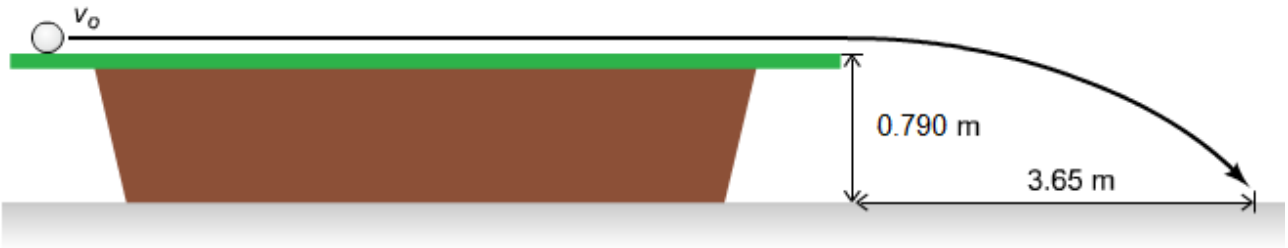
Answer on Question #54433, Physics / Mechanics | Kinematics | Dynamics

The top of the pool table is 0.790 m from the floor. The placement of the tape is such that 0 m is aligned with the edge of the table (as shown). The winner of the competition wants to know if he has broken the world record for the break shot of 32 mph (about 14.3 m/s). If the winner's ball landed a distance 3.65 m from the table edge, calculate his break shot speed. Also need to know at what speed did his pool ball hit the ground.

Solution:



1) Time to drop a distance of 0.790 m is

$$t = \sqrt{\frac{2h}{g}} = \sqrt{\frac{0.790}{9.8}} = 0.284\ s$$

Horizontal velocity of shot is

$$v_x = \frac{d}{t} = \frac{3.65}{0.284} = 12.85\ \text{m/s}$$

No new record.

2) Horizontal component is 12.8 m/s.

Vertical component is

$$v_y = gt = 9.8 * 0.284 = 2.783\ m/s$$

V at ground is

$$v = \sqrt{v_x^2 + v_y^2} = \sqrt{12.85^2 + 2.783^2} = 13.15\ \text{m/s}$$

Answer: $12.85\ \text{m/s};\ 13.15\ \text{m/s}$