Answer on Question #73843-Physics-Classical Mechanics

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 35.0o 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 vertical position of a spider is

$$y = v_y t - \frac{gt^2}{2}$$

$$v_y = v \sin 35$$

Thus,

$$y = vt \sin 35 - \frac{gt^2}{2} = (0.870)(0.0770) \sin 35 - \frac{(9.81)(0.0770)^2}{2} = 0.00934\ m = 9.34\ mm.$$

Answer: 9.34 mm.