Calendars

We have 2 obvious objects in the sky to judge time, the Sun and the Moon. Thus we have 3 natural measures of time: 1 rotation of the Earth (a day), 1 orbit of the Moon around the Earth (a ‘moonth’ or month), 1 orbit of the Earth around the Sun (a year). Every other measurement of time, (hours, weeks etc.) is artificially created by us.

<table>
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<th>Solar calendar</th>
<th>Lunar calendar</th>
<th>Luni-solar calendar</th>
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<tr>
<td><strong>Explanation</strong></td>
<td>Measured in years</td>
<td>Measured in moons</td>
<td>Measured in years, with adjusted months</td>
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| **Advantages**         | • Accurate to the year (you can reliably know, when to plant crops in the spring and harvest at the end of summer) | • Simple- Moon phases easy to observe thus reliable.  
• Convenient blocks of time (New Moon to new moon is 29.5 days rather than 365.24) | • accurate to the year and uses convenient blocks of time. |
| **Disadvantages**      | • Inconveniently large block of time.  
• hard to judge when the Sun around (it often takes several days before you can determine that the days are really getting longer) | • Not accurate to the year -a 12 moon calendar is only 354 days. A 13 moon calendar is 384 days  
• A lunar calendar either loses 11 days a year or a complex series of adjustments have to be made | • compromises between number of moons and length of year, so months are no longer new Moon to new Moon. |
| **Users**              | Ancient peoples (prehistoric)  
Early Roman  
Civil Mayan and Aztec (18 months of 20 days each, plus 5 sacrifice/unlucky days) | Islamic calendar (11 days too short. Ramadan falls earlier each year)  
Jewish/ Babylonian (complex alternation between 12 and 13 moon years)  
Traditional Chinese (add an extra month every 19 years) | Egyptian  
Lakota/Cheyenne and other plains peoples  
Later Roman (Julian) => Christian Europe  
=>Modern western nations (Gregorian)  
Chinese govt. calendar |

There are some remarkable cultures that use calendars based on constellation positions instead of, or as well as, more common luni-solar calendars

| Stellar Calendars | Venus -Sacred Mayan (260 days), Dogon people, Mali  
Pleiades/Star groupings - Egyptian (flood season), Sub-Saharan Africa,  
Bright stars in specific constellations - many Native American peoples. |

For more on calendars and the history of our own modern calendar go to: http://calendopedia.com/ or http://www.webexhibits.org/calendars/index.html
I. Horizon System

1. Zenith: A point directly overhead.

2. Nadir: A point directly below.

3. Meridian: A line that is in the middle of the sky running north to south.


5. Azimuth: An angle measured along the horizon eastward, starting at the North point.
   
   North = 0 and 360 degrees
   East = 90 degrees
   South = 180 degrees
   West = 270 degrees

6. Altitude: An angular distance above the horizon
   
   Horizon = 0 degrees
   Zenith = 90 degrees.
II. Equatorial System

1. Ecliptic: Apparent path of the sun in the sky.

2. Celestial Equator: Projection of the Earth's equator into the sky that divides the sky into a northern and southern hemisphere.

3. Declination: An angular measure north or south of the equator.
   
   Equator = 0 degrees
   North pole = + 90 degrees
   South pole = - 90 degrees

4. Right Ascension: An angle measured along the equator eastward, starting at the Vernal Equinox (where the equator crosses the ecliptic)
   The angle is measured in hours from 0 to 24

III. Conversion Method between Altitude and Declination

Distance from the zenith = Your latitude - Declination of object

   = 37 - Dec.

If the answer is a + number, then the object is south.
If the answer is a - number, then the object is north.
View of the Sun Across the Earth (variation with Latitude)
Phases of the Moon