

Lesson Plan for “Make Your Own Magnifier”

Written by: Joseph Zhou, Chloe Gu, Jackie Huang

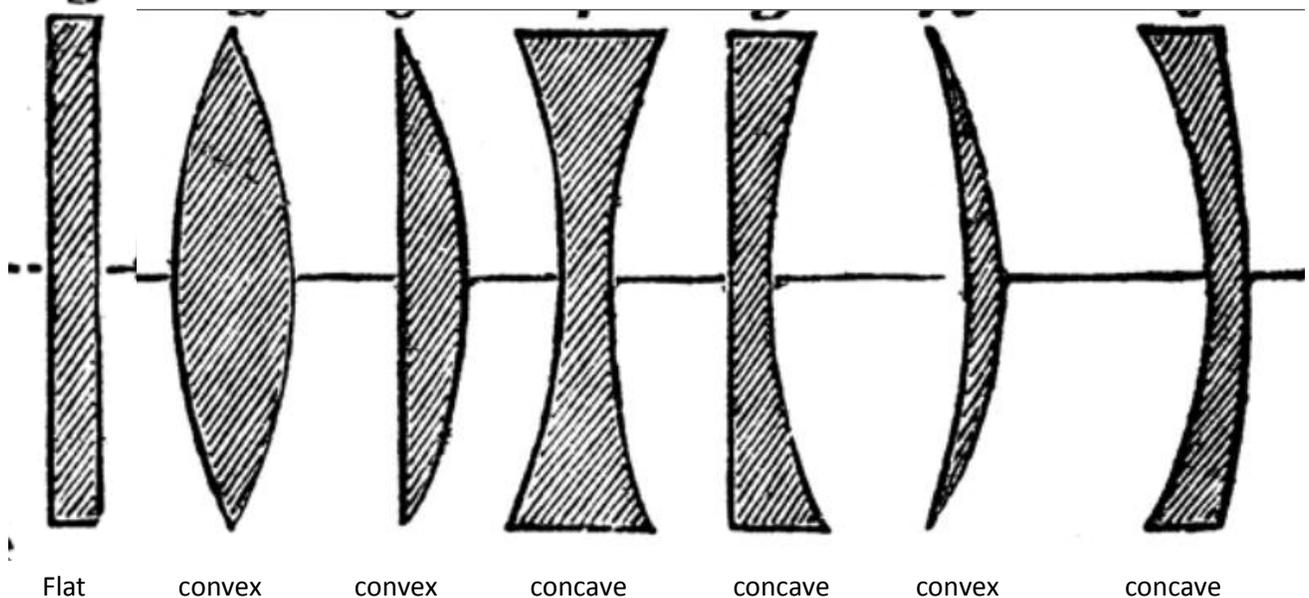
Introduction/Background Info

The way an object appears can be changed in several ways, such as being viewed through different medium or viewed through different shapes of medium. For example, chopsticks look different when viewed in air versus viewed in water. Glasses are a good example to show how a change in shape of medium, which we look through, changes the appearance of objects.



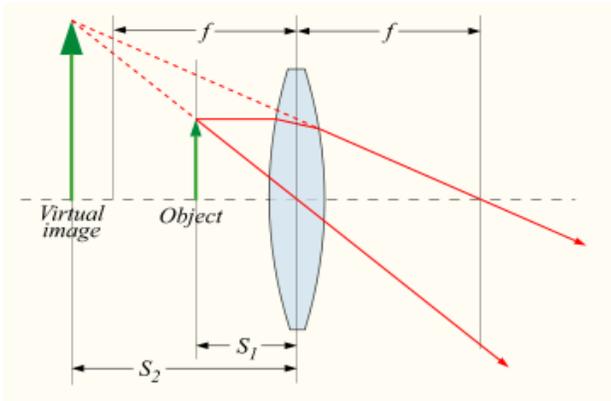
Glasses come in three different shapes: convex, concave, and flat. In this experiment we will focus on how different shapes affect the appearance of objects.

Let's take a look of different glasses. And classify them:

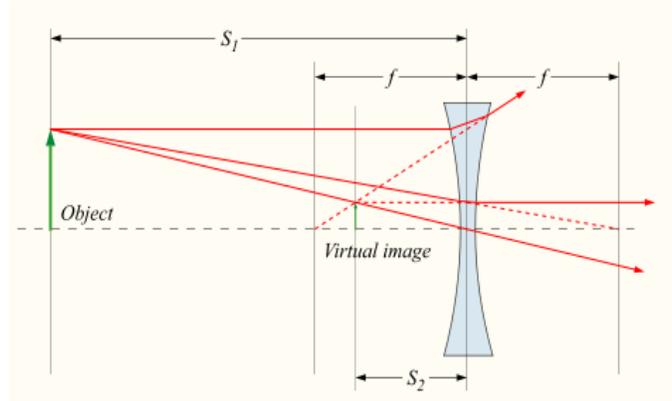


We notice that nearsighted people wear concave lenses; meanwhile, elderly wear convex lenses, which magnify objects. Therefore we can say that convex lenses act as a magnifier.

Here are two pictures, showing how lights travel through convex and concave lens and how images are like with regard to the original objects.

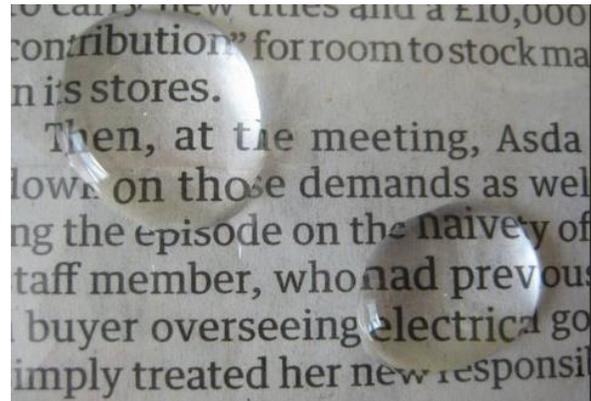


Convex: image is larger than the objects



concave: image is smaller than the objects.

In this experiment we will make our own simple magnifier. We will be using a cup, saran wrap, and water to create a magnifying glass. We will put a small piece of candy in the cup, cover it with saran wrap and secure with a rubber band. Then we will create a convex shape and fill it with water, this will magnify the small piece of candy.



Student Objectives

- Learn the difference between convex and concave shape
- The difference with lenses for nearsighted and farsighted glasses
- Simple principles of optic light
 - It's the shape of the lens that changes how we see the images
 - The lens use **refraction** to change what we see.
 - **Refraction** is the change in direction of a light due to a change in its **medium**.

Topics (Optional)

List any key terms/concepts with brief explanations. This is particularly helpful as a reference for the mentors.

- Convex/ concave
- Refraction
- Medium

Overview of Lesson Process

We will spend 5-10 minutes (Phase 1-2) in assessing what the students already know about convex and concave shapes and identifying examples of each shape. We will demonstrate that convex and concave shapes affect the appearance of an object with a spoon and pair of reading glasses. We will then spend around 10-20 minutes (Phase 3-4) discussing and explaining what refraction means and identify different types of medium. We will then allow the students to build their own magnifier. After they have built the magnifier, we will spend 5 minutes (Phase 5) asking students to explain why their magnifier magnifies and solidify concepts of convex and concave shapes.

Students can choose to bring their magnifier home, or decide to dispose/ pour out the water.

Materials

Item	Quantity (25 students)	Price	Vendor
Metal spoons	12	\$12.29	Amazon
Plastic Wrap	Big enough to cover opening of bowl x 25	500 sq feet \$13.99	Amazon
M&M / Small Candies	25 pieces	56 ounces \$11.55	Amazon
Reading Glasses	3	3 for \$10	Amazon
Plastic Bowl	25	100 for \$16.17	Amazon
Rubber Bands	25	1lbs for \$7.42	Amazon
Water	Students can get from fountain		

Procedures

Phase 1: Convex and Concave

- What is the difference between convex and concave shapes?
- Draw the two different shapes?

Phase 2: Applications of Convex and Concave

- Eye Glasses have both convex and concave shapes.
- How does the shape, convex/ concave, change the image?
- How do near sighted and farsighted glasses differ?
- A spoon also has both convex and concave shapes
- How does the different sides of the spoon change your reflection?

Phase 3: Explain refraction

- **Refraction** is a change in the direction of light due to a change in **medium**
- Explain **medium**.
- Shape of **medium** affects the image you see

Phase 4: Building a Magnifier

- If we want to view a magnified image what shape should the medium be?
- Start with a bowl
- Place a small candy in the bowl
- Cover the top of the bowl with plastic wrap

- Hold plastic wrap as you create shape [convex or concave]
- Secure plastic wrap with rubber band
- And add water
- Now look at the small piece of candy through the medium shape we created.

Phase 5: Concluding Thoughts and Clean Up

- Ask students why the piece of candy appears different
- Ask students to identify the shape
- Ask students to identify the medium

Resources

Here you might list the resources you used so future mentors can view it and search for more resources. You can also include resources that might be useful to the students. Make sure you cite your references.

<http://beam.ucla.edu/node/13>

<http://www.scientificamerican.com/section.cfm?id=bring-science-home>

[http://beam.berkeley.edu/resources/lesson-plans?tid=All&tid_1\[\]=5&tid_1\[\]=4](http://beam.berkeley.edu/resources/lesson-plans?tid=All&tid_1[]=5&tid_1[]=4)

<http://seplessons.ucsf.edu/> (click on lesson plan database and search for keywords)