

Another FREE SAMPLE LAB from TOPS LEARNING SYSTEMS!

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pinhole microscope

...adapted from TOPS Learning Systems
TRIPLE MAGNIFIER KIT #100

- Hole-punch an index card. Cover the hole with a bit of aluminum foil. Use clear tape to hold it.
- Press down *hard* on a pin into the center of this hole, while the card rests on a smooth *hard* surface. (With strong backlighting, you should see a distinct pin-prick.)
- Stick the pin on a strip of clear tape and center it over the mouth of a small jar.
- Hold the jar up to a very bright light (never the sun) with the foil against your eyelashes. Look at the pin through the pinhole.
- Move the jar closer to your eye so the pin looks bigger, and bigger, and bigger, and bigger...

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- 02 MEASURING LENGTH (gr 6-10)
- 03 GRAPHING (gr 6-10)
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OBJECTIVE

To experience pinhole magnification.

LAB NOTES

Copy the activity above for each student or lab group.

Steps 3-4. Tips for good, and **safe**, pinhole magnification:

Lighting – brighter is better. Plain light bulbs or bright sky are good. **Never** aim toward the sun. Avoid viewing toward halogen bulbs, which can expose the eyes to damaging UV radiation. Incandescent bulbs get hot enough to burn skin.

Pinhole Trade-offs – A big pinhole allows a wide, bright field of view. A tiny pinhole allows an astonishingly sharp focus at very close range. Bigger is easier. Smaller is dim, but impressive!

Eyes – Remove glasses, and press the index card against your face so your eyelashes brush the pinhole. (Those heavy, dark “grasses” jumping around are your eyelashes!)

Finding the image – Start at a distance where the whole jar is visible. Bring it to the pinhole, keeping the centered pin in view.

How pinholes magnify – Light rays from very near objects are too divergent for your eye lens to focus on your retina. Pinholes block divergent rays to allow a clear (if dim) view of the object. The object is magnified because near objects fill more of your field of view. At reading distance (250 mm), the pin looks actual size. At 2.5 mm (100 times closer) the pin looks 100 times larger.

EVALUATION

Q. A secret message is printed on a bright light bulb in tiny letters. How would you read it?

A. Poke a tiny pinhole in foil and hold it very close to your eye. Approach the light bulb until you can see the message. *Don't do this without adult supervision. See safety notes at left.*

EXTENSION

Rubber-band a strip of clear tape sticky-side-out across the lens of a strong flashlight. Sprinkle with salt, sugar, or pepper, and examine through a pinhole microscope.

MATERIALS

- A small index card.
- A hole punch.
- Aluminum foil.
- Clear tape.
- A small glass jar.

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