

Group Members:

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## Sunrise, Sunset

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This activity looks at the basic reasons for the seasons. You will measure the position of the Sun in the planetarium at sunrise, noon and sunset on four key days during the year. You will also determine the number of hours of daylight on these dates.

Your instructor will set the planetarium for the first day of each of the four seasons. Azimuth can be used to measure the position of the Sun at sunrise and sunset. Azimuth is measured around the horizon. The horizon is circular and there are  $360^\circ$  around the circle. Due north is  $0^\circ$  azimuth. Due east is  $90^\circ$ , due south  $180^\circ$  and due west  $270^\circ$ . Markers on the planetarium horizon mark every  $10^\circ$  of azimuth. Use these markers estimate the sunrise/sunset position to the nearest degree. Use the center of the Sun for your measurements.

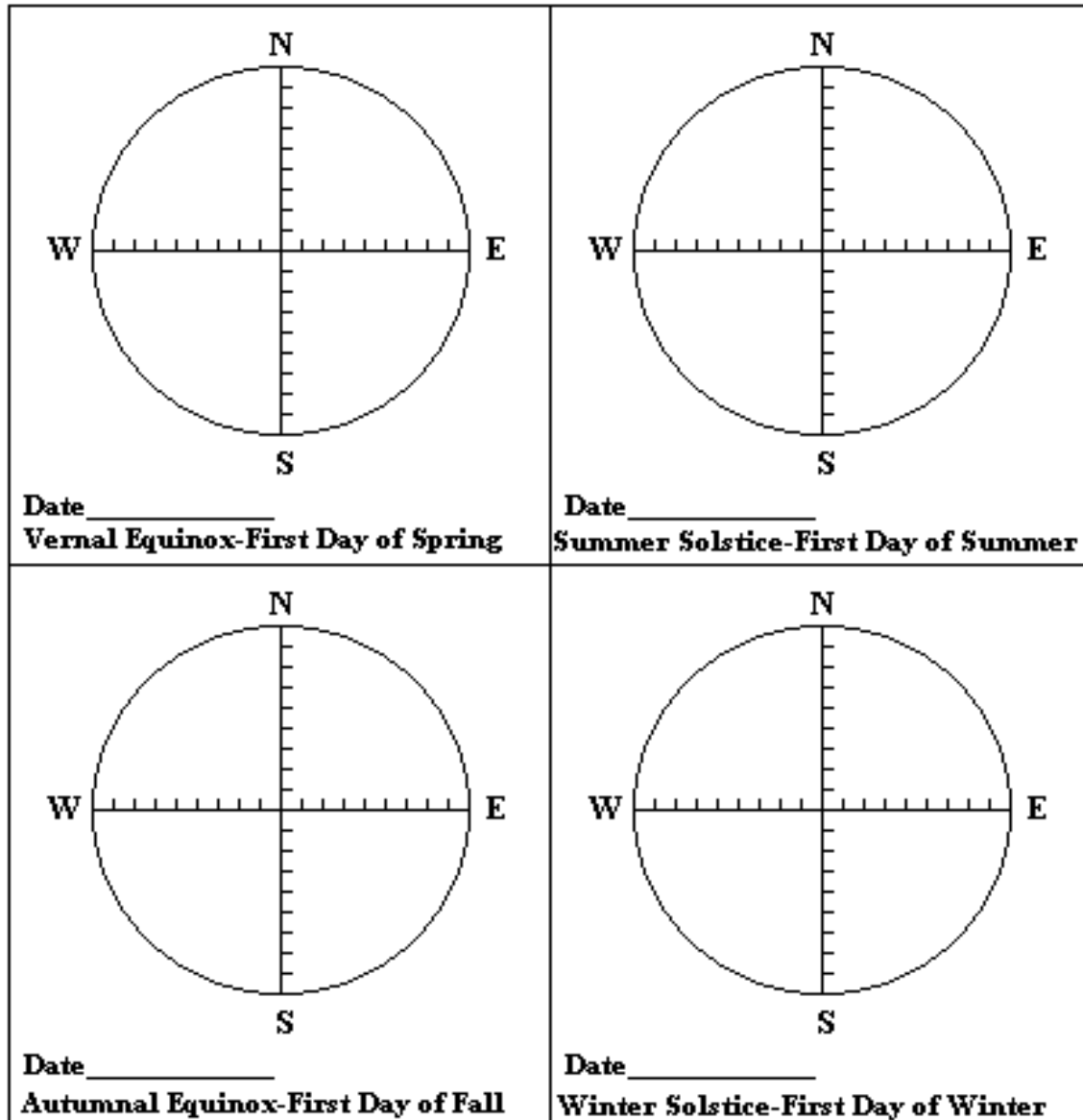
The coordinate grid can be used to estimate the number of hours of daylight. Note that there are 24 hours of right ascension and it takes the Earth 24 hours to rotate once compared to the Sun. So the movement of each hour of right ascension past the meridian takes one hour of time. Count the number of hours it takes to move from sunrise to sunset to obtain the number of hours of daylight for each of the four dates.

The altitude of the Sun at noon will be measured using the meridian. The meridian is the line running from north to south through the zenith. It reads zero degrees at the horizon and  $90^\circ$  at the zenith. Record the altitude of the sun at noon on the four dates in the table below.

Sun Position Data Table

Date	Azimuth Sunrise	Azimuth Sunset	Altitude of Sun at Noon	Hours of Daylight
March 21				
June 21				
September 21				
December 21				

The diagrams below represent the sky on the first day of each season. Using the data from the table above indicate the apparent path of the Sun for each season. You can use a protractor to measure the azimuth position of the Sun for sunrise and sunset. Mark the position of the Sun for noon. The hash marks along the meridian and the E-W line indicate degrees; each mark is 10°. Remember that there are 90° from the horizon to the zenith. Make a smooth curve to represent the daily motion of the Sun across the sky for each diagram.



1. Describe how the position of sunrise and sunset changes over the course of a year.
2. How does the altitude of the Sun at noon change over a year's time?
3. Discuss the annual change in the amount of daylight.
4. Based on this activity what two factors cause the temperature variations that we who live in the temperate climates of world experience?
5. Which month of the year should be the warmest? The coldest? Does this agree with your personal experience of the temperate climate? If not, explain why. (Hint: Think of what happens in a swimming pool—temperature wise--at different times during a summer day when a cool evening is followed by a hot day.)