

**LESSON: Sunlight****GRADE:****1****OBJECTIVES:****1-ESS1 Earth's Place in the Universe**

- **1-ESS1-2** Make observations at different times of year to relate the amount of daylight to the time of year.

**MATERIALS & RESOURCES:**

For tracking sun indoors:

- Book: *Sunshine Makes the Seasons*, by Branley
- Glass marker (marker meant for writing on glass)
- Graph- large enough for classroom display
- Optional- Hot dog cooker supplies is found below with instructions.

For the Garden Unit lesson:

- Camera
- Paper large enough for a map of garden
- Color pencils or crayons

**PRESENTATION:**

Ask students if they've noticed that the days seem shorter in the winter and longer in the summer. In this activity they get to track the sun and see the difference in the amount of daylight in different seasons. Or track the amount of sun for the garden. If someone holds a ball and turns it very slowly while a friend shines a light on the ball, what happens? The light will shine only on the surface that is facing the light. Pretend the ball is the Earth and the light is the sun. And, as the ball/Earth moves around it's orbit, the angle of the sun shining changes. As this changes so do the seasons.

As a kick off or celebration at the end of the activity, they get to build a solar hot dog cooker. (This can be modified to cook other foods if hot dogs aren't on the menu.)

**DIRECTIONS:**

1. Ask the children if they have noticed which time of year has the most and least amount of daylight. Read the book, *Sunshine Makes the Seasons*.
2. Explain that they are going to carry out a long term experiment to track the sun and the hours of daylight. An activity illustrating movement of sun and

Earth would be useful along with this lesson so the children know it is the Earth that actually moves, not the sun. The language (sun rise, sun set) we use can make it confusing.

3. Find a window from which the kids can see the sun every day.
4. At the same time of day have the kids look to see where the sun is in the sky. Have them mark the location on the window with a removable marker. Making a mark once a week is adequate since the point won't move that much from day to day. The goal is to be able to see the change marked on the window. It is important to make the mark at the same time of day each time. After a few weeks they will see a track beginning across the window.
5. Along with this activity have the children track the time of sunrise and sunset in a graph which the class can see somewhere in the room.
6. After several weeks they will see a pattern.
7. As a way to celebrate, the class can build a hot dog cooker as described in the directions below.

**TIME:** **10 min per week for a few months**

### **Optional: Hot Dog Cooker**

This project is for older students or for younger students with adult supervision.

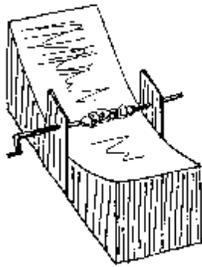
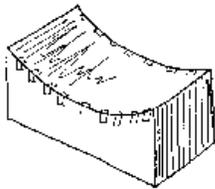
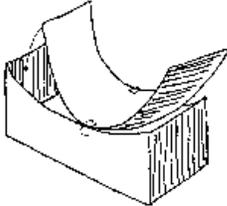
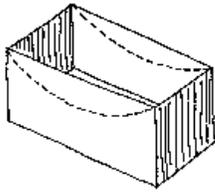
### **MATERIALS:**

- cardboard box
- tin foil
- poster board

### **DIRECTIONS:**

From website: <http://www.energyquest.ca.gov/projects/solardogs.html>

1. Select a long narrow box; the longer the box the more heat collection is possible. Choose a focal length between 5" and 10" and design a parabolic curve as seen in the picture below. One template could be used for all the cookers. Trace the curve on the open end of the box so that it is centered and straight.



2. Cut out the curve with a utility knife (illustrated in first drawing)
3. Measure and cut a piece of poster board that will fit flush against the opening to the box (illustrated in second drawing)
4. Attach this with tape beginning at the center and working toward to edges (illustrated in third drawing).
5. Cover the curve with white glue and apply aluminum foil shiny side out. Start in the middle and smooth toward the edges. Try not to wrinkle or fold the foil; you want it as smooth as possible.
6. Use two scraps of cardboard taped to each side as supports. Using the sun or a projector light, test the focal point. There should be a bright spot where light is concentrated; mark this spot and punch a hole for the skewer. Use a section of a coat hanger from which the paint has been removed for a skewer (illustrated in fourth drawing).
7. Enjoy your hot dog!

**TIME:**

**90-120 min**

**DIRECTIONS FOR GARDEN UNIT LESSON:**

1. Read the book, *Sunshine Makes the Seasons*.
2. Determine a schedule by choosing a time of day when someone can photograph the garden at least once per week. Photograph the garden from the *same* position and same time each week. Below is a photo which shows the light & shade on a garden plot. The shaded areas will change & move as the Earth turns daily and moves around it's orbit.

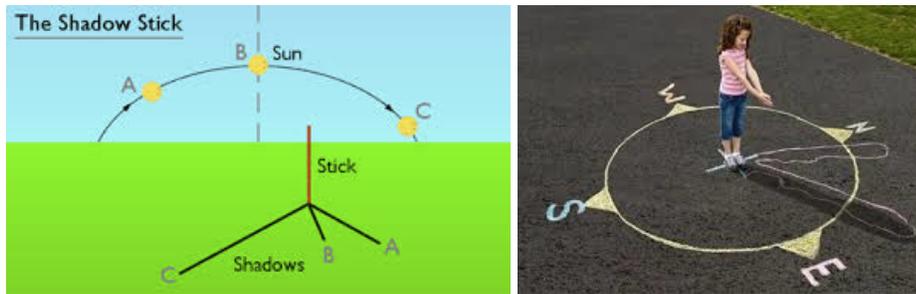


3. Create a poster of the photos by printing and placing them in order. When the pattern becomes evident, discuss as a group, the change in sunlight, what caused the change, and what does this mean for plants in the garden?
4. Optional- use the lesson, *Create a Neighborhood Map*, Kdg. Social Studies to add more practice in map drawing. Draw a map of the garden. Have the children help to use light shades of colored pencils or crayons to illustrate the path of light/shade. If the garden does not have areas of defined shade as the Earth turns, make your own shade. You can pound a stick into the ground or use a friend to create shade – a shadow. Just makes sure the person stands in the same spot every photo. See additional activities below for more ideas to show how the path of sunlight changes daily & months and year.

**TIME:**

**depends on activities chosen  
10 min week to photograph  
light on garden or mark light  
on window**

### 30-45 min to create map



### ADDITIONAL ACTIVITIES WITH SUNLIGHT

found at: Eye On the Sky presented by Project FIRST, fostering reading through science & technology [http://www.eyeonthesky.org/lessonplans/04sun\\_shadows.html](http://www.eyeonthesky.org/lessonplans/04sun_shadows.html)

### DIRECTIONS:

#### In the classroom

1. Begin the discussion of shadows by asking students what they about them. These points can be listed on the "What we Know" section of a "Shadows" KWL chart. Students may bring up the following points:
  - It is very dangerous to look at the Sun.
  - We NEVER look directly at the Sun!
  - The Sun creates shadows.
  - We all make shadows.
  - If there is sunshine, there will be shadows.
  - Without the Sun, we would not have shadows.
  - If the Sun is shining behind us, we will see our shadows in front of us.
  - A shadow happens when an object (or a person) gets between the Sun and the surface of the Earth.
2. Ask students if they have any questions about shadows. List 3-4 of them on the "What we Want to Know" section of the KWL chart.
3. Explain that students will be going outside to observe shadows and make drawings of what they see.
4. Ask for a student volunteer help you demonstrate how to trace a shadow.
5. Turn on the lamp, turn off the overhead lights, and ask students to observe the student's shadow being cast in the classroom. Ask them where the light source is and where the shadow is cast.

6. Explain that the Sun is similar to the light and discuss the location of the shadow.
7. Demonstrate how to trace the shadow by following the outline of the student's shadow with your finger.
8. Explain that each student will use chalk to trace the outline of his or her partner's shadow on the playground.
9. Tell students that after the tracing is complete, they can use pencils to draw their partner, his or her shadow, and the location of the Sun on their work sheets.
10. Remind students NEVER to look directly at the Sun.
11. After students have drawn on their work sheets they can add more detail in the classroom with crayons.
12. You may find it useful to print out a sample of student work sheet to show your students.

### **Outdoor hands-on Activity**

1. Remind students again, NEVER to look directly at the Sun, but to concentrate on the shadows.
2. In pairs, students spread out over the yard. Distribute chalk.
3. Ask students to position themselves to make shadows.
4. Begin tracing by outlining partner's shoes--this is especially important if doing the extension activity in this lesson.
5. As students complete the shadow tracing with chalk on the playground surface, distribute the work sheet.
6. Make sure that each student gets the opportunity to create a shadow and also document the shadow of a classmate.

### **Extension Activity: Changing Shadows**

1. Two or three hours after students have completed their first shadow tracings, explain that they will go outside again to observe their partner's shadow and make tracings of what they see.
2. Ask students to predict if the second shadows will be the same as or different from the first shadows they drew.
3. Ask for a show of hands and take a tally of students' predictions.
4. Return to the playground and ask students to find their shadows. Distribute chalk. Remind students again, NEVER to look directly at the Sun, but to concentrate on the shadows.

5. Have students reposition themselves in their original locations, using their shoe outlines as a guide.
6. Ask students to complete the second shadow tracing.
7. If time allows, redistribute student work sheets and have students add the second shadow.
8. The following questions can guide a discussion of what students observed:
  - Did anything change in your tracings? What looks different?
  - How many of your shadows moved? Tally raised hands. Review the tally taken in the morning and see how many students predicted correctly.
  - What do you think made the shadows move? How can you explain that?
  - Did the Sun move? Did we move? (Of course, we moved! Explain to students that shadows move as a result of the Earth's motion.)
  - Ask students what else they have learned and want to add to their KWL chart. Place any new questions on the chart and check if any previous questions can now be answered!
  - "[What Makes Day and Night](#)" is a good lesson for explaining the Earth's rotation more fully. For older students, "[Making a Sundial](#)" allows exploration of changing shadows as a means of telling time.