

| <p>Big Idea:</p> <p>How can we design tests so that we can investigate how sound behaves and how light behaves?</p> <p>Guiding Questions:</p> <p>How can you prove that you can only see something when someone shines a light on it or if the object gives off its own light?</p> <p>What happens to a beam of light when you put different kinds of things in front of it?</p> <p>How would you design an experiment to prove your thinking?</p> <p>How do instruments (band) make sound?</p> <p>21st Century Themes/Skills:</p> | | | | | | | |
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| DCI (Disciplinary Core Ideas) | Science and Engineering Practices | Cross Cutting Concepts | Student Learning Objectives | Differentiated Activities (Consider the 5 Es) | Resources/Technology | Formative Assessments | Benchmark Assessment |
| <p>PS4.A: Wave Properties</p> <ul style="list-style-type: none"> Sound can make matter vibrate, and vibrating matter can make sound. (1-PS4-1) | <p>Planning and Carrying Out Investigations</p> <ul style="list-style-type: none"> Plan and conduct investigations collaboratively to produce evidence to answer a question. (1-PS4-1),(1-PS4-3) | <p>Cause and Effect</p> <p>Simple tests can be designed to gather evidence to support or refute student ideas about causes. (1-PS4-1),(1-PS4-2),(1-PS4-3)</p> | <p>By the end of the lesson, students should be able to:</p> <p>Identify objects and materials that reflect or transmit light.</p> <p>Observe and describe how light can behave differently when it strikes various objects and materials (transparent, translucent, opaque).</p> <p>Observe and describe how light can be reflected onto another object by using a mirror.</p> | <p>ENGAGE 1:</p> <p>Hold up a picture of the Sun and a flashlight, and point to the lights in the classroom. Ask:</p> <p>What do these objects produce? How is light useful to us?</p> <p>What other objects produce light?</p> <p>Use students' responses to generate a class discussion about light.</p> <p>Ask students if they have ever used a flashlight in the dark so that they are not scared. Continue the discussion by asking students to describe how and why a flashlight is used.</p> <p>Tell students that they are going to view a video with the characters Ping and Pong, in which Pong reads a story where Ping is bored and wants to find new friends.</p> <p>Show the video segment called Shade. This is a longer clip, so stop the video (about one third of the way through) when Pong says, "Don't worry, Little Ping, because we have our friends with us." Check to see if students have comments or questions about the first part of the video.</p> <p>Ask students to make predictions about what will happen in the rest of the video. Ask: How will the shadow friends help save Ping and Pong from the wolf? Create a class chart to which students may add their predictions and see the full range of ideas.</p> <p>After students have viewed the video, ask:</p> <p>What forms shadows? (light)</p> <p>What happens when light cannot get through something? (It makes a shadow.)</p> <p>What do you call the darkness behind an object? (a shadow)</p> | <p>Unit 4 Resources</p> | <p>To further review the concepts taught in this lesson, have students view the video segment Light: Sources and Observations. Pause during the video to allow students to comment on what they have just seen.</p> <p>Have students fold a sheet of drawing paper into sixths, creating six sections. Instruct them to draw two pictures of objects that transmit light, two pictures of objects that reflect light, one picture showing how light is reflected using a mirror, and one picture showing how a shadow is formed when something blocks the light.</p> <p>Students should write a caption under each picture. Be sure to evaluate students on the concept rather than their artistic skill. If a picture is not clear, ask the student to explain</p> | |
| <p>PS4.B: Electromagnetic Radiation</p> <ul style="list-style-type: none"> Objects can be seen if light is available to illuminate them or if they give off their own light. (1-PS4-2) Some materials allow light to pass through them, others allow only some light through and others block all the light and create a dark shadow on any surface beyond them, where the light cannot reach. Mirrors can be used to redirect a light beam. (Boundary: The idea that light travels from place to place is developed through experiences with light sources, mirrors, and shadows, but no attempt is made to discuss the speed of light.) (1-PS4-3) | <p>Constructing Explanations and Designing Solutions</p> <ul style="list-style-type: none"> Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. (1-PS4-2) Use tools and materials provided to design a device that solves a specific problem. (1-PS4-4) | <p>Influence of Engineering, Technology, and Science, on Society and the Natural World</p> <ul style="list-style-type: none"> People depend on various technologies in their lives; human life would be very different without technology. (1-PS4-4) | <p>By the end of the lesson, students should be able to:</p> <p>Identify objects and materials that reflect or transmit light.</p> <p>Observe and describe how light can behave differently when it strikes various objects and materials (transparent, translucent, opaque).</p> <p>Observe and describe how light can be reflected onto another object by using a mirror.</p> | <p>EXPLORE 1:</p> <p>Present students with the first Lesson Question and have them complete the first section of the Scientific Explanation Student Sheet ("My Question") using this question. Students may type their responses directly into the digital resource, or they may write or draw their responses on a printed copy of the resource. The digital resource includes a link to a PDF version of the Student Sheet.</p> <p>Guide students to think about what they already know about the Lesson Question. Additionally, encourage students to think about how they know what they do (evidence and reasoning). In the first box of the Student Sheet, students should record this information for the Lesson Question. Introduce the section titled "Evidence I found," explaining to students that they will complete this section as they work through the rest of this Explore.</p> <p>Have students begin the "Evidence I found" section by recording information gathered during Engage.</p> <p>Say: In this video, you will learn about light and what happens when light strikes different objects. Tell students to listen as they view the video for three ways to describe how light behaves when it strikes an object.</p> <p>Show students the video segment. Afterward, gather students as a class and ask them to name three things that can happen to light as it hits different objects (blocked to form a shadow, reflected, or transmitted). Write the glossary terms reflect and transmit on the board. Have students work in pairs or small groups to define each term based on their prior knowledge and what they learned from the video segment. Students may write or draw their definitions.</p> <p>After students have defined each term, encourage them to look up the terms in the Interactive Glossary, and compare their definitions with those in the glossary. Then, have students make any changes to their written definitions as needed.</p> <p>Ask students if they think that either of the two terms they just explored can help a human see objects. Take suggestions and then ask students to keep thinking about this question as they work on a Hands-On Activity. Have students work in groups to complete the Hands-On Activity: Lights On!</p> <p>Following the activity, have students share their answers to questions in a class discussion. Ask students what helps us see objects (light reflecting from the surface of an object).</p> <p>Read aloud the section titled What Happens When Light Strikes Different Objects and Materials? in the Core Interactive Text.</p> <p>Write the words energy and light on the board. Have students work in pairs or small groups to define each term based on what they have learned so far. Students may write or draw their definitions.</p> <p>After students have defined each term, encourage them to look up the terms in the Interactive Glossary, and compare their definitions with those in the glossary. Then, have students make any changes to their written definitions as needed.</p> <p>Gather the class and ask students to give examples of sources of light.</p> | <p>Video Segment: Shade</p> | <p>Have students complete the Constructed Response and Selected Response items for the lesson Light. Have students complete the Constructed Response and Selected Response items for Light Energy.</p> <p>Provide each student with a blank Venn diagram. Label one circle "reflect" and the other circle "transmit."</p> <p>Show different objects one at a time, and ask students to draw a picture of the object in the appropriate circle.</p> <p>Students use the Board Builder tool to create a board that shows what they know about the focus question. Emphasis should be placed on the evidence they have collected to support their findings.</p> | |

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| <p>PS4.C: Information Technologies and Instrumentation</p> <p>•People also use a variety of devices to communicate (send and receive information) over long distances. (1-PS4-4)</p> | <p>Scientific Investigations Use a Variety of Methods</p> <p>•Science investigations begin with a question. (1-PS4-1) •Scientists use different ways to study the world. (1-PS4-1)</p> | | <p>EXPLAIN: Have students use the evidence that they collected in the Explore 1 sessions to complete the sections of the Scientific Explanation Student Sheet (sections "My Claim" and "My claim is true because"). Students may type their responses directly into the digital resource, or they may write or draw their responses on a printed copy of the resource. The digital resource includes a link to a PDF version of the Student Sheet. Have groups of two to four students share their explanations with each other. Students should then revise or enhance their explanations based on group discussion.</p> | <p>Video Segment: Shadow</p> | | |
| | | | <p>EXPLORE 1: Present students with the second Lesson Question and have them complete the first section of the Scientific Explanation Student Sheet ("My Question") using this question. Students may type their responses directly into the digital resource, or they may write or draw their responses on a printed copy of the resource. The digital resource includes a link to a PDF version of the Student Sheet. Guide students to think about what they already know about the Lesson Question. Additionally, encourage students to think about how they know what they do (evidence and reasoning). In the first box of the Student Sheet, students should record this information for the Lesson Question. Remind students about the section titled "Evidence I found," explaining to students that they will complete this section as they work through the rest of this Explore. Have students add to the "Evidence I found" section by recording information gathered during Engage that relates to the second Lesson Question.</p> | <p>Video Segment: How Light Moves</p> | | |
| | | | <p>Instruct students to create a chart with two columns (or provide one already constructed.) Students should title the chart, "Objects that Reflect or Transmit Light," and label the two columns "Reflect Light" and "Transmit Light." Ask students to add to the chart as they explore resources to answer the Lesson Question. Make sure students know that they can record information as text, diagrams, or drawings. Read aloud the reading passage Mirrors Reflect Light and the section of the Core Interactive Text titled What Are Some Objects That Reflect or Transmit Light? Follow up with a class discussion in which you ask students to suggest other objects that reflect light. reading passage: Mirrors Reflect Light EXPLORE 2: Instruct students to create a chart with two columns (or provide one already constructed.) Students should title the chart, "Objects that Reflect or Transmit Light," and label the two columns "Reflect Light" and "Transmit Light." Ask students to add to the chart as they explore resources to answer the Lesson Question. Make sure students know that they can record information as text, diagrams, or drawings. Read aloud the reading passage Mirrors Reflect Light and the section of the Core Interactive Text titled What Are Some Objects That Reflect or Transmit Light? Follow up with a class discussion in which you ask students to suggest other objects that reflect light. Let students know that they will be viewing a video segment. Say: In this video, you will learn about how objects can be identified by how they interact with light. Tell students to listen for different ways to describe objects. Instruct them</p> | | | |

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| | | | | <p>EXPLAIN 2: Have students use the evidence that they collected in the Explore 2 sessions to complete the sections of the Scientific Explanation Student Sheet (sections "My Claim" and "My claim is true because"). Students may type their responses directly into the digital resource, or they may write or draw their responses on a printed copy of the resource. The digital resource includes a link to a PDF version of the Student Sheet. Have groups of two to four students share their explanations with each other. Students should then revise or enhance their explanations based on group discussion. Present students with the final Lesson Question and have them complete the first section of the Scientific Explanation Student Sheet ("My Question") using this question. Students may type their responses directly into the digital resource, or they may write or draw their responses on a printed copy of the resource. The digital resource includes a link to a PDF version of the Student Sheet. Guide students to think about what they already know about the Lesson Question. Additionally, encourage students to think about how they know what they do (evidence and reasoning). In the first box of the Student Sheet, students should record this information for the Lesson Question. Refer again to the section titled "Evidence I found," explaining to students that they will complete this section as they work through the rest of this Explore. Have students begin the "Evidence I found" section by recording information gathered during Engage that relates to the final Lesson Question. Tell students that they are going to engage in an exploration about reflection. Have them work in pairs on the Exploration, Reflection and complete the Student Guide Level 1. Discuss students' observations as a class. Read aloud the passage How Can Light Be Reflected onto Another Object Using a Mirror? from the Core Interactive Text.</p> <p>EXPLAIN 3: Have students view the video segment Bouncing Light. Follow up by asking the class questions such as: What happens when light hits a rough surface? (Light bounces off in many different directions.) What happens when light hits a smooth surface? (Light bounces off in one direction, so you can see your reflection.) What type of surface would be best to reflect light for a specific purpose? (smooth surface to make sure that light is reflected and to allow accurate prediction of reflected light) Have students use the evidence that they collected in the Explore 3 sessions to complete the sections of the Scientific Explanation Student Sheet (sections "My Claim" and "My claim is true because"). Students may type their responses directly into the digital resource, or they may write or draw their responses on a printed copy of the resource. The digital resource includes a link to a PDF version of the Student Sheet. Have groups of two to four students share their explanations with each other. Students should then revise or enhance their explanations based on group discussion. Scientific Explanation Student Sheet</p> <p>ELABORATE 2: Tell students that they will be viewing a video segment. Ask students to think about the following question as they view: How does this video help us better understand the Lesson Question: What happens when light strikes different objects and materials? Have students view the video segment Light Reflection: Dependent on Surface. Follow up by asking students to answer the question you asked them to think about. Ask additional questions such as: How does light interact with dull hair and shiny hair differently? What makes dull hair shiny and why? How is shiny hair like a mirror? Write the words reflect and transmit on the board. (Students first explored these Interactive Glossary terms in Explore 1.) Ask students to look for evidence of either of these action words as they view a video segment. Show the video segment Light. Ask the class: Which word describes how the eye handles light? Ask students to explain their answer. Then, ask: Why does the eye handle light in this way?</p> <p>ELABORATE 3: Go with students on a "Light Walk" around the school. Look for sources of light and objects that transmit or reflect light. Students should use Board Builder to design and create a classroom chart</p> | <p>Video Segment: Investigating Visibility</p> | | |
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