

AP physics C web review ch 8 Torque**Multiple Choice**

Identify the choice that best completes the statement or answers the question.

- _____ 1. Masses are distributed in the x,y -plane as follows: 6.0 kg at (0.0, 0.0) m, 4.0 kg at (2.0, 0.0) m, and 5.0 kg at (2.0, 3.0) m. What is the x -coordinate of the center of gravity of this system of masses?
- 18 m
 - 2.0 m
 - 1.2 m
 - 1.0 m
 - 0.96 m
- _____ 2. A 100-N uniform ladder, 8.0 m long, rests against a smooth vertical wall. The coefficient of static friction between ladder and floor is 0.40. What minimum angle can the ladder make with the floor before it slips?
- 22°
 - 51°
 - 18°
 - 42°
 - 58°
- _____ 3. An 800-N billboard worker stands on a 4.0-m scaffold supported by vertical ropes at each end. If the scaffold weighs 500 N and the worker stands 1.0 m from one end, what is the tension in the rope nearest the worker?
- 450 N
 - 500 N
 - 800 N
 - 850 N
 - 900 N
- _____ 4. An 800-N billboard worker stands on a 4.0-m scaffold weighing 500 N and supported by vertical ropes at each end. How far would the worker stand from one of the supporting ropes to produce a tension of 550 N in that rope?
- 1.4 m
 - 2.0 m
 - 2.5 m
 - 2.7 m
 - 2.9 m
- _____ 5. A uniform, horizontal beam of length 6.0 m and weight 120 N is attached at one end to a wall by a pin connection (so that it may rotate). A cable attached to the wall above the pin supports the opposite end. The cable makes an angle of 60° with the horizontal. What is the tension in the cable needed to maintain the beam in equilibrium?
- 35 N
 - 69 N
 - 60 N
 - 120 N
 - 150 N

- _____ 6. A uniform 1.0-N meter stick is suspended horizontally by vertical strings attached at each end. A 2.0-N weight is suspended from the 10-cm position on the stick, another 2.0-N weight is suspended from the 50 cm position, and a 3.0-N weight is suspended from the 60 cm position. What is the tension in the string attached at the 100-cm end of the stick?
- 1.9 N
 - 3.0 N
 - 3.5 N
 - 4.0 N
 - 4.4 N
- _____ 7. A 4.2-kg mass is placed at (3.0, 4.0) m. Where can an 8.4-kg mass be placed so that the moment of inertia about the z -axis is zero?
- (-3.0, -4.0) m
 - (-6.0, -8.0) m
 - (-1.5, -2.0) m
 - (-0.75, -1.0) m
 - There is no position giving this result.
- _____ 8. The Earth moves about the Sun in an elliptical orbit. As the Earth moves closer to the Sun, which of the following best describes the Earth-Sun system's moment of inertia?
- decreases
 - increases
 - remains constant
 - none of the above choices are valid
- _____ 9. A bowling ball has a mass of 7.0 kg, a moment of inertia of $2.8 \times 10^{-2} \text{ kg}\cdot\text{m}^2$ and a radius of 0.10 m. If it rolls down the lane without slipping at a linear speed of 4.0 m/s, what is its angular speed?
- 0.80 rad/s
 - 10 rad/s
 - 0.050 rad/s
 - 40 rad/s
 - 4 rad/s
- _____ 10. A baseball pitcher loosens up his pitching arm. He tosses a 0.15-kg ball using only the rotation of his forearm, 0.32 m in length, to accelerate the ball. What is the moment of inertia of the ball alone as it moves in a circular arc with a radius of 0.32 m?
- $1.5 \times 10^{-2} \text{ kg}\cdot\text{m}^2$
 - $16 \times 10^{-2} \text{ kg}\cdot\text{m}^2$
 - $4.0 \times 10^{-2} \text{ kg}\cdot\text{m}^2$
 - $7.6 \times 10^{-2} \text{ kg}\cdot\text{m}^2$
 - $1.0 \times 10^{-2} \text{ kg}\cdot\text{m}^2$
- _____ 11. A solid cylinder ($I = MR^2/2$) has a string wrapped around it many times. When I release the cylinder, holding on to the string, the cylinder falls and spins as the string unwinds. What is the downward acceleration of the cylinder as it falls?
- 0
 - 4.9 m/s²
 - 6.5 m/s²
 - 9.8 m/s²
 - 11 m/s²

- _____ 12. A 40-kg boy is standing on the edge of a stationary 30-kg platform that is free to rotate. The boy tries to walk around the platform in a counterclockwise direction. As he does:
- the platform doesn't rotate.
 - the platform rotates in a clockwise direction just fast enough so that the boy remains stationary relative to the ground.
 - the platform rotates in a clockwise direction while the boy goes around in a counterclockwise direction relative to the ground.
 - both go around with equal angular velocities but in opposite directions.
 - none of the above.
- _____ 13. A rod of length L is hinged at one end. The moment of inertia as the rod rotates around that hinge is $ML^2/3$. Suppose a 2.00-m rod with a mass of 3.00 kg is hinged at one end and is held in a horizontal position. The rod is released as the free end is allowed to fall. What is the angular acceleration as it is released?
- 3.70 rad/s²
 - 7.35 rad/s²
 - 2.45 rad/s²
 - 4.90 rad/s²
 - 8.80 rad/s²
- _____ 14. A ventilation fan with a moment of inertia of 0.034 kg·m² has a net torque of 0.11 N·m applied to it. If it starts from rest, what kinetic energy will it have 8.0 s later?
- 31 J
 - 17 J
 - 11 J
 - 6.6 J
 - 5.4 J
- _____ 15. The total kinetic energy of a baseball thrown with a spinning motion is a function of:
- its linear speed but not rotational speed.
 - its rotational speed but not linear speed.
 - both linear and rotational speeds.
 - neither linear nor rotational speed.
 - none of the above.

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Answer Section**

MULTIPLE CHOICE

1. C
2. B
3. D
4. C
5. B
6. C
7. E
8. A
9. D
10. A
11. C
12. C
13. B
14. C
15. C