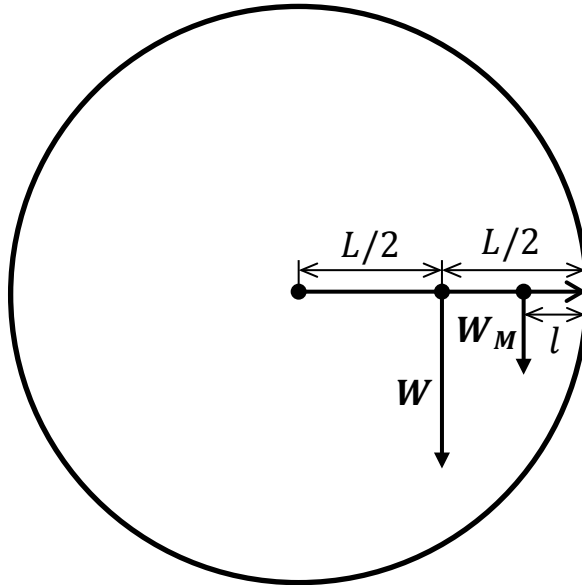


Answer on Question #53229 - Physics - Mechanics - Kinematics - Dynamics

Mario is doing pull-ups about $l = 1$ meter from the end of the hour hand of a clock on the Big Ben Tower in London. Mario weighs $W_M = 650\text{N}$ and the Hour hand weighs $W = 5000\text{N}$ and is uniform in density. The time is 3pm. The Hour hand is $L = 5$ meters long. What is the net Torque around the pin that attaches the hour hand to the clock face?

Solution:



The forces which act on the Hour hand are shown in the figure above. Since the pull-ups is the periodic process the net force acting on the Hour hand due to Mario's weight is W_M . Therefore the net torque around the pin is given by

$$\tau = \frac{L}{2}W + W_M(L - l) = \frac{5\text{m}}{2}5000\text{N} + 650\text{N}(5\text{m} - 1\text{m}) = 15.1 \text{ kN} \cdot \text{m}$$

Answer: 15.1 kN · m.