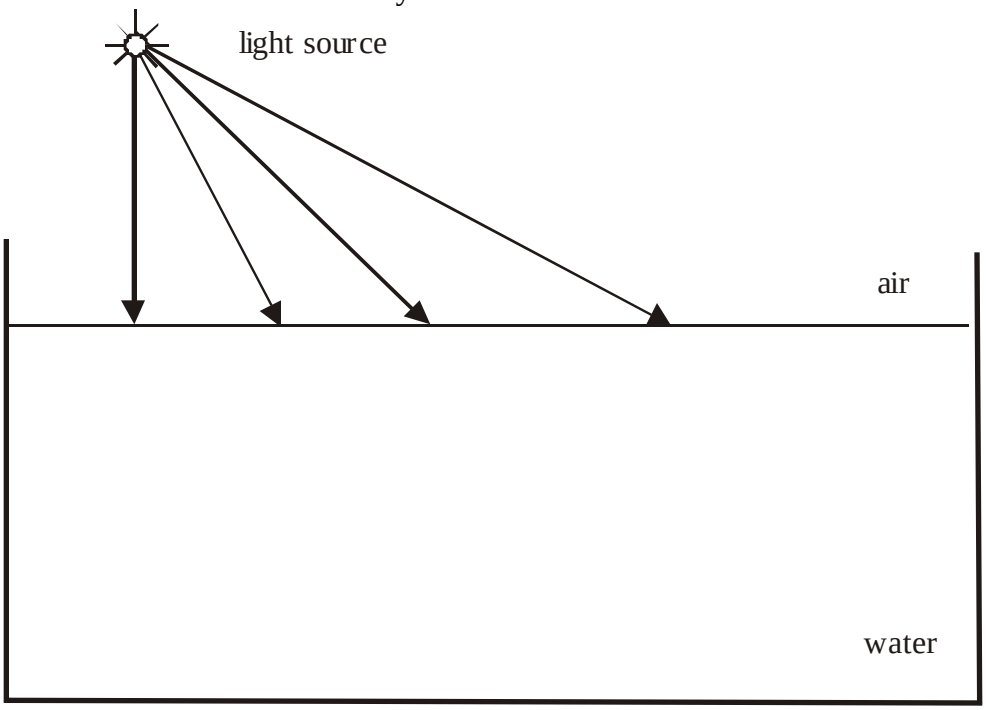
Name_____

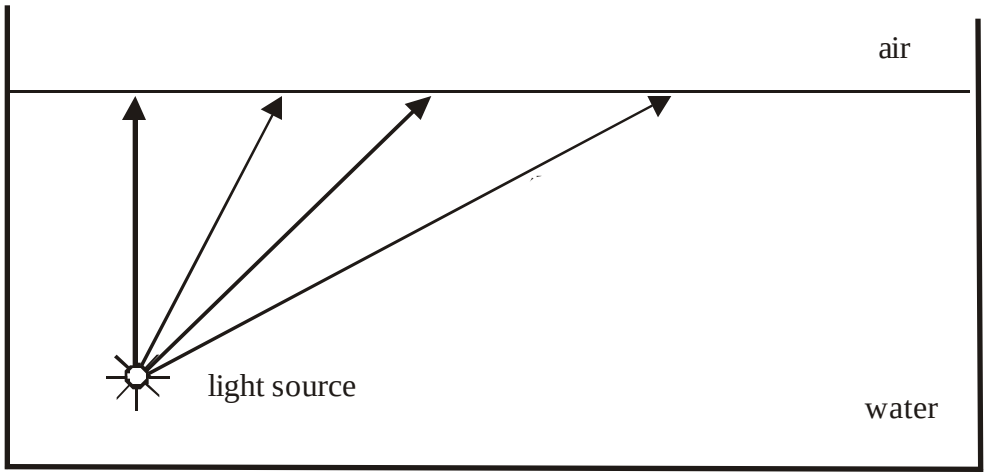
Date_____**Pd**____

Particle Model of Light Worksheet 7: Refraction

1. Sketch the path of the rays as they pass from the air into the water. Draw observer's eyes in the water that could see each ray.

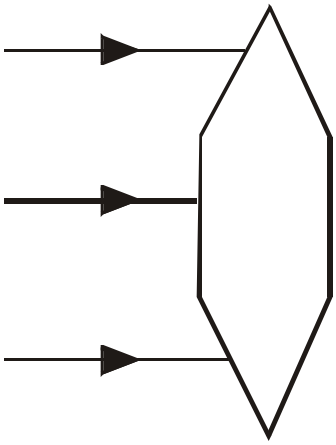


2. The light source is now under water. Sketch the path of the rays as they pass from the water into the air. Draw observer's eyes in the air that could see each ray.

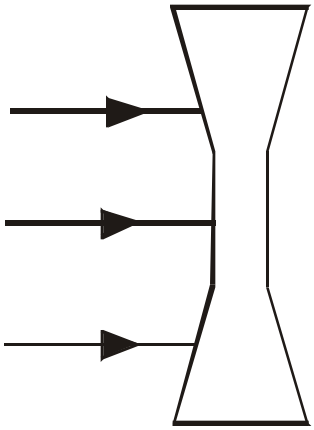


Qualitatively sketch the path of the light rays below as they enter and exit the glass blocks. It may be helpful to draw the normal at each interface.

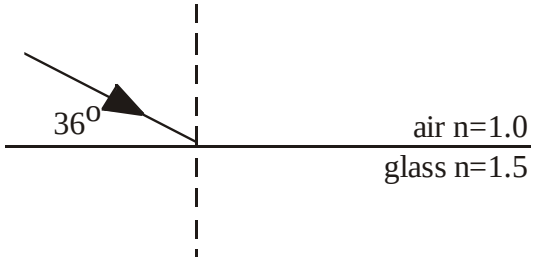
3.



4.

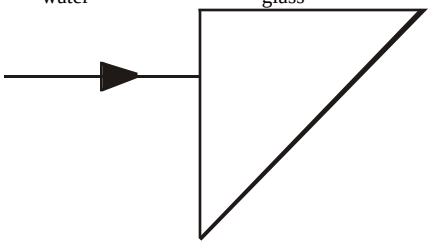


5. Quantitatively determine the direction of the refracted ray.

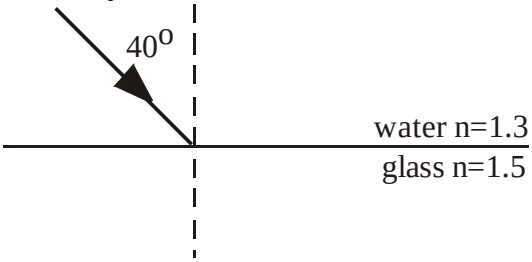


6. Find and draw the angle at which light will leave the 45-45-90 triangular glass block in water.

$n_{water} = 1.3$ $n_{glass} = 1.5$

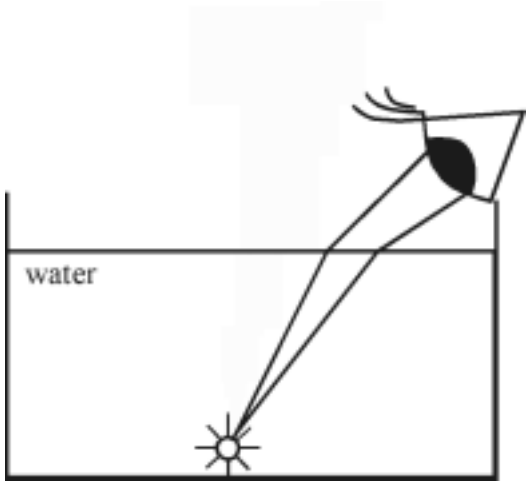


7. Quantitatively determine the direction of the refracted ray.



8. In a lab experiment where light passes from air into a plastic block, the incident angle is measured to be 25^o and the refracted angle is 21^o. Find the index of refraction for the block.

9. a. Locate the position of the image of the underwater light source as seen by the eye.



b. If one of the light rays in the tank of water hits the surface at 35^o as measured from the normal, at what angle will it enter the air? ($n_{water} = 1.33$)

c. Now suppose the incident angle in the water is 80^o as measured from the normal. What is the refracted angle? What problem arises?

d. Find the critical angle for the water-air interface (this is the incident angle that corresponds to the largest possible refracted angle, 90˚).