

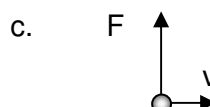
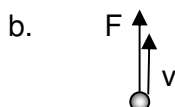
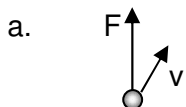
Module 7

Assignment #1

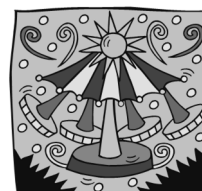
Physics

Read pages 217 - 230.

1. For which situation below will the object move with uniform circular motion?



2. An object has a constant speed. Explain why its acceleration is not necessarily zero.
3. An object has a constant velocity. Is its acceleration necessarily zero?
4. An object is moving in a circle and has a centripetal acceleration of 3 m/s^2 . If the speed of the object doubles, but the radius of rotation doesn't change, what is the new centripetal acceleration?
5. An object is moving in a circle and has a centripetal force of 8 N. If the radius of rotation of the object doubles, but the speed doesn't change, what is the new centripetal force?
6. A ride at the fair spins people in circles. The radius of the circle is 7.2 m. The mass of the cage that you sit in is 243 kg and its speed is a constant 24 m/s.
- a. Calculate the centripetal acceleration.
- b. Calculate the centripetal force.
7. The Barrel O' Fun ride at the fair consists of a large drum that spins horizontally. People stand along the outside wall and as the drum is spinning, the floor is lowered. The people remain pressed against the sides of the drum. If the radius of the drum is 4.6 meters and it spins with a speed of 18.5 m/s, how much force would there be on a 61-kg person?
8. A 15.9-kg object travels in a circle with a constant speed of 14 m/s. If the centripetal force applied to the object is 480 N, what is the radius of the circle in which it is spinning?
9. A 1400-kg car is traveling on a flat road. The road curves with a radius of 36 m. If the coefficient of friction between the road and the car's tires is 0.55, what is the maximum speed the car drive along the curve?
10. Apolo Ohno races around a circular speed skating track with a radius of 25 meters. The friction coefficient between the ice and his skates is 0.12. What maximum speed can Ohno attain going around the track without wiping out?
11. A coin placed 20 cm from the center of a rotating, horizontal disc slips when its speed is 40 cm/s.
- a. What provides the force in the radial direction?
- b. What is the coefficient of friction between the coin and the spinning disc?
12. Honors: A nylon fishing line can support a hanging load of 32 kg before it breaks. A 4 kg mass is attached to the line and swung with a radius of 0.7 m. At what speed of rotation will the line break?



Use the Planet Data Table inside the front cover of your book for masses and radii of planets.

13. What is the book's definition of gravity?
14. What are the two current theories as to why massive objects attract one another?
15. A 18-kg mass and a 29-kg mass are 0.7 meters apart. What is the gravitational force between the masses?
16. A 30-kg object is 3.9 meters above the surface of the earth.
 - a. What is the gravitational attraction between the object and the earth?
 - b. What is the weight of the object? ($w = mg$)
17. Where would the acceleration due to gravity be greater: on top of Mt. Everest or at the bottom of the Dead Sea? Explain your answer using the Law of Universal Gravitation.
18. What is the gravitational force between the earth and Jupiter when the two planets are 6.14×10^{11} meters apart?
19. It takes a mosquito 4 seconds to fly around your head one time.
 - a. Is 4 seconds the mosquito's period or frequency?
 - b. How far around your head will the mosquito get in one second?
 - c. Is the answer to the previous question the mosquito's period or frequency?
20. Wall-e, the robot, drives in 3-meter diameter circles at a constant speed of 0.8 meters per second.
 - a. What is the distance the robot travels in one trip around the circle?
 - b. How long does it take Wall-e to go around the circle one time?
 - c. What is the frequency of the robot's trip around the circle?
21. Honors: A satellite orbits the earth with a speed of 4.5×10^3 m/sec. What is its altitude?
22. Honors: A satellite orbits the earth at an altitude of 2725 km. What is the satellite's orbital period?

