

## ***EXPERIMENT: REFRACTION AND THE REAPPEARING COIN***

Here's a magic trick that goes all the way back to the ancient Greeks. The Greeks were big fans of light. They especially liked mirrors.

Archimedes, a famous Greek mathematician, may even have used light and mirrors to win a battle! Roman ships attacked his city of Syracuse, Greece in 212 B.C. The Romans kept their ships in the harbor where the Greeks couldn't reach them. The Greeks were trapped!

So Archimedes made a set of mirrors that focused the sunlight. Where the focused rays met, there was enough heat to start a fire. Then, from his city on the shore, *Archimedes set the Roman ships on fire.*

Some historians call this story a legend – an interesting story, but not true. However, over 200 years ago, Louis Leclerc de Buffon used 168 small mirrors to set wooden planks on fire . . . at a distance of 150 feet. So Archimedes *could* have done it.

In this experiment, we're not going to set anything on fire.

### **You will need:**

a bowl

a penny (You can also use a nickel, a peso, etc.)

some water

a friend who can pour water

1. Put the penny in the bowl. Look at the penny, then walk backwards until just after you can't see the penny anymore.
2. It's very important that you *can't see the penny*. Without that, the magic of this trick fizzles into nothing.
3. *Stay where you are*, and have your friend pour water into the bowl.
4. If all goes well, *the penny should appear*.
5. Explain why the water makes the penny appear. Be sure to mention what kind of light behavior this shows.
  
6. What light behavior did Archimedes use to set the ships on fire?