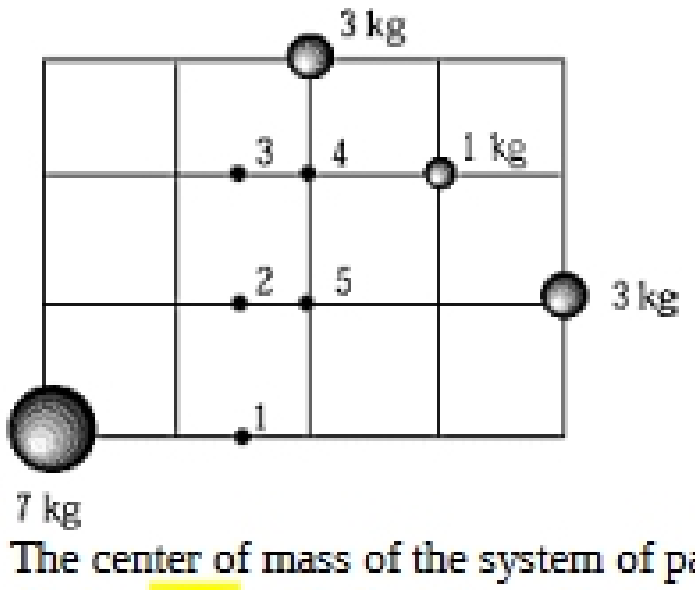
Practice Test#3 (Chapters 8,9, and 10 From Tipler)

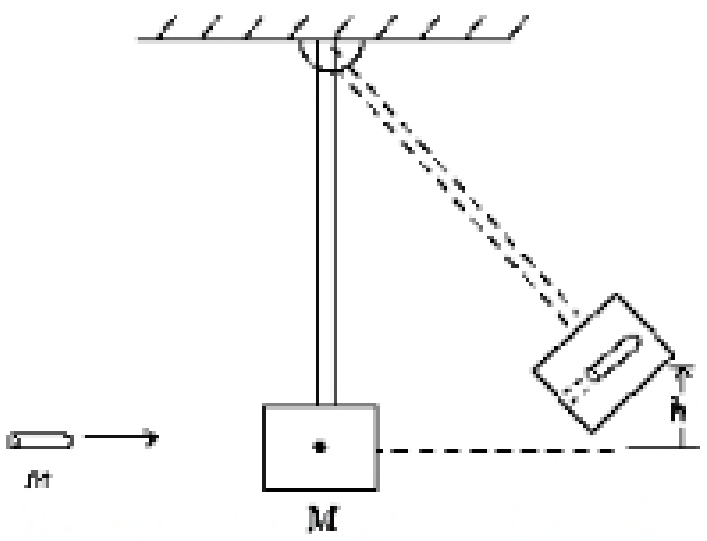
1.



The center of mass of the system of particles shown in the diagram is at point
A) 1 B) 2 C) 3 D) 4 E) 5

2. A boy and girl on ice skates face each other. The girl has a mass of 20 kg and the boy has a mass of 30 kg. The boy pushes the girl backward at a speed of 3.0 m/s. As a result of the push, the speed of the boy is
2.0 m/s

3.



A bullet, m = 0.500 kg, traveling with a velocity of 100 m/s strikes and embeds itself in the bob of a ballistic pendulum, M = 9.50 kg. The combined masses rise to a height h = 1.28 m. The speed V_f of the combined masses immediately following impact is
5.00 m/s

4. A pitcher throws a baseball with a velocity of 27 m/s. After being struck by a bat the ball travels in the opposite direction with a velocity of 40 m/s. If the ball has a mass of 0.11 kg and is in contact with the bat for 3.0 ms, the average force exerted by the bat on the ball is
2.5 kN

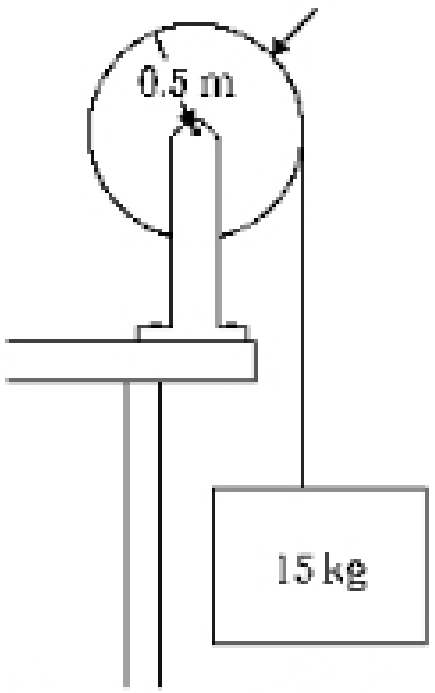
5. A 0.060-kg tennis ball, moving with a speed of 2.5 m/s, has a head-on collision with 0.090-kg initially moving away from it at a speed of 1.00 m/s. Assuming a perfectly elastic collision, what is the speed of each ball after the collision?
a. 0.70 m/s and 2.20 m/s

6. A wheel of diameter of 68.0 cm slows down uniformly from 8.40 m/s to rest over a distance of 115 m. What is the angular acceleration?
-0.90 rad/s^2

7 What constant torque, in the absence of friction, must be applied to a wheel to give it an angular velocity of 50 rad/s if it starts from rest and is accelerated for 10 s? The moment of inertia of the wheel about its axle is 9.0 kg · m^2.
45 N · m

8. The moment of inertia of a slim rod of mass m and length L about a transverse axis through one end is $mL^2/3$. The moment of inertia of such a rod about a transverse axis through the rod at a distance $L/3$ from one end is
$mL^2/9$

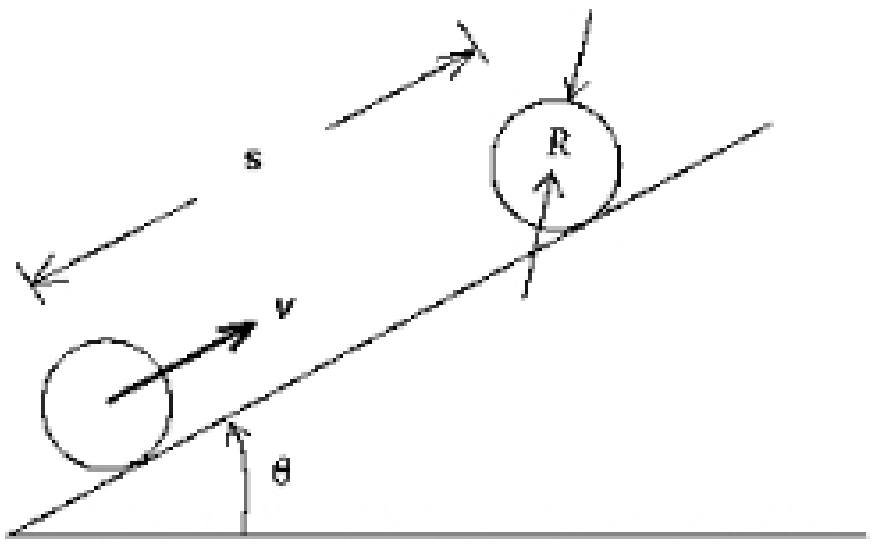
9.



The moment of inertia of the wheel in the figure is 0.50 kg · m^2, and the bearing is frictionless. The acceleration of the 15-kg mass is approximately

8.7 m/s^2

10.



A solid disk (I_{cm} = ½ mR^2) rolls without slipping up a plane a distance *s*. The plane is inclined at an angle □ with the horizontal. The disk has mass *m*, radius *R*, and an initial translational speed *v*. The distance *s* the disk rolls is

A) ¾ $v^2/(g \sin \square)$
B) ½ $v^2/(g \sin \square)$
C) ½ $Rv/(g \sin \square)$
D) ½ $mg(\sin \square - \cos \square)(Rv)^2$
E) $v^2/(g \sin \square)$

11. A constant torque of 15 N · m acts for 3.0 s on a system of mass 2.0 kg. The change in angular momentum of the system during this period of time is

45 kg · m^2/s

12. A man stands on the center of a platform that is rotating on frictionless bearings at a