



Lesson 1: In Search of Light

Exploring the Ongoing Role of Light Energy in Human Lives

Overview

In this introduction to the *Energy Lights Maine* module, students consider the ongoing role of light energy in humans' lives. Through a folktale about the Sun, students are reminded that sunlight is the primary source of light energy on Earth. Students investigate a variety of early light emitting devices and consider their benefits and drawbacks.

Teacher Background

Maine has the distinction of being the first place in the country that sunlight touches. While most of us do not think about our relationship with the Sun on a regular basis, light energy plays an important role in the day to day activities of humans. Early humans had an intimate relationship with the Sun as evidenced by the presence of elaborate rituals to protect it and symbolism, folklore, and myths to explain its mysteries. While we know a great deal more about the Sun and the light and heat energy it provides the Earth, humans are still learning new ways to put light energy to work in ways that are most beneficial.

Light is a form of energy. It is called radiant energy because it is radiated by the sun and is made up of several different types of light that scientists have identified as wavelengths of energy that can be used in a many different ways. Like most forms of energy, light energy begins with the Sun. Yet, light is such a common part of modern life that it is often taken for granted. Humans have been devising ways to light up their environment for thousands of years. History shows that humans have accomplished this complex and challenging task in ways that, at first, may seem simple. However, despite advances in technology, not all lighting methods used today are based on new technology.

In this lesson, students examine pictures of “early” light emitting devices. These devices do not use electricity and were used until the invention of the incandescent light bulb. Students become familiar with the devices by reading and discussing the brief descriptions of the images on the cards. Students work together in small groups to determine criteria with which to sort the cards and in a follow up discussion; consider the benefits and drawbacks of these early devices. The intent of this activity is for students to become aware of the variety of methods humans have devised over time to



make light available when natural lighting was not accessible and to consider the advances people have made in lighting technologies. As a follow up to the class light card activity, students look for examples of modern light devices and create “modern” light cards. While research into the historical development of light emitting devices is not built into the lesson, the light card activity may spark students’ interest in finding out more about the history connected to the light emitting devices featured in the lesson.



Key Ideas

- Light is a form of energy.
- The Sun is the primary source of Earth’s light energy.
- Human knowledge and skill to create light emitting devices has evolved throughout history.

Lesson Goals

Students will:

- develop a basic understanding that the Sun is the primary source of Earth’s energy, including light.
- explore light emitting devices of the past and consider their benefits and drawbacks.
- make the connection that natural resources are used as sources of light.



Vocabulary

fuel: a substance that can be burned to provide heat or power.

myth: typically, a traditional story of an event that serves to explain a practice, belief, or natural phenomenon.

Preparation

- Determine how to darken the classroom.
- Gather Lesson 1 materials. (See Materials List below)
- Hang chart paper and have markers available.
- Prepare sets of *Early Light* cards. Copy cards on heavy card stock and cut into sets. Put each set in a re-sealable bag. Consider lettering, numbering or color-coding card sets to make reuse easier.
- Preview and practice reading *Raven: A Trickster Tale from the Pacific Northwest*.

Materials

Item	Quantity
Materials to make classroom dark	
Small light such as flashlight or book light	1
Literature: <i>Raven A Trickster Tale from the Pacific Northwest</i> by Gerald McDermott	1
Teacher Resource 1.1: <i>Early Light Card Sets</i>	1 per group of 3 students
Chart paper, markers, tape	1 set
Scientist's Notebook	1 per student
Student Handout 1.1: Blank Light Card template	1 per student

Time Required: 2 sessions

Session 1: Set up Scientists' Notebooks and read the folktale

Session 2: Do Light Cards activity and homework; Explain day 2

Connection to Maine Learning Results: Parameters for Essential Instruction

- Recognize that the Sun is the source of Earth's surface heat and light energy. MLR D2(3-5) e
- Explain that natural resources are limited, and that reusing, recycling, and reducing materials and using renewable resources is important. MLR C3(3-5) e
- Science helps people understand their natural world. MLR C4(3-5)





Teaching The Lesson

Engage

1 Read the sun myth *Raven: Trickster from the Pacific Northwest*.

Make the classroom as dark as possible with all the lights in the room turned off, closing the shades and doors, if possible. Have students in a circle on the floor.

Acknowledge the fact that the lights are off in the classroom. Ask students: *Think about what it might have been like to have classes or simply go about daily activities before the invention of electric lighting?* Allow students share their ideas. Students will most likely make the connection that in very early times the main source of light was the Sun.

Explain to students that the Sun was extremely important but somewhat mysterious to people long ago. Tell them that there were many stories and rituals connected to the Sun and the light it produces. Explain to students that they are going to hear a folktale called *Raven: Trickster Tale from the Pacific Northwest* by Gerald McDermott.

Show the students the book cover and ask them to predict what they think the story is about and why. Accept all answers. Instruct students to listen to the story carefully because at the end of the story they will be asked how the story relates to humans' past understanding of light. With a small reading light on and with great drama, read the *Raven: Trickster Tale from the Pacific Northwest* aloud to the class.

Note: For background information about the traditional Raven myth, see **The Raven Story** at Teachers' Domain: <http://www.teachersdomain.org/resources/echo07/lan/stories/raven/index.html> Consider showing this video clip to students.

Alternatively or as an extension, you may wish to provide other stories about the sun as the source of light for the Earth. Divide students into small groups and ask each to examine a different title, compare and contrast, and find common themes in the stories.



Other suggested titles include:

Arrow to the Sun by Gerald McDermott

The Way to Start a Day by Byrd Baylor

The Lizard and the Sun by Alma Ada

Note: *Students are intrigued by stories. When stories, including myths and nonfiction accounts, are told in the context of a science lesson, it broadens their view of how people perceive events or generate ideas about how things happen. The Raven story helps children realize that humans in the past were puzzled by the Sun and the light it produced, thinking it was magical and mysterious. The main idea to bring forth from this story is that light from the sun has always been and will remain very important to humans.*

2 Discuss the sun myth.

Turn on the lights and ask,

- *Why do you think people of the past made up stories like the Raven?* (Myths, legends, and folktales were often created to explain phenomenon people did not understand. Typically stories offered explanations about events in nature.)
 - *Why do you think the Raven was chosen to be the giver of light?* (See author's note found at the front of the book.)
 - *What parts of the story tell us the Sun is important to the people?*
- Lead a short, open discussion of the story, accepting all answers.

Note: *Why accept all answers when some may not be correct? At this point in the lesson, the goal is engage all students and initiate the sharing of ideas. Creating an environment where all ideas are accepted will aid in this. Questioning techniques such as "What do **you think** this story is about?" rather than "**What is** the story about?" will help create that atmosphere. This discussion provides an opportunity to assess students' current thinking which will guide future conversations.*



Explore

3 Examine *Early Light* cards.

Students return to their seats where they can work together in small groups of 3. Explain that, unlike earlier times, humans have a greater knowledge of light energy. Humans have learned how to create light emitting devices to use when sunlight is not available or is limited.

Give each group a set of *Early Light* cards. Direct students to read and discuss the information on each of the cards. Challenge students to sort the cards in a way that makes sense to them. Explain that each group member should have the opportunity to suggest

his or her card sorting ideas before the group decides on final groupings.

Note: As students sort their cards, circulate around the room, making note of their conversations. Their conversations are just as important as the final grouping they choose. One of the purposes of the Early Light card sort activity is to promote divergent thinking and open discourse while exploring the historical use of light. Divergent thinking is a type of thinking that can use content as a vehicle to prompt diverse or unique thinking among students and allow them an opportunity to examine different perspectives.

Some students, however, may experience difficulty in thinking of categories in which to sort the cards. Teachers may want to provide prompts such as, **How are these two cards alike? Can you find any other cards that are alike in the same way?**

This purpose of this activity is to promote critical and creative thinking. It is not about being right or wrong, as there are no right or wrong ways to sort the cards. Reassure your students of this before they begin and reinforce it throughout the activity. As students view other groups' cards they will see that there are, in fact, many ways to organize them. Examples include: timeline, human vs. machine vs. natural, how much fire/light it produces, natural vs. electric vs. oil light, etc.

Keep in mind that some of the information on the Early Light cards may be challenging for some students' at this grade to read and understand. It may be helpful assign students to groups that have a mix of reading abilities.



Reflect And Discuss



4 Discuss *Early Light* cards.

Once the groups have finished sorting the cards, explain to students that they will walk around the room and view their classmates' groupings. Ask these questions to provide a focus:

- *What were some of the ways your classmates grouped the 'Early Light' cards?*
- *Do humans still use these methods to generate light today? Why or why not?*

Gather the students to discuss the questions. The purpose of this discussion is to guide the students' thinking toward the idea that these devices may not be safe, economical, environmentally friendly, and/or convenient ways to generate light. Humans used and continue to use the resources and technology that is available to them, and there are pros and cons of each resource.

Note: Students may group the *Early Light* cards in a variety of ways. Cards could be grouped according to the fuel source used such as oil, gas, pitch, wood, etc. Students may choose to group the cards following an historical timeline or use some other criteria. Accept all ideas and pay particular attention to students' conversations, listening to the ideas they have about the card groupings.

Summarize the grouping patterns used by the class. Acknowledge that humans have improved lighting technology and continue to do research and seek out improvements.

5 Introduce *Modern Light* cards.

Direct students to look for 3-5 different present-day light emitting devices around their homes and communities. These could be light bulbs, fixtures, or other light emitting devices. Provide each student with a blank *Light Card* template that they can complete by including a drawing or photograph of the “modern” light and a brief description of the light emitting device. Challenge students to find particularly interesting lights and encourage students to elicit the help of family members with this assignment.

In the classroom, after students complete this out-of-class assignment, have them sort their *Modern Light* cards and/or put their cards on display, perhaps affixed to a poster.

6 Bring lesson to a close.

Ask students to respond to the following prompt in their scientists' notebooks:

- List three things you learned about light.
- Record two questions you have about light.

Planning Ahead

In preparation for Lesson 2, teachers should collect student notebooks and compile their questions on chart paper.



Extensions

Student may:

- View NASA Goddard's Sun for Kids online video (approximately 6 1/2 minutes) which describes early "sun" ideas and segues into the tools NASA uses to make observations and learn more about Earth's most important star. <http://learners.gsfc.nasa.gov/mediaviewer/SunForKids/>
- Visit NASA's Sun-Earth Connection Education Forum for educational materials, multimedia presentation, and "Ask a Scientist" link. <http://sunearth.gsfc.nasa.gov/edsecef.htm>
- Explore other light myths including:
Arrow to the Sun by Gerald McDermott
The Way to Start a Day by Byrd Baylor
The Lizard and the Sun by Alma Ada
- Research various ancient cultures' connection with the sun. Egyptians, Incas, and Aztecs built extensive structures explicitly for sun worship.
- Conduct follow up research about the light emitting devices featured in the *Early Light* cards.
- View Wired Magazine's Gallery: A Brief History of Light http://www.wired.com/gadgets/miscellaneous/multimedia/2008/11/gallery_lights
- Start a small indoor garden which could lead to investigations about plants' dependence on the sun.



Connection to Maine Agencies

MEEP (Maine Energy Education Program) has a *Great Energy Debate Game (4th to 12th grade)*.

- What are the pros and cons of renewable versus nonrenewable resources?
- Do students have any preconceptions as to which energy sources are the best?

In this debate, students take on the real world challenge of convincing others that one energy source is the best. A MEEP representative will come to interested schools, free of charge, to guide this activity. The MEEP website is <http://www.mEEPnews.org/classroomactivities>

For schools in Aroostook County, a Maine Public Service (MPS) representative will come to interested schools, free of charge, to guide and support concepts developed in this lesson. A description of programs is available at www.mainepublicservice.com. Click on the education section of the site. To schedule a visit

contact Nancy Chandler at 207.760.2556 or nchandler@mainepublicservice.com.

Online References and Resources

http://www.wired.com/gadgets/miscellaneous/multimedia/2008/11/gallery_lights

Early Light Cards Credits

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