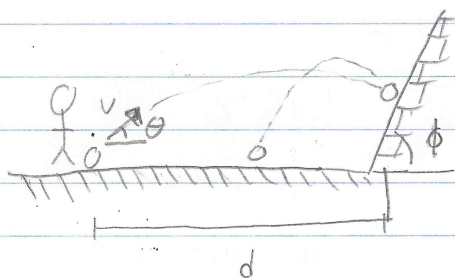


20-P-MOM-DY-14

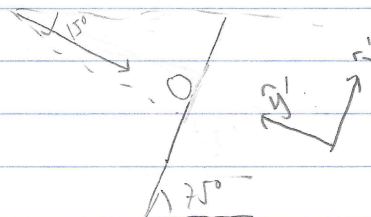
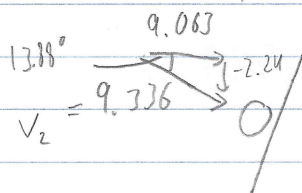
A soccer player practices by kicking a ball against a wall angled 75° from the ground. The ball leaves the ground at $v = 10 \text{ m/s}$ and 25° off the floor. The ball hits the wall $d = 15 \text{ m}$ away from the kickoff spot. If $e = 0.7$ how far away from the original position does the ball land.



$$(v_1)_x = v_1 \cos \theta \quad \frac{d}{v_x} = t = 0.66 \text{ s}$$

$$h = v_{iy}(t) + \frac{1}{2}(a)(t^2) = 0.653 \text{ m above ground}$$

$$v_f = v_i + at = -2.248 \text{ m/s } \hat{j}$$



$$v_2 = v_2 \sin(15 - 13.88) \hat{i}' - v_2 \cos(15 - 13.88) \hat{j}'$$

$$\text{in } \hat{j}' \quad \frac{-(v_3)_{\hat{j}'}}{(v_2)_{\hat{j}'}} = e \quad (v_3)_{\hat{j}'} = e(v_2)_{\hat{j}'} = -6.5534 \text{ m/s } \hat{j}'$$

in \hat{i}' momentum conserved $(v_2)_{\hat{i}'} = (v_3)_{\hat{i}'} = 0.182 \text{ m/s } \hat{i}'$
 $v_3 = 6.537 \text{ m/s}$ at 88.40° to the wall
 16.6° to the floor

$$v_3 = -6.265 \hat{i} + 1.868 \hat{j}$$

$$d = v_{it} + \frac{1}{2}at^2 \quad -0.653 = 1.868t - 4.9t^2 \quad t = 0.60 \text{ s}$$

$$s = t(v_3)_{\hat{i}} = -3.759$$

$$15 + s = \text{answer}$$

$$\text{answer} = 11.241 \text{ m}$$