Answer on Question #51678, Physics, Optics

1 .The critical angle for total internal reflection at an air-water interface is approximately 48º. In which of the following situations will total internal reflection occur?

a. light incident in water at 40º
b. light incident in water at 55º
c.light incident in air at 40º
d. light incident in air at 48º

When the angle of incidence of the light ray is greater than the critical angle then no refraction takes place. Instead, all the light is reflected back into the denser material in this case the glass. This is called total internal reflection.

Answer: b. light incident in water at 55º

2 What effect does enlarging of the hole in a pinhole camera have on the image? The image gets

a. larger
b smaller
c. shaper
d. fuzzier

If you make the hole bigger more light can get in so the image is brighter, however the size of each antishadow gets bigger so they all tend to overlap making the image fuzzy.

Answer: d. fuzzier

3. A camera obscura used by a potrait painter is located 6 m from a child who stands 1 m tall. How tall is her image if the back of the camera obscura is 2 m away?

a. 1/3 m
b. 1/2 m
c 1 m
d 3 m

Solution:
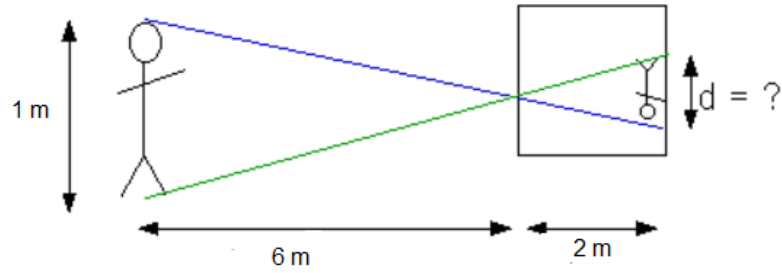
The triangle formed by the object (the child) and the rays from the child's head and feet going to the pin-hole and the triangle formed by the image and the rays coming from the pin-hole toward the head and feet of the image are similar triangles so the ratios of corresponding sides of these triangles are equal. That is,

$$\frac{d}{2\,\text{m}} = \frac{1\,\text{m}}{6\,\text{m}}$$

Thus,

$$d = \frac{2}{6} = \frac{1}{3}\,\text{m}$$

Answer: a. 1/3 m

4 The law of reflection states that
a. light travels in a straight line
b. light must be reflected into our eyes to be seen
c. the angle of reflection is equal to the angle of incidence
d. light striking a rough surface is scattered in all directions

The law of reflection states that when a ray of light reflects off a surface, the angle of incidence is equal to the angle of reflection.

Answer: c. the angle of reflection is equal to the angle of incidence