

# How can you see underwater?



*Discover an easy way to better see objects underwater.*

**Setting:** Indoors

**Time:** 30 minutes

**Concepts:** light, refraction

**Skills:** observing, predicting

**Subject(s):**

- ✓ Physics

**Ages:**

- ✓ 3-5
- ✓ 6-8

**Materials:**

- Clear, transparent plastic cup
- Small toy that sinks
- Diving mask or water goggles (optional)



**Safety First!**

Never leave a child unattended in a bathtub or other body of water.

**What to do!**

1. Place the plastic toy in the bathtub with enough water to cover the toy but not deeper than the height of the cup. What do you observe? Does the toy float or sink?
2. Look at the toy. Is it harder to see the toy now that it is underwater?
3. Make waves in the water. How hard is it to see the toy now?
4. Stick the bottom of the cup into the water over the toy on the bottom of the bathtub, being careful not to get water inside the cup. How well can you see the toy now? Does the cup make a difference?
5. Put water in the cup and again place it over the toy on the bottom of the bathtub. Does the water affect how well you can see the toy?

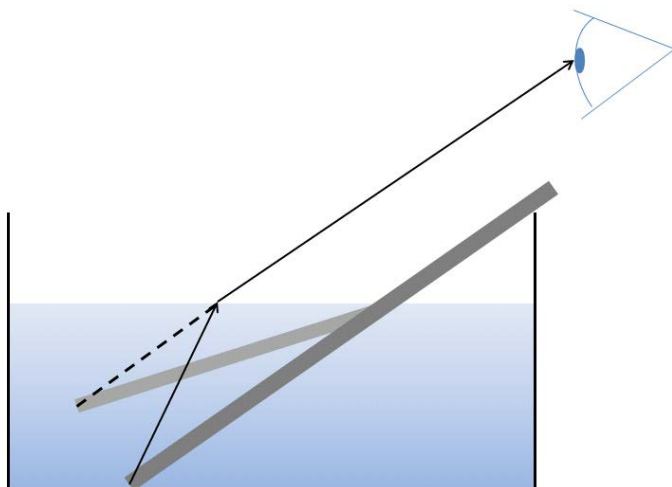
**What's happening?**

Light bends as it travels between substances of different densities. Since water is more dense than air, the light bends (or refracts) where the air and water meet, making it harder to see the objects below the surface.

The angle that the light hits the surface of the water at affects how it bends or refracts. If the surface is moving, then the light is scattered and the object under the water appear distorted. The cup "calms" the water and provides a smooth surface for the light to travel through; thus creating a clearer image of the object underwater. Adding water to the cup increases the amount of refraction and makes the toy harder to see.

# How can you see underwater?

Why does it matter?



Due to the bending of light through water, items that you are looking at underwater may not be exactly where you think they are. If you were trying to spear a fish underwater, you would have to aim lower than where the fish appears because the light reaching your eye from the fish is bent.

Eye glasses or contact lenses use the bending (refracting property) of light to correct vision. When the light passes through the eye glass lens it is bent. The prescription of the lens, which is determined by the thickness and shape of the lens, indicates the angle that the light will be bent. The lens is shaped so that the light now hits the proper part of the inside, back of your eye (the retina), allowing you to see objects more clearly.



## Investigate further!

- If there is enough water in the bathtub, try looking at the object using a diving mask or goggles. How hard is it to see the toy now?
- Cut the bottom out of a bucket or pail. Tape clear plastic over the opening in the bottom. With an adult present, use this to view the plants and animals under water in streams and ponds.