

**AP C - Webreview ch 7 (part I) Rotation and circular motion****Multiple Choice**

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

- \_\_\_\_\_ 1. 2 600 rev/min is equivalent to which of the following?
- 2600 rad/s
  - 43.3 rad/s
  - 273 rad/s
  - 60 rad/s
  - 56 rad/s
- \_\_\_\_\_ 2. What is the angular speed about the rotational axis of the Earth for a person standing on the surface?
- $7.3 \times 10^{-5}$  rad/s
  - $3.6 \times 10^{-5}$  rad/s
  - $6.28 \times 10^{-5}$  rad/s
  - $3.14 \times 10^{-5}$  rad/s
  - $5.72 \times 10^{-5}$  rad/s
- \_\_\_\_\_ 3. A spool of thread has an average radius of 1.00 cm. If the spool contains 62.8 m of thread, how many turns of thread are on the spool?
- 100
  - 1 000
  - 3 140
  - 62 800
  - 66 900
- \_\_\_\_\_ 4. A ceiling fan is turned on and reaches an angular speed of 120 rev/min in 20 s. It is then turned off and coasts to a stop in an additional 40 s. The ratio of the average angular acceleration for the first 20 s to that for the last 40 s is which of the following?
- 2
  - 0.5
  - 0.5
  - 2
  - 1.5
- \_\_\_\_\_ 5. Starting from rest, a wheel undergoes constant angular acceleration for a period of time  $T$ . At what time after the start of rotation does the wheel reach an angular speed equal to its average angular speed for this interval?
- $0.25 T$
  - $0.50 T$
  - $0.67 T$
  - $0.71 T$
  - $0.82 T$

- \_\_\_\_\_ 6. A Ferris wheel, rotating initially at an angular speed of  $0.500 \text{ rad/s}$ , accelerates over a  $7.00\text{-s}$  interval at a rate of  $0.0400 \text{ rad/s}^2$ . What angular displacement does the Ferris wheel undergo in this  $7\text{-s}$  interval?
- $4.48 \text{ rad}$
  - $2.50 \text{ rad}$
  - $3.00 \text{ rad}$
  - $0.500 \text{ rad}$
  - $0.225 \text{ rad}$
- \_\_\_\_\_ 7. A  $0.15\text{-m}$ -radius grinding wheel starts at rest and develops an angular speed of  $12.0 \text{ rad/s}$  in  $4.0 \text{ s}$ . What is the average tangential acceleration of a point on the wheel's edge?
- $0.45 \text{ m/s}^2$
  - $6.8 \text{ m/s}^2$
  - $28 \text{ m/s}^2$
  - $14 \text{ m/s}^2$
  - $15 \text{ m/s}^2$
- \_\_\_\_\_ 8. Consider a point on a bicycle wheel as the wheel makes exactly four complete revolutions about a fixed axis. Compare the linear and angular displacement of the point.
- Both are zero.
  - Only the angular displacement is zero.
  - Only the linear displacement is zero.
  - Neither is zero.
- \_\_\_\_\_ 9. Consider a point on a bicycle wheel as the wheel turns about a fixed axis, neither speeding up nor slowing down. Compare the linear and angular velocities of the point.
- Both are constant.
  - Only the angular velocity is constant.
  - Only the linear velocity is constant.
  - Neither is constant.
- \_\_\_\_\_ 10. Consider a point on a bicycle wheel as the wheel turns about a fixed axis, neither speeding up nor slowing down. Compare the linear and angular accelerations of the point.
- Both are zero.
  - Only the angular acceleration is zero.
  - Only the linear acceleration is zero.
  - Neither is zero.
- \_\_\_\_\_ 11. Calculate the linear speed due to the Earth's rotation for a person at a point on its surface located at  $40^\circ \text{ N}$  latitude. The radius of the Earth is  $6.40 \times 10^6 \text{ m}$ .
- $299 \text{ m/s}$
  - $357 \text{ m/s}$
  - $390 \text{ m/s}$
  - $465 \text{ m/s}$
  - $423 \text{ m/s}$
- \_\_\_\_\_ 12. A point on the rim of a  $0.25\text{-m}$ -radius fan blade has centripetal acceleration of  $0.20 \text{ m/s}^2$ . Find the centripetal acceleration of a point  $0.05 \text{ m}$  from the center of the same wheel.
- $0.01 \text{ m/s}^2$
  - $0.02 \text{ m/s}^2$
  - $0.04 \text{ m/s}^2$
  - $0.08 \text{ m/s}^2$
  - $0.09 \text{ m/s}^2$

- \_\_\_\_\_ 13. A point on the rim of a 0.25-m-radius rotating wheel has a centripetal acceleration of  $4.0 \text{ m/s}^2$ . What is the angular speed of the wheel?
- 1.0 rad/s
  - 2.0 rad/s
  - 3.2 rad/s
  - 4.0 rad/s
  - 4.5 rad/s
- \_\_\_\_\_ 14. A point on the rim of a 0.15-m-radius rotating disk has a centripetal acceleration of  $5.0 \text{ m/s}^2$ . What is the angular speed of a point 0.075 m from the center of the disk?
- 0.89 rad/s
  - 1.6 rad/s
  - 3.2 rad/s
  - 5.8 rad/s
  - 6.2 rad/s
- \_\_\_\_\_ 15. When a point on the rim of a 0.30-m-radius wheel experiences a centripetal acceleration of  $4.0 \text{ m/s}^2$ , what tangential acceleration does that point experience?
- $1.2 \text{ m/s}^2$
  - $2.0 \text{ m/s}^2$
  - $4.0 \text{ m/s}^2$
  - $5.0 \text{ m/s}^2$
  - Cannot determine with the information given.
- \_\_\_\_\_ 16. A 0.150-m-radius grinding wheel, starting at rest, develops an angular speed of  $12.0 \text{ rad/s}$  in a time interval of 4.00 s. What is the centripetal acceleration of a point 0.100 m from the center when the wheel is moving at an angular speed of  $12.0 \text{ rad/s}$ ?
- $0.450 \text{ m/s}^2$
  - $7.20 \text{ m/s}^2$
  - $14.4 \text{ m/s}^2$
  - $28.8 \text{ m/s}^2$
  - $30.6 \text{ m/s}^2$
- \_\_\_\_\_ 17. The distance from the center of a Ferris wheel to a passenger seat is 12 m. What centripetal acceleration does a passenger experience when the wheel's angular speed is  $0.50 \text{ rad/s}$ ?
- $16.9 \text{ m/s}^2$
  - $9.0 \text{ m/s}^2$
  - $3.0 \text{ m/s}^2$
  - $6.0 \text{ m/s}^2$
  - $2.0 \text{ m/s}^2$
- \_\_\_\_\_ 18. What centripetal force does an 80-kg passenger experience when seated 12 m from the center of a Ferris wheel whose angular speed is  $0.50 \text{ rad/s}$ ?
- 484 N
  - 720 N
  - 914 N
  - 240 N
  - 180 N

- \_\_\_\_\_ 19. A 0.400-kg object is swung in a circular path and in a vertical plane on a 0.500-m-length string. If the angular speed at the bottom is 8.00 rad/s, what is the tension in the string when the object is at the bottom of the circle?
- 5.60 N
  - 10.5 N
  - 16.7 N
  - 19.6 N
  - 20.3 N
- \_\_\_\_\_ 20. A 0.30-kg rock is swung in a circular path and in a vertical plane on a 0.25-m-length string. At the top of the path, the angular speed is 12.0 rad/s. What is the tension in the string at that point?
- 7.9 N
  - 16 N
  - 18 N
  - 83 N
  - 96 N
- \_\_\_\_\_ 21. A 1 500-kg car rounds an unbanked curve with a radius of 52 m at a speed of 12 m/s. What minimum coefficient of friction must exist between the road and tires to prevent the car from slipping? ( $g = 9.8 \text{ m/s}^2$ )
- 0.18
  - 0.30
  - 0.28
  - 0.37
  - 0.42
- \_\_\_\_\_ 22. At what angle (relative to the horizontal) should a curve 52 m in radius be banked if no friction is required to prevent the car from slipping when traveling at 12 m/s? ( $g = 9.8 \text{ m/s}^2$ )
- $28^\circ$
  - $32^\circ$
  - $16^\circ$
  - $10^\circ$
  - $8.2^\circ$
- \_\_\_\_\_ 23. At what speed will a car round a 52-m-radius curve, banked at a  $45^\circ$  angle, if no friction is required between the road and tires to prevent the car from slipping? ( $g = 9.8 \text{ m/s}^2$ )
- 27 m/s
  - 17 m/s
  - 23 m/s
  - 35 m/s
  - 43 m/s
- \_\_\_\_\_ 24. A roller coaster, loaded with passengers, has a mass of 2 000 kg; the radius of curvature of the track at the bottom point of the dip is 24 m. If the vehicle has a speed of 18 m/s at this point, what force is exerted on the vehicle by the track? ( $g = 9.8 \text{ m/s}^2$ )
- $2.3 \times 10^4 \text{ N}$
  - $4.7 \times 10^4 \text{ N}$
  - $3.0 \times 10^4 \text{ N}$
  - $1.0 \times 10^4 \text{ N}$
  - $5.5 \times 10^4 \text{ N}$

- \_\_\_\_\_ 25. Consider a point on a bicycle tire that is momentarily in contact with the ground as the bicycle rolls across the ground with constant speed. The direction for the acceleration for this point at that moment is:
- upward.
  - down toward the ground.
  - forward.
  - at that moment the acceleration is zero.
  - none of the above.
- \_\_\_\_\_ 26. Consider a child who is swinging. As she reaches the lowest point in her swing:
- the tension in the rope is equal to her weight.
  - the tension in the rope is equal to her mass times her acceleration.
  - her acceleration is downward at  $9.8 \text{ m/s}^2$ .
  - none of the above.
  - both choices A and C are valid.
- \_\_\_\_\_ 27. A cylindrical space colony 8 km in diameter and 30 km long has been proposed as living quarters for future space explorers. Such a habitat would have cities, land and lakes on the inside surface and air and clouds in the center. All this would be held in place by the rotation of the cylinder about the long axis. How fast would such a cylinder have to rotate to produce a 1-g gravitational field at the walls of the cylinder?
- 0.05 rad/s
  - 0.10 rad/s
  - 0.15 rad/s
  - 0.20 rad/s
  - 0.25 rad/s

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Answer Section**

**MULTIPLE CHOICE**

1. C
2. A
3. B
4. D
5. B
6. A
7. A
8. C
9. B
10. B
11. B
12. C
13. D
14. D
15. E
16. C
17. C
18. D
19. C
20. A
21. C
22. C
23. C
24. B
25. A
26. D
27. A