

Name \_\_\_\_\_  
Date \_\_\_\_\_ Period \_\_\_\_\_

### Unit 5 Circular Motion Physics Review Problems

1. An ostrich lays the largest bird egg. A typical diameter for an ostrich egg at its widest part is 12 cm. Suppose an egg of this size rolls down a slope so that the tangential speed of its widest part is 0.13 m/s. What is the magnitude of the centripetal acceleration acting at those points? (0.28 m/s<sup>2</sup>)
2. A 75 kg stunt performer is spun in a horizontal circle radius of 446 m for a movie shoot. The speed of the performer is 12 m/s. What is tension in the cable holding the performer? (24N)
3. A 3 kg object is attached to a 1.3 m long string and swung in a vertical circle at a constant speed of 10 m/s.
  - a. What is the tension in the string when the object is at the bottom of its path? (260 N)
  - b. What is the tension in the string when the object is at the top of its path? (200 N)
4. A 56 kg speed skater with a velocity of 17 m/s comes into a curve of 19 m radius. How much friction must be exerted between the skates and the ice to negotiate the curve? (852 N)
5. What is the minimum radius a roller blader can make a turn at is he is travelling at 5 m/s and the coefficient of friction between the wheels and the road is 0.50. (5 m)

6. Deimos a satellite of Mars has an average radius of 6.3 km and a mass of  $5.0 \times 10^{15}$  kg. Calculate the gravitational force applied to a rock with a mass of 3.0 kg that lies at the surface of Deimos. ( $2.5 \times 10^{-2}$ N)

7. What are the speed and period of a satellite orbiting Mercury at 265 km whose mass is  $3.30 \times 10^{23}$  kg and radius is  $2.44 \times 10^6$  m. ( $2.85 \times 10^3$  m/s, 1.66 hours)

8. Jupiter, the largest planet in the solar system, has a mass of 318 times that of Earth and a radius that is 11 times that of earth. Calculate the gravitational force exerted on a 50.0 kg mass on Jupiter's surface. ( $1.3 \times 10^3$  N) Hint: Find the ratio of Jupiter's gravitational pull to that on earth.)

9. Determine the period of a pendulum 1.0 m long. (2.0 s)

10. After landing on an alien planet in a galaxy far away, you carefully measure the period of a pendulum 2.0 meters long, and find it to be 3.5 seconds. What is the value of "g" on the planet? ( $6.4 \text{ m/s}^2$ )