3M Young Scientist Lab

WHELMERS Student Activity | Grades 3–5

Disappearing Glass

WHAT YOU NEED:

- Large, glass container (fishbowl, mixing bowl, or similar)
- Very clean, high-temperature-resistant kitchen container, small enough to fit completely in the larger vessel (lab glassware or bakeware, one without markings works best)
- Cooking oil - enough to completely cover the smaller glass vessel

DESCRIPTION

Glass objects seem to magically disappear when placed in cooking oil.

NEXT GENERATION SCIENCE STANDARDS

- **PS4.B Electromagnetic Radiation**
  - An object can be seen when light reflected from its surface enters the eyes (4-PS4-2)
- **PS4.B Electromagnetic Radiation**
  - When light shines on an object, it is reflected, absorbed, or transmitted through the object, depending on the object's material and the frequency (color) or the light. (MS-PS4-2)
  - The path that light travels can be traced as straight lines, except at surfaces between different transparent materials (e.g., air and water, air and glass) where the light path bends. (MS-PS-2)

WHAT YOU DO

For this activity, the temperature-resistant glass must be absolutely clean. After you have washed and rinsed the small glass container with soap and water, you might need to give it a final rinse or two. Any spots left on the glass will be noticeable and give away the location of the "invisible glass."

1. Pour the oil into the large glass container. When pouring, try to avoid creating bubbles.
2. Carefully submerge the smaller container into the oil. It should seem to disappear! You'll soon see that any bubbles in the oil might stick to the small glass and make its presence known.

WHAT HAPPENS

The science behind the disappearing glass is refraction, the bending of light as it passes from one medium to another. You probably have experienced the refraction of light reflected off objects submerged in water. Since the index of refraction of the oil is almost the same as that of the temperature-resistant glass, light is not significantly refracted as it passes from the oil through the glass, making it invisible. Common glass has a different index of refraction than the oil and therefore is slightly visible when submerged in it. Scientists often use refraction as a method of identifying the brand or composition of unknown glass.

WHERE IN THE WORLD

Here are a few ways understanding refraction can be helpful:

1. Identify Gems - Gemologists, gem experts, use specific oils with different refractive indexes to identify gems or find a fake. If a gem is submerged in a liquid with the same refractive index as the gem, it will be hard to see. If the refractive indexes are different it is easy to see.
2. Spear Fishing - If a spearfisher is looking into the water, they will need to consider the refraction of the light. The refraction tricks the eye into seeing the fish further away and closer to the surface of the water than it actually is.

Can you think of more ways refraction can be used to solve problems?