

# Make a Hologram

## Introduction

Forget TVs and 3D glasses, holograms are the future of seeing something “real.” Make a hologram that can be seen from any angle, with a few simple tools and materials.

## Think About This

- What makes something look like it’s really there?

## Tools & Materials

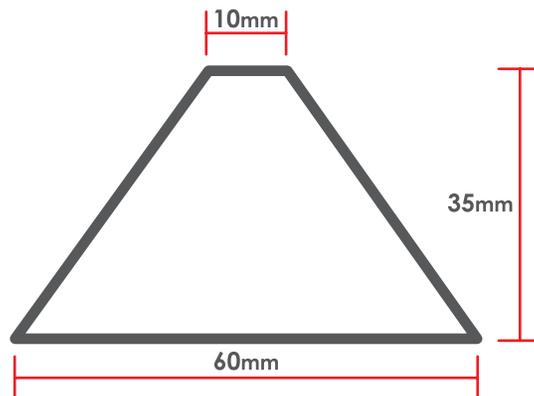


- A piece of sturdy, clear plastic, this could be:
  - Thick plastic packaging
  - A clear plastic bottle
  - An old CD case
- Scissors (An X-Acto blade may be needed if you are using a CD case. Ask an adult for help!)
- A thin marker for tracing
- Clear tape
- A smartphone or tablet capable of playing a video

## Directions

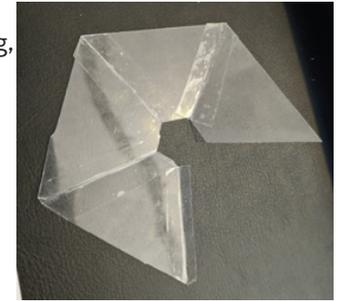
- Using the template below, trace or measure the thickest line onto the plastic to outline the shape 4 times. If using a plastic bottle, we suggest following this video: <https://youtu.be/itvDyS3N6jY>

Pyramid Projector Template:

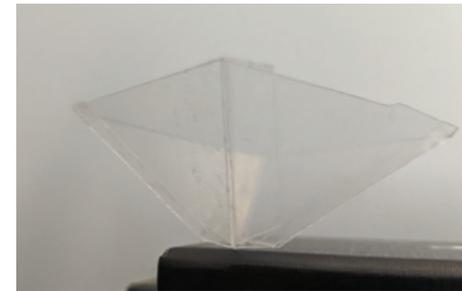


- Carefully cut out the plastic. Be sure to make the sides as straight as possible
- Tape the angled sides of each piece together, such that all the shortest edges are closest together.

- Lay two pieces next to each other so that the angled sides are touching, and the shortest sides are pointing ‘inward’.
- Connect the pieces by putting a piece of tape over where the angled sides meet.



- The shape should look like an upside-down pyramid without its top when completed.



- Find this [video](https://youtu.be/Y6OmFBvXCj8) (<https://youtu.be/Y6OmFBvXCj8>) and prepare to play it on a device. Then place the projector onto the center of the screen. This will be in the middle of all the images of the video. This works best in a dark space.

It may be necessary to adjust the 3D projector. Each short edge should be evenly touching the screen, and each side should face towards an image in the video. Feel free to bend the taped edges or add more tape if needed.

# Make a Hologram Continued

## What's Happening?

A hologram is a bit like a picture but also a bit like viewing an object in real life, because it is made to capture how light would bounce off that object from any angle - making something 2D appear 3D. We can see them used to help our favorite sci-fi characters communicate, in our favorite amusement park, or even to secure sensitive documents, like an ID, credit card, or a \$100 dollar bill!

Holograms need two basic things to work: images of an object taken at different angles, and a place for those images to reflect light. In a true hologram, these images are usually in a thin layer, all stacked on one another, and the light is reflected by the shiny surface of the material it is made from. However, in this experiment, we have only created an illusion of a hologram, although it needs the same basic things found in a true hologram. So, what is actually going on?

In this case, a beam of light leaves the device screen and reflects off the plastic into your eye. Since we are looking at the projector edge-on, the image appears as if it is actually in the center. Rather than having a thin layer of images, four different versions of the same object are used, one for each side of the projector. Each side projects how the object would look if you viewed it from that side in real life, creating the illusion of a true 3D hologram.

## Take it Further

The projector used for this experiment was created from a template to fit a small phone. Are there different sizes of projectors that also work? What angle for the edges provides the best hologram? Test it out!

Your experiments so far have used a video someone else created as the hologram image. Do you think you could make an image that works correctly when projected?

