CHAPTER 7 Review

CIRCULAR MOTION

Review Questions

1. When a solid wheel rotates about a fixed axis, do all of the points of the wheel have the same tangential speed?

2. Correct the following statement: The racing car rounds the turn at a constant velocity of 145 km/h.

3. Describe the path of a moving body whose acceleration is constant in magnitude at all times and is perpendicular to the velocity.

4. Give an example of a situation in which an automobile driver can have a centripetal acceleration but no tangential acceleration.

Conceptual Questions

5. The force exerted by a spring increases as the spring stretches. Imagine that you attach a heavy object to one end of a spring and then, while holding the spring's other end, whirl the spring and object in a horizontal circle. Does the spring stretch? Explain.

6. Can a car move around a circular racetrack so that the car has a tangential acceleration but no centripetal acceleration?

7. Why does mud fly off a rapidly turning wheel?

Practice Problems

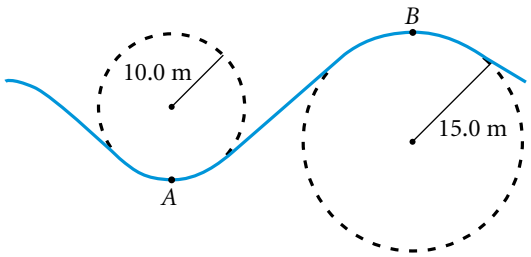
For problems 8–9, see Sample Problem A.

8. A building superintendent twirls a set of keys in a circle at the end of a cord. If the keys have a centripetal acceleration of 145 m/s^2 and the cord has a length of 0.34 m, what is the tangential speed of the keys?

9. A sock stuck to the side of a clothes-dryer barrel has a centripetal acceleration of 28 m/s^2. If the dryer barrel has a radius of 27 cm, what is the tangential speed of the sock?

For problems 10–11, see Sample Problem B.

10. A roller-coaster car speeds down a hill past point *A* and then rolls up a hill past point *B*, as shown below.
    a. The car has a speed of 20.0 m/s at point *A*. If the track exerts a normal force on the car of 2.06×10^4 N at this point, what is the mass of the car? (Be sure to account for gravitational force.)
    b. What is the maximum speed the car can have at point *B* for the gravitational force to hold it on the track?



11. Tarzan tries to cross a river by swinging from one bank to the other on a vine that is 10.0 m long. His speed at the bottom of the swing is 8.0 m/s. Tarzan does not know that the vine has a breaking strength of 1.0×10^3 N. What is the largest mass that Tarzan can have and still make it safely across the river?

NEWTON'S LAW OF UNIVERSAL GRAVITATION

Review Questions

12. Identify the influence of mass and distance on gravitational forces.

13. If a satellite orbiting Earth is in free fall, why does the satellite not fall and crash into Earth?

14. How does the gravitational force exerted by Earth on the sun compare with the gravitational force exerted by the sun on Earth?

15. Describe two situations in which Newton's laws are not completely accurate.