EXPERIMENT

Transparent, Opaque, & Translucent

Read the text and conduct the experiment by shining a flashlight directly on each object. Then complete the table and answer the questions.

Light can pass through many types of solids, liquids, and gases. However, light cannot pass through all objects.

When light can pass through an object, the object is called transparent. When light cannot pass through an object, the object is called opaque. When some light passes through an object, but not all of it, the object is called translucent.

Object	Describe it	Test it	Conclusion
Construction paper	Solid, thick paper; colored	Light did not pass through the paper.	Construction paper is opaque.
Tissue paper			
Plastic wrap			
Clear glass			
Plastic lid			
Cardboard box			
Wax paper			
Aluminum foil			
Paper towel			
Wood			

1. What are common characteristics of opaque objects?
2. What are common characteristics of transparent objects?
3. How does a translucent object affect light passing through it?

Reflection

Read the text and answer the questions.

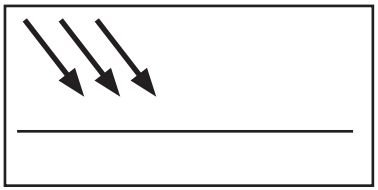
What happens when light waves strike an object? The answer depends on what the object is, and how flat or rough the surface of the object is. Sometimes, light waves hit an object and bounce back. When a light wave bounces off an object, it is called reflection.

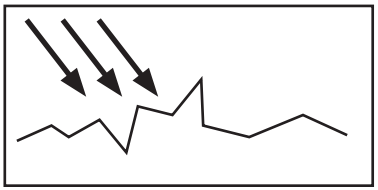
Objects that are flat, shiny, and smooth often reflect light at the same angle it hits. Think about a smooth, flat surface like a mirror or a flat lake. On a mirror, light rays bounce back at the same angle they hit. This is how you can see yourself reflected on the surface of a mirror or flat lake.

On the other hand, rough and dull objects reflect light, but they scatter it in all directions. Think about a rough brick—you can't see yourself reflected in a brick! Curved surfaces like a funhouse mirror reflect light in different directions, too, causing the reflected image to twist or distort.

If all surfaces were flat and shiny, we could not see the actual objects we look at. Rough and dull objects allow us to see an object, including its shape, size, and color because it is not evenly reflecting all of the light from other objects around it.

1. Use the text to define reflection.
2. How does the surface of an object affect the reflection of light?
3. A. What words would you use to describe reflective objects?
   B. Give three examples of items that reflect light.
4. A. What words would you use to describe objects that scatter light?
   B. Give three examples of objects that scatter light.
5. Use the text to draw lines illustrating how light rays will reflect off these two surfaces.





Colors: Absorbed & Reflected

Read the text and answer the questions.

"White light" is the combination of all wavelengths of visible light (ROYGBV). The sun, light bulbs, and candles all produce white light.

When waves of white light strike an object, some wavelengths of light are absorbed, or taken in, and other wavelengths are reflected, or bounced off. The reflected wavelengths are what the human eye sees as color.

Imagine a green apple. Why does the apple look green? When white light strikes the apple, the apple absorbs all wavelengths of the visible spectrum, except green. Green is the only color wavelength reflected by the apple. Therefore, when the reflected light enters the human eye, the apple looks green.

What about the color black? When talking about light, black is not a color. Black is the absence of light. When an object absorbs all wavelengths of light and reflects none, it looks black.

1. Make inferences from the text to complete the chart.

Object	Absorbed colors	Reflected colors
shiny red sports car		
lemon		
lime		
grape soda		
your shirt		

2. What is the relationship between wavelength and color?
3. Use the text to draw a diagram illustrating how light waves allow us to see colors.
4. What colors does a white sheet of paper absorb? What colors does it reflect? Explain your response using logic and evidence from the text.

Refraction

Read the text and answer the questions.

Have you ever noticed that a straw looks bent in your drink? This bending is a trick of light called refraction. Refraction is simply light's change in direction between mediums. The straw *looks* bent underwater because the light is refracted in a different direction than when it travels through the air.

Refraction is caused by a change in the speed of light. In space, where there is no medium, light travels at 186,000 miles per second—the fastest speed in the universe! But when light enters the Earth's atmosphere, it slows down and changes direction. When light travels through water, glass, or another medium, it slows down even more, and changes direction again.

1. A. Use the text to define refraction.
   B. Explain the difference between reflection and refraction.
2. List at least two ways a medium can affect light. Cite evidence from the text to support your answers.
3. Why does light refract when it enters the Earth's atmosphere?
4. What does a straw appear to be when it enters a glass of water?

Make inferences from the text to determine whether or not each of the following is either a **cause** or **effect** of refraction.

____ Light passes from space into the Earth's atmosphere.

____ A pencil appears to bend in a glass of water.

____ The curve of eyeglass lenses help some people to see better.

____ Light changes speed and direction depending on the medium.

____ Judging distance when swimming underwater is difficult.

Writing Prompt

Imagine you are trying to spear a fish for dinner. Write about what you see, and use the concept of refraction to explain why you should not aim your spear exactly where you see the fish.