

HOME THEATER

Learn about light's properties by creating your own home theater out of a shoebox and magnifying glass!

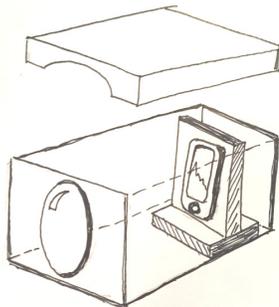
Materials

- 1 shoebox
- 1 large magnifying glass
- Glue (hot glue gun if you have one)
- Two pieces of sturdy cardboard or foamboard that can fit in the shoebox
- Smartphone
- Hobby Knife

Procedure

- Reinforce the shoebox's shape by gluing the flaps and letting it dry.
- Trace the outline of the magnifying glass in the center of one of the smaller ends of the shoebox, then cut out that circle.
- Place the magnifying glass in the hole, then glue its edges into place.
- Put the lid of the shoebox in place and trace where it overlaps the lens, then cut that part out of the lid's rim.
- Take two pieces of the foamboard (or sturdy cardboard) and glue them into a 'T' with one piece standing straight up from the other. This will be your phone stand.
- Set your phone to its highest brightness and lock the screen so it will not auto-rotate.
- Attach the phone to your phone stand and place it at the opposite end of the box from the lens.
- Move it slowly towards your lens to focus the image.
- Place the lid on the box, turn off the lights, and enjoy the show!

Your finished projector should look like the diagram shown here!

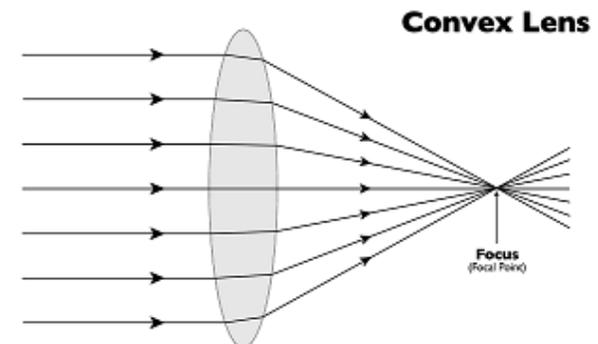


Results

You've created a projector! Your image is upside down at first, but by flipping the phone or image you can fix this. The image also will get fuzzier the closer or farther it is from a "sweet spot," called a **focal point**, where you have the best focus.

Why?

Your magnifying glass is a **convex lens**. Convex lenses are wider at the middle than the edges and **refract**, or bend, light. This magnifies an object to the viewer, but also flips the image of the object. The best focus is when the image is projected where all the rays of light converge, called the **focal point**.



To learn more about how light and lenses work, check out the Pink Palace Museum's *Light and Color* program.

To see a high-powered projector in action, join us at the CTI 3D Giant Theater!