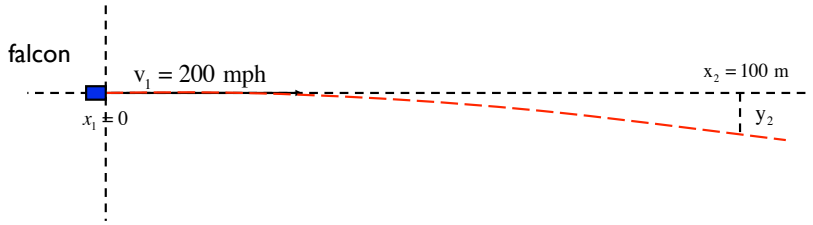
The Falcon

A falcon moving 200 mph in the horizontal pulls in its wings and freefall for 100 meters. How far will the falcon have fallen after that 100 meters of "free fall."



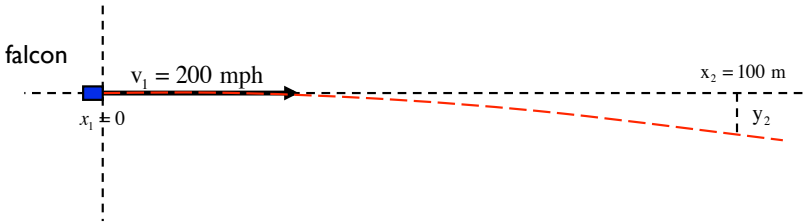
We can write:

$$x_2 = x_1 + v_{1,x}t + (1/2)a_x t^2$$

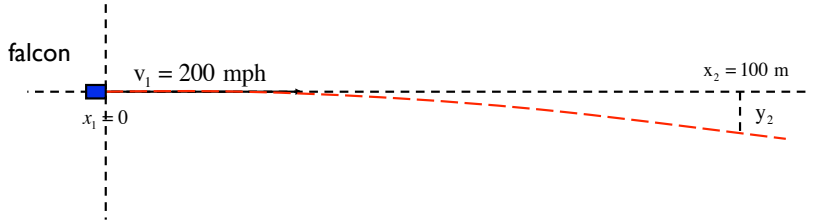
$$\Rightarrow \quad x_2 = 0 + v_1 t + 0$$

$$\Rightarrow \quad (100\text{ m}) = \left[(200\text{ mi/hr})(1609\text{ m/mi})(1\text{ hr}/3600\text{ sec})\right]t$$

$$\Rightarrow \quad t = 1.12\text{ seconds}$$



How far will the falcon have fallen after 100 meters of "free fall."



And we can write:

$$y_2 = y_1 + v_{1,y}t + (1/2)a_y t^2$$

$$\Rightarrow \quad y_2 = 0 + 0 + (1/2)\left(-9.8\text{ m/s}^2\right)(1.12\text{ s})^2$$

$$\Rightarrow \quad y_2 = -6.15\text{ meters}$$