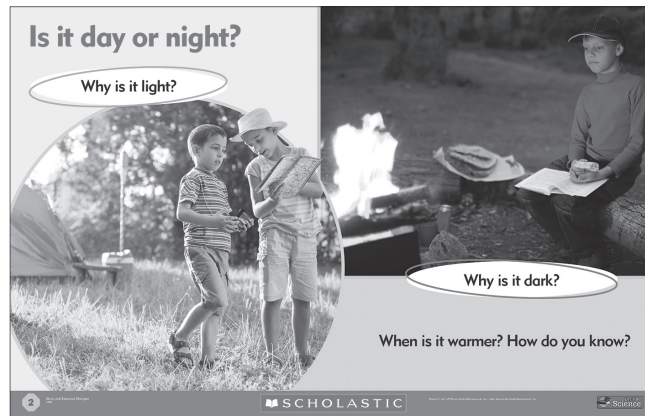


Why Is the Sun Important?



Focus: Students will develop and practise inquiry skills while exploring changes in heat and light from the sun.

Specific Curriculum Outcomes

Students will be expected to:

- 4.0 explore and investigate changes in heat and light from the sun [GCO 1/3]
- 5.0 follow safety procedures and rules [GCO 2]
- 8.0 communicate while exploring and investigating [GCO 2]
- 13.0 propose an answer to the initial question or problem and draw a simple conclusion [GCO 2]

Performance Indicators

Students who achieve these outcomes will be able to:

- describe changes in air temperature and light in sunlight and shade
- draw a picture showing differences in light and heat in summer and winter

NOTES:

Attitude Outcome Statements

Encourage students to:

- recognize the role and contribution of science in their understanding of the world [GCO 4]
- consider their observations and their own ideas when drawing a conclusion [GCO 4]
- show concern for their safety and that of others in carrying out activities and using materials [GCO 4]

Cross-Curricular Connections

English Language Arts

Students will be expected to:

- communicate information and ideas effectively and clearly, and to respond personally and critically [GCO 2]
- use writing and other forms of representation to explore, clarify, and reflect on their thoughts, feelings, experiences, and learnings; and to use their imaginations [GCO 8]
- create texts collaboratively and independently, using a variety of forms for a range of audiences and purposes [GCO 9]

Getting Organized

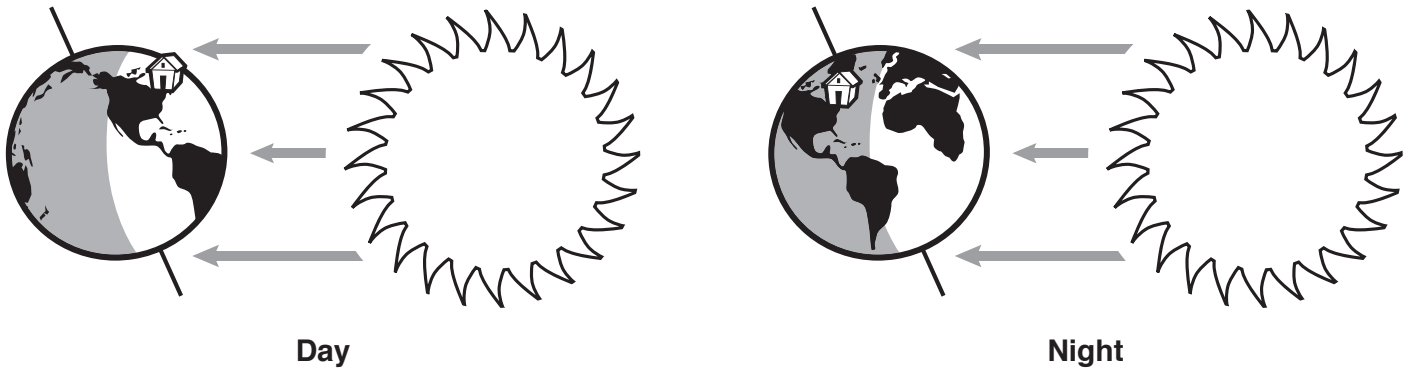
Program Components	Materials	Before You Begin	Vocabulary	
• Science Card 2 • <i>What Is the Inquiry Process?</i> poster Literacy Place: • <i>A Hot Day</i> (Guided Reading, Level C)	• index cards • thermometer • small containers of cold water and warm water • coloured markers • digital camera (optional)	• Prepare a KWHL chart.	• bright • cold • cool • dark • day • hot • light • measure • moon • night • shade • sun • temperature • thermometer • warm	• conclude • explore • investigate • observe • predict • record

Safety

- Provide students with shatterproof thermometers and supervise them closely when they handle the thermometers.
- Review school safety rules before students go outside for an investigation.

Science Background

- Earth's rotation causes day and night. Sunlight strikes only the side of the Earth that faces the sun, which changes as Earth rotates every 24 hours. Earth's rotation also makes it appear that the sun rises over the east, arcs across the sky, and goes down in the west.



- Shade is caused by the presence of an object or substance that absorbs some of the energy from the sun's rays, such as the water in clouds.
- Liquid-filled thermometers exploit the fact that liquids expand when heated, and contract when cooled. In the closed tube of a thermometer, this causes the height of the liquid in the tube to rise or fall a consistent distance in relation to temperature.
- Sunlight is an important, renewable source of energy (solar energy). Although the technology has advanced, the idea of using the sun's energy for human activities is old. Early Indigenous peoples used the sun's energy to dry food for storage (e.g., caribou meat would be dried to form jerky). Among early European peoples, it was common to use the sun's energy to dry grains or fruit.
- Sunburns are caused mainly by absorption of ultraviolet (U.V.) waves. Overexposure of the skin to U.V. waves can cause skin cancer. Sunblock lotions contain chemicals through which U.V. waves cannot pass.

Possible Misconceptions

Students may believe that the sun moves in the sky. They are also likely to believe that scientists make big “discoveries” in a mysterious way, instead of

being curious and asking questions about the world around them and trying to answer those questions.

ACTIVATE



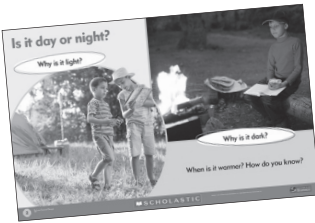
What Is the Temperature?

Write “temperature” on the Word Wall. Ask:

- What does “temperature” mean?
- What words can we use to describe something that is hot? cold?

Add students’ suggestions of descriptive words, along with “hot” and “cold,” to the Word Wall. If necessary, explain that the temperature is a measurement that tells us how hot or cold something is.

CONNECT



Day and Night

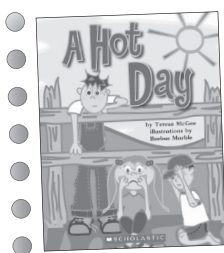
Share Science Card 2 with the class. Have students identify which image shows day and which shows night, then ask:

- How do you know? What is different?
- Is the temperature the same at night and in the day?
- Is the sun out during the night or day? How about the moon?
- What else do you know about night and day?
- What would you like to find out about night and day?

Record students’ responses in a KWL chart. Then, read the supplementary questions on the Science Card: *Why is it light? Why is it dark? When is it warmer? How do you know?* Have students offer answers. Prompt thinking by asking students to explain their answers and by asking questions such as:

- Why is it warmer in the day than at night?
- Does the sun always come up at the same time every day? Does it always go down at the same time?
- What else would you like to know about the sun? How could we find out?

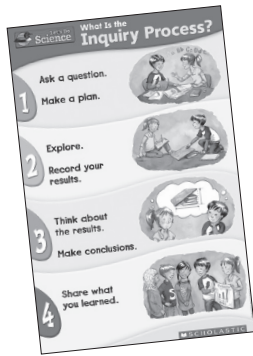
Allow students time to brainstorm ideas for how to find answers for their questions, then record their suggestions on the KWL chart.



Literacy Place Connection:

In *A Hot Day* (Guided Reading, Level C) the sun is making the farmer, the children, and the animals very hot. Discuss with students what the characters do to cool off.

CONSOLIDATE



Sun and Heat

Share with the class that science is a way of finding out about the world around us. Direct students' attention to the steps shown on the poster *What Is the Inquiry Process?* Point out that the inquiry process starts by asking a question. Read over the rest of the steps on the poster as a class, then guide a discussion of what these steps mean. Focus on the type of questions that can be explored through science inquiry by asking questions such as:

- **What are the students doing at the “Explore” step?**
- **What things might they be observing?**
- **Can we explore any of the questions on our KWHL chart by making observations?**

Model asking a question and planning an investigation for the class. Tell the class that the question you are going to investigate is:

- **Does the sun make the schoolyard warmer?**

Discuss how this question can be answered by observing something in the real world—how warm or cool an area is—by asking questions such as:

- **What might we observe to answer this question?**
- **What tool might we use to measure warmth?**
- **How could we make a record of that measurement?**

Tell students that you have made a plan to answer your question. (If students say that they already know the answer to the question, point out that they have made a prediction and that we can check their prediction using the inquiry process. Explain that, sometimes, a prediction is part of making a plan.) Begin by showing the class a thermometer, allowing each student to handle it directly. Explain that a thermometer is a tool that measures how hot or cold something is.

Place the thermometer in cold water and warm water, making sure that students see and understand the relationship between the height of the liquid and temperature, in qualitative terms. Point out the numbers on the scale and tell students that we measure temperature by reading the number beside the liquid. Explain that the number gets bigger when the temperature gets hotter.

Then, share that you plan to find out if the sun makes the playground warmer by observing the height of the liquid in the thermometer in a shady spot and in a sunny spot. (If students are ready, make the activity more open by challenging small groups to come up with their own question about the sun that they can investigate in the schoolyard using the thermometer.) Point to the step “Record your results” on the *What Is the Inquiry Process?* poster. Tell the class you plan to record your results by taping an index card to the thermometer and marking how high the liquid is in the shade and in the sun, using two different coloured markers. Demonstrate this for the students.

Before proceeding further, review any safety rules with the class, including any for going outside. Have students watch as you record the height of the liquid in the thermometer in a shady place and then a sunny place. You might have a volunteer mark the card instead. Prompt students to think about the inquiry process and make observations about heat and light from the sun, by asking questions such as:

- **Why are we doing this now?**
- **Why are we doing this in this way?**
- **Does it feel cooler or warmer in the shade? in the sun?**
- **Is it bright or dark? How do you know?**
- **What do you predict will happen to the height of the liquid in the thermometer here?**
- **How has the height of the liquid in the thermometer changed? What does this mean?**

Challenge students to observe other things that are different between the sunny and shady places (light level, shadows). Record these observations too, taking photographs if possible. If students are ready, have them decide where to take measurements elsewhere on the schoolyard. When measuring is completed, post the results in the classroom. Refer to the *What Is the Inquiry Process?* poster and point out the steps you have taken so far. Then, say that we now need to think about our results. Ask:

- **Do these results help me answer my question? How?**

Tell the class that now we will make a conclusion, which is an answer to the question we explored. As a class, brainstorm a conclusion and record it on the chart of the results. Finally, point out the last step on the poster (“Share what you learned”). Explain that when we communicate what we have learned, other people will know the answer to the question and how we found it out. Working in small groups, have students plan their own way to communicate the results and conclusion and then carry out their plans. Alternatively, have students brainstorm a conclusion in small groups. Then, have each group communicate their conclusion with the class and discuss their reasoning before having the class come up with a consensus conclusion.

If students have worked in groups to investigate their own question or are ready, make this activity more open by providing students with a thermometer taped to a white card, coloured markers, and a digital camera (optional) and challenge them to make their own plan to use these materials to find an answer to the initial question.

EXPLORE MORE

Life in the Dark

Invite students to work in a group and create a skit, a poster, or tell a story about what it would be like to live in a world without sunshine. Draw out students’ experiences of what it is like when the sun goes down early in the winter.