

## Review Questions on Rotational Motion

### Multiple Choice

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

- \_\_\_\_\_ 1. Horses that move with the fastest linear speed on a merry-go-round are located
- a. near the center
  - b. near the outside
  - c. anywhere, because they all move at the same speed
  - d. remains the same
- \_\_\_\_\_ 2. Your pet hamster sits on a record player whose angular speed is constant. If he moves to a point twice as far from the center, then his linear speed
- a. doubles
  - b. quadruples
  - c. halves
  - d. remains the same
- \_\_\_\_\_ 3. Suppose the circumference of a bicycle wheel is 2 meters. If it rotates at 1 revolution per second when you are riding the bicycle, then your speed will be
- a. 0.05 m/s
  - b. 1.0 m/s
  - c. 2 m/s
  - d. 3.14 m/s
- \_\_\_\_\_ 4. An industrial flywheel has a greater rotational inertia when most of its mass is
- a. nearest the rim
  - b. nearest the axis
  - c. uniformly spread out as in a disk
  - d. remains the same
- \_\_\_\_\_ 5. The moment of inertia for a solid sphere is given by  $I = \frac{2}{5} mR^2$ . If the radius of the Earth is  $6.38 \times 10^{11}$  meters and the mass of the Earth is  $5.97 \times 10^{24}$  Kg, then the Earth's moment of inertia in  $\text{kg}\cdot\text{m}^2$  is:
- a.  $9.72 \times 10^{36}$
  - b.  $243 \times 10^{47}$
  - c.  $1.52 \times 10^{36}$
  - d.  $9.72 \times 10^{47}$
- \_\_\_\_\_ 6. A coin and a ring roll down an incline starting at the same time. The one to reach the bottom first will be
- a. ring
  - b. coin
  - c. Both reach the bottom at the same time
  - d. remains the same
- \_\_\_\_\_ 7. Put a pipe over the end of a wrench when trying to turn a stubborn nut on a bolt, to effectively make the wrench handle twice as long, you'll multiply the torque by
- a. eight
  - b. four
  - c. two
  - d. no change in torque
- \_\_\_\_\_ 8. The long heavy tail of a spider monkey enables the monkey to easily vary its
- a. weight
  - b. momentum
  - c. inertia
  - d. center of gravity
- \_\_\_\_\_ 9. The famous Leaning Tower of Pisa doesn't topple over because its center of gravity is
- a. relatively low for such a tall building
  - b. above a place of support
  - c. in the same place as its center of mass
  - d. displaced from its center
- \_\_\_\_\_ 10. When a twirling ice skater brings her arms inward, her rotational speed
- a. increases
  - b. decreases
  - c. remains the same
  - d. remains the same

- \_\_\_\_\_ 11. What is the rotational speed of the Earth about its axis, in radians per second. (Remember there are  $2\pi$  radians in one revolution)
- a.  $4.421 \times 10^{-4}$  c.  $1.375 \times 10^3$   
b.  $7.272 \times 10^{-4}$  d.  $4.363 \times 10^{-3}$
- \_\_\_\_\_ 12. Two people are balanced on a seesaw. If one person leans toward the center of the seesaw, that person's end of the seesaw will
- a. rise c. rise then fall  
b. stay at the same level d. fall
- \_\_\_\_\_ 13. A car travels in a circle with constant speed. The net force on the car is
- a. directed forward, in the direction of travel c. zero because the car is not accelerating  
b. directed toward the center d. directed out from the center
- \_\_\_\_\_ 14. A small boy places a rock under the middle of a long wooden plank, sits near one end and his mother sits near the opposite end. To balance each other
- a. the mother should move further away from the boy c. both should move closer to the middle of the plank  
b. the boy should move closer to his mother d. None of the choices would work
- \_\_\_\_\_ 15. Suppose you are on a Ferris wheel, seated 10 m from the Ferris wheel's axis. If you make a complete rotation each minute, your linear speed is
- a. 10 m/min c. 62.8 m/min  
b. 31.4 m/min d. 100 m/min
- \_\_\_\_\_ 16. Which will roll down an incline in the shortest time, a can filled with water or the same can filled with ice?
- a. water c. both the same  
b. ice d. not enough information given
- \_\_\_\_\_ 17. A number of children form a line, holding hands. The child at the front of the line begins to spin around faster and faster causing the others to run in a circle around her. While the line of children is rotating, which of the statements are correct?
- a. The player at the front of the line has the smallest angular velocity c. All the children have the same linear velocity  
b. The last child in the line has the smallest tangential acceleration d. All the children have the same angular velocity