# Lesson 1

## HOW DO WE SEE OBJECTS?

**WORDS TO KNOW**

light ray

visible light

reflection

## THE BIG IDEA

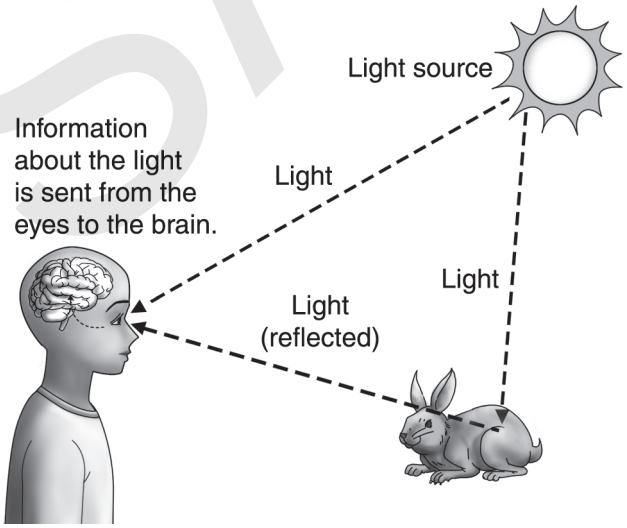
- We see an object when light reflects off it and enters our eyes.

## WHAT I NEED TO KNOW

Early scientists thought the human eye sent out light rays to objects, allowing us to see things. Later, they realized that a source such as the sun sends out light, and our eyes receive the light.

The human eye sees the many colors of visible light, a type of electromagnetic wave. Humans are not able to see other types of electromagnetic waves, such as radio waves or heat, but some animals can.

You can see the light from the sun, from a flashlight, or from any other light source. How do you see objects that do not make their own light? First, light travels in a straight line from a source. Second, the light hits an object. You can see objects because light waves bounce, or reflect, off them. This is called reflection. Next, the reflected light travels in a straight line from the object to your eye. You can see the object because it reflects light.




### THINK ABOUT IT

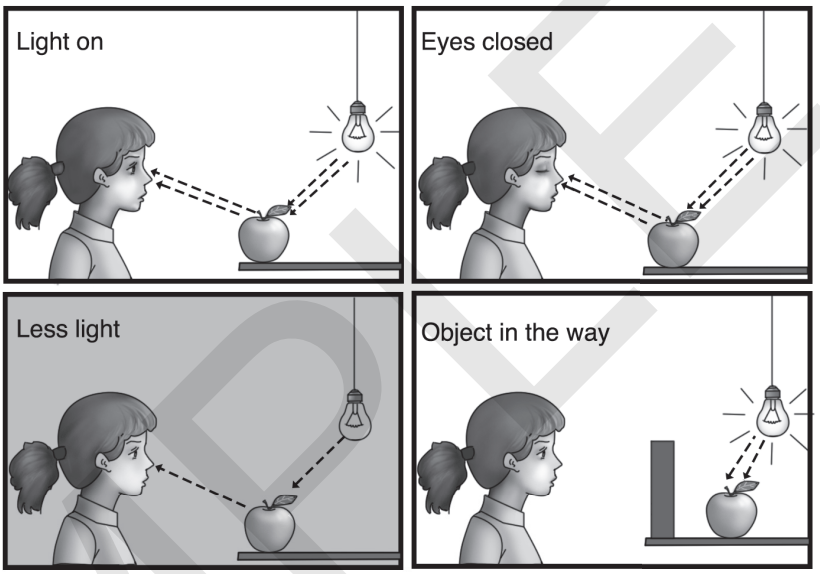
Imagine you are looking for something in a closet. Can you find it with the lights off? Can you find it with your eyes closed? Can you see it behind the clothes or in a box? What helps you see what you are looking for?

## TURN AND TALK

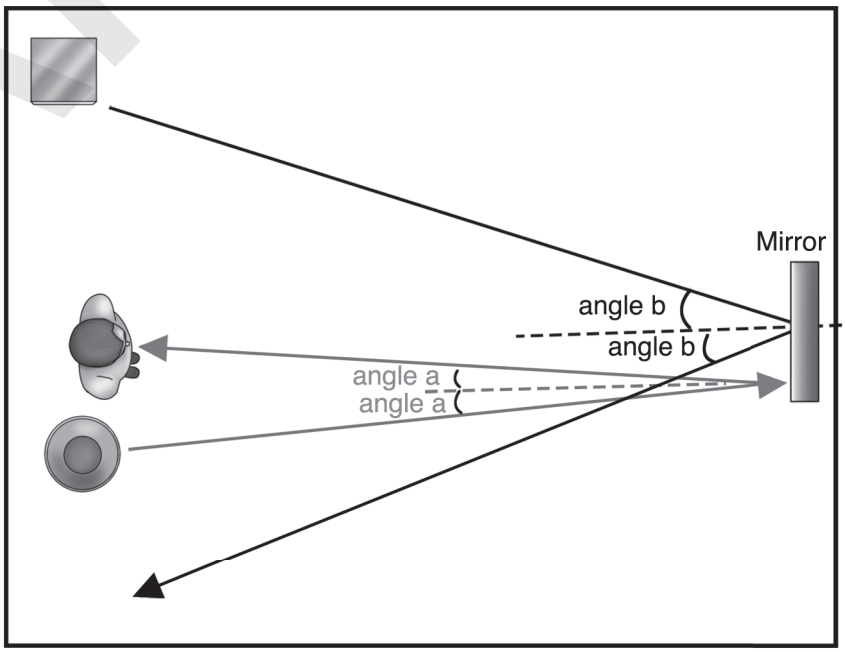
Talk about mirrors and what you have noticed in your experience with them. Have you ever held a mirror and used it to look around a corner? If your hair is parted on the left, why does it look like it is parted on the right when you look at yourself in a mirror? Where do objects that reflect in a mirror appear to be in relation to where they really are?

The eye has special cells that can sense different colors of light. The eye sends this information to the brain, allowing you to see.

Light cannot reach your eyes if they are closed, or if something is blocking the light. If there is low light, you see things differently. If there is no light, you cannot see at all.




How do we see objects in a mirror? Because light travels in straight lines, the light strikes the mirror at an angle and reflects off of it at the same angle. This is why what you see in a mirror depends upon where you stand.




The person can see the vase (bottom image) but not the table (top image).

# WHAT I HAVE LEARNED

1. How are we able to see objects?

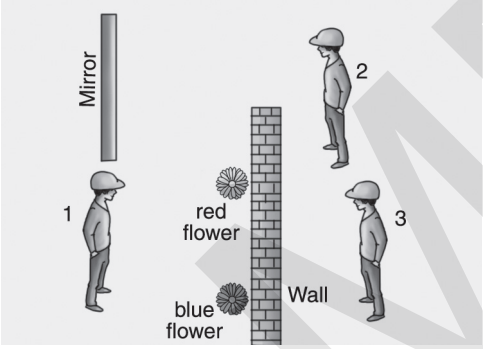
   Ⓐ When the objects absorb light rays

   Ⓑ When light rays are reflected into our eyes

   Ⓒ When light rays come from our eyes

   Ⓓ When we can feel light rays

This is a model of a brightly lit office with two walls, a mirror, and flowers. Use this model to answer questions 2 and 3.




2. Who can see the red flower without using the mirror?

   Ⓐ Person 1

   Ⓑ Person 2

   Ⓒ Person 3

   Ⓓ No one

### SKETCH IT

Sketch the diagram and then use arrows to show how the light rays reflect from the flower toward each of the three people's eyes. Remember that light travels in a straight line and cannot pass through walls!

3. Who can see the red flower in the mirror?

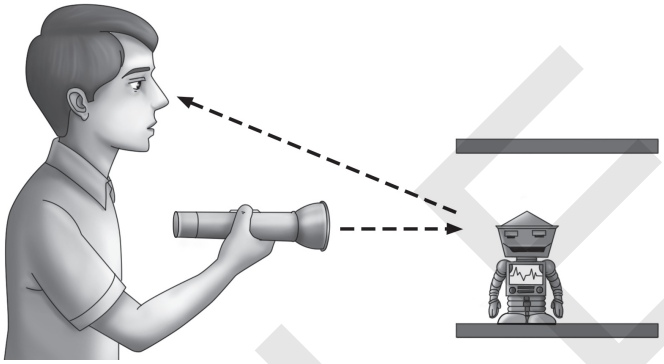
   Ⓐ Person 1

   Ⓑ Person 2

   Ⓒ Person 3

   Ⓓ No one

4. In this model, what is the source of light and what is the object the boy sees?



Ⓐ The source of light is the eyes, and the object is the robot.

Ⓑ The source of light is the flashlight, and the object is the eyes.

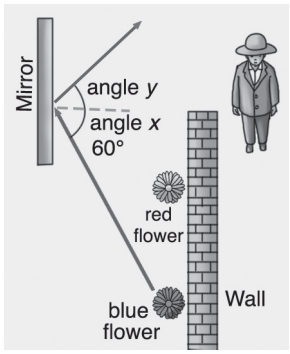
Ⓒ The source of light is the robot, and the object is the flashlight.

Ⓓ The source of light is the flashlight, and the object is the robot.

### HINT, HINT

Remember that an acute angle is less than 90° and an obtuse angle is greater than 90°. Also remember that when you fold a picture along a line of symmetry, the two sides match. Does this help you figure out the number of degrees in angle *y*?

5. In this model, the dashed gray line shows the line of symmetry for the reflection of the blue flower.




Which statement is true?

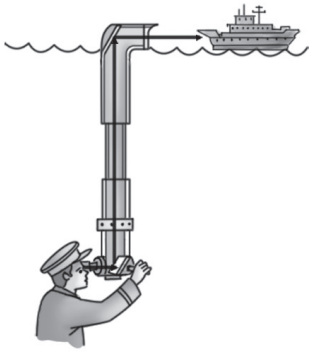
Ⓐ Angle *y* is acute, so the person can see the blue flower.

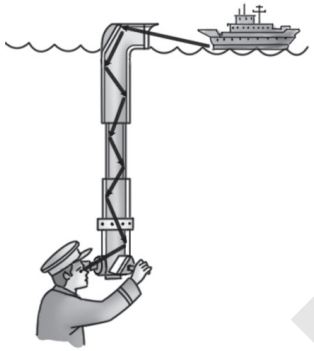
Ⓑ Angle *x* + angle *y* = 120° and is obtuse. The person cannot see the blue flower.

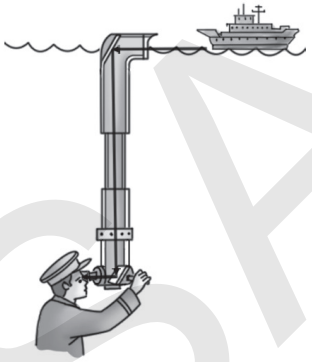
Ⓒ Angle *x* + angle *y* = 90° and is a right angle. The person can see the blue flower.

Ⓓ We cannot tell what angle *y* is, so we do not know if the person can see the blue flower.

6. A periscope uses two mirrors to allow sailors to see what is on the surface of the ocean even when a submarine is underwater. Which picture correctly shows how light travels to allow the sailor to see the ship?

Ⓐ 

Ⓑ 

Ⓒ 

Ⓓ