

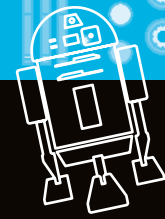
# R2-D2 HOLOPROJECTOR

## MAKE A CELL PHONE BOX PROJECTOR

Need to send a message across the galaxy? Just switch on a holoprojector! These gadgets use light to create three-dimensional (3D) holograms. You can build your own projector and use light to display 2D images. All you need is a cell phone, cardboard boxes, a magnifying glass, and a few household items to project your own images... just like R2-D2!



**DIFFICULTY**  
Tricky

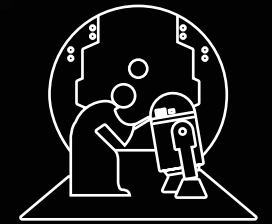


The light from the cell phone passes through a magnifying glass lens placed over a hole in the front of the box.

## IN A GALAXY FAR, FAR AWAY....



Holoprojectors create 3D images by manipulating beams of light. They can display static images, recorded messages, and live audio-visual feeds. Due to the large amount of power they use, most holoprojectors display a blue-and-white image. They come in various sizes, from astromech-mounted units to simple handheld devices.

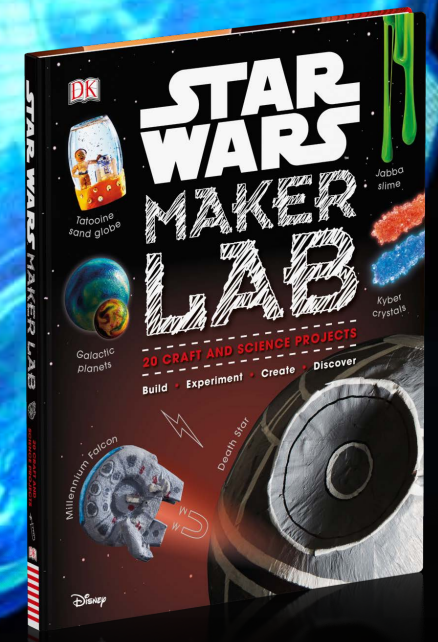


## WHAT YOU NEED



The picture on the cell phone is projected onto a wall or a screen.

Content from *Star Wars Maker Lab* (DK)



START HERE



**1** Securely tape the bottom of the large box, leaving the top open. On one of the small sides of the box trace around the magnifying glass lens with a pencil. Draw a smaller circle within this circle.



**2** Use scissors to cut out the inner circle, then set aside the cardboard disk. On the inside of the box, stick the lens against the hole with strong tape. Make sure you tape over any gaps.

**3**

Next, use scissors to cut two slits in the top flaps of the box about  $\frac{2}{3}$  of the way down from the lens and fold them out. Then seal together the longer flaps with strong tape.

**4**

Create R2-D2's dome. Place plastic wrap around the outside of a bowl that is a bit larger than the small side of the box. Papier-mâché the bowl.

**"HELP ME  
OBI-WAN  
KENOBI.  
YOU'RE MY  
ONLY HOPE."**

Princess Leia



R2-D2 accesses a holomap providing a full blueprint of General Grievous's command ship, the *Invisible Hand*.

**5**

Once the papier-mâché dome is dry, paint it gray. Then use the cardboard disk you set aside to trace a circle on the top of the dome. Cut out the circle to make a lens hole.

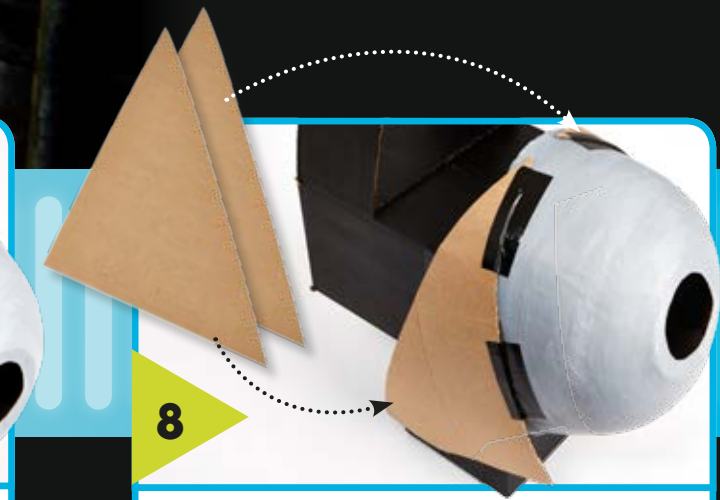
Cutting out the lens hole is tricky, so ask an adult for help.

**6**

Use strong tape to fully seal the small box. Paint both boxes black, including the inside of the larger box's flaps. You may need two coats of paint to make the boxes very black.

**7**

Tape the larger lens box to the small box so that it overhangs a little. Then securely tape the dome to the front of the lens box, making sure the hole lines up with the lens.

**8**

Cut out two large triangles of lightweight cardboard. Wrap them around both sides of the dome and both boxes. Secure the triangles firmly to the dome with strong tape.



9

Cut out and tape a large rectangular strip of cardboard around the bottom of the dome so it hides the boxes. Cover any gaps at the front of your model with small cardboard triangles.



10

Once all the pieces of cardboard have been securely taped in place, paint your model to look like R2-D2's head. Use the photo above as a guide to the astromech's design.

Put your phone on its brightest setting.

11

Save a *Star Wars* image to your phone. Turn off auto screen rotation and flip the image landscape. Put the phone into the box sideways, with the image upside down. Secure it with adhesive putty.



12

Close the flaps with an elastic band to keep out light. Point the projector at a plain wall. Turn out the lights and focus your picture by moving the projector closer to or farther away from the wall.

YOU'VE  
DONE IT!

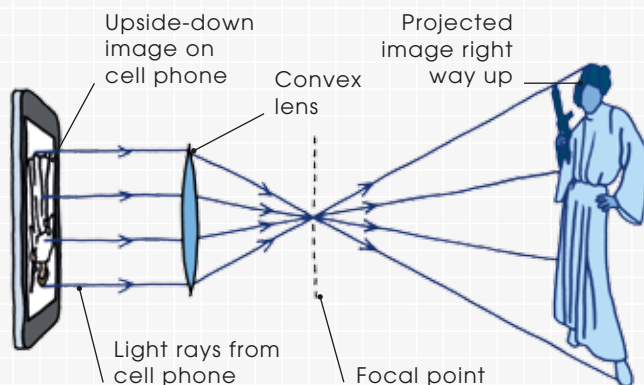
## HOW IT WORKS

### LIGHT BENDERS

A lens is a piece of transparent material that is used for forming an image by focusing light. Lenses are used in magnifying glasses, microscopes, and telescopes. They can bend light rays and refocus them to enable us to see things too small for the naked eye, or view faraway objects such as planets.

### PROJECTING IMAGES

Projectors use a convex lens, which bulges out in the center. When light rays pass through it they are bent inward and meet at a spot known as the focal point. Past the focal point a projected image is flipped upside down and enlarged when it makes contact with a screen or wall.



Rebel Alliance leaders discuss strategy around a holoprojection of the Death Star, a planet-destroying battle station built by the Galactic Empire.

## IN OUR GALAXY...

### THE BIGGER PICTURE

When you go to the movies, small images on a reel of film, or digital images, are projected through a powerful lens that magnifies them onto the big screen. Many images are displayed each second one after the other, to give the illusion of moving scenes.

