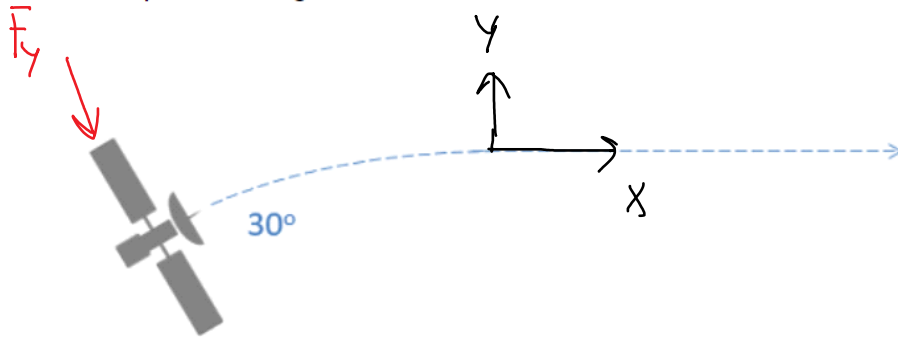


Problem 5

A satellite with a mass of 12,000 kg and a speed of 600 m/s is traveling 30 degrees from horizontal. If the capsule is to have the same speed but travel horizontally after 10 seconds, what is the magnitude and direction of the required average thruster force?



$$(F_x)(t) = m v_{fx} - m v_{ix}$$

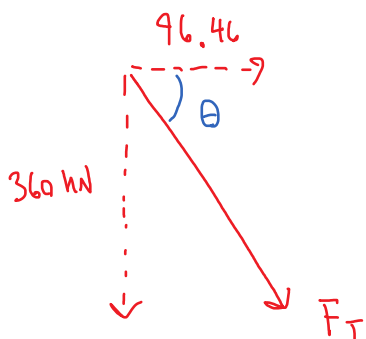
$$(F_y)(t) = m v_{fy} - m v_{iy}$$

$$(F_x)(10s) = (12,000 \text{ kg})(600 \text{ m/s}) - (12,000 \text{ kg})(600 \cos(30) \text{ m/s})$$

$$\underline{F_x = 96,462 \text{ N}}$$

$$(F_y)(10s) = -(12,000 \text{ kg})(600 \sin(30) \text{ m/s})$$

$$\underline{F_y = -360,000 \text{ N}}$$



$$F_T = \sqrt{360^2 + 96.46^2} = \boxed{372.7 \text{ kN}}$$

$$\theta = \tan^{-1}\left(\frac{360}{96.46}\right) = \boxed{75^\circ}$$