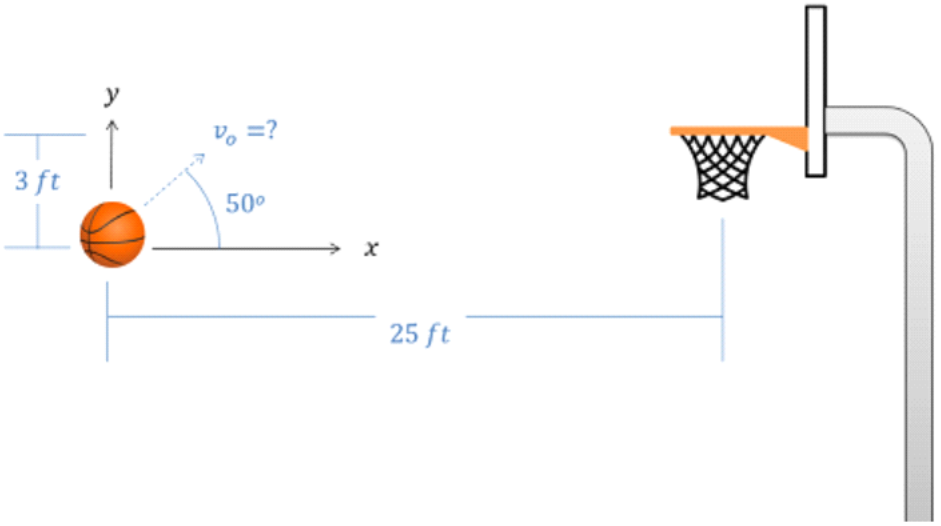
Question 2:

A basketball is thrown towards as hoop that is three feet higher in the y direction and 25 feet away in the x direction. If the ball is thrown at an initial angle of 50 degrees, what must the initial velocity be for the ball to make it into the hoop?



acc $\ddot{X}(t) = 0$ $\qquad \ddot{y}(t) = -32.2$

Vel $\dot{X}(t) = V_o \cos(50)$ $\qquad \dot{y}(t) = -32.2t + V_o \sin(50)$

pos $X(t) = V_o \cos(50)t + \not{C}^0$ $\qquad y(t) = -\frac{32.2}{2}t^2 + V_o \sin(50)t + \not{C}^0$

at t' $\quad x = 25 \quad y = 3$

$$25 = V_o \cos(50)\, t' \qquad 3 = -\frac{32.2}{2}t'^2 + V_o \sin(50)\, t'$$

$$\downarrow$$

$$t' = \frac{25}{V_o \cos(50)}$$

$$3 = -\frac{32.2}{2}\left(\frac{25}{V_o \cos(50)}\right)^2 + V_o \sin(50)\left(\frac{25}{V_o \cos(50)}\right)$$

$$3 = -24354\left(\frac{1}{V_0^2}\right) + 29.7938$$

$$V_0 = \sqrt{\frac{-24354}{-26.7938}} = \boxed{30.1487 \text{ ft/s}}$$