Problem 2 - Impulse Momentum I

The space capsule has a mass of 1200 kg and a moment of inertia $I_G = 900$ kg-m^2 about an axis passing through G and directed perpendicular to the page. If it is traveling forward with a speed $v_G = 800$ m/s and executes a turn by means of two jets, which provide a constant thrust of 400 N for 0.3 s, determine the capsule's angular velocity just after the jets are turned off.

CLASSIFY MOTION

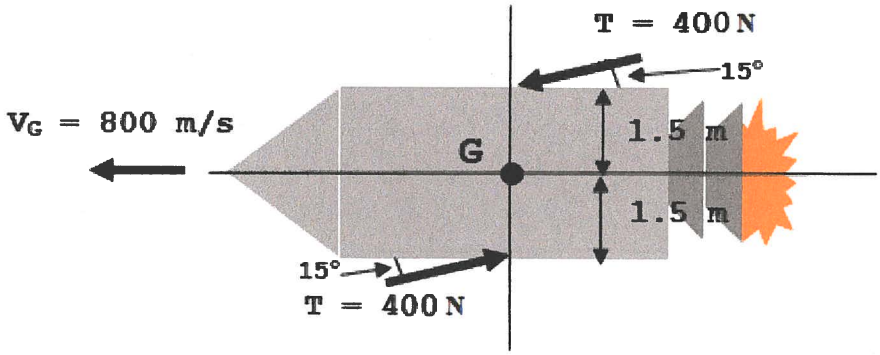
GPM

PROPERTIES

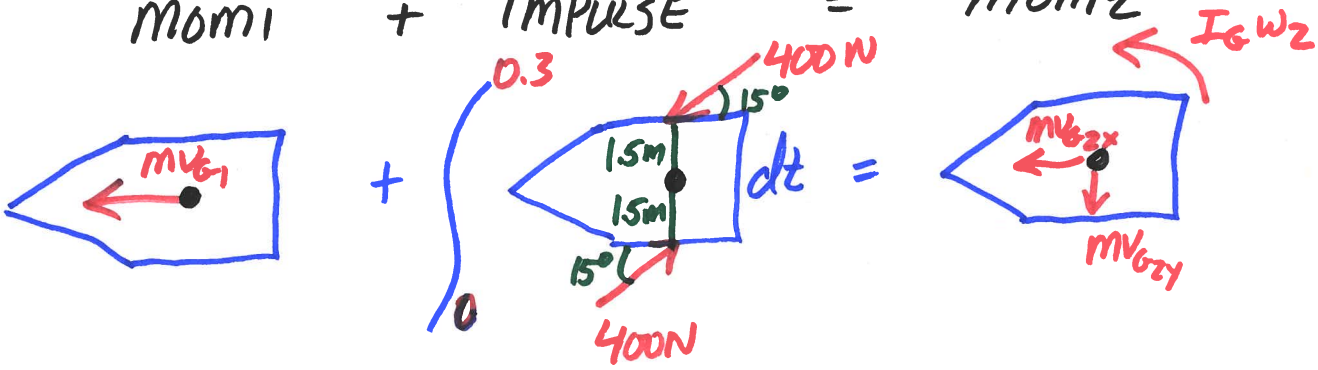
$m = 1200$ kg

$I_G = 900$ kg-m^2

$V_{G_1} = 800$ m/s



$$\text{MOM}_1 + \text{IMPULSE} = \text{MOM}_2$$



$$\circlearrowleft \Sigma M_G \quad 0 + \int_0^{0.3} -2\,(400\cos 15°)(1.5)\,dt = -900\omega_2$$

$$-1159t\Big|_0^{0.3} = -900\omega_2$$

$$\omega_2 = 0.386 \text{ rps} \circlearrowleft$$