	Most North East	Longest day	Highest for Year
Autumnal Equinox	Sept. 23	Due East	12 hr. Day and Night	Midway Between Extremes
Winter Solstice	Dec. 22	Most South East	Shortest Day	Lowest for Year

The Gregorian, Julian, and other Lunar and Solar calendars use a predetermined system of days and weeks adjusted by various intercalary days to keep the calendar in step with the annual motion of the Sun. The Gregorian Calendar leap day in February every 4 years is an intercalary day.