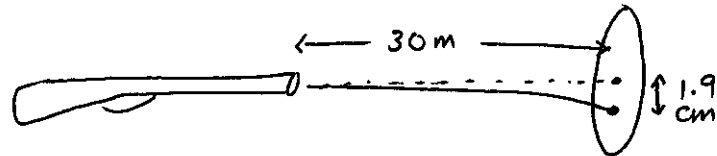Name : *Solution*   Id :   Sec. # : 26

A rifle is aimed horizontally at a target 30 m away. The bullet hits the target 1.9 cm below the aimed point.

a) What is the bullet's time of flight?

choose the origin at the firing point. Since the rifle was aimed horizontally $\Rightarrow \theta_0 = 0$

$$\Delta y = (V_0 \sin \theta_0) t - \frac{1}{2} g t^2$$

$$-0.019 = 0 - \frac{1}{2} \times 9.8 \times t^2$$

$$\Rightarrow \boxed{t = 6.2 \times 10^{-2} \text{ s}}$$

←— 30 m —→
↕ 1.9 cm

b) What is the speed of the bullet as it emerges from the rifle?

The initial speed can be found from

$$\Delta x = (V_0 \cos \theta_0) t$$

$$30 = V_0 \times 1 \times 6.2 \times 10^{-2}$$

$$\Rightarrow \boxed{V_0 = 4.8 \times 10^2 \text{ m/s}}$$