



Alien Invasion

Boys and Girls Club After School Science
NSF Center for Chemical Innovation
Chemistry at the Space Time Limit (CaSTL)
<https://www.castl.uci.edu/>

Standard(s) Addressed: Children know light is reflected from mirrors and other surfaces.

Lesson Objective:

Children will be able to know that light is reflected from mirrors and other surfaces by using the light emitted from a flashlight/laser pointer to reflect off a mirror to hit a designated target and by explaining this phenomenon and giving at least two example of other reflective objects.

Materials Used:

12 light sources (flashlights/laser pointers)

12 mirrors

12 targets (sheets of paper decorated as a target)

tape

flashlights

various household items for Extend: metal coffee mug, metal coffee can, Coke can, metal cover, pots, pans, covers, shiny binder, shiny book from bookshelf, water bottle, glasses, plastic plate, laminated sign, cell phone, TV

Classroom Management:

Setting up: Before the lesson, attach the targets to the wall using the tape. Children will be grouped into 2-3 per group.

During Explore: While the children are reflecting light off the mirror to hit the target, teacher will walk around, observe, and supervise.

Clean Up: After Explore, take down all targets and collect flashlights/laser pointers.

Signal: Stand silently in front of the room, raising hand in the air to get the children's attention.

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ENGAGE: *Connect to Prior Knowledge and Experience, Create Emotionally Safe Learning Environment, Preview New Vocabulary* **Estimated time: 5 – 10 minutes**

Description of Engage: Teacher will engage the children in a discussion regarding light by demonstrating one of the properties of light (that light travels in a straight line) using the laser pointer. Then the teacher will ask the children what they already know about mirrors.

Teacher’s Role	Teacher Questions	Children’s Role
<p>Teacher gets the children interested in the lesson by showing them 2 images of sunlight passing through dark clouds.</p> <p>Teacher scripts their words.</p> <p>Teacher shows the children that the light from the laser pointer travels in a straight line.</p> <p>Teacher then introduces mirrors and asks the children what they already know about mirrors.</p> <p>Teacher scripts the children’s words.</p>	<p>Look at the two pictures. Talk to your elbow partner about what you see and be prepared to tell us one thing you notice.</p> <p>I have a laser pointer in my hand. I am going to hide it with a piece of paper. I want you to try to find the red dot of light on the wall or ceiling and tell me in what direction I am holding the pointer.</p> <p>Why were you able to guess the direction of the pointer?</p> <p>What can you say about how light travels?</p> <p>Here is a mirror. What do you know about mirrors?</p> <p>Why can you see yourself in the mirror?</p>	<p><i>“The light travels in a straight line.”</i></p> <p><i>“It seems to have an edge or border.”</i></p> <p><i>“It spreads out as it comes through the cloud.”</i></p> <p>Children look around the room to find the red dot of light and use their arms to show the direction of the pointer.</p> <p><i>“The pointer must be pointing where we see the red dot.”</i></p> <p><i>“Light travels in a straight line.”</i></p> <p><i>“Mirrors are shiny”</i></p> <p><i>“I can see myself in the mirror”</i></p> <p><i>“Light bounces off a mirror”</i></p>

EXPLORE: *Hands-On Learning, Contextualize Language, Use of Scaffolding (Graphic Organizers, Thinking Maps, Cooperative Learning), Use of Multiple Intelligences, Check for Understanding* **Estimated time: 10 – 15 minutes**

<p>Description of Explore: Each group will have 2 – 3 children. Each group will be given a laser pointer, a mirror, and an assigned “target” that is taped on the wall. Each group will shine light on the target using the pointer a) while facing the target and b) while facing away from the target using a mirror.</p>		
<p>Teacher’s Role</p> <p>Organize the children into their groups.</p> <p>Ask one member of each group to collect the materials.</p> <p>Tell the children the pointer should only be shined on the ground, the mirror, or the target and they need to be careful to avoid each other’s face and eyes.</p> <p>Supervise the children to avoid any dangerous behavior.</p> <p>If some children finish early, challenge them to use additional mirrors and partners to hit the target.</p>	<p>Teacher Questions</p> <p>You are going to shine light on the target in two ways: the first way is by facing the target; and the second way is by facing away from the target.</p> <p>Talk to your group to decide how you can shine the light on the target without looking at it.</p> <p>As teacher walks around the room, teacher asks each group:</p> <p>Which was easier: shining the light directly on the target or using the mirror?</p> <p>What happens when you shine the light on the mirror?</p> <p>What is the most number of mirrors you used to hit the target?</p>	<p>Children’s Role</p> <p>Children shine light on the target while facing it.</p> <p>They shine light onto the target without facing it by reflecting light off the mirror.</p> <p>Ask questions if they are unclear or unsure.</p> <p>Children are responsible for their own safety and the safety of others.</p> <p>“Shining the light directly on the target. We could look at it and see it.”</p> <p>“It bounces.”</p> <p>“Three”</p> <p>“Five”</p>
<p>EXPLAIN: <i>Listening, Speaking, Reading, and Writing to Communicate Conceptual Understanding</i> Estimated time: 20 minutes</p> <p>Description of Explain: Children will present their findings to the class one group at a time. The teacher will encourage discussion by asking questions such as inquiring how the children managed to shine the light on the target without facing it. Through continued inquiry, the children will arrive at the conclusion that light reflects off shiny surfaces. Through further questioning, the children will provide other examples of light traveling in a straight line and other examples of light reflecting off a surface.</p>		

Teacher's Role	Teacher Questions	Children's Role
Teacher asks groups probing and clarifying questions.	<p>How did you shine the light on the target without facing it?</p> <p>What if you did not have a mirror? How could you hit the target without facing it?</p> <p>What other objects do you think you could use?</p> <p>How is the light from the pointer different from the light coming from the overhead lights in the ceiling?</p>	<p>"We shined the light on the mirror and the light reflected off the mirror and hit the target."</p> <p>"Use something shiny."</p> <p>"Aluminum foil"</p> <p>"The overhead light goes everywhere in the room but the pointer only hits one spot at a time."</p>
<p>EVALUATE: <i>Thinking Maps, Summarize Lesson and Review Vocabulary, Variety of Assessment Tools, Games to Show Understanding</i> Estimated time: throughout</p> <p>Description of Evaluate: The children will be assessed whether or not they learned that light travels in a straight line and can be reflected off shiny surfaces by their responses to the discussion questions.</p>		
Teacher's Role	Teacher Questions	Children's Role
Teacher monitors the children's understanding to be sure they know that light travels in a straight line	<p>How did you get the light from the pointer to hit the target?</p> <p>How is the light from the flashlight different from the pointer?</p>	<p>"It reflected off the shiny mirror."</p> <p>"The light from the flashlight goes everywhere but the laser pointer only goes to one spot at a time."</p>
<p>EXTEND/ELABORATE: <i>Group Projects, Plays, Murals, Songs, Connections to Real World, Connections to Other Curricular Areas</i> Estimated time: 5 – 10 minutes</p> <p>Description of Extend/Elaborate: Teacher asks children to look for other objects that reflect light.</p>		
Teacher's Role	Teacher Questions	Children's Role
Teacher facilitates discussion to connect the lesson to the real world.	Name some objects that reflect light.	<p>"The ocean"</p> <p>"Water"</p>

<p>Teacher looks for misconceptions since this lesson used a mirror. The children may think that only shiny surfaces reflect light but all surfaces do. This is how we can see objects around us: light hits the object, reflects, and the reflected light reaches our eyes.</p>	<p>Shine the laser pointer at some shiny objects and notice the reflection of the light.</p> <p>Try some of these objects and complete the worksheet with your observations: metal coffee mug, metal coffee can, Coke can, metal cover, pots, pans, covers, shiny binder, shiny book from bookshelf, water bottle, glasses, plastic plate, laminated sign, cell phone, TV</p> <p>Use flashlights to reflect light off the objects. How is the reflected light similar to that of the laser pointer? How is the reflected light different from the laser pointer?</p>	<p><i>“Aluminum foil”</i></p>
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Name _____

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Draw the shape of the light that is the reflection of the laser light on the mirror.



Extend.

Draw the item. Draw the shape of the light that is the reflection of the laser light on the item.

Item	Observation of Reflected Light (dim, sharp, diffuse, blurry, big, small, round, oval)

Common Characteristics of Lesson Plans

Get Children into the Learning--Connect to Their Prior Knowledge

Exploration/Investigation/Hands-On Learning

Making Meaning--Teachers and Children Together

Evaluation/Assessment

Extension to the Real World or Other Curricular Areas

Other Aspects to Consider:

The lesson is Child-Centered--the child is listening, speaking, reading, writing and drawing. The child is thinking.

The children talk more than the teacher talks.