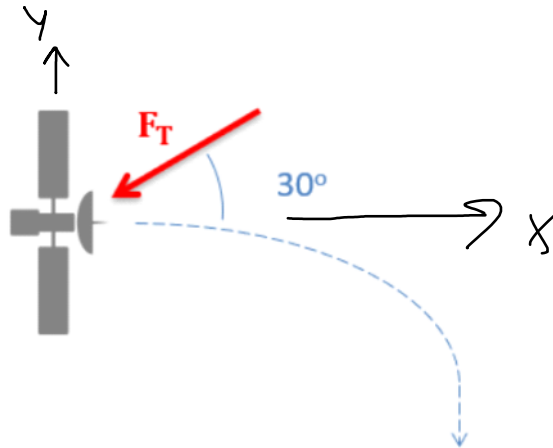


Problem 4

A satellite with a mass of 12,000 kg and a speed of 600 m/s fires a thruster exerting a force of 600 kN at a 30 degree angle with the current path as shown below. The thruster is turned off after completing a 90 degree turn as shown below.

- How long was the thruster on?
- What is the final velocity?



$$(F_x)(t) = \cancel{m \cancel{v}_{fx}^0} - m v_{ix}$$

$$(F_y)(t) = m v_{fy} - \cancel{m \cancel{v}_{iy}^0}$$

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

$$\boxed{t = 13.86 \text{ s}}$$

$$(-600,000 \text{ N}) \sin(30) (13.86 \text{ s}) = (12,000 \text{ kg})(v_{fy})$$

$$\boxed{v_{fy} = -346.4 \text{ m/s}}$$