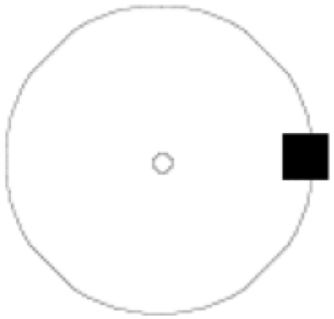
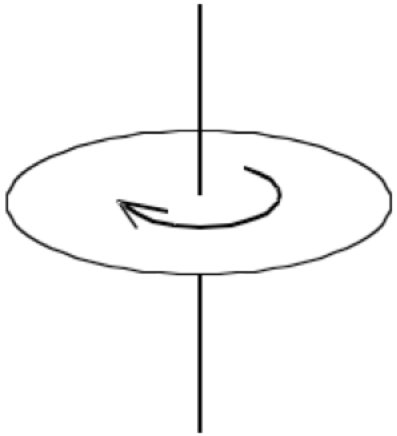
Consider a solid disk with an axis of rotation through the center (perpendicular to the diagram). The disk has mass M and radius R A small mass m is placed on the rim of the disk. What is the moment of inertia of this system?



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

A disk is spinning as shown with angular velocity ω. It begins to slow down.



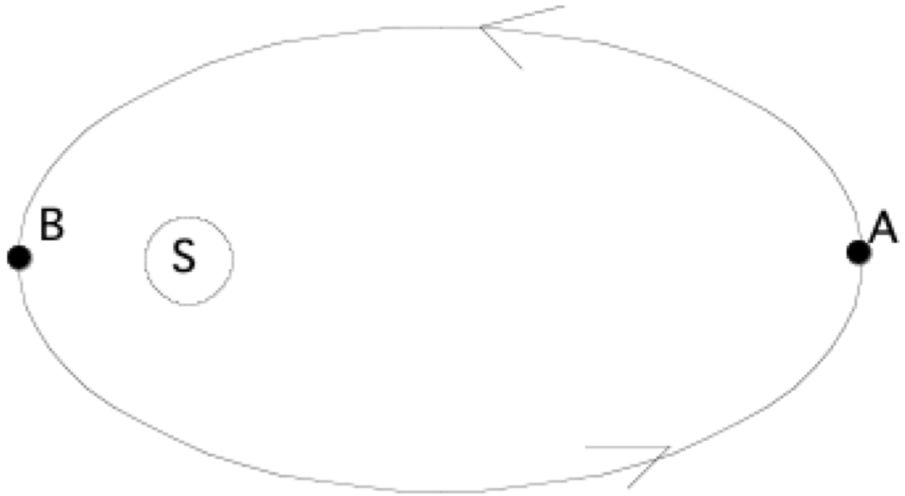
While it is slowing, what is the direction of its vector angular acceleration $\vec{\alpha}$

A) $\uparrow$ B) $\downarrow$

C) $\leftarrow$ D) $\rightarrow$

E) Some other direction.

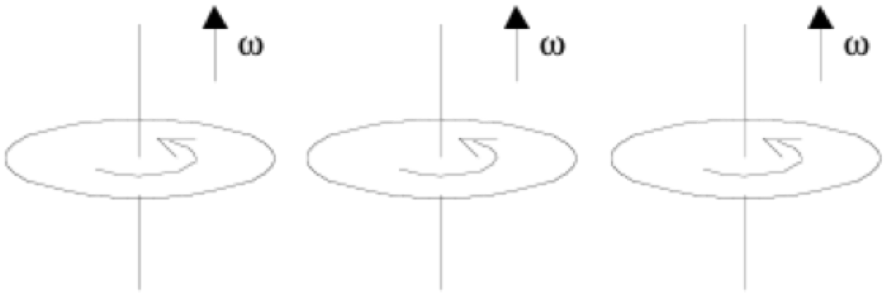
A planet in elliptical orbit about the Sun is in the position shown.



How does the magnitudes of the angular momentum of the planet L_{planet} (with the origin at the Sun) at positions A and B compare?

A) $L_A = L_B$
B) $L_A > L_B$
C) $L_A < L_B$

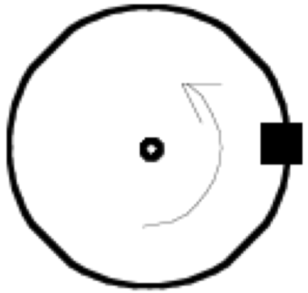
Three identical wheels are all spinning with the same angular velocity ω. The total angular momentum of the 3-wheel system has magnitude L.



One of the three wheels is flipped upside-down, while the magnitude of its angular velocity remains constant.
The new angular momentum of the 3-wheel system has magnitude..

A) L (the same as before) B) (2/3)L C) (1/3)L
D) some other value.

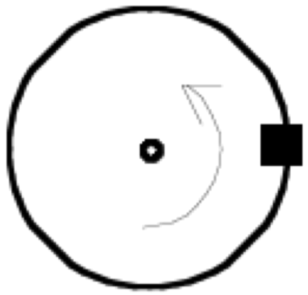
Consider a solid disk with an axis of rotation through the center (perpendicular to the diagram). The disk has mass M and radius R. A small mass m is placed on the rim of the disk.



Suppose that mass-disk system is rotating and the axle is frictionless. Atom-Ant carries the mass m toward the center of the rotating disk. As Atom-Ant moves inward, the magnitude of the angular momentum L of the system..

A) increases B) decreases C) remains constant

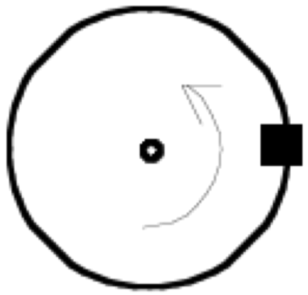
Consider a solid disk with an axis of rotation through the center (perpendicular to the diagram). The disk has mass M and radius R. A small mass m is placed on the rim of the disk.



As Atom-Ant moves inward the kinetic energy of the system..

A) increases B) decreases C) remains constant

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.



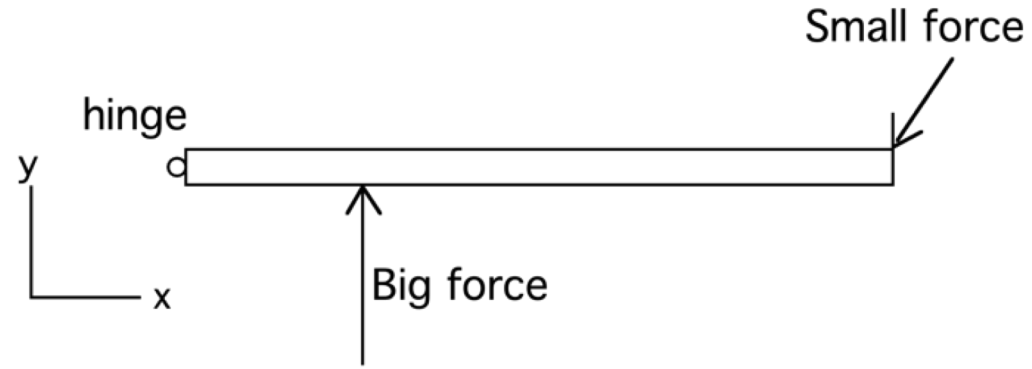
Suppose the disk was on a phonograph player, so that it always turned at 33 rpm. As Atom-Ant moves inward, the speed of the mass m

A) increases B) decreases C) remains constant

A star is rotating with a period T. Over a period of a million years, its radius decreases by a factor of 2. What is the new period of the star? (Hint: $I_{sphere} = \frac{2}{5} M R^2$)

A)T/2
B) 2T
C) 4T
D) T/4
E) None of these.

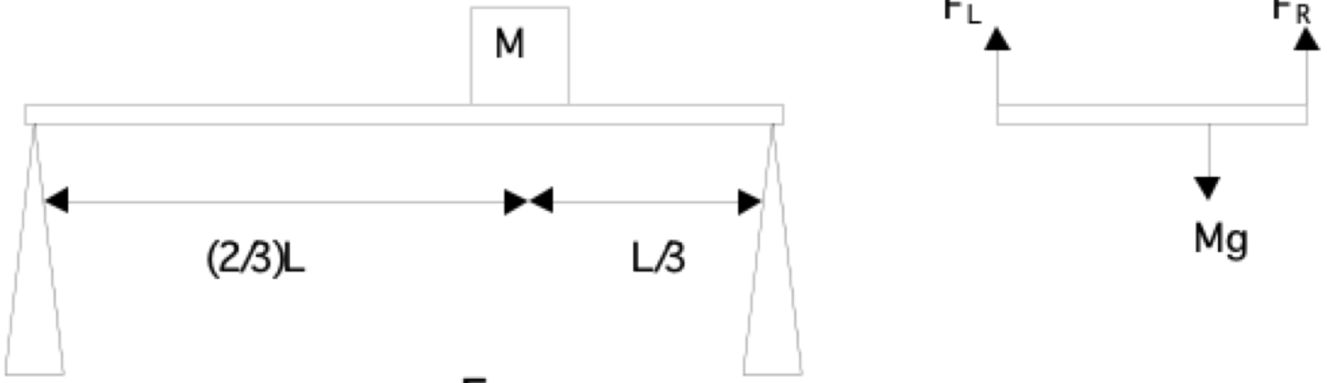
A door is pushed on by two forces, a smaller force at the door knob and a larger force nearer the hinge as shown. The door does not move.



The force exerted on the door by the hinge...

A) is zero
B) points ↑ (along +y)
C) points ↓(along -y)
D) points ↘ (lower right, in diagram)
E) points in some other direction

A mass M is placed on a very light board supported at the ends, as shown. The free-body diagram shows directions of the forces, but not their correct relative sizes.

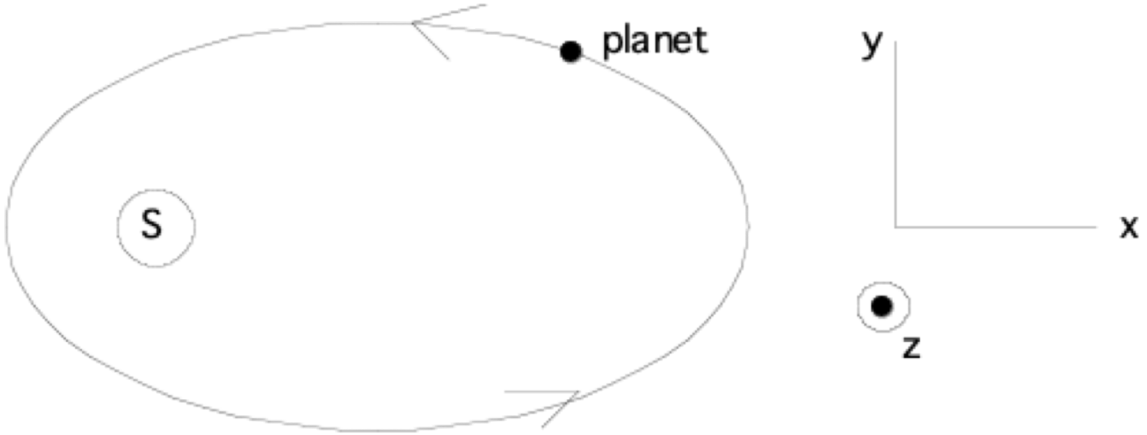


What is the ratio $\frac{F_R}{F_L}$?

(Hint: consider the torque about the mass M).

A) 2/3 B) 1/3 C) 1/2 D) 2
E) some other color.

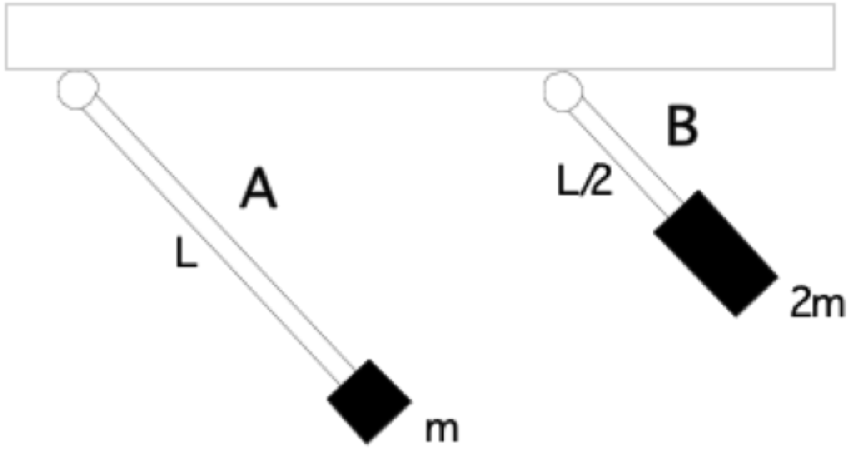
A planet in elliptical orbit about the Sun is in the position shown.



With the origin located at the Sun, the vector torque on the planet..

A) is zero.
B) points along +z.
C) is in the x-y plane.
D) None of these.

Two light (massless) rods, labeled A and B, each are connected to the ceiling by a frictionless pivot. Rod A has length L and has a mass m at the end of the rod. Rod B has length L/2 and has a mass 2m at its end. Both rods are released from rest in a horizontal position.



Which one experiences the larger torque?

A) A B) B C) Both have the same size τ.

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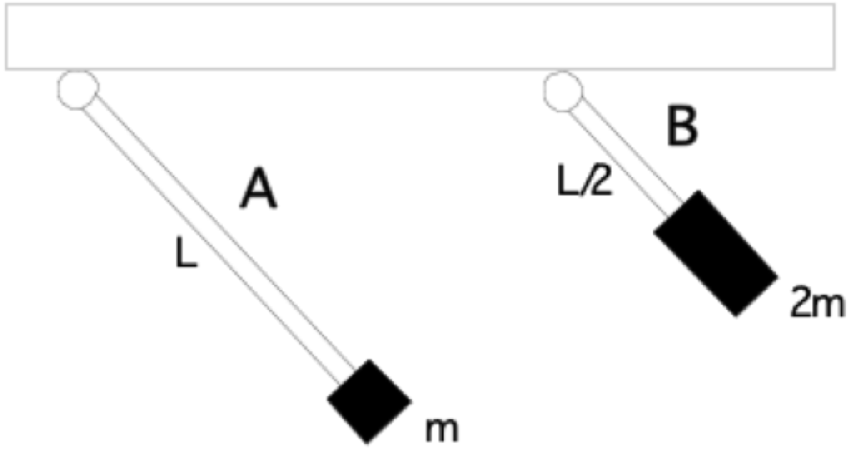
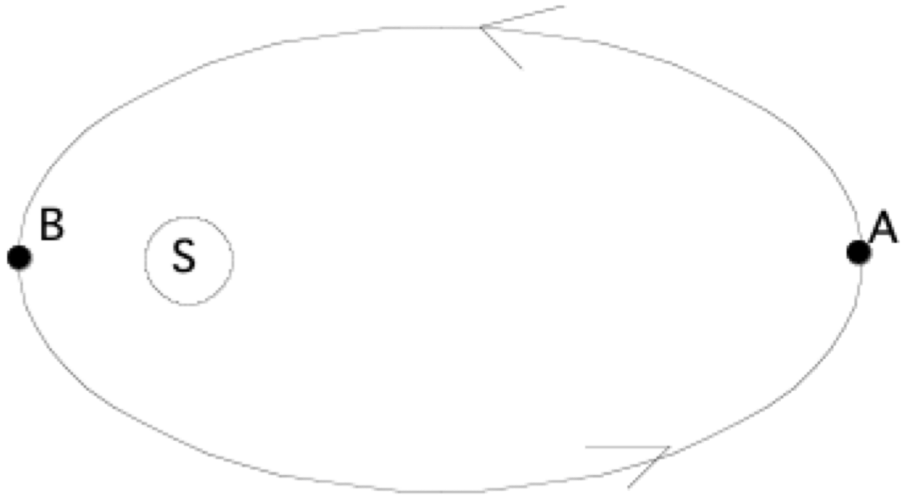


Which one falls to the vertical position fastest?

A) A B) B C) Both fall at the same rate

Hint $\alpha = \frac{\tau}{I}$

A planet in elliptical orbit about the Sun is in the position shown.



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