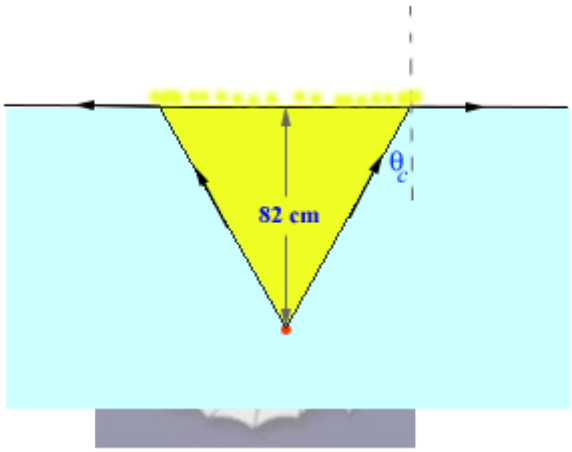
605.

Problem 43.45 (RHK)

A point source of light is 82.0 cm *below the surface of a body of water. We have to find the diameter of the largest circle at the surface through which light can emerge from the water.*



Solution:

Critical angle for water-air interface is given by

$$\sin\theta_c = \frac{1}{1.33},$$

or

$$\theta_c = \sin^{-1}\left(\frac{1}{1.33}\right) = 48.7^0.$$

The point source of light is 82 cm below the surface of the body of water. Therefore, the diameter of the largest circle at the surface through which light can emerge

when the source of light is kept 82 cm below the surface, as shown in the figure, will be

$d = 2 \times 82 \times \tan\left(48.7^0\right)$ cm $= 187$ cm.