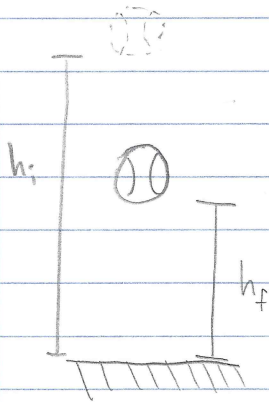


20-P-MOM-DY-13

A tennis ball, of mass $m = 0.3 \text{ kg}$, is dropped onto a gym floor. The ball has a coefficient of restitution $e = 0.5$ with the floor. If the tennis ball bounces up to a height $h = 0.2 \text{ m}$, determine the height from which the ball was dropped.



Solution

$$v_f^2 = v_i^2 + 2ad$$

$$v_i = \sqrt{v_f^2 + 2ad} = 1.98 \text{ m/s}$$

$$e = \frac{(v_B)_2 - (v_A)_2}{(v_A)_1 - (v_B)_1}$$

$v_B = \text{ball}$

$v_A = \text{floor}$

$$= \frac{(v_B)_2}{-(v_B)_1} \quad (v_B)_1 = -\frac{(v_B)_2}{e} = 3.96 \text{ m/s}$$

$$v_f^2 = v_i^2 + 2ad$$

$$d = \frac{v_f^2 - v_i^2}{2a} = 0.799 \text{ m}$$