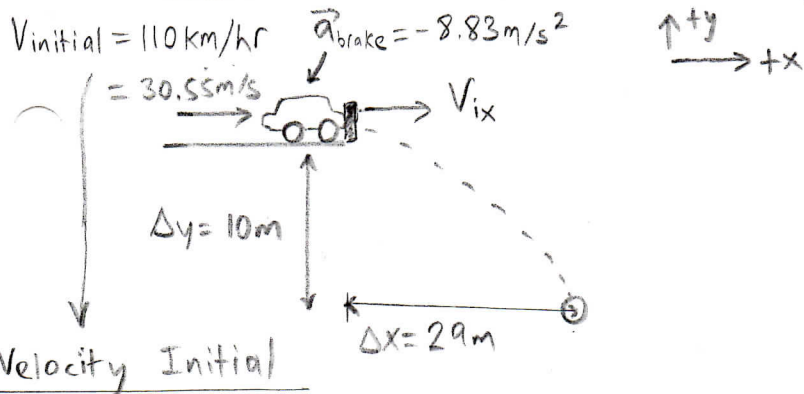


Crime Scene #3: Road Rage



$$V_{\text{initial}} = 110 \frac{\text{km}}{\text{hr}} \times \frac{1 \text{ hr}}{3600 \text{ s}} \times \frac{1000 \text{ m}}{1 \text{ km}}$$

$$V_{\text{initial}} = 30.6 \text{ m/s}$$

Velocity after hitting Gaurd Rails is reduced by 10m/s

$$V_{\text{initial}} = 21.7 - 10$$

$$V_{\text{initial}} = 11.7 \text{ m/s}$$

Velocity after breaking

$$\vec{a} = -8.83 \text{ m/s}^2$$

$\Delta t = 1 \text{ sec}$ (evelyn claims she engaged her breaks for one full second)

$$\vec{V}_i = 30.6 \text{ m/s}$$

$$\vec{V}_f = ?$$

$$\vec{V}_f = \vec{V}_i + \vec{a} \Delta t$$

$$\vec{V}_f = 30.6 + (-8.83)(1)$$

$$\vec{V}_f = 30.6 - 8.83$$

$$\vec{V}_f = 21.7 \text{ m/s}$$

30.6 m/s → 21.7 m/s → 11.7 m/s
initial braked after hitting the rail

* She claims she hit the breaks so lets check

$$V_{ix} = 11.7 \text{ m/s}$$

$$\vec{a} = -9.8 \text{ m/s}^2$$

$$\Delta y = -10 \text{ m}$$

$$\Delta x = 29 \text{ m}$$

$$\Delta t = ?$$

$$\Delta y = V_{iy} \Delta t + \frac{1}{2} a_y \Delta t^2$$

$$-10 = \frac{1}{2} (-9.8) \Delta t^2$$

$$-10 = -4.9 \Delta t^2$$

$$\frac{-10}{-4.9} = \Delta t^2$$

$$\sqrt{2.04} = \sqrt{\Delta t^2}$$

$$1.43 \text{ sec} = \Delta t$$

$$\Delta dx = V_{ix} \cdot \Delta t$$

$$= 11.7 \cdot 1.43 = 16.7 \text{ m}$$

doesn't come close to 29m

* check if she was snoozing (asleep)

$$V_{\text{initial}} - 10 \text{ m/s (from rail)}$$

$$= 30.6 - 10$$

$$= 20.6 \text{ m/s}$$

$$\Delta dx = V_{ix} \cdot \Delta t$$

$$= 20.6 \times 1.43 = 29.4 \text{ m}$$

∴ she was asleep