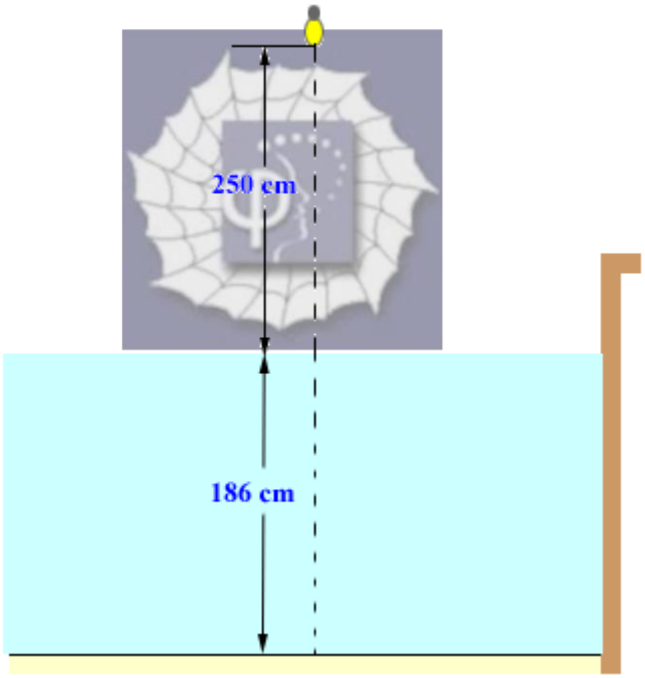
599.

Problem 43.33 (RHK)

A light bulb is suspended 250 cm *above the surface of the water in a swimming pool; as shown in the figure. The water is* 186 cm *deep and the bottom of the pool is a large mirror. We have to find the distance of the image of the light bulb when viewed from near normal incidence.*



Solution:

From the Snell's laws of refraction we know that the depth, *d*, of a pool of water, refractive index *n*, when viewed from above at normal incidence to the surface of the water will appear to be

$$d' = \frac{d}{n} = \frac{186}{1.33}\ \text{cm} = 139.8\ \text{cm}.$$

We have taken for the refractive index of water, $n = 1.33$. It is given that the distance of the light bulb from the surface of the water is 250 cm. Therefore, the image of the light bulb as reflected from the bottom surface of the pool when viewed from near normal incidence will be about $(139.8 + 250)\ \text{cm} = 389.8\ \text{cm}$ from the mirrored surface at the bottom of the pool.