

45. Two forces act on the ball, the force of the rod and the force of gravity. No torque about the pivot point is associated with the force of the rod since that force is along the line from the pivot point to the ball.

As can be seen from the diagram,

the component of the force of gravity that is perpendicular to the rod is $mg \sin \theta$. If ℓ is the length of the rod, then the torque associated with this force has magnitude $\tau = mgl \sin \theta = (0.75)(9.8)(1.25) \sin 30^\circ = 4.6 \text{ N} \cdot \text{m}$. For the position shown, the torque is counterclockwise.

