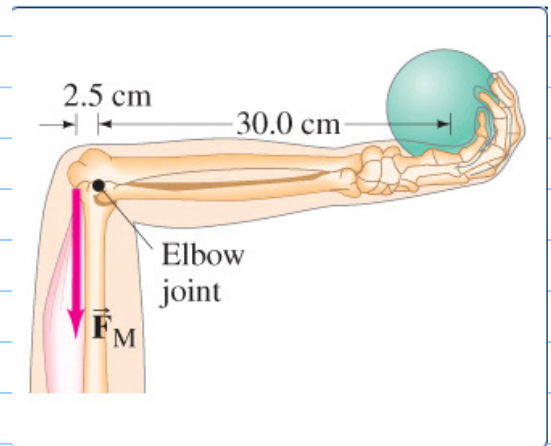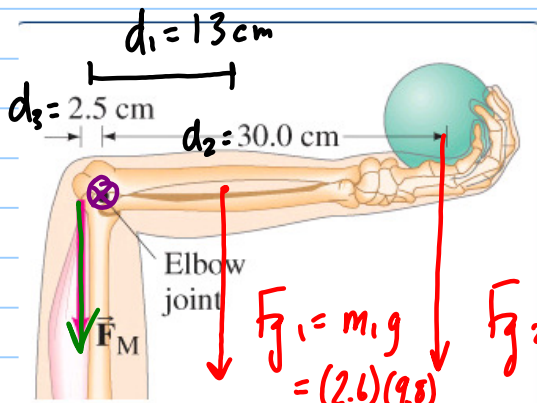How much force must the
tricep muscle in the upper arm
exert on the lower arm to hold
a 8.2 kg shot put?

Assume the lower arm has a
mass of 2.6 kg and its center
of mass is 13 cm from the
elbow joint.

2.5 cm

30.0 cm

Elbow
joint

$\vec{F}_M$

$$F_{g_1} = m_1 g$$
$$= (2.6)(9.8)$$
$$= 25.48 \, N$$

$$F_{g_2} = m_2 g \checkmark$$
$$= (8.2)(9.8)$$
$$= 80.36 \, N$$

$$\tau_c = \tau_{cc} \checkmark$$

$$F_{g_1} d_1 + F_{g_2} d_2 = F_M d_3 \checkmark$$

$$F_M = \frac{F_{g_1} d_1 + F_{g_2} d_2}{d_3} = \frac{(25.48 \, N)(0.13 \, m) + (80.36 \, N)(0.300 \, m)}{0.025 \, m}$$

$$= \boxed{1100 \, N} \checkmark\checkmark$$