CHAPTER REVIEW

Concept Items

6.2 Uniform Circular Motion

4. How can you express centripetal force in terms of centripetal acceleration?

a. $F_c = \frac{a_c^2}{m}$
b. $F_c = \frac{a_c}{m}$
c. $F_c = ma_c^2$
d. $F_c = ma_c$

5. What is meant by the word centripetal?

a. center-seeking
b. center-avoiding
c. central force
d. central acceleration

Critical Thinking Items

6.2 Uniform Circular Motion

12. What are the directions of the velocity and acceleration of an object in uniform circular motion?

a. Velocity is tangential, and acceleration is radially outward.
b. Velocity is tangential, and acceleration is radially inward.
c. Velocity is radially outward, and acceleration is tangential.
d. Velocity is radially inward, and acceleration is tangential.

13. Suppose you have an object tied to a rope and are rotating it over your head in uniform circular motion. If you increase the length of the rope, would you have to apply more or less force to maintain the same speed?

a. More force is required, because the force is inversely proportional to the radius of the circular orbit.
b. More force is required because the force is directly proportional to the radius of the circular orbit.
c. Less force is required because the force is inversely proportional to the radius of the circular orbit.
d. Less force is required because the force is directly proportional to the radius of the circular orbit.

Problems

6.2 Uniform Circular Motion

18. What is the centripetal force exerted on a 1,600 kg car that rounds a 100 m radius curve at 12 m/s?

a. 192 N
b. 1, 111 N
c. 2, 300 N
d. 13, 333 N

19. Find the frictional force between the tires and the road that allows a 1,000 kg car traveling at 30 m/s to round a 20 m radius curve.

a. 22 N
b. 667 N
c. 1, 500 N
d. 45, 000 N

TEST PREP

Multiple Choice

6.2 Uniform Circular Motion

28. Which of these quantities is constant in uniform circular motion?

a. Speed
b. Velocity
c. Acceleration
d. Displacement

29. Which of these quantities impact centripetal force?

a. Mass and speed only
b. Mass and radius only
c. Speed and radius only
d. Mass, speed, and radius all impact centripetal force

30. An increase in the magnitude of which of these quantities causes a reduction in centripetal force?

a. Mass
b. Radius of curvature
c. Speed

31. What happens to centripetal acceleration as the radius of curvature decreases and the speed is constant, and why?

a. It increases, because the centripetal acceleration is inversely proportional to the radius of the curvature.
b. It increases, because the centripetal acceleration is directly proportional to the radius of curvature.
c. It decreases, because the centripetal acceleration is inversely proportional to the radius of the curvature.
d. It decreases, because the centripetal acceleration is directly proportional to the radius of the curvature.

32. Why do we experience more sideways acceleration while driving around sharper curves?

a. Centripetal acceleration is inversely proportional to the radius of curvature, so it increases as the radius of curvature decreases.
b. Centripetal acceleration is directly proportional to the radius of curvature, so it decreases as the radius of curvature decreases.
c. Centripetal acceleration is directly proportional to the radius of curvature, so it decreases as the radius of curvature increases.
d. Centripetal acceleration is directly proportional to the radius of curvature, so it increases as the radius of curvature increases.

Short Answer

6.2 Uniform Circular Motion

43. What type of quantity is centripetal acceleration?
a. Scalar quantity; centripetal acceleration has magnitude only but no direction
b. Scalar quantity; centripetal acceleration has magnitude as well as direction
c. Vector quantity; centripetal acceleration has magnitude only but no direction
d. Vector quantity; centripetal acceleration has magnitude as well as direction

44. What are the standard units for centripetal acceleration?
a. m/s
b. m/s^2
c. m^2/s
d. m^2/s^2

45. What is the angle formed between the vectors of tangential velocity and centripetal force?
a. 0°
b. 30°
c. 90°
d. 180°

46. What is the angle formed between the vectors of centripetal acceleration and centripetal force?
a. 0°
b. 30°
c. 90°
d. 180°

47. What are the standard units for centripetal force?
a. m
b. m/s
c. m/s^2
d. newtons

48. As the mass of an object in uniform circular motion increases, what happens to the centripetal force required to keep it moving at the same speed?
a. It increases, because the centripetal force is directly proportional to the mass of the rotating body.
b. It increases, because the centripetal force is inversely proportional to the mass of the rotating body.
c. It decreases, because the centripetal force is directly proportional to the mass of the rotating body.
d. It decreases, because the centripetal force is inversely proportional to the mass of the rotating body.

Extended Response

6.2 Uniform Circular Motion

57. Is an object in uniform circular motion accelerating? Why or why not?
a. Yes, because the velocity is not constant.
b. No, because the velocity is not constant.
c. Yes, because the velocity is constant.
d. No, because the velocity is constant.

58. An object is in uniform circular motion. Suppose the centripetal force was removed. In which direction would the object now travel?
a. In the direction of the centripetal force
b. In the direction opposite to the direction of the centripetal force
c. In the direction of the tangential velocity
d. In the direction opposite to the direction of the tangential velocity

59. An object undergoes uniform circular motion. If the radius of curvature and mass of the object are constant, what is the centripetal force proportional to?
a. $F_c \propto \frac{1}{v}$
b. $F_c \propto \frac{1}{v^2}$
c. $F_c \propto v$
d. $F_c \propto v^2$