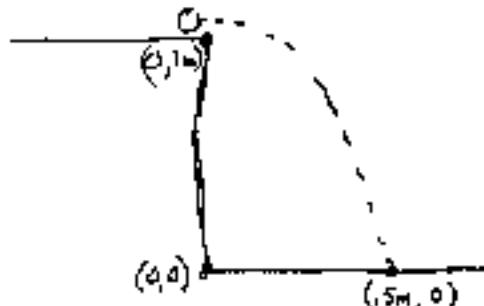


1. A ball rolls off a horizontal table 1.0 m high and strikes the floor 0.50 m from the edge of the table ($g = 9.8 \text{ m/s}^2$). Draw a sketch.

a. How long did the ball fall before it struck the floor? (3 points)



$$y = y_0 + v_{y0}t + \frac{1}{2}at^2$$

$$0 = 1.0 \text{ m} + 0 + \frac{1}{2}(-g)t^2$$

$$t^2 = \frac{-1.0 \text{ m}}{\frac{1}{2}(-9.8 \text{ m/s}^2)} \Rightarrow \boxed{.45 \text{ s} = t}$$

b. With what speed (horizontally) did the ball leave the table? (3 points)

$$x = v_{x0}t \Rightarrow .5 \text{ m} = v_{x0}(.45 \text{ s})$$

$$v_{x0} = \frac{.5 \text{ m}}{.45 \text{ s}} = \boxed{1.11 \text{ m/s}}$$

2. A jet fighter flying at 500 m/s makes a horizontal turn at constant speed. The pilot has instructions not to exceed 25 m/s^2 . What is the minimum radius of his turn? (3 points)

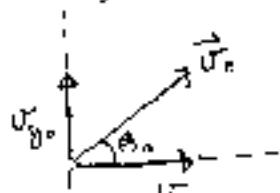


$$a_c = \frac{v^2}{r}$$

$$r = \frac{v^2}{a_c} = \frac{(500 \text{ m/s})^2}{25 \text{ m/s}^2} = 10000 \text{ m}$$

$$\approx \boxed{10 \text{ km}}$$

3. A projectile is fired from your ship's gun at an initial speed of v_0 , at an angle of θ_0 with the horizontal. What are the expressions (equations) for the initial x and y components of the velocity vector? Draw a sketch. (1 point)



$$v_{x0} = |\vec{v}_0| \cos \theta_0$$

$$v_{y0} = |\vec{v}_0| \sin \theta_0$$

$$v = v_0 - ar \quad x = x_0 + v_0 t - \frac{1}{2}at^2 \quad v^2 = v_0^2 + 2a(x - x_0) \quad \bar{v} = \frac{v_0 + v}{2} \quad a_p = \frac{v^2}{r}$$

Extra Credit: What Rhodes Scholar and Buffalo Bills quarterback from the mid 1960's entered politics after football, serving first in the house and then on the president's cabinet?

JACK KEMP