



Fun with Prisms

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 an object is seen when light traveling from the object enters the eye.
Children observe the effects of a prism on sunlight and the light from a laser pointer.

Lesson Objective:

Children will be able to know that light travels in a straight line but spreads out into its component colors when it enters a prism. They will notice the different effects of a prism on sunlight and the light from the laser pointer.

Materials Used:

For each group:
3 equilateral plastic prisms
laser pointer

Classroom Management:

Setting up: Before the lesson, assemble the prisms and laser pointers. Children will be grouped into 2-3 per group.

During Explore: While the children are observing the effects of the prism in two investigations, teacher will walk around, observe, ask questions, and supervise.

Clean Up: After Explore, collect the 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 asking them to remember the lesson from the previous week with the spectrometers.

Teacher’s Role	Teacher Questions	Children’s Role
<p>Teacher gets the children interested in the lesson by asking what they learned last week with the flashlight/laser pointer and spectrometer.</p> <p>Teacher scripts their words.</p> <p>Teacher asks students for evidence to support their statements.</p> <p>Teacher shows the children the equilateral plastic prism that they will use in today’s investigation.</p>	<p>Remember last week’s investigation with the flashlight/laser pointer and spectrometer?</p> <p>What is one thing you learned about the difference between the white flashlight and the red laser pointer?</p> <p>How do you know that the white light from the flashlight has all the colors of the rainbow?</p> <p>Today we are going to investigate what happens to light when it passes through a prism.</p>	<p>“The white light has all the colors of the rainbow.”</p> <p>“The red laser light only has red.”</p> <p>“We saw the rainbow colors in the spectrometer.”</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**

Description of Explore: Each group will have 2 – 3 children. Each group will go outside to use the prism in sunlight. The teacher will ask the children if they have ever used a prism before. What do they think will happen when they shine the sun’s light through the prism? The children will turn the prism until they can see the colors of the rainbow. They will record their observations on their worksheet. They will then come inside and shine the red laser light into the prism. The teacher asks them to predict what they think will happen before they do this. They write their predictions then do the investigation and write their observations.

Teacher’s Role	Teacher Questions	Children’s Role
<p>Organize the children into their groups.</p>	<p>You are going to do two investigations: Sunlight through the prism and the red laser light through the prism.</p>	

<p>Teacher models what to do in each investigation.</p> <p>Teacher asks the children to predict what they think will happen to the sunlight and the red laser light when they pass through the prisms.</p>	<p>But before you do these investigations, you will do what scientists do: make a prediction.</p> <p>What do you think will happen to the white sunlight when it travels through the prism? Write this on your worksheet.</p> <p>What do you think will happen to the red laser light when it travels through the prism? Write your prediction on your worksheet.</p> <p>As teacher walks around the room, teacher asks each group:</p> <ol style="list-style-type: none"> 1. What happens to sunlight when it travels through the prism? 2. What happens to the red laser light when it travels through the prism? <p>Use this sentence frame:</p> <p>I see _____ when the white sunlight travels through the prism.</p> <p>The red laser light _____ when it travels through the prism.</p>	<p>Children write what they think will happen. Answers may vary.</p> <p><i>“We will see the colors of the rainbow.”</i></p> <p><i>“We will see white light.”</i></p> <p><i>“We will see red light only.”</i></p> <p><i>“We will see the colors of the rainbow.”</i></p> <p>The children do the investigations once the teacher sees the predictions.</p> <p><i>“We see the colors of the rainbow.”</i></p> <p><i>“It changes direction.”</i></p> <p><i>“I see the colors of the rainbow when the white sunlight travels through the prism.”</i></p> <p><i>“The red laser light changes direction when it travels through the prism.”</i></p> <p>Ask questions if they are unclear or unsure.</p>
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		Children are responsible for their own safety and the safety of others.
<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 about their observations of the light spreading into different colors or changing direction.</p>		
Teacher’s Role	Teacher Questions	Children’s Role
<p>Teacher asks groups probing and clarifying questions.</p> <p>The teacher reminds the children that the word that scientists use to talk about the spreading of white light into the colors of the rainbow is “diffraction.”</p>	<p>What do you think happens to the white sunlight when it goes into the plastic prism?</p> <p>How is this like last week’s investigation with the spectrometer?</p> <p>Does the red laser light spread out into the colors of the rainbow?</p> <p>How is this like last week’s investigation with the spectrometer?</p> <p>The word that scientists use to describe this spreading of white light into the colors of the rainbow is: diffraction.</p> <p>Can you say that word?</p>	<p>“It spreads out into the colors of the rainbow.”</p> <p>“With the spectrometer, the white light spread out into the rainbow colors when it hit the diffraction grating (CD).”</p> <p>“No. The red light only has red in it. It does not have the other colors.”</p> <p>“The red light did not show any other color—only red.”</p> <p>“Diffraction”</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 vocabulary words to describe different properties of light: reflection, refraction, and diffraction.</p>		
Teacher’s Role	Teacher Questions	Children’s Role
<p>Teacher monitors the children’s understanding to be sure they know the word that describes the light bouncing off a material (reflection),</p>	<p>We are going to play a game to see if you have learned the words that scientists use to describe the different ways that light changes when it hits</p>	

<p>light changing direction and speed (refraction), and white light spreading into its different colors (diffraction).</p> <p>Teacher puts the 3 words on the whiteboard that describe the properties of light that the children have been investigating for the past several weeks.</p> <p>The teacher describes in words each of the properties and the children write the word on their whiteboards and show the word to the teacher at the signal.</p> <p>Once the teacher checks for the correct word, then the children erase the word and get ready for the next one.</p> <p>Once the teacher checks for the correct word, then the children erase the word and get ready for the next one.</p>	<p>a material or it travels through a material.</p> <p>I have written the 3 words here and your job is to write on your little whiteboard the correct word that describes the property of light.</p> <p>I will tell you when to show me your word.</p> <p>OK? Ready?</p> <p>This word describes the property of light that means white light spreading out into the colors of the rainbow.</p> <p>OK. Show me your word.</p> <p>This word describes the property of light that means light bouncing off a shiny object.</p> <p>OK. Show me your word.</p> <p>This word describes the property of light that means light changing direction and speed.</p> <p>OK. Show me your word.</p>	<p>“<i>Diffraction</i>”</p> <p>“<i>Reflection</i>”</p> <p>“<i>Refraction</i>”</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 and the children sing the Light song.</p>		

Teacher's Role	Teacher Questions	Children's Role
Teacher shows the children the words to the song and they sing it together.	OK. Now we are going to sing a song to help us remember some of the words that scientists use when they talk about light.	Children and teacher sing the song.

Name _____

Fun with Prisms

Prediction: I think that the sunlight will when it travels through the prism.	Observation:
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Prediction: I think that the red laser light will when it travels through the prism.	Observation:
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How is the white sunlight different from the red laser light?

When the white sunlight passes through the plastic prism, it

_____.

When the red laser light passes through the plastic prism, it

_____.

Did You Know There Are Different Colors in Light?

(to the tune of "If You're Happy and You Know It. . .")

by Dr. Terry Shanahan, July 31, 2005

Did you know there are different colors in light? (Clap, clap)
Did you know there are different colors in light? (Clap, clap)
Red, orange, yellow, green,
Blue, indigo, and violet,
Did you know there are different colors in light? (Clap, clap)

Did you know light bounces like a ball? (It's reflection!)
Did you know light bounces like a ball? (It's reflection!)
Light rays bounce off an object
And travel to your eye.
Did you know light bounces like a ball? (It's reflection!)

Light always travels in a straight line, (Yes, it will!)
Light always travels in a straight line, (Yes, it will!)
It may change its angle
But it's a line, just the same.
Light always travels in a straight line, (Yes, it will!)

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.