

p 265 MC 8, 10
p 266 Problem 4, 21, ~~22, 23~~ 28
Tutorial - Torque Rank

(1)

- Multiple Choice

8) τ is + what mean?

No of choices necessarily correct

+ τ means causes CCW rotate

(2)

10) τ of 10N F is zero? what mean?

a) F at axis of rotation

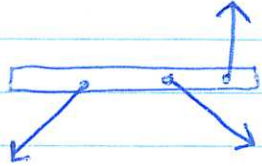
b) line // to F is go through axis

Both correct

4

- Problems

4) 200 N Forces exert on beam



a) $\odot \tau_1 = Fr \sin \theta = (200 \text{ N})(1 \text{ m}) \sin 50^\circ$

a) $\tau_1 = -153 \text{ Nm}$

(2)

$\ominus \tau_2 = Fr \sin \theta = (200 \text{ N})(1.5 \text{ m}) \sin 30^\circ$
b) $= -150 \text{ Nm}$

b) $r_3 = ?$ when τ_3 balance $\tau_1 + \tau_2$

c)

$$\sum \tau = 0 \text{ Nm}$$

$$\tau_3 - \tau_2 - \tau_1 = 0 \text{ Nm}$$

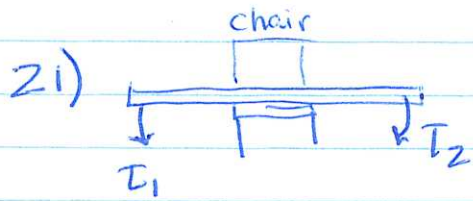
$$\tau_3 = \tau_1 + \tau_2$$

$$Fr \sin \theta = \tau_1 + \tau_2$$

$$r = \frac{\tau_1 + \tau_2}{F \sin \theta} = \frac{153 \text{ Nm} + 150 \text{ Nm}}{(200 \text{ N})(\sin 90^\circ)}$$

$$= 1.52 \text{ m}$$

4



$l = 3\text{m}$

$m_1 = 70\text{kg}$ left

$r_1 = 1.5\text{m}$

$m_2 = 50\text{kg}$ right

$r_2 = 1.5\text{m}$

$m_3 = 54\text{kg}$

$r_3 = ?$

$\sum \tau = 0\text{Nm}$

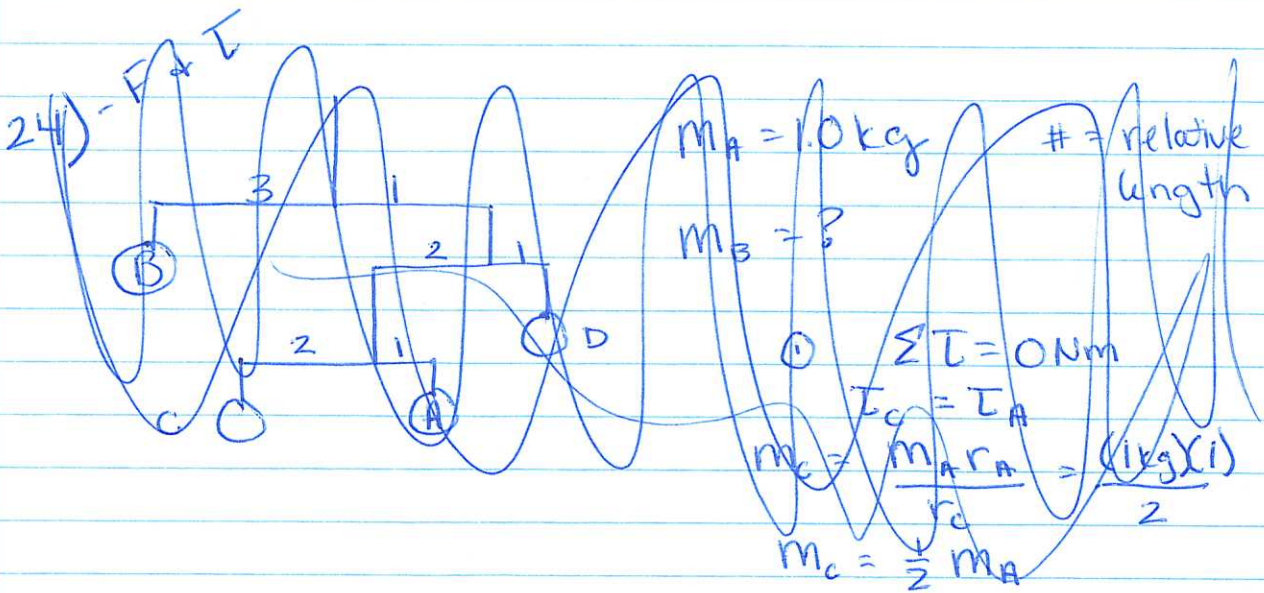
$\tau_1 - \tau_2 - \tau_3 = 0\text{Nm}$

$m_1 r_1 - m_2 r_2 - m_3 r_3 = 0\text{Nm}$

$r_3 = \frac{m_1 r_1 - m_2 r_2}{m_3} = \frac{(70\text{kg})(1.5\text{m}) - (50\text{kg})(1.5\text{m})}{54\text{kg}}$

$r_3 = 0.56\text{m}$

(1)



$m_A = 1.0\text{kg}$

= relative length

$m_B = ?$

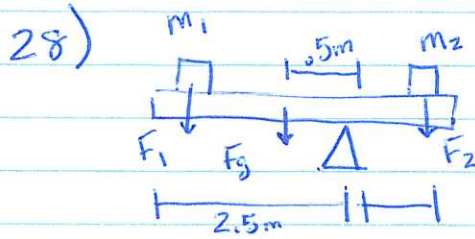
$\sum \tau = 0\text{Nm}$

$\tau_C = \tau_A$

$m_C = \frac{m_A r_A}{r_C} = \frac{(1\text{kg})(1)}{2}$

$m_C = \frac{1}{2} m_A$

(4)



$$m_b = 20 \text{ kg} \quad r_b = 0.5 \text{ m}$$
$$l_{\text{total}} = 4 \text{ m}$$

$$m_1 = 30 \text{ kg} \quad r_1 = 2.5 \text{ m}$$
$$m_2 = ? \quad r_2 = 1.5 \text{ m}$$

$$\sum \tau = 0 \text{ Nm}$$

$$\tau_1 + \tau_g - \tau_2 = 0 \text{ Nm}$$

$$m_1 r_1 + m_b r_b = m_2 r_2$$

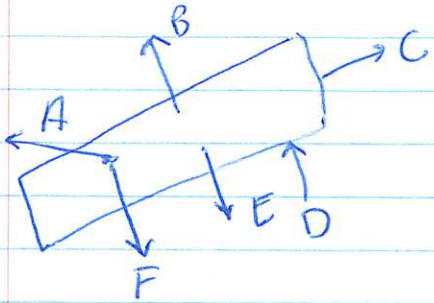
$$m_2 = \frac{m_1 r_1 + m_b r_b}{r_2} = \frac{(30 \text{ kg})(2.5 \text{ m}) + (20 \text{ kg})(0.5 \text{ m})}{1.5 \text{ m}}$$

$$m_2 = 57 \text{ kg}$$

(1)

④

- Online Tutorial - Torque Ranking



Rank (large to small)

D B F A C
E

(1)