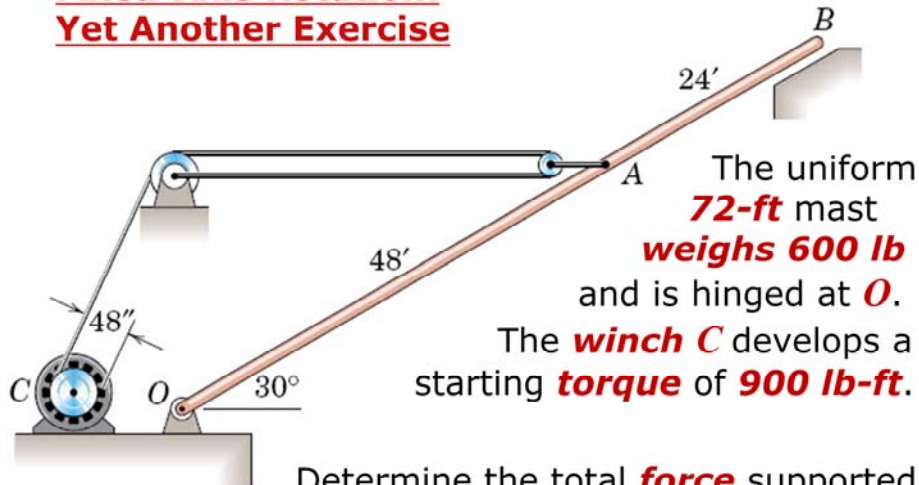


**Fixed-Axis Rotation:
Yet Another Exercise**

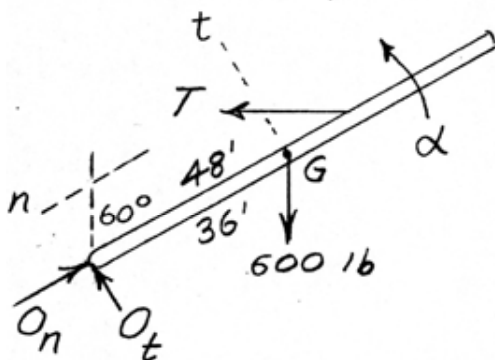


The uniform **72-ft** mast **weighs 600 lb** and is hinged at **O**.
The **winch C** develops a starting **torque of 900 lb-ft**.

Determine the total **force** supported by the **pin** at **O** as the mast begins to lift off its support at **B**. Also find the corresponding **angular acceleration α** of the mast.

ME 231: Dynamics

6/66 $M = \frac{I}{2} r, T = \frac{2(900)}{2} = 900 \text{ lb}$



$$\Sigma M_O = I_O \alpha;$$

$$900(48 \cos 60^\circ) - 600(36 \sin 60^\circ) = \frac{1}{3} \frac{600}{32.2} 72^2 \alpha$$

$$\alpha = 0.0899 \text{ rad/sec}^2$$

$$\Sigma F_t = m \bar{a}_t; O_t + 900 \cos 60^\circ - 600 \sin 60^\circ = \frac{600}{32.2} (36) (0.0899)$$

$$O_t = 129.9 \text{ lb}$$

$$\Sigma F_n = m \bar{a}_n = 0; 900 \sin 60^\circ + 600 \cos 60^\circ - O_n = 0$$

$$O_n = 1079.4 \text{ lb}$$

$$O = \sqrt{129.9^2 + 1079.4^2} = 1087 \text{ lb}$$