Chapter 10   Circular Motion

Exercises

10.1 Rotation and Revolution (page 171)

Match each term to its definition.

Term	Definition

_____ **1.** rotation

_____ **2.** axis

_____ **3.** revolution

a. straight line around which rotation takes place

b. motion about an axis located within the body of the object

c. motion about an axis located outside the body of the object

4. Circle the letter that best describes Earth's motion around the sun.

a. spin

b. rotation

c. revolution

d. linear

5. When you ride a bicycle, the bicycle wheels _____ around their axles.

6. Circle each letter that is an example of rotation.

a. a Ferris wheel in motion

b. Earth moving around the sun

c. an ice skater doing a pirouette

d. riders on a Ferris wheel in motion

10.2 Rotational Speed (pages 171–174)

Match each term to its definition.

Term	Definition

_____ **7.** linear speed

_____ **8.** rotational speed

_____ **9.** tangential speed

a. speed of something moving along a circular path

b. number of rotations per unit of time

c. distance traveled per unit of time

10. Circle the letter that describes the direction of motion associated with tangential speed.

a. toward the center of rotation   b. tangent to the circular path

c. outward from the center   d. downward toward Earth

11. Is the following sentence true or false? The terms *linear speed* and *rotational speed* can be used interchangeably. _____

12. Is the following sentence true or false? All parts of a spinning merry-go-round have the same angular speed. _____

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13. The abbreviation RPM stands for _____.

14. The diagram below shows the velocity vector for a can spun on a string at the moment that the string breaks.
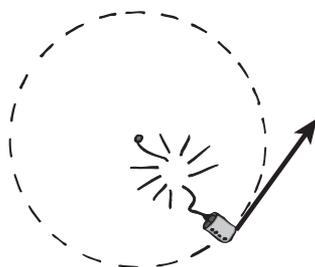
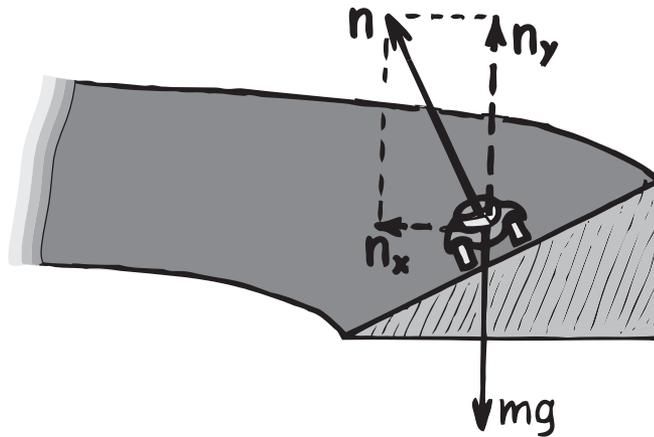
Circle the letter that best describes the quantity represented by the vector.

a. rotational speed   b. radial speed

c. tangential speed   d. axial speed

15. Is the following sentence true or false? Tangential speed is directly proportional to rotational speed. _____

16. Circle the letter of each action that results in an increase in a circularly moving object's tangential speed.

a. moving farther from the axis of rotation

b. decreasing the RPM

c. increasing the rotational speed

d. moving closer to the axis of rotation

17. Circle the letter of the equation or description that describes the relationship between tangential speed, radial distance, and rotational speed.

a. $V \sim IR$

b. tangential speed ~ radial distance × rotational speed

c. $\omega \sim vr$

d. tangential speed ~ radial distance × (rotational speed)^2

18. Is the following sentence true or false? Your tangential speed while standing at the axis of rotation of a spinning platform is zero.

_____

19. As your radial distance from the center of a rotating platform increases, your _____ speed also increases.

20. Circle the letter that best describes how a train stays on the tracks when going around a curve.

a. Wheels rotate at the same rate but cover different distances as they roll.

b. Raised edges on the outside of each wheel keep them from coming off of the tracks.

c. Wheels rotate at different rates so each wheel travels a different distance.

d. The train tracks are banked so both wheels cover the same distance.

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10.3 Centripetal Force (pages 175–177)

21. Is the following sentence true or false? Any object moving in a circle is constantly accelerating. _____

22. *Centripetal* means _____.

23. The force directed toward a fixed center that causes an object to follow a circular path is _____.

24. If centripetal force ceased to act on an object moving in a circular path, the object would _____.

25. Explain where the centripetal force that holds a car in a curved path while rounding a corner comes from.

_____

26. Is the following sentence true or false? In a washing machine's spin cycle, water is forced away from the clothes. _____

27. Circle each letter that identifies a factor that affects the amount of centripetal force acting on an object.

   a. tangential speed   b. radius of curvature

   c. mass   d. force of gravity

28. A race car is driven around a banked track as shown in the drawing below. Circle the letter of the answer that identifies the centripetal force vector.

   a. n b. n_y
   c. n_x d. mg

10.4 Centripetal and Centrifugal Forces (pages 178–179)

29. The apparent outward force on a rotating or revolving body is _____ force.

30. Circle the letter that best describes the meaning of the word *centrifugal.*

   a. toward the center

   b. center-seeking

   c. circle-like

   d. away from the center

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31. Describe why you are pressed against the door of a car as it rounds a sharp corner.

_____

_____

32. Is the following sentence true or false? When a can tied to a string is swung in a circle, an outwardly directed force acts on the can.

_____

33. What causes the centrifugal-force effect?

_____

_____

10.5 Centrifugal Force in a Rotating Reference Frame (pages 179–180)

34. Imagine riding on a fast-moving train. Describe your speed from the reference frame of the train and from a reference frame of the ground outside the train.

_____

_____

_____

35. Is the following sentence true or false? In a rotating reference frame, both centripetal and centrifugal force act on objects in the rotating system.

_____

36. The centrifugal force experienced in a rotating reference frame is not a _____ force.

37. Circle the letter of each true force.

   a. nuclear force   b. gravitational force

   c. electromagnetic force   d. centrifugal force in a rotating system