Bent Pencil

Apparatus

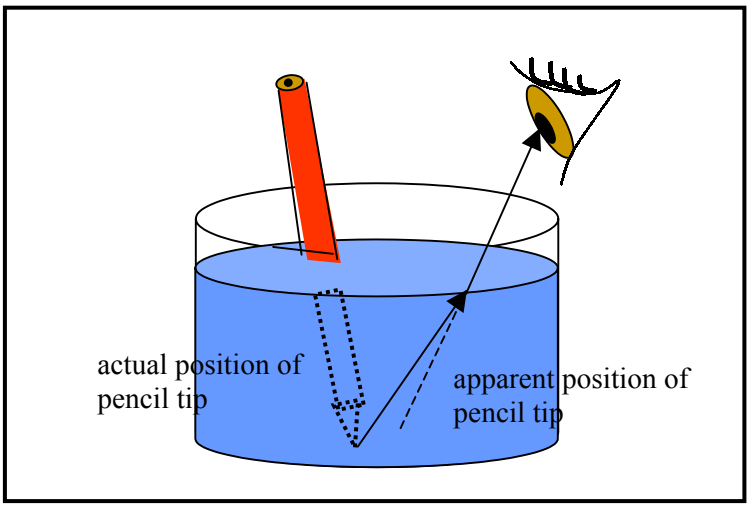
transparent container of water, for example a glass beaker, pencil

Action

The students observe the pencil through side of the container. They should note that the pencil appears to bend at the air-water interface, and explain this apparent bending. By removing the pencil from the water, they can easily see that the pencil is not in fact bent.

The Physics

The light from the pencil is refracted when it passes from the water into air, bending away from the normal as it moves from high to low refractive index. The light coming from the pencil tip appears to be coming from the apparent pencil tip as shown.



Accompanying sheet

Bent Pencil

Observe the pencil.
What do you notice about it?

Pull it out of the water. Is the pencil actually bent?

Why does the pencil appear to bend where it enters the water?
Can you tell by the direction of the bend
whether the air or water has the higher refractive index?