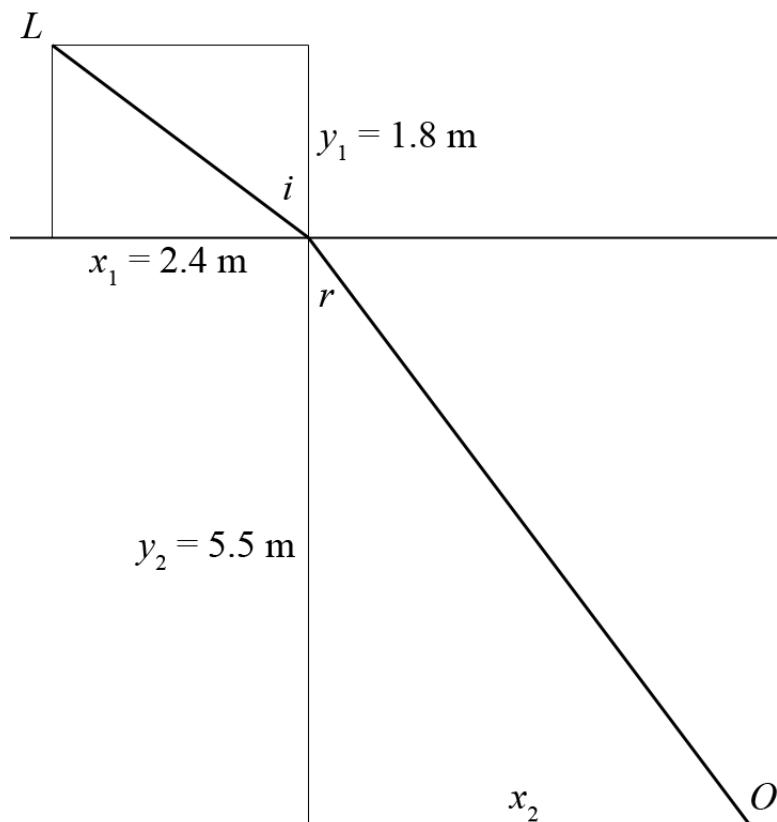


Question #63826, Physics / Optics

Morty is depressed. One night while sitting on the pier, aimlessly shining his laser into the water, he sees a glint from a shiny object. Specifically, he sees this light when he shines the laser 2.4 m in front of him while holding the pointer 1.8 m above the water. If the water is 5.5 m deep, what is the horizontal distance to the shiny object on the ocean floor? (Note: the index of refraction for water is 1.33)

Solution



$$\tan i = \frac{x_1}{y_1} = \frac{2.4}{1.8} = 1.33; i = 53.13^\circ; \sin i = 0.8$$

$$\sin r = \frac{\sin i}{n} = \frac{0.8}{1.33} = 0.602; r = 36.98^\circ$$

$$x_2 = y_2 \tan r = 5.5 \cdot 0.753 = 4.14 \text{ m}$$

Horizontal distance from Morty to the shiny object on the ocean floor is $2.4 + 4.14 = 6.54 \text{ m}$

Answer: 6.54 m.