

Think Like  
A Scientist

# The Light Explorers Go on a Campout



NSTA  
eBooks<sup>+</sup> Kids



TEACHER'S  
GUIDE

# Overview

This teacher's guide is designed to provide ideas for how to use pages of *The Light Explorers Go on a Campout* e-book with students. It explains the concepts and suggests what to look for in students' learning, while also supplying information about how they are practicing science and using crosscutting concepts.

**Teachers who follow the guide while addressing the specific needs of their classroom will be able to:**

- engage students in grade-level appropriate, three-dimensional learning;
- use the e-book as a tool in class-wide, small group, or independent explorations of its content;
- provide additional ideas and activities that utilize the e-book content but are not included in the e-book;
- explore how STEM content can be effectively integrated into literacy (English language arts);
- facilitate investigations that utilize the e-book content and connect it with students' own classroom and community; and
- assess students on the first-grade content standards to which this e-book is aligned and additional *Common Core State Standards*, in English language arts and mathematics suggested throughout the e-book.



Lexile® Measure: 510L

## Book Description

*The Light Explorers Go on a Campout* allows learners to take an active role in exploring with characters Liz and Sam as they investigate the anchor phenomenon: light is needed to see things and some objects make their own light. The backyard campout is the perfect setting for experiencing and interacting with this phenomenon.

In the first topic, Light and Sight, readers investigate how lights help them (and the characters) see objects. They will make choices about which light to turn on and how light direction, distance, and brightness determine how well they can see an object.

In the second topic, What Makes Light, readers investigate the phenomenon of

which objects make their own light. They will use models and carry out investigations right along with the characters to obtain, evaluate, and communicate information about different light sources. They will also investigate the difference between the Sun and the Moon, and learn that the Sun makes its own light and the Moon does not.

In the third topic, Light Travels in a Straight Line, students investigate how light travels to illuminate objects. They will gather evidence from investigations that light travels in a straight line. When light travels to the space where an object is at, the object is illuminated, and when light is directed away from this space, the object is not visible.

Topic four brings together the science phenomena, crosscutting concepts, and science and engineering practices that students have engaged with throughout the e-book in a three-dimensional activity that can be used as a summative assessment.



## The Driving Question

A driving question is one that drives the teaching and learning for a given unit, or even an entire school year. It provides context for the purpose of student exploration and understanding of a phenomenon. This e-book is written around the driving question:

***How is light used to see things?***

## Three-Dimensional Learning and *The Light Explorers Go on a Campout* E-book

You will notice throughout the document that certain words and phrases are highlighted in different colors: blue, green, and orange. These colors correspond to the **science and engineering practices (blue)**, **crosscutting concepts (green)**, and **disciplinary core ideas (orange)**. The book also incorporates **engineering design (purple)**. This will help you quickly notice how each of the three dimensions and engineering design are used on a page. Refer back to this section for the full descriptions.

This e-book does not use all of the grade-level elements for the practices and crosscutting concepts, but that does not mean that you should not be aware of the other practices and concepts your students need to know. For a full list of all grade-level elements for the science and engineering practices and crosscutting concepts, refer to [Appendix A](#).

For ideas for engaging in literacy, refer to [Appendix B](#).



# Topic 1

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## *Light and Sight*

This topic introduces children to light and why it is needed to see objects. They will investigate different ways the characters rely on light to find out information through their sense of sight.

By the end of the topic, students will be able to:

- conduct investigations using light to illuminate different objects;
- compare observations for similarities and differences between different light sources;
- describe how light affects our ability to see objects; and
- construct an explanation of why light is needed to see.



## Page 2



Students interact with the page to **explore what happens** when the Sun sets. They will **observe** how the **changing position** of the Sun **leads** to having less light **to see objects**. The Check Your Thinking questions and pop-up answers guide independent readers to **construct an explanation** that **the Sun gives light to see things**, and when the Sun sets it gets dark.

Lead a class discussion to **obtain and evaluate information** by **communicating** what students **observed as they carried out this investigation**. Have them **construct an explanation** about what **caused** the scene to get **darker and harder to see**. Then ask students to **give reasons from evidence to support their explanation**. Support students with the following prompts:

- **What happens to the light at sunset (patterns)?**
- How does the Sun getting lower in the sky **change** what **can be seen (cause-and-effect)?**

### Investigation

#### Safety Notes



1. Remind students not to look directly into the lantern or flashlight.
2. Be sure students are seated before darkening a room. Do not have students change locations unless the lights are turned on.

#### Materials:

- Three objects (can be any objects, such as ones found in the classroom like a stapler, a book, and a backpack)
- A handheld lantern, like one you would use for camping

## TOPIC 1: Light and Sight

Reinforce the concept that **light is needed to see things** by **conducting an investigation**. Place three objects on a table. Darken the room except for a single lantern held over the table. Ask students to share with a partner what they can see.

Lower the lantern to the table's edge and have students **compare which of the three objects are illuminated the most**.

Next, lower the lantern beyond the table's edge so the objects are no longer illuminated. Ask students to describe the **difference in what they can see when the light is no longer shining on the objects**.

Finally, turn the lantern off completely and **ask students to compare** what they can see. After turning the classroom lights back on, have a class discussion to fill in a chart like the one below to help students record observations. Use the vocabulary of *visible*, *not visible*, and *somewhat visible*. Repeat the investigation as necessary to help students determine how well each object is seen.

Position of Lantern	Object 1	Object 2	Object 3
Lantern above table			
At table's edge			
Below table			
No light			

Students **review what they have observed from the investigation** and **describe in their own words** what **causes a change in what is seen before and after the Sun sets**.

## Pages 4



Students **interact by choosing lights (obtaining information)** to turn on and off as if they were right there with Liz and Sam! They will **investigate to gather evidence** to answer the question: Why do you think one light works better? Students should reason that the **brighter light gives more light to see (scale and proportion)** the mystery shape.

### Differentiated Instruction



If students are unable to explain why the brighter lantern showed the figures and the weaker lantern did not, show them the **difference between two lanterns**. Darken the room and have students **investigate and compare the different strengths** of the two light sources. Ask them to **explain what they can see with one compared to the other**. Return to the page and ask students to **explain why the brighter lantern showed what the shapes were, while the weaker lantern did not**.

*Safety Note: Make sure the students are in place and not walking around once the room is darkened. Turn the lights back on before they are instructed to move to another location.*

## Page 8



Students discover that stars **make light** as they read the text and select the stars to find the Big Dipper.

*Note: A first grade core idea in Earth and space science (ESS) explores patterns in the motion of celestial bodies.*

### Thinking Beyond



Cut out star shapes from black paper and place the black paper (not the cut out star shape) over the lenses of flashlights. Students turn on their flashlights and shine the stars at the ceiling. Have them point the stars and move them together to make different clusters. Explain that a group of stars make a constellation.

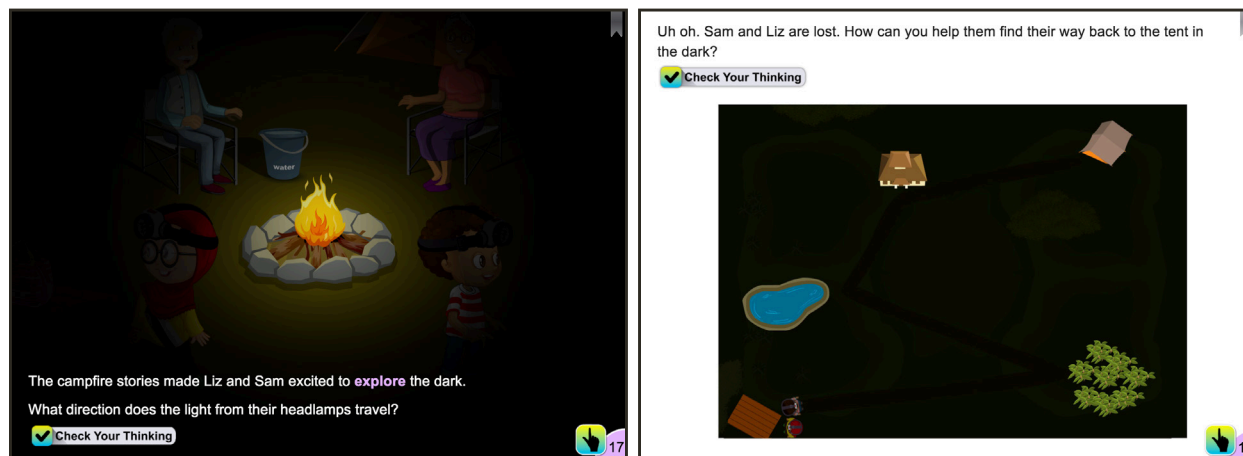
Guide students to make the connection that the Sun is also a star. Explain that each star they see in the sky is making its own light, just like our Sun.

Use the following questions:

- What do your groups of stars look like?
- How is this **model of stars** different from real stars?
- What do you think our Sun looks like from as far away as these other stars?



## Page 17 & 18



By choosing what headlamp to turn on, students observe the different directions of each path of light. They gather **evidence that light travels in a straight line** and that **light makes things visible** in this straight path of illumination.

### Safety Notes



1. Students should never look directly into the beam of the headlamp or shine it into other students' eyes.
2. Make sure the students are in place and not walking around once the room is darkened. Turn the lights back on before they are instructed to move to another location.

Demonstrate how headlamps are a **source of light**. Give two volunteers each a headlamp and darken the room. Have them stand next to each other, facing opposite directions. Take turns turning on the headlamps and **support observation and discussion** among the entire class with the following prompts:

- **What can you see when the first headlamp is turned on?** What **can you see** when this one is turned off and the **second is turned on** (**cause-and-effect, structure and function**)?
- **What would happen** if one student turned his or her head?
- **Use this evidence to explain** how light travels.

## Page 19



Liz is holding a lantern and Sam is holding a flashlight aimed at a dark shape in a tree. Students interact by **investigating** how **light helps them to see** the mystery shape in the tree.

Students are encouraged to help Sam and Liz find what is making the sound by **choosing which light will shine on the shape** in the tree. Through **cause-and-effect thinking**, students will **explain with evidence which light shines** on the owl in the tree **so it can be seen**. When students turn on the lantern, the shape is outlined but detail cannot be seen. When students turn on the flashlight, the owl is visible.

### Thinking Beyond



Duplicate a similar scenario in the classroom by darkening the room and placing two different stuffed animals in opposite corners of the room. The room will have to be quite dark so the shapes of the animals are not recognized unless light shines on them. Hold a flashlight in each hand and point them at the animals. Have students **direct you to which light to turn on to view and identify the animals**.

Possible inquiry questions/prompts: (**cause/effect**)

- Can you see the animal in the dark?
- How did you know which **light to use to see** each animal?
- **What causes** the **animal to be seen**?
- How does the **light need to be pointed to see something**?