

ACTIVITY 6

WHERE DOES THE SUN SET?

Grades :
**4 and
higher**

Level of preparation:
intermediate

Student groupings:
individual

Length:
**5 min each time, total length
of at least one month**

Location of activity:
at home

BRIEF DESCRIPTION

In this activity spanning over several weeks, students observe where the Sun sets on the horizon and record their observations.

LEARNING GOALS

- Observe that the Sun does not always set in the same location on the western horizon.
- Explain how the location where the Sun sets varies depending on the time of year.
- Explain how the time at which the Sun sets varies depending on the time of year.

MATERIALS

- Activity sheet
- Something rigid to write on while outside
- Pencil

INTRODUCTION

We teach children that the Sun rises in the east and sets in the west. But does the Sun always set due west exactly? To investigate, this activity encourages children to watch the sunset over several weeks or months. They will draw their observations on a map of the western horizon that they will draw the first night.

This video shows an example of the changing position of the Sun at sunrise over a full year.

<https://www.youtube.com/watch?v=8FrJhFCfRW4>

The images comprising that video were taken in Germany and show the changing position of sunrise. Despite the many cloudy mornings, it is easy to observe the motion of the Sun on the horizon during the year. This is the purpose of the proposed activity, but to make it simpler, we will observe sunset instead of sunrise, and only for a few weeks instead of over a full year.

PREPARATION

- **Plan the observation period.** The change in the position of the sunset will be more apparent in the weeks / month near the equinoxes of spring and fall. Around those times, the Sun will appear to move faster on the horizon from night to night. It is therefore recommended to do this activity near the autumnal equinox (September, October) or the spring equinox (February, March, April). This project works better if you extend your observations over a period of at least one month, if not longer.
- **Find the time at which the Sun sets the first night in order to guide the students.** Most weather forecast sites include the times of sunset. You can also use the Sunrise and Sunset Calculator from the National Research Council: <http://www.nrc-cnrc.gc.ca/eng/services/sunrise/index.html>
- Before the activity, print the activity sheet so that each student has a copy.

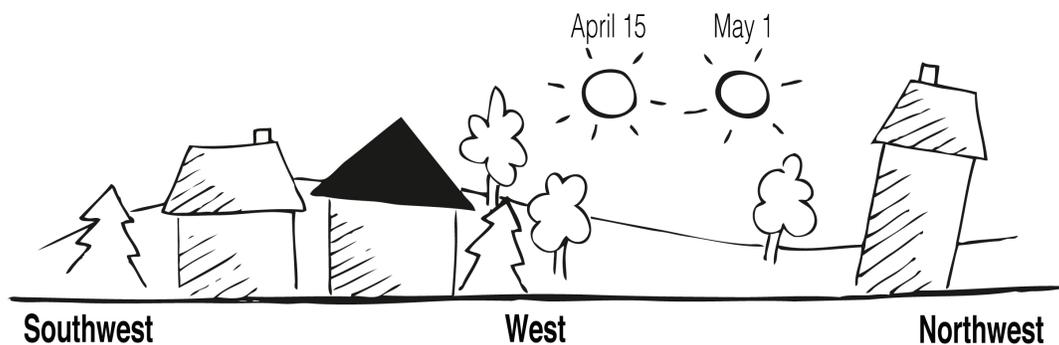


Figure 8. Map of the western horizon with two positions of the Sun at sunset. Note that it will probably be impossible to identify the cardinal points exactly.

METHOD

- Explain to the students that they will observe and note where the Sun sets in the coming weeks.
- Be careful not to stare at the Sun directly, even when it is close to the horizon. A single quick glance is enough to see its position on the horizon.

- Start by determining the place where you will make your observations. Since you will try to observe as often as possible, it's best to choose the location where you usually are around sunset. Try to find a spot with a good view of the western horizon. It's important to make the observations from the exact same spot each time.
- Observe your first sunset. You are now looking at the western horizon. Draw some objects you see on the horizon, such as houses and trees. You will use this as a map to show the changing position of the Sun each evening. Make sure to make your map large enough to include several observations of the Sun.
- For each observation, draw the Sun on your map. Remember to include the date and time.
- The weather and your daily activities may not allow you to observe sunset every day. This is normal! It isn't necessary to observe so often to notice the motion of the Sun. In fact, it would be difficult to notice the difference in position between one evening and the next. It's better to have one or two good observations each week.

Here are **some questions you may wish to ask your students**, depending on the level of analysis and inquiry you want to reach (answers are given in italics).

- Before finishing the observation period, ask students if they can predict where the Sun will set next. They can then compare their prediction with their real observation.
- What did you notice in your observations? *The sun does not always set in the same place. It moves along the western horizon. Moreover, it does not always set at the same time.*
- What direction does the Sun appear to move along the horizon? *If you observe during summer or fall, the Sun moves from right to left night after night. If you observe during winter or spring, the motion will be from left to right. To be more precise, we can give the answers based on the cardinal points (see Figure 9):*
 - *Between December 21 and March 21, the Sun moves from southwest to west (to the right).*
 - *Between March 21 and June 21, the Sun moves from west to northwest (to the right).*
 - *Between June 21 and September 22, the Sun moves from northwest to west (to the left).*
 - *Between September 22 and December 21, the Sun moves from west to southwest (to the left).*
- Can you tell if there's a time of the year when the Sun sets exactly due west? What's special about that day? *The sun sets exactly due west on the equinoxes: March 21 (approximately) for the spring or vernal equinox and September 22 (approximately) for the fall equinox. These are the times of the year when the Sun is directly above the equator and lights the southern and northern hemispheres equally.*

ALTERNATIVE:

If your students are old enough and have access to cameras, you might suggest they take a picture of the sunset instead of drawing it. Just as for the drawings, they should make sure to always take their photos from the same location. To compare the Sun's position on each picture, they could then use the pictures to draw their map. If they want a more complex project, they could assemble the pictures into a video as in the example provided in the introduction. Note: students should make sure to take pictures quickly and only at sunset to avoid damaging their camera. They should also avoid looking directly through the viewfinder if they have a camera with this option, which is not the case for cameras on smartphones.

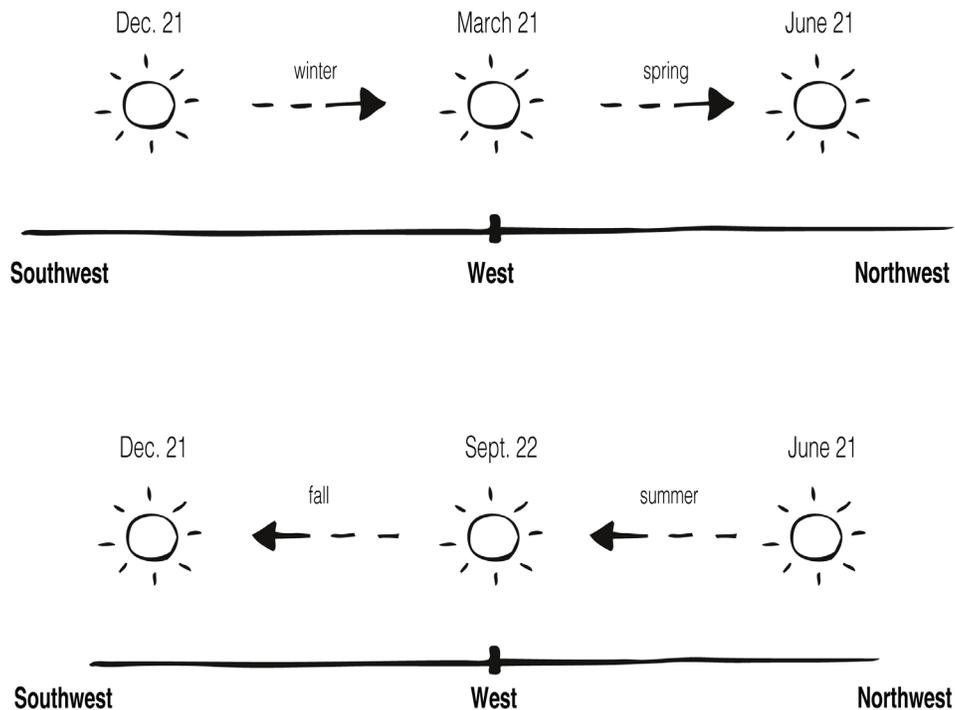


Figure 9. Position of the setting Sun on the western horizon throughout the year.

ADDITIONAL INFORMATION

Why does the Sun appear to move along the western horizon throughout the year? This apparent motion of the Sun is due to the tilt of Earth's axis of rotation. As the Earth moves around the Sun, we in the North face toward the Sun in summer and away in winter because of this tilt. This is the same phenomenon that explains why the Sun is higher in the sky at noon in summer than at noon in winter. In this activity, instead of watching the Sun at noon, we watched it at sunset. Look at Figure 6 to compare the positions of the Sun in the sky in summer and winter. Pay special attention to the western horizon. This apparent motion on the western horizon is shown in Figure 9, indicating the direction depending on the season.

INTERESTING NOTE:

The Sun appears to stop its apparent motion and to change direction at the summer and winter solstices (June 21 and December 21 approximately). In fact, the word "solstice" comes from the Latin "sol", meaning "Sun", and from "sistere", meaning "stop". So these are the times of the year when the Sun seems to stop for a few days before going back in the opposite direction.

WHERE DOES THE SUN SET?

Over the next few weeks, you will observe where the Sun sets on the horizon. You will mark your observations on an horizon map you will draw here. This project works better if the observation period lasts a month or more. **Be careful not to observe the Sun directly, even when it is low on the horizon.**

- First, you need to decide the location from which you will observe. It is important for the observations to be made from the exact same spot every time.
- When you observe a sunset, you are facing the western horizon. Draw below what you see on this horizon, such as trees or buildings. This will be the map on which you will indicate the Sun's position at each sunset. Make sure your map is large enough to draw many observations of the Sun.
- Every time you observe, draw the Sun on your map. Make sure you note the date and time.

Once you have many observations over a long period, what do you notice?
