Conceptual Questions

16. Would you expect tides to be higher at the equator or at the North Pole? Why?

17. Given Earth's radius, how could you use the value of G to calculate Earth's mass?

Practice Problems

For problems 18–19, see Sample Problem C.

18. The gravitational force of attraction between two students sitting at their desks in physics class is 3.20×10^{-8} N. If one student has a mass of 50.0 kg and the other has a mass of 60.0 kg, how far apart are the students sitting?

19. If the gravitational force between the electron (9.11×10^{-31} kg) and the proton (1.67×10^{-27} kg) in a hydrogen atom is 1.0×10^{-47} N, how far apart are the two particles?

MOTION IN SPACE

Review Questions

20. Compare and contrast Kepler's model of the solar system with Copernicus's model.

21. How do Kepler's laws help support Newton's theory of gravitation?

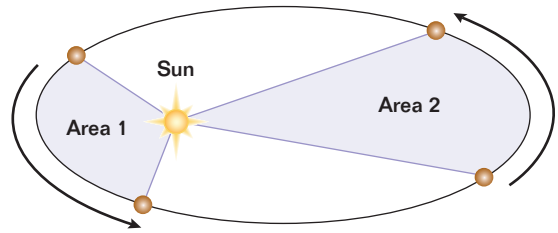
22. You are standing on a scale in an elevator. For a brief time, the elevator descends with free-fall acceleration. What does the scale show your weight to be during that time interval?

23. Astronauts floating around inside the space shuttle are not actually in a zero-gravity environment. What is the real reason astronauts seem weightless?

Conceptual Questions

24. A tiny alien spaceship (m = 0.25 kg) and the *International Space Station* are both orbiting Earth in circular orbits and at the same distance from Earth. Which one has a greater orbital speed?

25. The planet shown below sweeps out Area 1 in half the time that the planet sweeps out Area 2. How much bigger is Area 2 than Area 1?



26. Comment on the statement, "There is no gravity in outer space."

Practice Problems

For problems 27–29, see Sample Problem D.

27. What would be the orbital speed and period of a satellite in orbit 1.44×10^{8} m above Earth?

28. A satellite with an orbital period of exactly 24.0 h is always positioned over the same spot on Earth. This is known as a *geosynchronous* orbit. Television, communication, and weather satellites use geosynchronous orbits. At what distance would a satellite have to orbit Earth in order to have a geosynchronous orbit?

29. The distance between the centers of a small moon and a planet in our solar system is 2.0×10^{8} m. If the moon's orbital period is 5.0×10^{4} s, what is the planet? (See **Table 1** of the chapter for planet masses.)

TORQUE AND SIMPLE MACHINES

Review Questions

30. Why is it easier to loosen the lid from the top of a paint can with a long-handled screwdriver than with a short-handled screwdriver?

31. If a machine cannot multiply the amount of work, what is the advantage of using such a machine?

32. In the equation for the magnitude of a torque, what does the quantity $d \sin \theta$ represent?