

# Crazy Refraction

**Estimated Time: 30-40 minutes**

## SUMMARY

Refraction is just as important as reflection, but it doesn't always get the attention it deserves! Try out this demo and experiments to learn more about refraction and discover some of its effects firsthand.

## WHAT YOU'LL LEARN

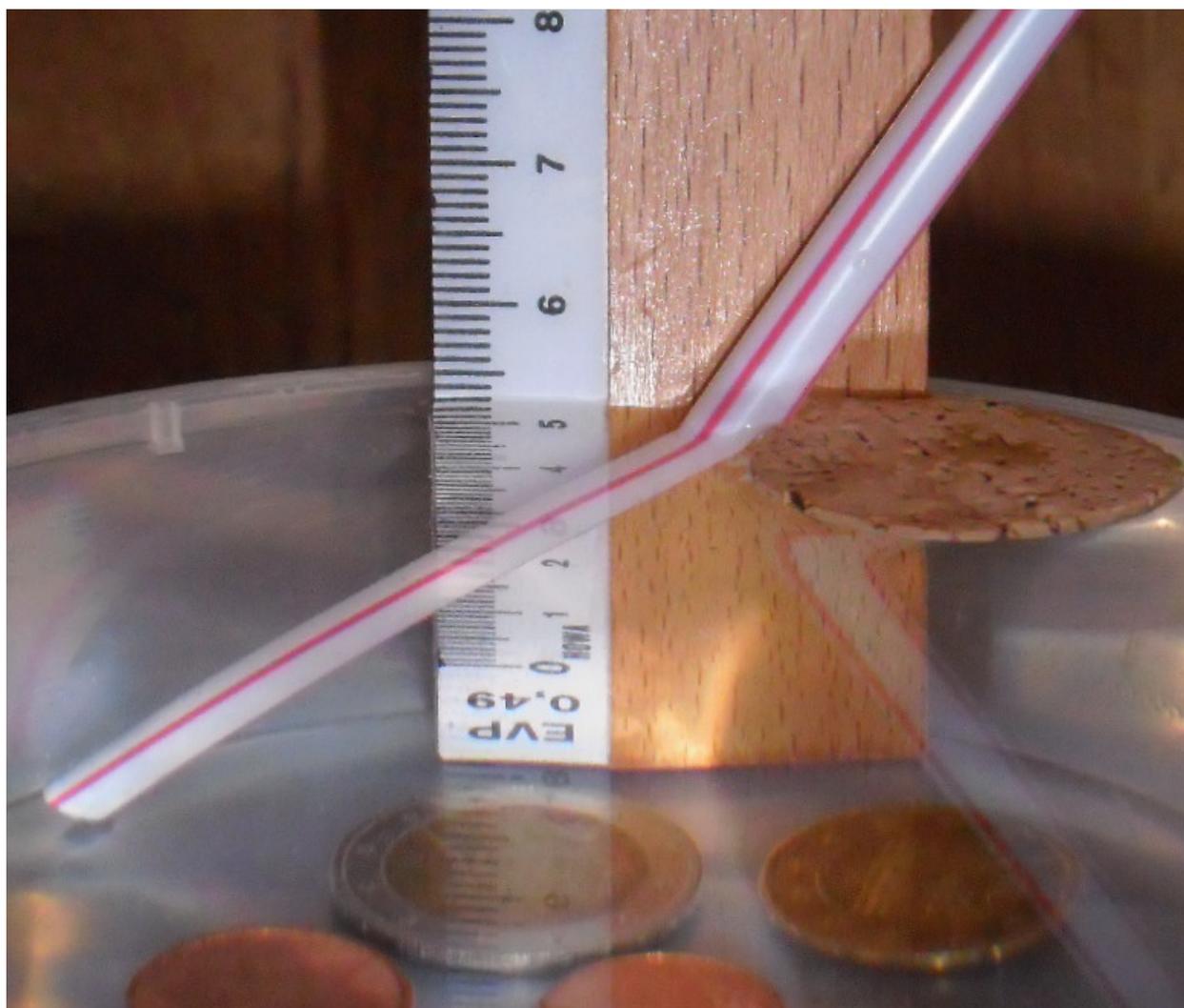
- The definition of refraction and the difference between refraction and reflection.

### Materials Used

- Glass of water
- Pencil
- Penny or other coin
- Other liquids such as olive oil, vegetable oil, rubbing alcohol, etc.

## WHAT TO DO

1. Ask students what they know about *reflection*. What sort of materials show reflection? Probably mirrors and shiny metal, but also water, windows, plastic, and other things.
2. Now ask students if they know about *refraction*. This is a related topic that's usually not as familiar to people so students might not have context for this word.
3. Demonstrate refraction to students by placing your glass of water over the penny so that it is in the center of the glass's bottom. Have students look straight down into the glass. They should see the penny directly in the glass's center.
4. Now have the students lean to one side. The penny should look like it is getting closer to one side of the glass. Do the students think the penny is moving or is it just the image?
5. The light from the penny is being *refracted* through the water. This means that the light is bent as it moves from water to air so that the image isn't straight through the water. The image on the second page might help explain this phenomenon.
6. Now try some experiments. Stick your pencil into the water and look from the side. The pencil looks like it's bending in the water! This is due to the same bending of light.
7. Try other liquids to see their refractive effect. If you dump out the water and pour rubbing alcohol into the glass, does the pencil still look bent? Is it more bent or less bent than the water?
8. Try other liquids in your glass and see how the refraction changes with each liquid. Students can rank the liquids from most bent (biggest refractive index) to least bent (lowest refractive index).



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