

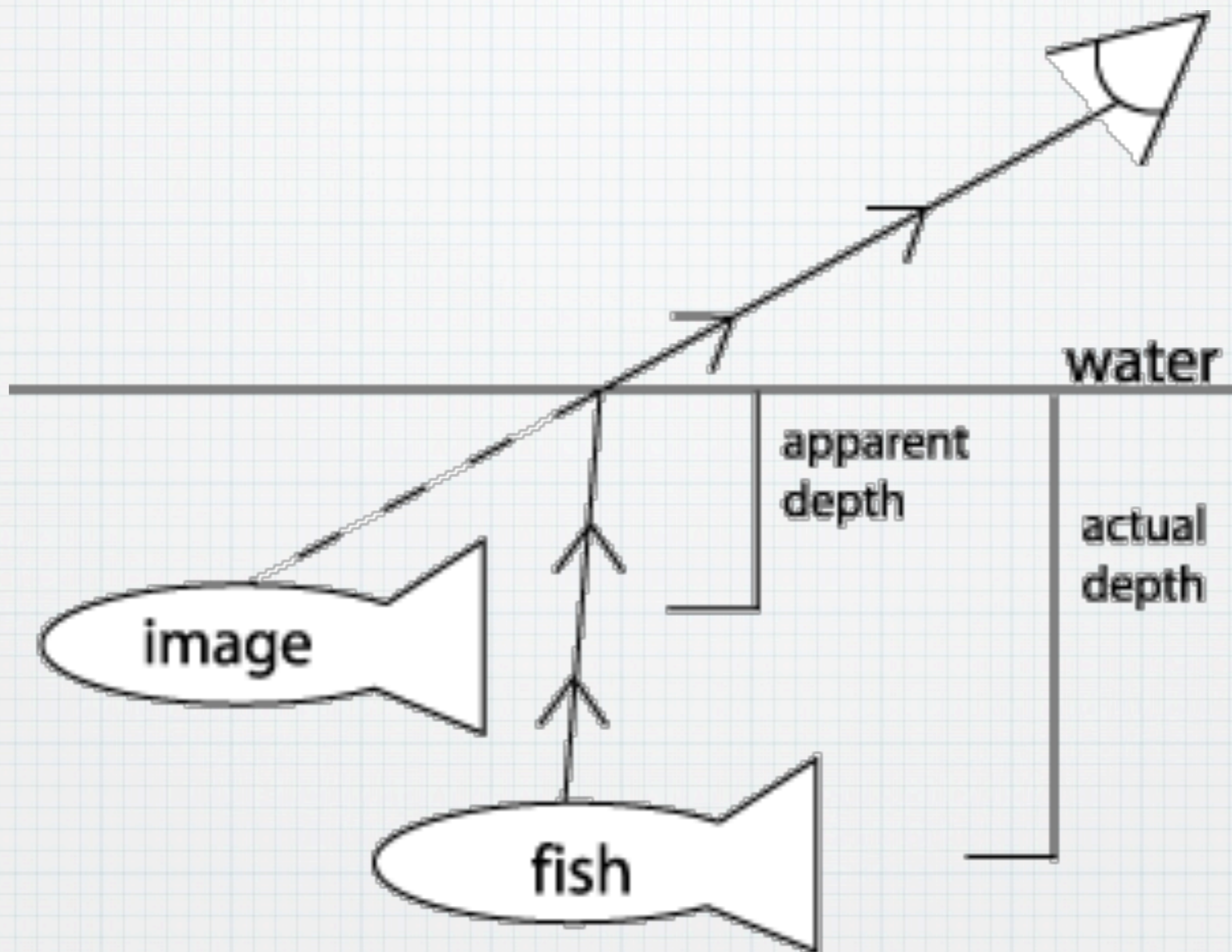
Refraction

- * Light travels in a straight line, but it bends as it passes from one medium to another, such as from air to water.
- * The bending of light as it passes from one medium to another is called refraction.
- * Refraction causes some interesting visual effects.

Optical Illusions

- * A spoon in water appears to be bent.





- * Refraction is due to changes in the speed of light.
- * For example as light moves from air into water, the speed decreases.
- * Different media (materials) slow down the light by different amounts.

*** The more light is slowed down, the more the light is refracted.**

Speed of Light

- * Light travels about 300 million m/s which is fast enough to travel around the Earth 7 times in one second,
- * But just as you can't run or walk as fast in a crowded hallway, light particles do not always reach their top speed.

- * Remember, light is electromagnetic radiation, which is transmitted in waves. The particles in a medium, slow down the passage of waves.**
- * Glass is more dense than air, so light travels slower in glass than in air.**

The Index of Refraction

- * The amount by which a transparent medium decreases the speed of light is indicated by a number called the index of refraction or refractive index.

*** The larger the refractive index, the more the medium decreases the speed of light.**

- * Light travels the fastest in a vacuum. The refractive index of light in a vacuum is assigned a value of 1.00. (This value can also be used for air since the refractive index is so close to 1.00 (its exactly 1.0003)

* Objects that slow down light have a refractive index above 1.0

* i.e. diamond = 2.42

* water = 1.33

* alcohol = 1.36

*** The refractive index of a medium, n , is determined by comparing the speed of light in the medium, v , with the speed of light in a vacuum, c . This leads to the following**

Index of refraction = $\frac{\text{speed of light in vacuum}}{\text{Speed of light in medium}}$

$$n = \frac{c}{v}$$