

Day 2

Bellringer:

Caleb and Anika each conduct an experiment in which they investigate whether the amount of dishwashing liquid affects how many bubbles are produced. They put different amounts of dishwashing liquid into two equal-sized jars. They put lids on the jars and shake them. Then, they measure the height of the bubbles. Which of the following methods would affect their results?

- A. Caleb took more time to set up his experiment than Anika.
- B. Anika shook the liquid in the jars for twice the amount of time as Caleb.
- C. Anika used jars with metal lids and Caleb used jars with plastic lids.
- D. Caleb used a metric ruler and Anika used a metric tape measure.

Today's Focus

Behavior of Light

I will be able to:

- Describe that light travels in straight lines until it strikes an object or travels from one material to another.
- Demonstrate that light can be reflected, bent (refracted). or/and absorbed.

Words to Know

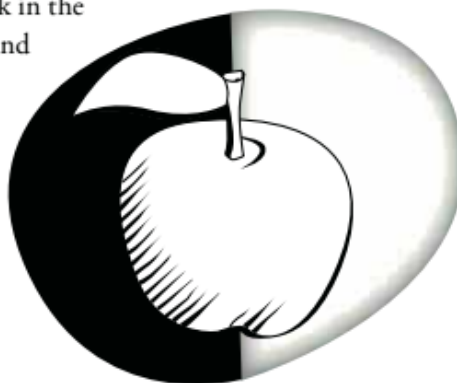
Term	Meaning
Light energy	
reflect	
bend (refract)	
absorb	
substance	

Think About This!! - Apple in the Dark

Imagine you are sitting at a table with a red apple in front of you. Your friend closes the door and turns off all the lights. It is totally dark in the room. There are no windows in the room or cracks around the door. No light can enter the room.

Circle the statement you believe best describes how you would see the apple in the dark:

- A.** You will not see the red apple, regardless of how long you are in the room.
- B.** You will see the red apple after your eyes have had time to adjust to the darkness.
- C.** You will see the apple after your eyes have had time to adjust to the darkness, but you will not see the red color.
- D.** You will see only the shadow of the apple after your eyes have had time to adjust to the darkness.
- E.** You will see only a faint outline of the apple after your eyes have had time to adjust to the darkness.



Describe your thinking. Provide an explanation for your answer.

Teacher Demonstration: Light Travels in a Straight Line

Writing:

Describe how you know that light travels in a straight line through the air and across the room using evidence from the demonstration.

How does the movement of light change when the mirror is used? _____

Draw or sketch what you observed and label your drawings.

Laser light only

Laser light and mirror

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Activity Time: Behavior of Light

Station 1: Light travels in a straight line

Observations	Draw and label a diagram of your observations

Station 2: Reflection of Light

Observations	Draw and label a diagram of your observations

Station 3: Refraction of Light: Part 1

Observations	Draw and label a diagram of your
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	observations

Station 4: Refraction of Light: Part 2

Observations	Draw and label a diagram of your observations

Station 5: Refraction of Light: Part 3

Observations	Draw and label a diagram of your observations

Station 6: Absorption of Light:

Observations	Draw and label a diagram of your observations

Video Disappearing Glass:

Explain why the pyrex glass seems to disappear in the oil. _____

Think About This!! - Can It Reflect Light?

What types of objects or materials can reflect light? Put an X next to the things you think can reflect light.

___ water

___ gray rock

___ leaf

___ mirror

___ glass

___ sand

___ potato skin

___ wax paper

___ tomato soup

___ crumpled paper

___ shiny metal

___ dull metal

___ red apple

___ rough cardboard

___ the Moon

___ rusty nail

___ clouds

___ soil

___ wood

___ milk

___ bark on a tree

___ brand new penny

___ old tarnished penny

___ smooth sheet of aluminum foil



Explain your thinking. Describe the "rule" or the reasoning you used to decide if something can reflect light.

Reading Passage: What is Light Energy?

Light energy moves in a straight line until it strikes an object or material. Some materials **absorb** (take in) light, some materials **reflect** (bounce back) light, and some materials **bend** (refract) light. Visible light (white light) includes all of the colors in the rainbow: red, orange, yellow, green, blue, indigo, and violet.

When visible light hits an object, some light waves may be absorbed by it, and some light waves may be reflected off of it. That reflected light is what is detected by your eyes. When you see an object, you are really seeing the light that reflects off of its surface.

For example, if your teacher uses a red marker on the board, the ink is reflecting red light to your eyes and absorbing all of the other colors found in visible light.


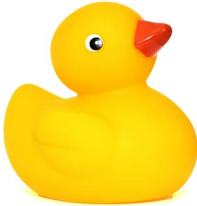
An object that reflects all colors of light will appear white. What color will an object appear if it absorbs all colors of light?



According to the text, how does light travel? _____

What might happen to light when it hits an object as it travels? _____

What color will an object appear if it absorbs all colors? _____

What colors are being reflected by the following objects?

Object	Reflected color(s)
	
	

What colors are being absorbed by these objects? _____

Reading Passage: How is Light Energy related to Thermal Energy?

Light energy is related to **thermal (heat) energy**. Because black objects absorb the energy from all of the colors of light at the same time, black objects get hotter more quickly. This explains why wearing a black t-shirt makes you hotter when you are outside in the Sun, but a white t-shirt does not get as hot.

Why do black objects get hotter than lighter colored objects? _____

When the surface of some substances or materials are smooth and shiny (like glass, water, mirrors, or polished metal), all light reflects off of the surface at the same angle that it strikes the surface.

This gives a complete reflection of an object.



The mountains and trees are reflected off of the surface of the lake.



This stainless steel garden gazing globe reflects the images of objects in this garden.



This kitten can see itself in the mirror because it detects the light that is reflected straight back to it off of the mirror.

Activity Time: Mirror Reflection

Observations (Up close)	Observations (From a distance)

Observations (Slight tilt to the left)	Observations (Slight tilt to the right)

Reading Passage: What Happens When Light is Bent (Refracted)?

Sometimes when light energy strikes an object, it is able to pass through the object. When this happens the light can be **bent, or refracted**. As light passes through a prism or a glass of water, it bends, causing a change in how we see it.

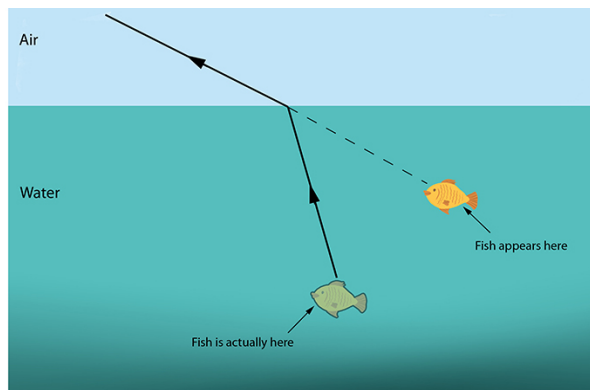
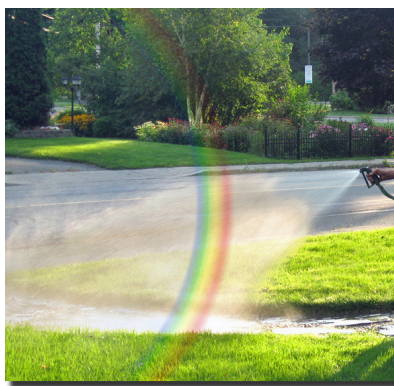
When white light passes through a prism it bends, and based on its wavelength, it separates out into individual colors, forming a rainbow. Visible light (white light) includes all of the colors in the rainbow: red, orange, yellow, green, blue, indigo, and violet.

Water droplets in the atmosphere after a rain act like prism to form rainbows. As light passes through the water droplets, the light is bent and separates out into the colors of the rainbow.

According to the text, what happens as light passes through a prism, or droplets of water in the atmosphere? _____

Light energy travels differently through different substances. Light energy slows down as it passes through water. When this happens the light is **bent, or refracted**. The light passing through the water bends around the pencil. This bending, or refraction, not only causes the pencil to appear broken, but it also magnifies the pencil making it appear larger than it actually is!

Have you ever noticed fish in a pond, or other body of water? When you try to reach in and get it, it seems like it should be closer to the surface than it actually is, this is because light bends as it enters the water, and again as it bounces off of the fish and is finally detected by your eyes.



Video: StudyJams

When light hits a _____, _____ surface, it _____ at the same angle it came in.

When we see colors, we only see the colors (of light) that are _____.



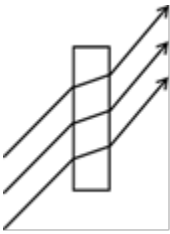
Smooth surfaces _____ most light

Rough surfaces _____ light.

When light waves move from one substance to another, they will _____ (or _____)

Writing - Where Will the Light Go?

Identify the property that the picture is demonstrating as reflecting (reflection), bending (refraction), or absorbing (absorption) and then explain what is occurring.

Light Behavior	Explanation
	
	
	

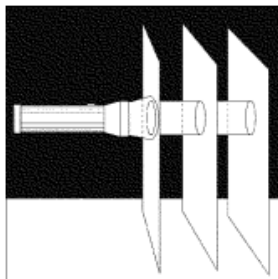
Revisit: Think About This!! - Apple in the Dark (Student Journal - Page 12)

Revisit: Think About This!! - Can It Reflect Light? (Student Journal - Page 15)

Check What You Know:

1. Jason was taking a walk around the pond in his local park. He noticed that there was a golf ball located in the bottom of the pond. Jason reached in to grab it, and realized that the ball was not positioned in the same spot he thought it was. What is causing Jason's view of the ball to be off?

A) The light is being absorbed by the water.
B) The light is reflecting off the water.
C) The light is being bent in the water because of refraction.
D) There are more vibrations occurring under the water.
2. Mr. Welder's class conducted an experiment to see how light travels. They punched holes in two index cards in the exact same location. A third index card was set up six inches away from the second index card. One of the students shined a flashlight through the first hole and the light appeared on the third index card.



Which behavior of light does this investigation demonstrate?

- A. Light produces shadows.
- B. Light travels in a straight line.
- C. Light is absorbed by solid objects.
- D. Light bends when it travels through water.