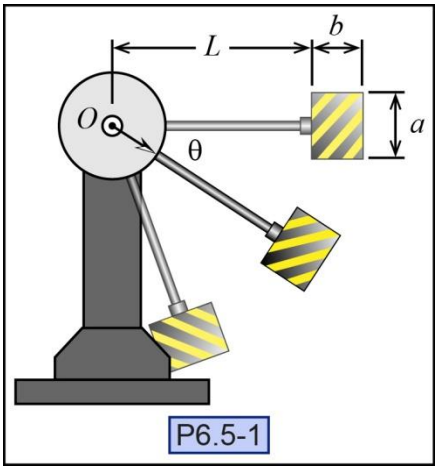
P6.5-1) The pendulum impact tester shown consists of a pendulum that rotates freely about the pivot O. The pendulum is made up of a sender rod of length L = 800 mm and mass 5 kg and a block at the end of the rod. The block has the dimensions: a = 250 mm and b = 200 mm with a mass of 30 kg. Determine the reaction force when the pendulum is releases from rest at $\theta = 0$.



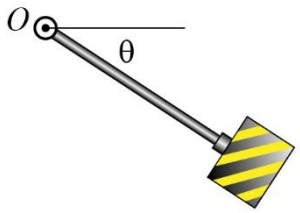
P6.5-1

Given:

Find:

Solution:

Draw a free-body diagram of the pendulum.



Determine the mass moment of inertia with respect to O.

$I_{O,Block}$ = _____

$I_{O,rod}$ = _____

$I_{O,total}$ = _____

Write down the pendulum's equation of motion as a function of θ and then solve for the angular acceleration when $\theta = 0$.

α = _____

Use kinematic relationships to solve for the linear accelerations needed for Newton's second law.

Solve for the linear accelerations of the center of gravity of the rod and block.

$\mathbf{a}_{G,rod}$ = _____

$\mathbf{a}_{G,block}$ = _____

Use Newton's second law to calculate the reaction force.

O = _____