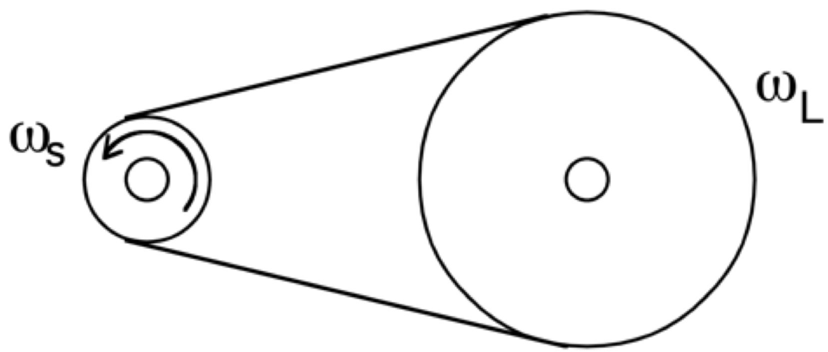
A small wheel and a large wheel are connected by a belt. The small wheel is turned at a constant angular velocity ωs. How does the magnitude of the angular velocity of the large wheel ωL compare to that of the small wheel?



A) $\omega_s = \omega_L$ B) $\omega_s < \omega_L$ C) $\omega_s > \omega_L$

A student in Physics 1110 sees the following CAPA question.

An engine flywheel turns with constant angular speed of 100 rev/min. When the engine is shut off, friction slows the wheel to rest in 2 hours. What is the magnitude of the constant angular acceleration of the wheel? Give the answer in units of rev/min^2.

The student writes

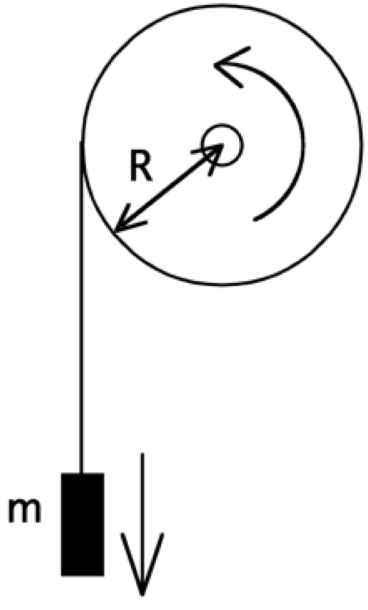
$$\omega = \omega_o + \alpha t, \quad \omega = 0,$$

$$\text{so } |\alpha| = \frac{\omega_o}{t} = \frac{2\pi f}{t} = \frac{2\pi(100\,{}^{\text{rev}}/_{\text{min}})}{120\,\text{min}}.$$

Does the answer come out correctly with the desired units?

A) Yes B) No

A mass m hangs from string wrapped around a pulley of radius R.
The pulley has a moment of inertia I and its pivot is frictionless.
Because of gravity the mass falls and the pulley rotates.



The magnitude of the torque on the pulley is..

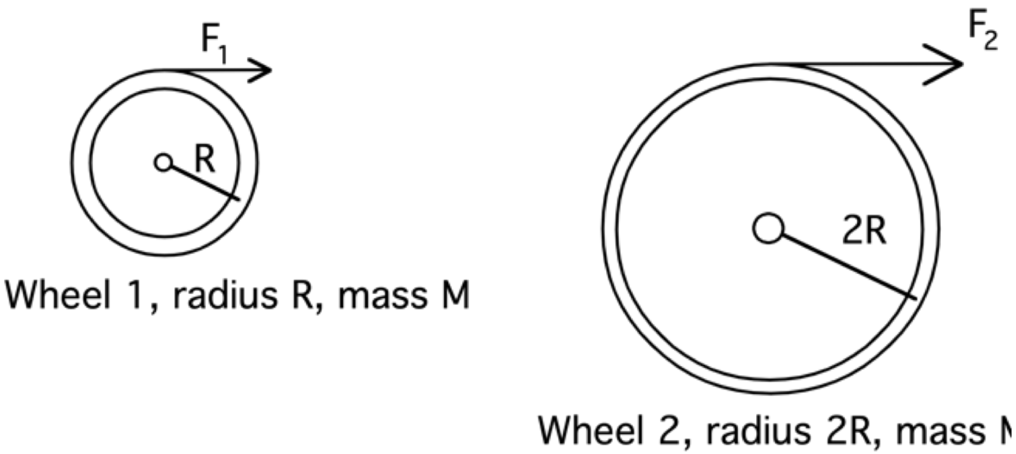
A) greater than mgR

B) less than mgR

C) equal to mgR

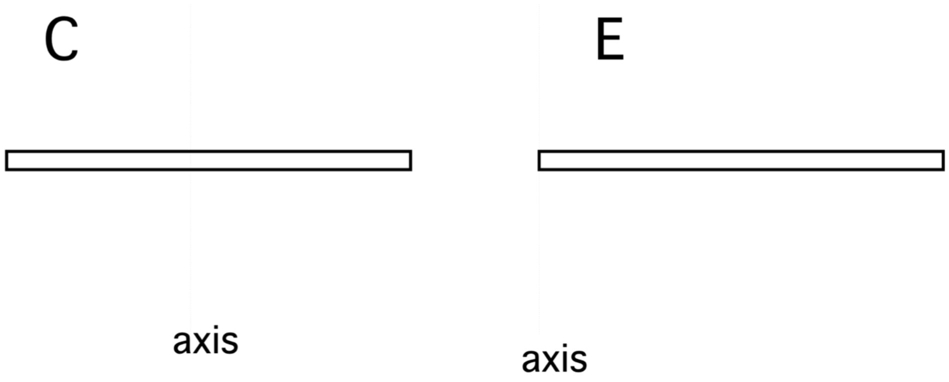
(Hint: Is the tension in the string = mg?)

Two wheels with fixed axles, each have the **same mass M**, but wheel 2 has twice the radius of wheel 1. Each is accelerated from rest with a force applied as shown. Assume that all the mass of the wheels is concentrated in the rims so that the moment of inertia of each is of the form $I = M R^2$ (hoop formula). In order to impart identical angular accelerations to both wheels, how much larger is F_2 than F_1? Recall that $\tau = I\alpha$



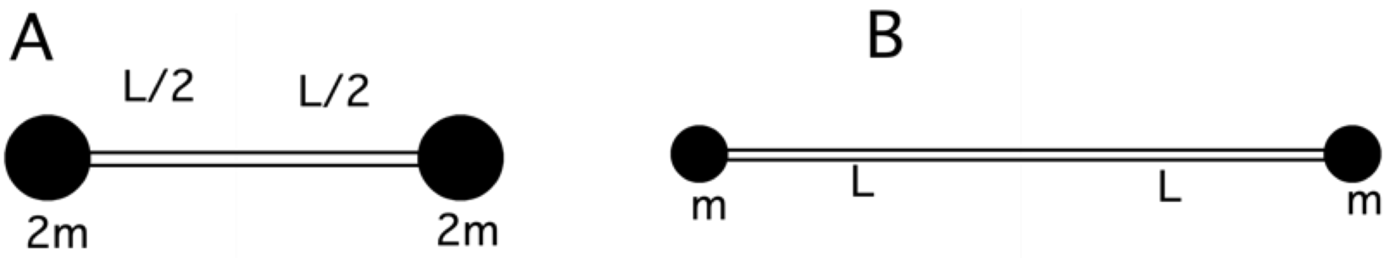
A) $F_2 = F_1$
B) $F_2 = 2F_1$
C) $F_2 = 4F_1$
D) $F_2 = 8F_1$
E) None of these.

Consider a rod of uniform density with an axis of rotation through its center and an identical rod with the axis of rotation through one end. Which has the larger moment of inertia?



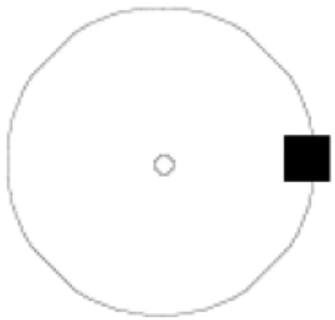
A) $I_C > I_E$ B) $I_C < I_E$ C) $I_C = I_E$

Consider two masses, each of size 2m at the ends of a light rod of length L with the axis of rotation through the center of the rod. The rod is doubled in length and the masses are halved. What happens to I?



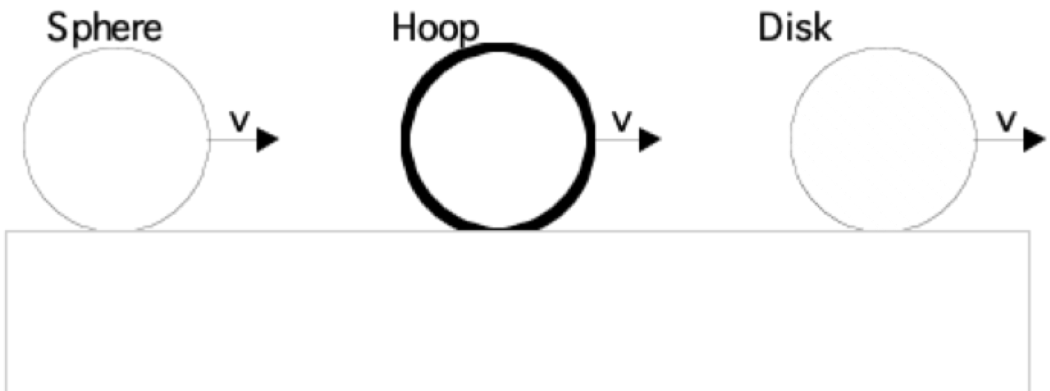
A) $I_A > I_B$ B) $I_A < I_B$ C) $I_A = I_B$

Consider a solid disk with an axis of rotation through the center (perpendicular to the diagram). The disk has mass M and radius R A small mass m is placed on the rim of the disk. What is the moment of inertia of this system?



A. $(M+m)R^2$
B. less than $(M+m)R^2$
C. greater than $(M+m)R^2$

A sphere, a hoop, and a cylinder, all with the same mass M and same radius R, are rolling along, all with the same speed v.

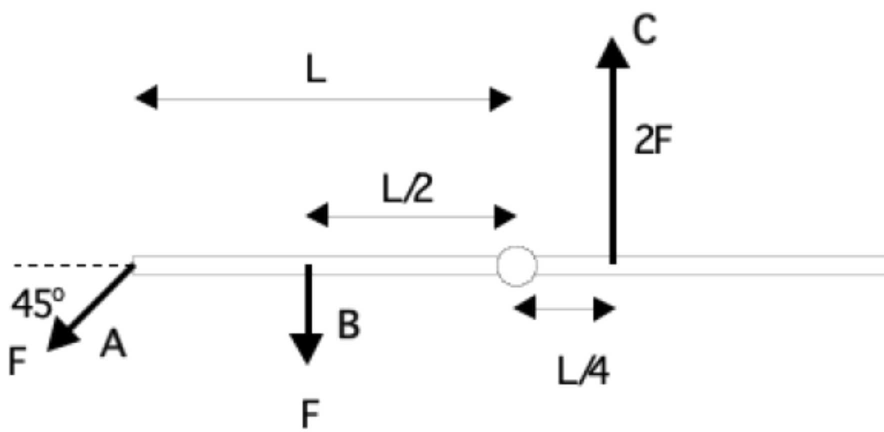


Which has the most kinetic energy?

A) Sphere B) Hoop C) Disk
D) All have the same KE.

Three forces labeled A, B, C are applied to a rod which pivots on an axis thru its center

[$\cos(45^0) = \sin(45^0) = 1/\sqrt{2} = 1/1.414$]



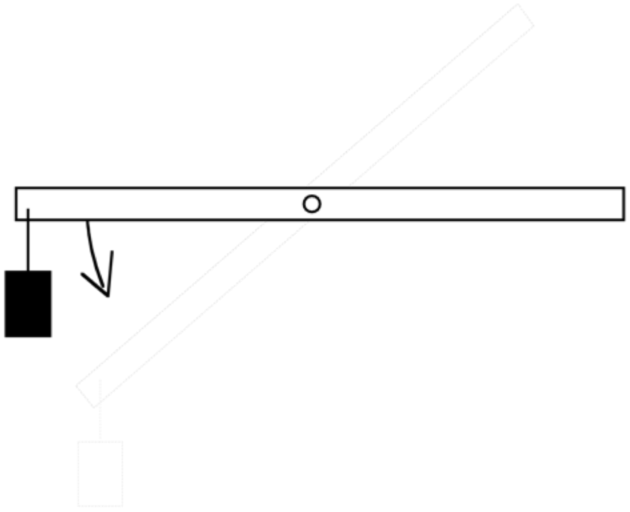
Which force causes the largest magnitude torque?

A) A　　B) B　　C) C

D) two or more forces tie for largest size torque.

A mass is hanging from the end of a horizontal bar which pivots about an axis through it center, but it being held stationary. The bar is released and begins to rotate. As the bar rotates from horizontal to vertical, the magnitude of the torque on the bar..

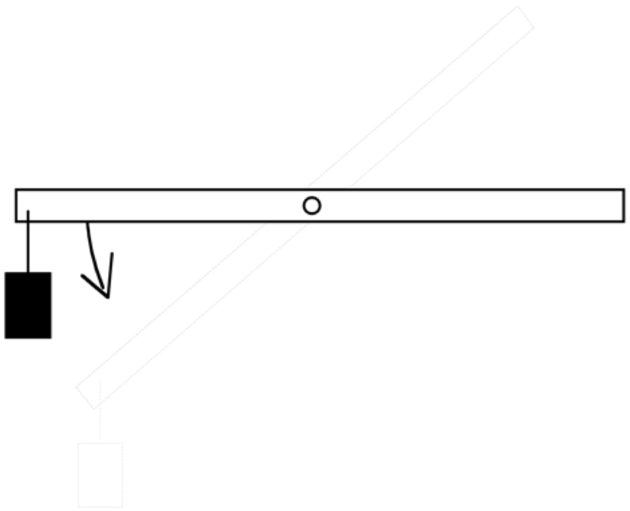
A) increases   B) decreases   C) remains constant



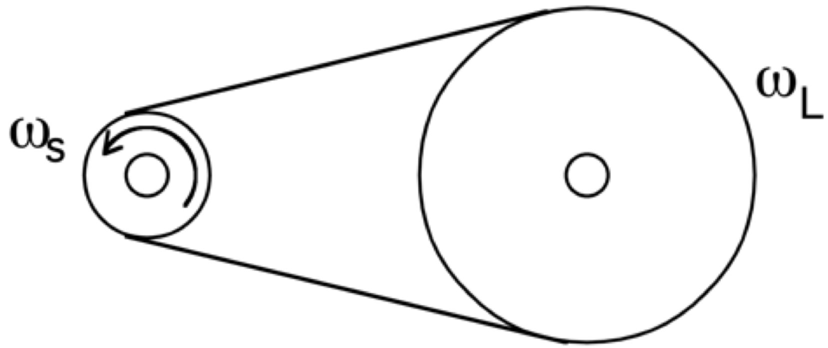
A mass is hanging from the end of a horizontal bar which pivots about an axis through it center, but it being held stationary. The bar is released and begins to rotate.

As the bar rotates from horizontal to vertical, the magnitude of the angular acceleration α of the bar..

A) increases B) decreases C) remains constant



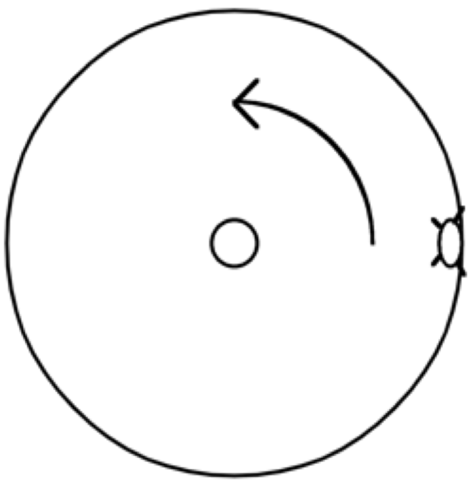
A small wheel and a large wheel are connected by a belt. The small wheel is turned at a constant angular velocity ω_s.



There is a bug S on the rim of the small wheel and another bug L on the rim of the large wheel. How do their speeds compare?

A) S = L B) S > L C) S < L

A ladybug is clinging to the rim of a spinning wheel which is spinning CCW very fast and is <u>slowing down</u>. At the moment shown, what is the approximate direction of the ladybug's acceleration?



A) ↓

B) ←

C) : ↙

D) ↘

E) None of these