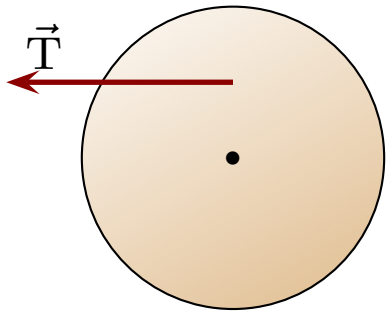
Question 1

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.



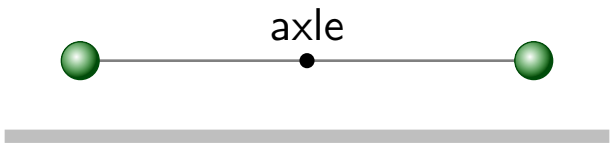
Which of the following represents the torque produced by the rope?

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. $\tau = \frac{R}{2} T \sin 180^\circ$

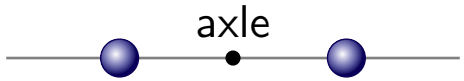
Question 2

Rods with length $2.0\,\mathrm{m}$ rotate about an axle at their midpoints. Two such rods are set up with masses attached as illustrated. In case B the mass are midway between the axle and end of the rod. The rods have negligible mass.

Case A



Case B

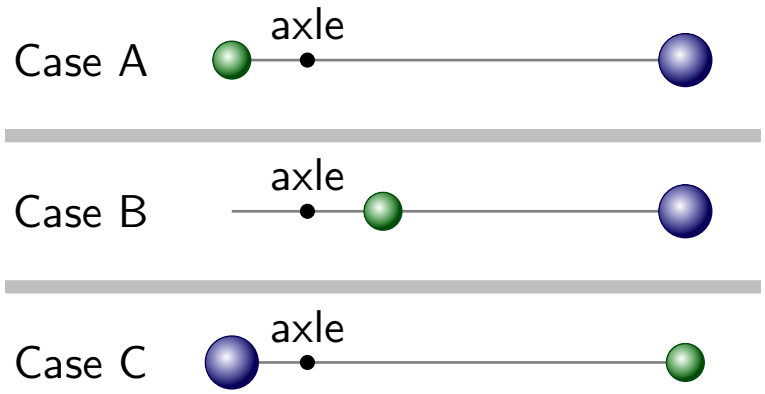


The masses in both cases are the same. Which of the following is true regarding the moments of inertia?

1. $I_\mathrm{A} = \frac{1}{4} I_\mathrm{B}$
2. $I_\mathrm{A} = \frac{1}{2} I_\mathrm{B}$
3. $I_\mathrm{A} = I_\mathrm{B}$
4. $I_\mathrm{A} = 2 I_\mathrm{B}$
5. $I_\mathrm{A} = 4 I_\mathrm{B}$

Question 3

Rods rotate about an axle as illustrated. Two such rods are set up with masses attached as illustrated. The rods have negligible mass and the larger ball has greater mass than the smaller.

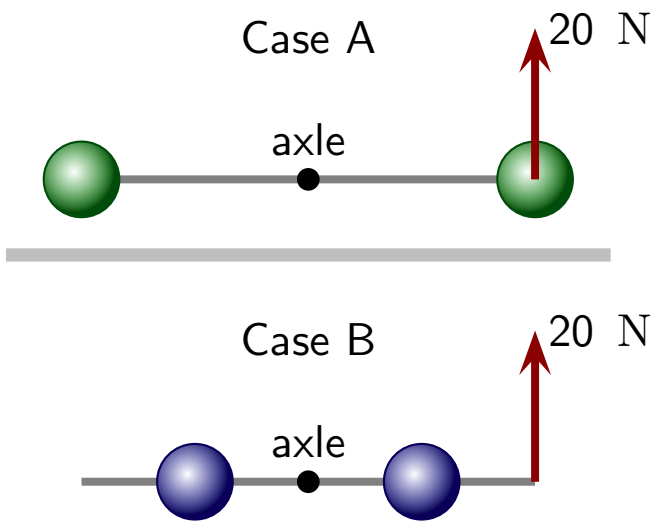


Which of the following is true regarding the moments of inertia?

1. $I_A = I_B < I_C$
2. $I_A = I_B > I_C$
3. $I_A = I_C > I_B$
4. $I_A = I_C < I_B$
5. $I_B > I_A > I_C$

Question 4

Rods with length $2.0\,\mathrm{m}$ rotate about an axle at their midpoints. Two such rods are set up with masses attached as illustrated.



The masses in both cases are the same. The same force acts at the end of each rod. Which of the following is true regarding the resulting angular acceleration?

1. $\alpha_A > \alpha_B$
2. $\alpha_A < \alpha_B$
3. $\alpha_A = \alpha_B \neq 0$
4. $\alpha_A = \alpha_B = 0$