Name _____ **Date** _____

Light: Bouncing and Bending

Key Words		
absorb	bend	bounce
energy	image	lens
light	mirror	opaque
reflect	reflection	refract
refraction	transmit	transparent

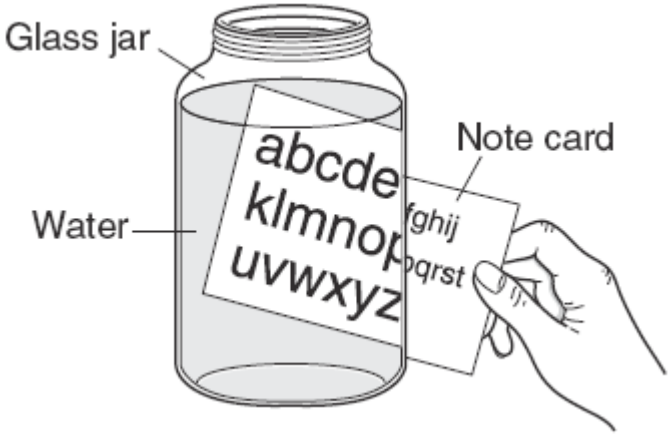
Most of the **light** around us comes from the sun. Light has many special properties that make it one of the most important types of energy on the Earth. Light travels in waves called light rays. When light rays hit the surface of an object, the object **absorbs** some of the light rays. Other rays are bounced back, or **reflected. Reflection** is the bouncing back of light rays from a surface. You can only see an object because some of the light it reflects travels to your eyes.

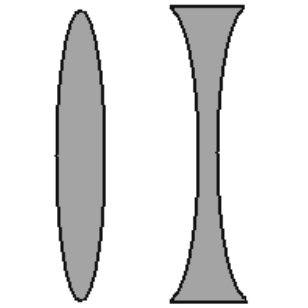
Light can pass through **transparent** objects, such as a clear pane of glass. Light rays also pass through **translucent** objects, but they do not go through as easily. For this reason, images seen through translucent objects appear to be fuzzy and lack detail. **Opaque** objects do not allow any light rays to pass through.

Certain objects reflect more light than others. Light rays are reflected back from a surface at the same angle they strike the surface. If the surface is rough, the reflected light bounces back in many different directions. If the surface is smooth, like a **mirror**, the rays bounce off the surface the same way they came to the surface. This is how a mirror image is formed. Other materials that reflect a lot of light include the shiny side of a flat piece of aluminum foil, shiny spoons, and tinted windows.

Most mirrors in your house are flat mirrors. But you may have seen curved mirrors in other places. Curved mirrors change your **image** (likeness) in funny ways. Some curved mirrors make you look short and wide while others make you look tall and thin. You can see how curved mirrors change your image by looking at yourself in a large spoon. Look at yourself in the curved part of the spoon. Turn the spoon over and look at yourself in the hollowed-out part of the spoon. Your images will look differently.

Light rays always travel in straight lines. However, light rays change direction when they travel from one substance to another. This bending of light is called **refraction.** Refraction occurs because light travels at different speeds through different substances. For example, light travels more slowly through water than through air. The light rays passing through a jar of water are bent when they pass from the water to the air. As a result, if you hold a note card with letters behind the jar, the writing looks closer and larger than it really is. A rainbow is an example of light being refracted. As the light passes through the air, it enters the tiny drops of water in the atmosphere. As it enters these tiny drops, the light is bent and split into many colors.





Different kinds of lenses refract light. A **lens** is a circular prism. Convex lens are thicker in the center than at the edges. Concave lens are thinner in the center than at the edges. Concave lenses make objects viewed through them seem larger. A hand lens is an example of a concave lens. When you view something with a hand lens, it magnifies the image, making it seem larger and closer. Some eyeglasses contain concave lenses that make it easier for the people wearing them to read small print. A convex lens is thinner in the middle and thicker at the edges. A camera contains a convex lens which makes larger objects appear smaller and farther away. Some eyeglasses have convex lenses, which allow the wearer to see objects that are farther away. Telescopes use different kinds of lenses and mirrors to allow people to see objects that are far away. A refracting telescope uses two or more lenses to form an image. A reflecting telescope uses an arrangement of mirrors to form an image.

1. Reflected light bounces back—

A in many directions
B at the same angle
C in a curved line
D in small circles

2. Why do images seen through translucent objects appear fuzzy and lack detail?

A The light rays bend at all angles.
B The light rays pass right through.
C Light rays do not pass through them easily.
D The light rays scatter in all directions.

3. Which word or words in paragraph 4 help you know what the word image means?

A Flat mirrors
B Curved mirrors
C Likeness
D Spoon

4. Which of the following objects is transparent?

A A sheet of white paper
B A curved mirror
C An aluminum can
D A clear pane of glass

5. This selection is mainly about—

A how light is reflected by mirrors
B how light rays change images
C the ways that light rays move
D convex and concave lenses

6. Why does a hand lens make an object appear larger?

A A hand lens is made of a concave lens.
B The convex lens in a hand lens magnifies the image.
C A hand lens is thinner in the center than at the edges.
D The smooth, shiny surface of the lens reflects most of the light.

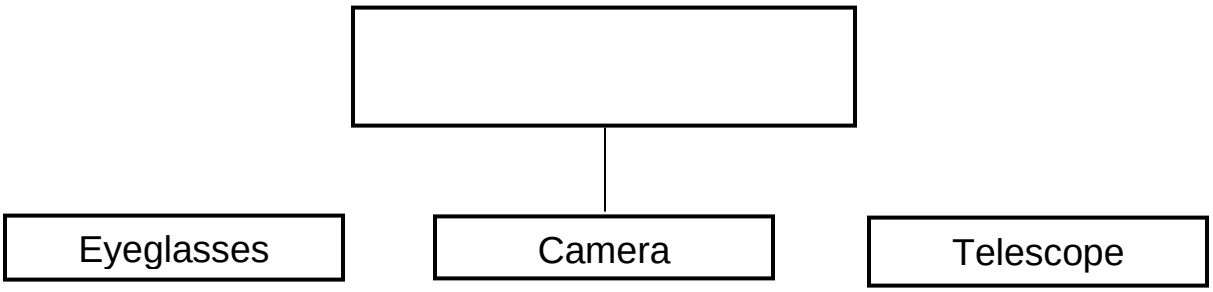
7. From where does most of the light around us come?

A Electric light bulbs
B The sun
C Television sets
D Lamps

8. Which of these examples would best model the behavior of light when light reaches the surface of a mirror?

A A soap bubble lands on the surface of a wall and bursts.
B A piece of clay is thrown at a wall and sticks to the surface.
C A moth flies toward a wall and lands on its surface.
D A ball is thrown at a wall and bounces away from the wall.

Look at this diagram of information from the passage



9. Which of the following belongs in the empty box?

A Objects That Use Lenses to Refract Light
B Objects That Are Good Reflectors of Light
C Objects That Make Images Look Larger
D Objects That Make It Easier for Us to See Small Things

10. Which of the following will reflect rather than refract light?

A Hand lens
B Prism
C Tinted window
D Concave lens

Vocabulary Puzzle

Directions: Find and ring the words in the puzzle that are found in the word bank below.

absorb	bend	bounce
energy	image	lens
light	mirror	opaque
reflect	reflection	refract
refraction	transmit	transparent

A	**A**	**Y**	**N**	**K**	**L**	**R**	**T**	**A**	**Y**	**Z**	**O**	**B**	**M**	**A**	**Z**	**N**	**T**	**C**	**A**	**R**	**F**	**E**	**R**
W	**B**	**A**	**B**	**L**	**I**	**E**	**R**	**O**	**Z**	**B**	**B**	**O**	**U**	**N**	**C**	**E**	**C**	**P**	**O**	**B**	**N**	**W**	**Z**
T	**D**	**S**	**P**	**C**	**G**	**F**	**A**	**C**	**D**	**B**	**C**	**Q**	**O**	**P**	**S**	**N**	**E**	**L**	**M**	**X**	**A**	**D**	**Q**
R	**E**	**P**	**O**	**D**	**H**	**R**	**N**	**D**	**A**	**R**	**O**	**P**	**A**	**Q**	**U**	**E**	**N**	**R**	**B**	**E**	**D**	**Y**	**V**
A	**D**	**F**	**Q**	**R**	**T**	**A**	**S**	**O**	**S**	**E**	**Q**	**U**	**S**	**E**	**C**	**R**	**E**	**F**	**L**	**E**	**C**	**T**	**T**
N	**P**	**R**	**G**	**D**	**B**	**C**	**M**	**M**	**I**	**R**	**R**	**O**	**R**	**F**	**T**	**G**	**U**	**Y**	**F**	**R**	**T**	**F**	**R**
S	**N**	**E**	**Q**	**S**	**T**	**T**	**I**	**G**	**U**	**G**	**H**	**O**	**G**	**P**	**B**	**Y**	**Q**	**S**	**R**	**S**	**V**	**F**	**A**
P	**I**	**M**	**H**	**F**	**R**	**I**	**T**	**T**	**H**	**L**	**X**	**U**	**K**	**S**	**E**	**T**	**J**	**I**	**W**	**H**	**U**	**I**	**N**
E	**I**	**M**	**V**	**J**	**I**	**R**	**E**	**F**	**L**	**E**	**C**	**T**	**I**	**O**	**N**	**U**	**J**	**T**	**G**	**I**	**H**	**G**	**S**
R	**W**	**J**	**A**	**H**	**Y**	**F**	**K**	**V**	**E**	**W**	**V**	**K**	**U**	**C**	**D**	**D**	**K**	**A**	**B**	**V**	**J**	**P**	**M**
E	**M**	**X**	**Y**	**G**	**W**	**K**	**I**	**W**	**X**	**L**	**L**	**L**	**R**	**E**	**F**	**R**	**A**	**C**	**T**	**I**	**O**	**N**	**I**
N	**Z**	**N**	**L**	**X**	**E**	**X**	**M**	**Z**	**J**	**Y**	**M**	**A**	**T**	**N**	**E**	**R**	**A**	**P**	**S**	**N**	**A**	**R**	**T**