Question #73806, Physics / Mechanics | Relativity

A spider crawling across a table leaps onto a magazine blocking its path. The initial velocity of the spider is 0.870 m/s at an angle of 35.0° above the table, and it lands on the magazine 0.0770 s after leaving the table. Ignore air resistance. How thick is the magazine? Express your answer in millimeters.

Solution

The height jumped by the spider is calculated as follows.

$$h = v_{0y}t - \frac{gt^2}{2},$$

where $v_{0y} = v_0 \sin 35°$.

Plugging in the values:

$$h = 0.87 \times \sin 35° \times 0.0770 - \frac{9.81 \times 0.0770^2}{2} = 9.3 \times 10^{-3} \text{ m} = 9.3 \text{ mm.}$$

Answer: 9.3 mm.