Creating a Horizon Sun Calendar

This activity is for students to do at home. When they complete it, they will have created a Horizon Sun Calendar for a month. According to Gerald Hawkins' theory, Stonehenge also provides such a calendar on a monumental scale, marking special days of the year.

Materials

- Pencil and Paper
- Magnetic Compass
- Watch or Clock

What to Do at Home

1. Select a position where you can observe the setting Sun every evening. Note where on the horizon the Sun sets on a given night. Note exactly where you are standing or sitting when you make your observation. Make a drawing of the horizon in that general area.
2. Using a magnetic compass, mark the compass directions Northwest, West, and Southwest on your drawing.
3. Once or twice a week for the next month, mark the location where the Sun sets for each clear day, and record the date and time of the sunset. Be sure always to make your observations from exactly the same spot.
4. Discuss results in class. Does the Sun set further to the south, further to the north, or in the same place on later days as compared with the first day?
5. When the students have completed the activity, tell them that they have created a Horizon Sun Calendar. On that same month next year, if the Sun is in one of the marked positions, it will tell them what date it is. Suggest that they keep their calendar for a year to see if that is true.

[This activity is also used in PASS, *Native American Astronomy*.]

Going Further

1. After about a month, look at your calendar. Can you find any relationship between the location of sunset and the time of sunset?
2. Observe the same star set each night for a period of about a week. Make a drawing of the horizon and mark the star's setting point along with the date and time. Be sure to observe from exactly the same spot.

Does its setting point change in the same way that the Sun's does?

3. Try to guess where the Sun would set three months later. How about six months later? Mark those guesses on your horizon picture (in pencil). Check your guesses after the months have gone by.
4. Could you devise a way to make a full-year calendar using the information in this activity?
5. Make a Horizon Sun Calendar based on observations of the rising point of the Sun.

6. If possible, note the location of sunset on March 21 or September 21. These are called the "equinox" dates, when day and night are of equal length. The position of sunset on those two days is said to be almost exactly due West.

Does your compass agree? If not, why might they not agree? Which do you think is more accurate?

The compass can be off by 10˚ or more, because of local magnetic fields (buildings, iron ore) and global deviations in the Earth's magnetic field. Sailors must carry charts showing these errors in magnetic compass directions so their navigation will be accurate.

The solar directions on the equinoxes are far more accurate than compasses, although they too are subject to some errors. The Earth's atmosphere, which bends around the globe, "refracts" the Sun's light, like a lens, so that the setting Sun is not exactly where it appears to be. This effect also means that day and night are not exactly the same length, even on the equinox. Finally, since the Earth's orbital period (365.26 days) is not exactly the same as the calendar year (365 days), the date of the equinoxes may vary by a day or so from March 21 and September 21.

7. Gerald Hawkins' theory about Stonehenge implies that ancient people in southern Britain to have been intensely interested in the motions of the Sun throughout the year.

Were ancient people elsewhere interested in the motions of the Sun or other astronomical bodies?

Invite your students to research the astronomical interests of their own ancestors, or of any cultures they find particularly interesting. The references in the bibliography of PASS, *Native American Astronomy* and PASS, *Stonehenge* are good starting points.