

Chapter 8

Light Technologies

Last unit we looked at a simple flat mirror. In this chapter we will look at more complex lenses that are used in modern day technologies such as microscopes, telescopes and much more.



Have you ever looked at yourself with a spoon? Was it upright or upside down (inverted)? Did it change any, meaning was it larger, smaller or the same?

The **attitude** of an image describes whether the image is upright or upside down in relation to the object.

Above are examples of curved mirrors which can create images in different places.

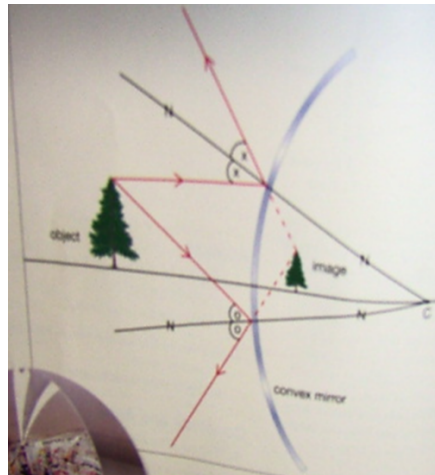
1) Concave mirrors

- curve in like a cave entrance, or the inside of the spoon
- If object is close to the mirror, the image is seen upright and larger than the real image Ex) Makeup mirrors
- if an object is far from the mirror, the image is inverted and smaller than the real image.

2) Convex mirrors

- curve outwards like backside of the spoon, or outside of a helium balloon.
- Always produce small, upright images
- Because images are smaller you see an overall scene.

Ex. Security Mirrors, Side Mirrors on Cars



Convex mirrors are more popular than concave.

Convex Mirrors produce images smaller and upright

<https://www.youtube.com/watch?v=oDNqfxRYQY0>

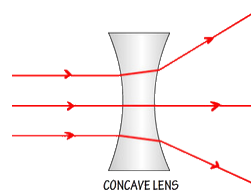
Copy and paste this link to YouTube and only watch until the 9 minute mark

A **lens** is a curved piece of transparent material, such as glass or plastic. Light refracts as it passes through the lens, causing the light rays to bend. ex) Eyeglasses

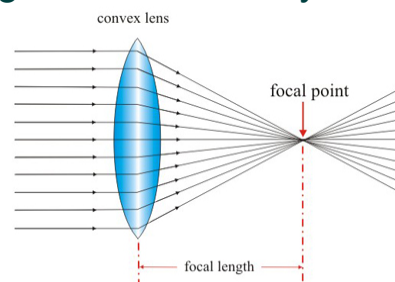


2 Types of lenses:

1) **Concave Lens** - is thinner and flatter in the middle than around the edges. When light passes through the thicker, more curved areas of the lens will bend more than light passing through fatter areas. This causes rays of light to spread out, or diverge, after passing through lens.

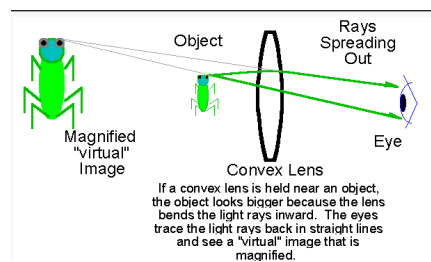


2) **Convex Lens** - is thicker in the middle than around the edges. When light passes through this causes rays of light to come together, or converge.



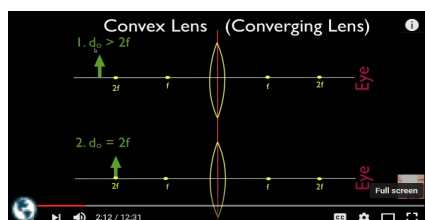
Lenses and Images

An image forms where the light rays from an object converge. The light rays spread out from points on the object. A convex lens refracts these rays so that they come back together



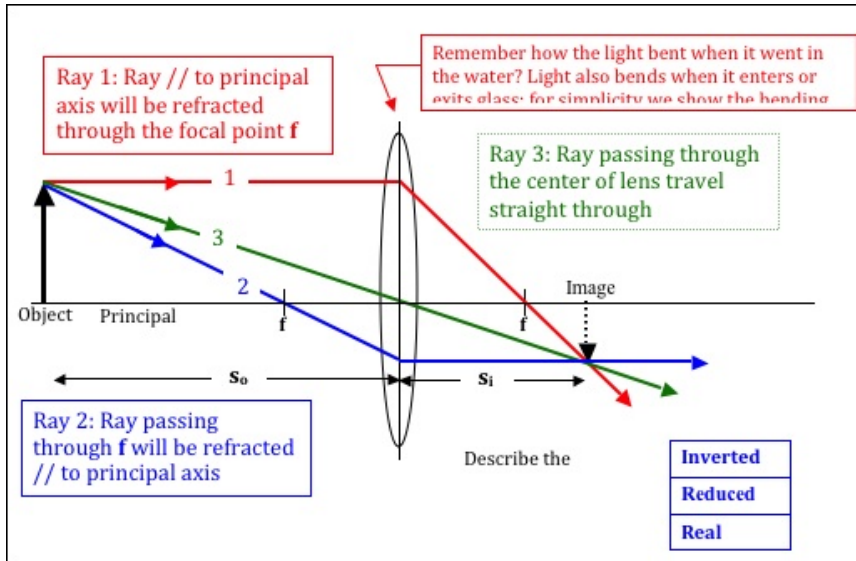
Magnifying Glass: A Simple Optical Device

This diagram shows how a magnifying glass bends light rays to make things look bigger than they are. Many optical devices use the same basic idea of bending the light to fool your eye and brain so light LOOKS like it came from a different (usually larger or closer) object.



<https://www.youtube.com/watch?v=c6mLLaqLdvg>

When you watch this clip pay attention to the direction the light takes for different lens.



Overall

When an object is farther away from convex lens, the image will be inverted and smaller. Because your eye sees the image of the arrow (in the previous slide) by the light rays that are actually coming from the image, the image is a real image.

Ex) An image from a movie screen is a real image since light actually travels from the screen to your eye. Both film projectors and overhead projectors use convex lens to create real images

Any image that can form on a screen is a real image since light actually travels from .

Real image has to be where the light is or is meeting after refraction, which means in front of a mirror, or behind a lens.

Virtual images are formed by diverging lenses (convex) or by placing an object inside the focal length of a converging lens (Magnifying glass), or the image in a plane mirror