

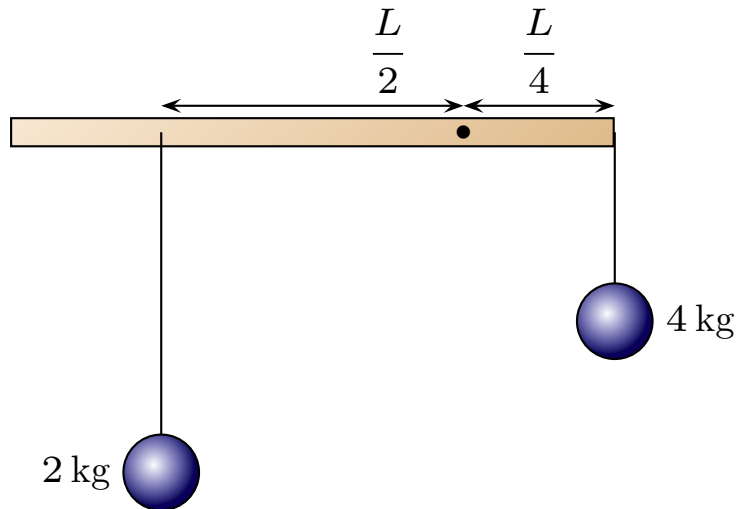
Warm Up Question 1

An axle passes through one end of a meter stick. A 10 N force pulls perpendicular to and at the other end the stick. The point of application of this force is then shifted to a point 25 cm from the axle and the force stays constant. Describe as precisely as possible how this changes the torque exerted by the force on the stick. Explain your answer.

1. It will be $1/4$ because of the distance.
2. It will be less. Distance is less.
3. Drops from 10 Nm to 2.5 Nm.

Question 1

A 1.0 kg metal rod with length L is free to pivot about *an axle to the right of its midpoint*. Two balls are suspended as illustrated.

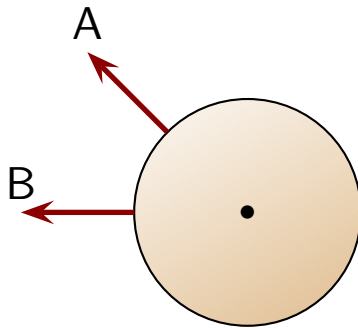


Which of the following best describes the net torque on the metal rod?

1. $\tau_{\text{net}} = 0$
2. $\tau_{\text{net}} > 0$
3. $\tau_{\text{net}} < 0$

Question 2

A disk can rotate about its center. A rope attached to the rim pulls directly outward. Two possibilities are illustrated.

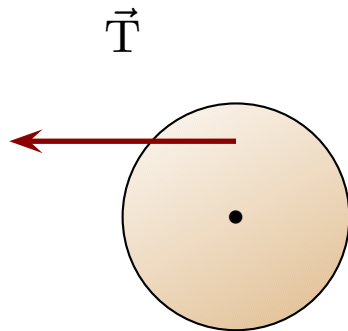


Which of the following represents the angle that should be used in $\tau = rF \sin \phi$ when calculating the torque about the center?

1. $\phi_A = 0^\circ$ $\phi_B = 0^\circ$
2. $\phi_A = 45^\circ$ $\phi_B = 0^\circ$
3. $\phi_A = 45^\circ$ $\phi_B = 180^\circ$
4. $\phi_A = 135^\circ$ $\phi_B = 0^\circ$
5. $\phi_A = 135^\circ$ $\phi_B = 180^\circ$

Question 3

A disk of radius R , can rotate about its center. A rope, attached half of the distance in from the rim toward the center, pulls with tension T as illustrated.



Which of the following represents the torque produced by the rope?

1. $\tau = RT \sin 90^\circ$
2. $\tau = RT \sin 180^\circ$
3. $\tau = -\frac{R}{2}T \sin 90^\circ$
4. $\tau = \frac{R}{2}T \sin 90^\circ$
5. $\tau = \frac{R}{2}T \sin 180^\circ$