

Concave and Convex Lens

Objectives:

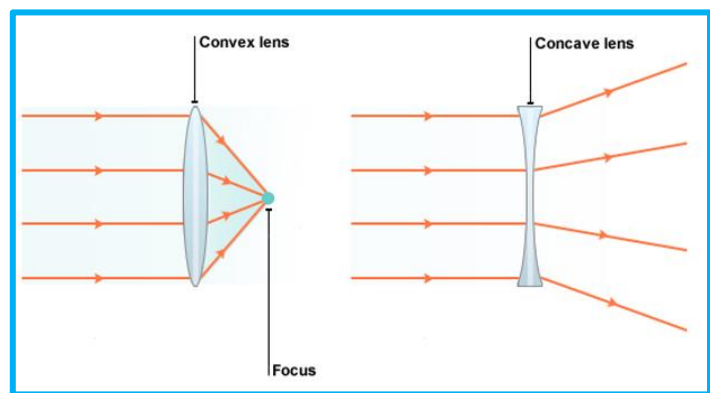
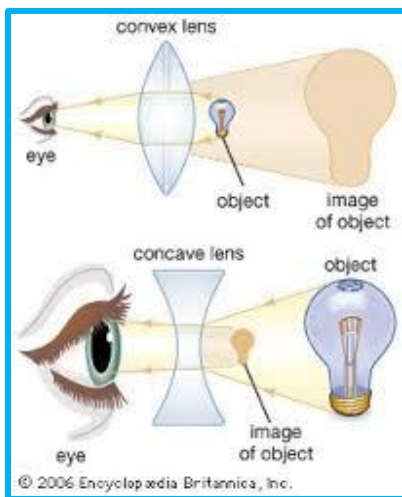
Students will visually recognize the difference between concave and convex lenses and explain what each does to light.

Materials Required:

- 10 plastic cups
- 10 pennies or spoons
- Pieces of window glass
- Small magnifying lens
- White cardboard
- Paper
- Ruler

Motivational Activity:

1. Explain how the last few days we have been talking about light rays.
2. A simple experiment that we will have them each do is having a small empty plastic cup with a penny placed in the bottom of it. Have the students back up until they cannot see the penny. Then go around and add water to the cups until they are able to see the penny in the bottom. (If more plausible, put a spoon in a cup of water.)



Sequence of Procedure:

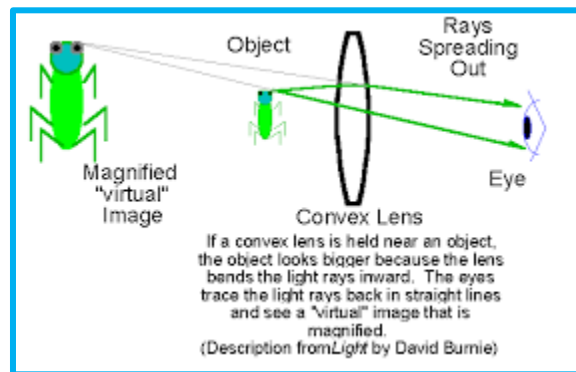
After doing this experiment with the students, ask them if they know why they were able to see the penny with the water in the cup. Alternatively, ask why the spoon appeared to be “broken”. After they answer, explain it appears this way because of the refraction of the light.

Discussion:

1. Refraction- the bending of light as it moves from one substance to another. Ask students for any more examples they can think of where refraction takes place. After students start into different kinds of lenses start with how lenses, a piece of material which light is able to pass through, are used to refract light. Also, explain that there are different types of lenses- convex and concave.
2. Ask the students if they know the difference between a convex and concave lens. Convex- a lens which is thicker in the middle than on the ends. Concave- a lens which is thinner in the middle than on the ends. A good way to remember the difference is a concave lens looks like the opening to a cave; therefore, we can remember that it curves inward.

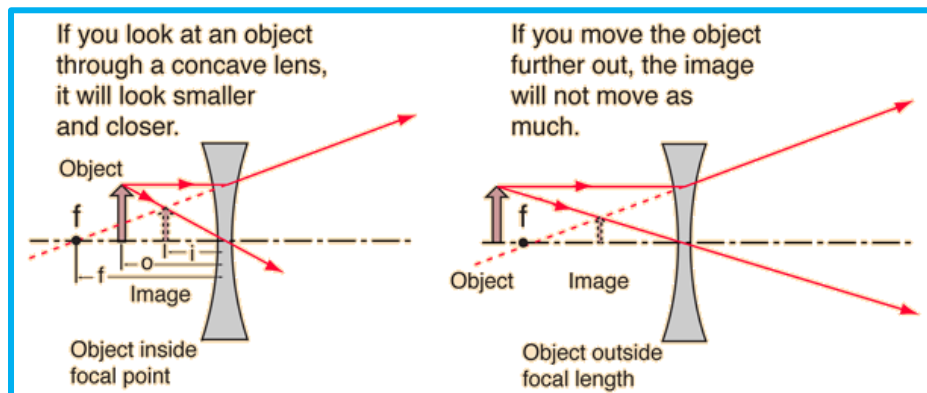
Convex Lenses:

- Refracts parallel light rays so they come together at a single point. Does anyone know what it is called when the light rays are made to come together? (Convergence)
- Point is known as the focal point.
- Distance from center of lens to focal point is the focal length.
- Example of a convex lens is a magnifier.
- Show overhead showing parts of a convex lens explained above.
- Image can be seen without actually looking through the lens. This type of image is known as a real image.
- When held close to objects, inside of its focal length, it produces an image known as a virtual image. To see a virtual image we must look through the lens.



Concave Lenses:

- Refracts the rays so they come apart. Ask if anyone know what it is called when the light rays are made to come apart from each other. (Divergence)
- Always forms a virtual image.
- Show overhead of concave lens.



Practical Uses of Lenses:

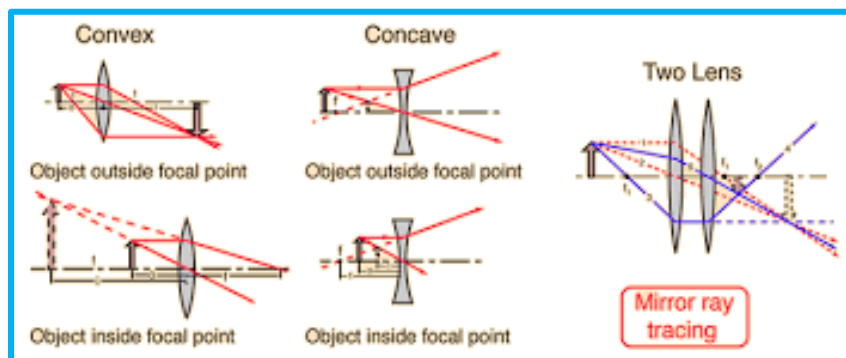
- Who knows of some uses of lenses?
- Cameras (normally convex), glasses (near= concave; far= convex); telescopes (at least 2 convex); microscopes (at least 2 convex).
- Ask for questions on material covered.

Closure:

Earlier in the chapter the students learned about how mirrors are used to reflect light rays, today they learned how light can also be refracted across an object. Think about how these two phenomena are different and also how they are related to each other are different and also how they are related to each other.

1. What does a lens do to light to form an image?
2. What are the differences between a convex and a concave lens?
3. What are some of the uses of lenses in everyday life?

Tomorrow they will learn how these three things (light, refraction, and reflection) work to give us the colors that we see.



Out-of-Class Activity:

Have students read next section on color, and have them list the colors of the spectrum in decreasing order of frequency.

Evaluation/Problems:

Problems with students understanding material (make sure to ask plenty of questions).

Video for reference: <https://www.youtube.com/watch?v=pBt-HZtvQsc>