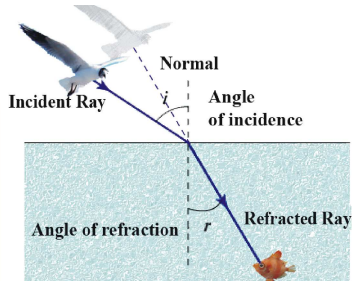
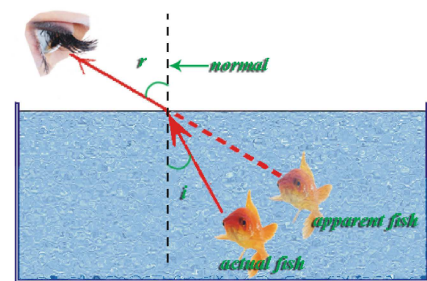


Reflection and Refraction

Waves can bounce and bend. When a wave strikes an object or surface it can bounce off. A bouncing wave is a reflection. Sound reflections are echos, while light reflections are mirror images. When light bounces off a smooth surface, a sharp mirror like image forms. Uneven or rough surfaces scatter light making the image unclear. When a wave passes from one substance to another, it may bend. Did you ever reach into water to pull something out, and miss? Things may appear to be in a different place than they really are, because the light rays bend as they pass from the water to the air. Bending of a wave as it passes from one medium to another is called refraction. Waves travel at different speeds in different mediums. Refraction occurs when a wave changes speed as it passes from one medium to another. The direction the wave bends depends on whether it is slowing down or speeding up. It is best understood relative to an imaginary line perpendicular to the surface of the medium called the normal. A wave speeding up as it enters a medium bends away from the normal. A wave slowing down as it enters a medium bends toward the normal.



Left: Light enters the air from the water, speeding up. The fish appears closer than it is.

Right: Light enters the water from the air, slowing down. The bird appears further away than it is.

When light passes through a raindrop or a prism, it is refracted twice – once on the way in, and once on the way out. Red light (the longest wave length) is refracted least, and violet light (the shortest wavelength) is refracted most. As a result the colors of light are separated.

Rainbows form from many separate water droplets acting as prisms.

Answer the questions below based on your reading above and on your knowledge of physics.

1. Why do you see an image in a mirror? _____

2. Why is it hard to pick a penny out of a beaker of water using tongs? _____

3. What causes a rainbow to form? _____

4. Why does a bird look further away to a fish than it actually is? _____

5. What causes refraction? _____
