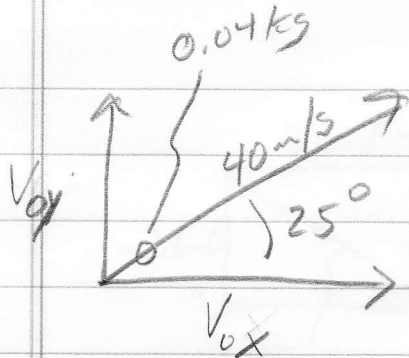


1st Extra Problem 9/31/10

1



$$\sin 25^\circ = \frac{v_{0y}}{40 \text{ m/s}}$$

$$v_{0y} = 16.9 \text{ m/s}$$

$$v_{0x} = \cos 25^\circ (40 \text{ m/s}) = 36.3 \text{ m/s}$$

remains constant through flight

$$d = v_0 t + \frac{1}{2} a t^2$$

$$d = 16.9 \text{ m/s} (2.5 \text{ s}) + \frac{1}{2} (-9.8 \text{ m/s}^2) (2.5 \text{ s})^2$$

$$d = 11.6 \text{ m} = y \text{ position @ } 2.5 \text{ s}$$

$$x \text{ position} = v_{0x} (2.5 \text{ s}) = 36.3 \text{ m/s} (2.5 \text{ s}) = 90.8 \text{ m}$$

at launch

at 2.5 sec

$$PE_1 + KE_1 = PE_2 + KE_2$$

$$mgh = \text{zero}$$

because projectile is at ground level

$$\frac{1}{2} m v^2 = 32 \text{ J}$$

Total E @ 2.5s

$$mgh = 4.55 \text{ J} = PE @ 2.5 \text{ s}$$

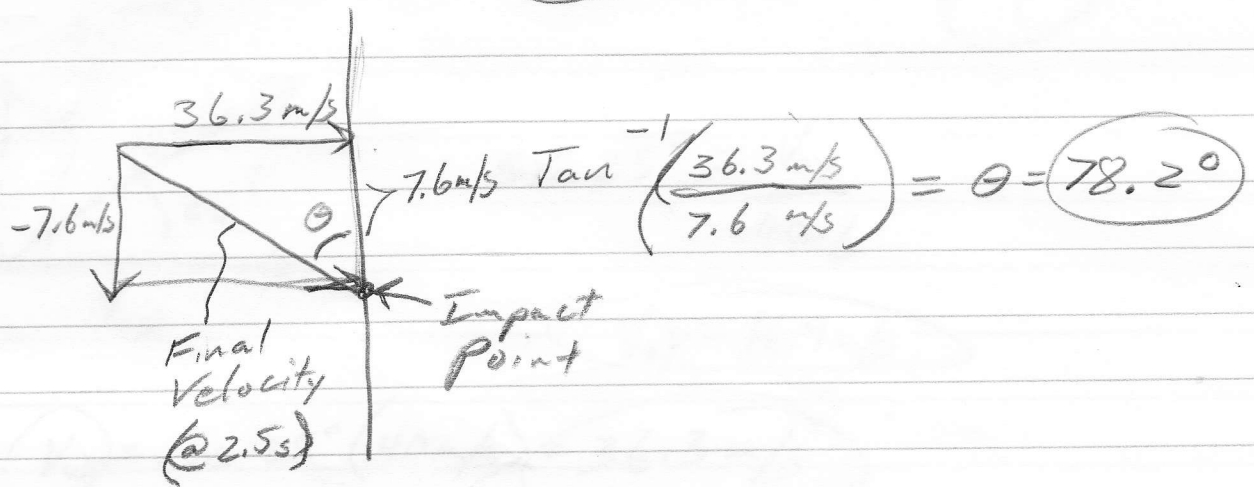
$$0.04 \text{ kg} (9.8 \text{ m/s}^2) (11.6 \text{ m}) = 4.55 \text{ J}$$

$$= KE_1 - PE_2 = 27.5 \text{ J} = KE @ 2.5 \text{ s}$$

$$v_{y@2.5s} = v_{0y} + at = 16.9 \text{ m/s} + (-9.8 \text{ m/s}^2) (2.5 \text{ s}) = -7.6 \text{ m/s}$$

a) $x = 90.8 \text{ m}$ b) $d = 11.6 \text{ m}$ c) $v_y = -7.6 \text{ m/s}$

(2)



Answers:

a) $d_x = 90.8 \text{ m}$ $d_y = 11.6 \text{ m}$

b) $v_x = 36.3 \text{ m/s}$ $v_y = -7.6 \text{ m/s}$

c) 78.2°

d) $PE = 4.55 \text{ J}$ $KE = 27.5 \text{ J}$ $Total E = 32 \text{ J}$