



KINDERGARTEN & 1ST GRADE
STEAM & SOCIAL STUDIES



YOU ARE MY SUNSHINE

Driving Question:

How can the sun's thermal energy change materials, and why is that important?

Materials Needed:

Sketchbook, writing utensil, crayons, markers or colored pencils, white bar soap, access to a microwave, thermometer

In this lesson, students will:

- observe and identify three forms of energy including light, thermal, and sound;
- explain the way folktales reflect beliefs of communities;
- observe and describe how thermal energy affects materials;
- ask questions and seek answers with a student-designed investigation of thermal energy in small groups; and
- create a series of three drawings based on their observations of thermal energy.

National Learning Standards:

Science: Kindergarten - K-PS3-1; K-PS3-2
 1st - 1-PS4-3; K-2-ETS1-1; K-2-ETS1-2
 Math: Kindergarten - K.MD.A.2
 1st - 1.MD.C.4
 Social Studies: 1st - I,c
 Art: Kindergarten - Cr1.1.Ka; Cr2.3.Ka
 1st - Cr1.1.1a



SPINNING THE COCOON

Begin the lesson by having students use their senses to explore energy in the forms of light, thermal and sound in the classroom, around the school building and outside. Take the students on an observation walk to these areas and tell them to use their eyes, ears and touch to make observations of these three forms of energy. As a group, stop and allow the students time to sit and draw some of their observations in a sketchbook.

When you return to the classroom or lab area, create a tree thinking map on the board together with the title “energy” and the three branches written as “light,” “thermal” and “sound.”

Ask students to share their observations from the walk and add them to the thinking map.

Next, demonstrate thermal energy with a simple heating soap demonstration. You will be placing a piece of white bar soap on a paper plate in the microwave and heating it for 90 seconds. Before showing the class this demonstration have them make predictions of how the soap will change and draw or write about these predictions in their journals. Then perform the demonstration and discuss the results with the class. If you do not have access to these materials you can also show your class a video of this demonstration. There are many options available on YouTube.

Review key vocabulary before continuing with the exploration.

- **Thermal** means relating to heat.
- **Investigation** is the action of testing and researching a question or inquiry.
- **Folktale** means an old story that has been passed down through generations of different cultures and groups of people through oral storytelling.”

KERNEL OF KNOWLEDGE

Temperatures in Antarctica rose [5.4 degrees](#) in the last half-century, much faster than the average rise for the rest of the planet.



METAMORPHOSIS

Students will listen to the African folktale, *Why the Sun and Moon Live in the Sky*. This can be read aloud by the teacher or heard via an online audio [link](#). In small groups, the students will discuss why this folktale was created and whether they think it is based on any facts.

Next, each group will design an investigation to test the heating effect of the sun on different materials and document their investigation in their journals. First, they will write down a question they have about how the sun's thermal energy will change an object. They may use objects in the classroom or bring something from home. Then each group should plan how they will carry out the investigation. Student groups will draw a pictures in their notebooks to show the steps of their investigation. Students will then carry out their investigation and make observations. Time should be allowed for students to modify their plans and retest if their first plan is unsuccessful.

Students should use thermometers to measure the temperature of the sun several times over a period of time when observing their object, and record temperatures and observations in their notebook. Instruct them to create drawings of how their object might be changing from the heat of the sun. Each time the students go out to check on their object, they will create a drawing to show the effects of the sun's heat. They should have no less than three drawings upon completion of the experiment. Students will share their results with the class and conclude why they think the sun should stay in the sky.



THROUGH THE LENS

Students should take photos of their drawings, then create a slideshow of their group's drawings in sequence. Students should be able to share their slideshow with their peers and verbally explain what is happening in their drawings.

UPCYCLE

Changes occurring as a result of heat have been observed and tested, but changes can also be made by cooling materials. How can the students change their investigation to not only evaluate the effect of applying thermal energy on an object but also of removing thermal energy? Students should redesign the investigations to observe and identify changes in materials caused by cooling. Then compare the changes in materials by both heating and cooling, and share those results with the class.



eARTh

Take the observation drawings that the students created and display them as a group. Each student should have three drawings. If possible, glue each student's drawings, in the order in which they were completed, onto a sheet of black paper. Invite the students to talk about their work and explain to their peers how their drawings reflect the effects of the sun's heat on their object. Also, talk with the students about their use of the elements of art in their work.

Next, take the students outside on a nature walk and instruct them to collect a few objects along the way. These might include leaves, acorns, rocks, flowers, sticks, etc. When you get back to the classroom, give each student a sheet of sun sensitive paper (darker colored construction paper will work as well). Have the students lay their objects that they gathered on their walk onto their paper. Be sure to leave some space between each of the items.

Now, place the paper in a space where it will be in the path of direct sunlight. If possible, outside would be best, but next to a window that receives strong sunlight will also work. Leave the paper out for a day or two, depending on the type of material that is used. Sun sensitive paper will change much faster than construction paper. Allow the students to check the progress of their pieces each day. Ask them what they notice about the paper when they look at it. What is happening to the areas where the objects are placed?

Once the paper has faded significantly, allow the students to remove all the objects on the paper. Form a discussion around what is left on the paper. Why is the space where the objects were a different shade or color? How did thermal energy affect their art?

Community Garden

From their observations, students will learn the effects that the heat of the sun can cause. Talk to them about the effects that the heat can also have on our bodies. Being in direct sunlight for too long is not good for us, so brainstorm with the students some ideas about what we can do if we want to stay outside for an extended time on a hot, sunny day. One solution would be to seek out a shaded area. Does the playground at your school have plenty of shade available? Take the students outside the school and observe the available shade. Ask, "Are there trees? Are there coverings on the play equipment?"

As a group, identify an area outside of the school that could use more shade. Now, form a plan to create a shaded area. Will you put up an umbrella? What about planting some trees? Work as a class to either build or raise money for your area. Use your drawings and other information from your previous observations on the effects of the sun's heat as your evidence for needing more available shade.



CAREER CONNECTION

Physicist - A physicist is a scientist who studies matter, energy, motion and force. To become a physicist, you need a bachelor's degree in physics as well as a master's degree. Ultimately, many physicists go on to complete their doctoral degree.

Astronomer - An astronomer is a scientific observer of celestial bodies or things of the sky including the sun, moon and stars. Most jobs in this field require a PhD in astronomy.



CAREER HIGHLIGHT

Sylvia Earle is an oceanographer who is advocating for our struggling oceans. She is highlighted in the film *High Seas Journey to Costa Rica Thermal Dome*, which was shown at EarthxFilm2018, where she is using her research to fight for the protection of this invaluable thermal energy source.

