Circular motion and gravitation practice problems answers

1. There is an analogy between rotational and linear physical quantities. What rotation amounts are similar to distance and speed? 2. Can centrist acceleration change the speed of circular movement? 3. If you want to reduce the voltage (which is related to centrist force) in high-speed tires, would you use large or small diameter tires? Explain. 4. De centrist force. Can any type of force (for example, voltage, gravitational force, friction, etc.) be a centrist force? Could any combination of forces be a centrist force? If the centrist force is directed towards the center, why do you feel like a car has been 'thrown' from the center as if it were going around a curve? Explain. 6. Race car drivers cut routine corners as shown in the shape. Explain how this ensures that the curve is taken at top speed. Two paths are shown around a racetrack curve. Race car drivers will get as much as possible because the internal path (called corner cutting) allows them to get curves at top speed. 7. A number of amusement parks have rides that make vertical loops as shown in shape. For safety, cars are connected so that they do not fall on the tracks. If the car passes over the top at the right speed, gravity alone will provide centrist force. What other force moves and what is its direction: (a) The car passes over the top faster than this speed? (b) Is the car going over the top slower at this speed? The curved way of moving is an example of the way you ride fun with a vertical loop. 8. As the vehicle exits the upper part of the recreational journey, which is pictured in The Shape under the following conditions, what is the direction of the force it exerts on the vehicle passenger: (a) The car passes over the top at the speed at which the force of gravity is the only one moving? (b) Does the car go over the top faster than this speed? (c) Does the car go over the top slower than this speed? 9. As a skater creates a circle, what force is responsible for making him turn? Use a free body diagram in your response. 10. Let's say that a child rides on a carny halfway between its center and its edge. She has a lunch box resting on wax paper, so there is little friction between her and the carousel. Which way will the path shown in The Shape go when the lunch box lets go? The lunch box leaves a trail of dust on the carousel. Is this track going to curl straight, left or right? Explain your answer. A child riding a carny releases his lunch box at point P. This is a view that comes from above the clockwise rotation. Assuming it slips through insignificant friction, will it follow path A, B or C when viewed from the Earth's reference frame? What about the shape of the road he left in the carousel? 11. Do you feel thrown away Is it time to negotiate a curve that is ideally banked for the speed of your vehicle? What is the direction of the force that the car seat exerts on you? 12. Let's say that a mass moves on a circular path on a frictionless table, as shown in shape. Within the Earth's reference frame, there is no centrifuge force that removes mass from the center of rotation, but there is a very real force that stretches the rope that connects the mass to the nail. Using concepts related to centrist force and Newton's third law, which describes the physical origin of the force, it describes the string extends. On a frictionless table, a mass attached to the nail moves on a circular path. The power that extends the rope is not real and fictional. What is the physical origin of the force in the string? 13. When a toilet is flushed or the sink is emptied, the water (and other material) begins to turn about drainage as it descends. Assuming that the first rotation flour and a flow are initially directly directly towards the drain, explain what causes the rotation and which direction it has in the northern hemisphere. (Remember that this has a small effect and causes rotational directional water jets in most toilets.) If water is pushed into the sewer, will the direction of rotation reverse? Is there any real power that throws water from clothes during the turning cycle of the washing machine? Explain how the water is removed. 15. Ride an amusement park, riders enter a large vertical barrel and stand against the horizontal ground wall. The barrel was turned upwards and the floor fell. Riders feel as if they are fixed to the wall by a force like gravitational force. It is used by riders to explain events in the frame where an imaginary power is felt and the barrel reference rotates. Describe in an inertia frame of reference (the earth is almost one) neither pins riders to the wall, and identify all the real forces that move to them. 16. Action at a distance, as for gravity, is considered unreasonable once and therefore wrong. What is the ultimate determinant of the truth in physics, and why was this action finally accepted? 17. Two friends are chatting Anna says an orbiting satellite is in free fall because the satellite continues to fall towards Earth. Tom says that an orbiting satellite is not in free fall because the acceleration from gravity is not 9.80 $\displaystyle m/s^2$. Who are you joining and why? 18. A no-returning frame of reference placed in the center of the Sun is almost inertia. Why not exactly an inertia frame? 19. Action at a distance, as for gravity, is considered unreasonable once and therefore wrong. What is the ultimate determinant of the truth in physics, and why was this action finally accepted? 20. Two friends are chatting Anna says an orbiting satellite is in free fall. The satellite continues to fall towards Earth. Tom says that an orbiting satellite is not in free fall because the acceleration from gravity is not $\displaystyle 9.80 m/s^2$. Who are you joining and why? 21. In an eliptic orbit for a satellite, draw a free body diagram that shows why its speed increases as it approaches its main body and decreases as it moves away. 22. Newton's laws of motion and gravity are one of the first to convincingly show the simpliability and unity that lies in nature. Many other examples have been discovered since then, and now we expect to find this type of underlying order in complex situations. Is there any evidence that such a pattern would always make new discoveries? 23. Under what framework do Kepler's laws apply? Are kepler laws completely descriptive, or does they contain causal information? 24. Semi-trailer trucks have a kilometer counter on a hub on a trailer wheel. The hub is weighted so that it does not rotate, but it includes gears to count the number of wheel revs, then calculates the distance traveling. If the diameter of the wheel passes through 1.15 m and 200,000 turns, how many kilometers should the kilometer counter be read? The solution is 723 km 25. Microwave ovens rotate at a rate of about 6 cycles/min. What's that per second in revolutions? What is the angus speed in radials per second? 26. A car with tires with a radius of 0.260 m will go 80,000 km before driving them down. How many revolutions do tires make, neglect any changes to the radius due to any backup and wear? Return a solution $\displaystyle 5×10^7$27. (a) What is the Earth's rotation time in seconds? (b) What is the Earth's anguly vesk? (c) Considering that the Earth has a radius of $\displaystyle 6.4×10^6m$ in its equator, what is the linear speed on the Earth's surface? 28. A baseball pitcher brings his arm forward during a step, spinning the forearm about the elbow. If the speed of the ball in the shooter's hand is 35.0 m/s and the ball is 0.300 m from the elbow joint, what is the angus speed of the forearm? Solution 117 rad/s 29. Lacrosse is thrown a net at the end of a stick, turning the toe and forearm about a ball elbow. If the angule vest of the ball related to the elbow joint is 30.0 rad/s and the ball is 1.30 m from the elbow joint, what is the speed of the ball? 30. A truck with tires with a radius of 0.420 m is 32.0 m/s. What is the angusary speed of rotating tires in radies per second? What is this in Rev/dk? Solution 76.2 rad/s 728 rpm 31. Integrated Concepts Kicking a football, kicker rotates his leg about the hip joint. (a) If the speed of the tip of the Kicker shoe is 35.0 m/s and the hip joint is 1.05 m from the tip of the shoe, what is the angular speed of the shoe tip? (b) The shoe is initially in contact with a fixed 0.500 kg of football for 20.0 ms. What Applied on football to give the force 20.0 m/s speed? (c) Find the maximum range of football by neglecting air resistance. Solution (a) 33.3 rad/s (b) 500 N (c) 40.8 m 32. Create Your Own Problem Imagine an amusement park ride that rotates around the vertical axis on a cylinder with vertical walls of participants. When the angular speed reaches its full value, the ground falls and the friction between the walls and the riders prevents them from sliding down. Riders create a problem in which they calculate the required anguler speed to make sure they do not slide down the wall. Add a free body diagram of a single drive. Variables to consider include the radius of the cylinder and the coefficients of friction between the riders' clothes and the wall. 33. A fair ride turns into a flying saucer to the invaders in the container. If the horizontal circular path followed by riders has a radius of 8.00 m, how many cycles per minute will be subjected to a central acceleration that is 1.50 times in size due to gravity? Solution 12.9 rev/min 34. A runner on the 200 m line should run towards the end of the track, a circular arc with a curvature radius of 30 m. If he completes the 200 m run at 23.2 s and runs at constant speed throughout the race, what is the magnitude of his centrist acceleration when running the curvy part of the track? 35. To take the Earth's age as $\displaystyle 4×10^9$ year and calculate the approximate total distance that the Earth has travel since its birth ,assuming that the orbital radius $\displaystyle 1.5 ×10^{11}$ has not changed and is circular (in the fixed reference frame according to the Sun). Solution $\displaystyle 4×10^{21}m$ 36. The propeller of the World War II fighter jet is 2.30 m in diameter. (a) What is its anguly fast speed in radies per second if it rotates at 1200 rpm? (b) If the plane is considered fixed on the track, what is the linear speed of the end at this angusary speed? (c) What is the centrist acceleration of the propeller tip under these conditions? Calculate in meters per second frame and convert to $\displaystyle g$ folds. 37. An ordinary workshop millstone has a radius of 7.50 cm and rotates 6500 rpm (a) calculate the centrist acceleration size on the edge at a square meter per second and transform the $\displaystyle g$ folds. (b) What is the linear speed of a point on the edge? Solution a) $\displaystyle 3.47×10^4m/s^2, 3.55×10^3g$ b) $\displaystyle 51.1m/s$ 38. Helicopter blades can stand up to enormous stresses. In addition to supporting the weight of a helicopter, they rotate at fast speeds and experience large centrist accelerations, especially at the tip. (a) Calculate the magnitude of centrist acceleration 300 rpm (b) Compare the linear speed of the tip with the speed of sound (charged at 340 m/s). 39. Olympic figure skaters are approximately 5 revs/s. (a) Angulas speed at radies per second? (b) What is the centrist acceleration of the skater's nose if it is 0.120 m away from the axis of rotation? (c) An extraordinary skater named Dick Button has managed to spin much faster than anyone since then in the 1950s-assuming it had a radius of about 9 rev/p. 0.120 m, what was the centrist acceleration of the tip of his nose? (d) Comment on the size of the accelerations found. It is nisby that Button torsed small blood vessels during their rotation. Solution a) 31.4 rad/s b) 118 m/s c) 384 m/s d)The centrist acceleration felt by Olympic skaters is 12 times larger than the acceleration caused by gravity. That's a lot of momentum in itself. The centrist acceleration felt by Button's nose was 39.2 times larger than the acceleration from gravity. No wonder the small blood vessels ruptured on their return. 40. What percentage of the acceleration on the Earth's surface is acceleration from gravity in the position of a satellite located 300 km above Earth? It's the 41st century. Confirm that the linear vest of an ultracentrifuge is about 0.50 km/h, and it is about 30 km/h in Earth orbit: (a) The linear vest of a point 0.100 m from its center, 50,000 rpm/min (b) the linear vest of the Earth orbiting the Sun (use data from the Earth's orbiting text and circularly approximate). Solution a) 0.524 km/h b) 29.7 km/h 42. A rotating space station is said to create artificial gravity— a loosely defined term for acceleration roughly similar to gravity. The outer wall of the rotating space station would become a backdrop for astronauts, and the centrist acceleration provided by the ground would allow astronauts to exercise and maintain muscle and bone strength in a more natural way than in never-returning space environments. If the space station diameter is 200 m, which angusary speed wheel $\displaystyle 9.80m/s^2$ will produce an artificial gravity? 43. On takeoff, the speed of a commercial jet is 60.0 m/s. The diameter of the tires is 0.850 m. (a) How many cycles/min are the tires rotated? (b) What is centied acceleration at the edge of the tyre? (c) With what force should a $\displaystyle 1.00×10^{−15}kg$ bacteria stick to the rim? (d) Take the ratio of this force to the weight of the bacterium. Solution (a) $\displaystyle 1.35×10^3rpm$ (b) $\displaystyle 8.47×10^3m/s^2$ (c) $\displaystyle 8.47×10^{−12}N$ (d) 865 44. Integrated Concepts Riders are returned to ride an amusement park in the form of a Viking ship hanging from a large pivot forward like a hard pendulum. Sometimes near the middle of the journey, the ship is instantly motionless on the circular arc. The ship then swings down under the influence of gravity. (a) Assuming negligible friction, a bow with a radius of 14.0 m and riders find the speed of riders under its arc, given the center of a system of spring mass travels that are close to the center of mass. (b) What is centrist acceleration under the arc? (c) Draw a free body diagram of forces moving on a rider below the arc. (d) Find the force riding a 60.0 kg drive and compare it to its weight. (e) Discuss whether the answer seems reasonable. The solution is (a) $\displaystyle 16.6m/s$ (b) $\displaystyle 19.6m/s^2$ (c) (d) $\displaystyle 1.76×10^3N$ or $\displaystyle 3.00w$, that is, normal force (up) times its weight. (e) This answer seems reasonable, because it feels like it is being forced into the chair very strongly by gravity. 45. Unreasonable Consequences A mother pushes her child on a swing so that its speed is 9.00 m/s. The swing is hanging 2.00 m above the center of mass of the child. (a) What is the magnitude of the child's centied acceleration at low point? (b) If the mass is 18.0 kg, what is the size of the force exerted by the child in the seat? (c) What is unreasonable about these results? (d) What propositions are unreasonable or inconsistent? Solution a) $\displaystyle 40.5m/s^2$ b) 905 N c) Partially (b) force is ived. Part acceleration (a) too much, about 4 g. d) swing speed is very large. At the speed given under the swing, ignoring friction, the upper all way has enough kinetic energy to send the child. 46. (a) A 22.0 kg boy rides a rotating playground carny at 40.0 rev/min. If it's 1.25 m from its center, what centrist force should it use? (b) What centrist force does it need to stay on a carousel in an amusement park that rotates at 3.00 rev/min, 8.00 m from its center? (c) Compare each force with its weight. Solution a) Calculate the centrist force at the end of the 100 m (radius) wind turbine blade, which rotates from 483 N b) 17.4 N c) 2.24 times its weight, 0.0807 times its weight 47. 0.5 cycles/s. Let's say the mass is 4 kg. 48. What is the ideal banking angle for a smooth turn within a 1.20km radius on a motorway with a speed limit of 105km/h (about 65mph), assuming everyone travels at the border? Solution $\displaystyle 4.14º$ 48. What is the ideal speed to get the 100 m radius curve at an angle of 20.0°? 49. (a) What is the bobsled rotation radius deposited at 75.0° and taken as 30.0 m/s, assuming it is ideally banked? (b) Calculate centrist acceleration. (c) Does this momentum seem great to you? a) 24.6 m b) $\displaystyle 36.6 m/s^2$ c) \(\displaystyle

a_c=3.73g.\) It doesn't look too big, but it's clear that bobsledders feel the force to them going through sharp banked turns. 50. Part of cycling includes leaning at the right angle when turning, as seen in The Shape. To be stable, the force exerted by the ground must be on a line that crosses the center of gravity. The force on the bicycle wheel can be dissolved into two vertical components - parallel friction to the road (which should provide centrist force) and vertical normal force (which should be equal to the weight of the system). (a) \(\displaystyle φ\) (as defined in the method) speed v size 12{v} {} and curvature radius related to r size 12{r} {} rotation in the same way the rotation is ideally for a banked path-i.e., \(\displaystyle π=tan^{1}v^2/rg\) (b) Calculate \(\displaystyle μ\\ \) for a 12.0 m/s rotation of the radius (as in a race). A cyclist must lean towards negotiating a turn on flat ground -his ability to do so would be instinctive. The force of the ground on the wheel must be in a line through the center of gravity. The net external force in the system is the centrist force. The vertical component of the force on the wheel cancels the weight of the system, while the horizontal component must provide centrist force. This process produces an relationship between a similar angle of rotation, speed v and curvature r radius for ideal banking of highways. Figure 51 (as shown in a) is a large centrifuge used to expose aspiring astronauts to accelerations similar to those experienced in rocket launches and atmospheric reentries. (a) If the drive is 15.0 m from the return center, what is the centrist acceleration \(\displaystyle 10g\) angus speed? (b) The driver's cage is hanging on a pivot at the end of the arm and allows it to swing outward during rotation, as shown in Figure(b). When the angle below the horizontal is \(\displaystyle\) centrist acceleration \(\displaystyle 10g\), will the mest hanger? (Tip: The arm provides centrist strength and supports the weight of the cage. Draw a free body diagram of the forces to see what the angle of 12{} {} should be.) (a) NASA centrifuge said trainees were subjected to accelerations similar to those experienced in rocket launches and back-entries. (source: NASA) (b) The rider in the cage shows how the cage rotates outward during rotation. This ensures that the total force applied to the drive by the cage is always along its axis. Solution a) 2.56 rad/s b) 5.71º bIntegrated Concepts If a car receives a banked curve at a speed lower than the ideal speed, it is necessary to maintain its shift into the friction curve (a real problem on icy mountain roads). (a) Calculate the ideal speed to get 100 the radius curve is 15.0º. (b) What is the minimum friction coefficient required for a frightened driver to take the same bend to 20.0 km/h? Solution a) 16.2 m/s b) 0.234 53. Modern roller coasters have vertical loops, as shown in The Shape. The curvature radius is smaller than those at the top, so that the downward centrist acceleration at the top is greater than the acceleration caused by gravity, and its passengers are firmly pressed into their seats. If the curvature radius is 15.0 m and the downward acceleration of the car is 1.50 g, what is the roller coaster speed at the top of the cycle? Tear-shaped loops are used in the latest roller coasters, thereby gradually minimizing the curvature radius. This means that centrist acceleration decreases from zero to the top maximum and gradually decreases again. A circular loop causes a jarring change in acceleration in the entrance, a disadvantage long ago discovered in the design of the railway curve. With a small radius of curvature at the top, centrist acceleration is easier for passengers to lose contact with the seat, so g can be kept larger and no seatbelt is required to keep them in place. 54. Unreasonable Consequences (a) Calculating the minimum friction coefficient required for a car to negotiate a 50.0 m radius curve at 30.0 m/s (b) What is unreasonable about the result? (c) What propositions are unreasonable or inconsistent? Solution a) 1.84 b) The coefficient of friction much greater than 1 is unreasonable. c) The default speed is too large for a tight curve. 55. (a) Calculate the mass of the Earth given acceleration from gravity in the Arctic \(\displaystyle 9,830 m/s^2\) and the Earth's radius is 6371 km from center to pole. (b) Compare this to \(\displaystyle 5×10^{24}kg\). Solution a) \(\displaystyle 5.979×10^{24}kg\) b) The best value for these three important figures is the same. 56. (a) Calculate the magnitude of acceleration due to gravity on the Earth's surface due to the moon. (b) Calculate the magnitude of the acceleration caused by gravity on Earth due to the sun. (c) Take the ratio of the moon's acceleration to the Sun and comment on why the tides are predominantly caused by the Moon despite this number. 57. (a) What is acceleration from gravity on the lunar surface? (b) On the surface of Mars? Mass of Mars \(\displaystyle 6.418×10^{23}kg\) and radius \(\displaystyle 3.38×10^6m\) Solution a) \(\displaystyle 1.62m/s^2\) b) \(\displaystyle 3.75m/s^2^) 58. (a) Calculate acceleration from gravity on the surface of the Sun. (b) If you could stand in the Sun, what factor would your weight increase? (Never mind, you can't.) 59. Moon and Earth revolve around common centers of mass, It is located about 4700 km from the center of the earth. (This is 1690 km below the surface.) (a) Calculate the magnitude of the acceleration caused by the moon's gravity. (b) Calculate the magnitude of the centrist acceleration of the Earth's center when rotating at this point once each month (approximately 27.3 d) and compare it with the acceleration found in part (a). Comment on whether they are equal and why they are equal. A) \(\displaystyle 3.42×10^{–5}m/s^2\) b) \(\displaystyle 3.34×10^{–5}m/s^2\) Values are almost the same. A gravitational force can be expected to have the same centrist force at the core of the system. 60. Solve the sample section by using (b) \(\displaystyle a_c=v^2/r\). 61. Astrology, this possible and uncertain so-called science, makes the position of the planets at the moment of birth of the person too. The only known force a planet exerts on Earth is gravitational. (a) Calculate the magnitude of the gravitational force applied to a 4.20 kg baby by a 100 kg father 0.200 meters away at birth (he helps, so he is close to the child). (b) Calculate the size of the force on the baby due to Jupiter, if it is at the closest distance to Earth, some \(\displaystyle 6.29×10^{11}m\) away. How does Jupiter's strength to the baby compare to the strength of the father on the baby? Other objects in the room and in the hospital building apply similar gravitational forces. (Of course, there may be an unknown force movement, but scientists need to be convinced that even the first one has an effect, causing a much less unknown force.) Solution a) \(\displaystyle 7.01×10^{–7}N\) b) \(\displaystyle 1.35×10^{–6}N\) 62. The existence of the dwarf planet Pluto has been proposed based on irregularities in Neptune's orbit. Pluto was later discovered close to its predicted location. But now the discovery seems coincidentic, because Pluto is small and irregularities in Neptune's orbit were not well known. To show that Pluto has a small impact on Neptune's orbit compared to the planet closest to Neptune: (a) Calculate gravitational acceleration on Nept {12}×s. Pluto's mass \(\displaystyle 1.4×10^{22}kg\). (b) Calculate the acceleration caused by gravity in Neptune caused by Uranus, currently compare the separation \(\displaystyle 2.50×10^{12}m\) and this because of Pluto. The mass of Uranus is \(\displaystyle 8.62×10^{25}kg\). 63. (a) The sun orbits the Milky Way galaxy once each \(\displaystyle 2.60 x 10^8y\), with a roughly circular orbit with an average radius of \(\displaystyle 3.00 x 10^4\) per radius of light years. (The light year is the distance that light travels in the 1st century.) Calculate centrist acceleration in the sun's galactic orbit. Is your result supportive? Reference almost inertia frame can be found in Sun contention? (b) Calculate the average speed of the Sun's galactic orbit. Did the answer surprise you? Solution a) \(\displaystyle 1.66×10^{–10}m/s^2\) b) \(\displaystyle 2.17×10^5m/s\) 64. Unreasonable Conclusion A mountain applies a gravitational force equal to 10.0 km from a person and 2.00% of its weight. (a) Calculate the mass of the mountain. (b) Compare the mass of the mountain with the mass of the Earth. (c) What is unreasonable about these results? (d) What propositions are unreasonable or inconsistent? (Accurate gravitational measurements can easily detect the impact of nearby mountains and variations in local geology.) Solution a) \(\displaystyle 2.937×10^{17}kg\) b) \(\displaystyle 4.91×10^{-8}\) of the Earth's mass. c) The mass of the mountain and the mass of the Earth are very large. d) The gravitational pull of the mountain is very large. 65. A geosynchronous Earth satellite is exactly what has an orbital time of 1 day. Such orbits are useful for communication and aerial observation, as the satellite remains above the same point on Earth (provided it orbits in the same direction as the Earth's rotation on the equatorial plane). Calculate the radius of such an orbit based on lunar data in the Table. 66. Calculate the mass of the Sun based on data orbiting the Earth and compare the resulting value with the actual mass of the Sun. Solution \(\displaystyle 1.98×10^{30}kg\) 67. Find Jupiter's mass based on data from the orbit of one of its moons and compare your result with its actual mass. Based on the data in Table 68, find the ratio of Jupiter's mass to the Earth's mass. Solution \(\displaystyle \frac{M_J}{M_E}=316\) 69. Astronomical observations of our Milky Way galaxy show that the galaxy has a mass of solar masses approximately \(\displaystyle 8.0×10^{11}\). A star orbiting around the galaxy is about \(\displaystyle 6.0×10^4\) light-years from its center. (a) What should be the orbital duration of that star? (b) If the period is \(\displaystyle 6.0×10^7\), what is the mass of the galaxy? Such calculations are used to imply the existence of dark matter in the universe, and have shown, for example, the presence of very large black holes in the centers of some galaxies. 70. Integrated Concepts Space debris is becoming a danger to other satellites left by ancient satellites and their launchers. (a) Calculate the speed of an orbiting satellite 900 km above the Earth's surface. (b) Let's say that a loose rivet orbits the same radius that intersects the satellite's orbit with the angle \(\displaystyle 90º\) relative to Earth. What's the speed of the rivet according to the satellite just before it hit? (c) Given that the rivet is 3.00 mm in size, how much The end? (d) If its mass is 0.500 g, what is the average force it exerts on the satellite? (e) How much energy is generated in collisions and joules? (The speed of the satellite does not change significantly, since its mass is much larger than that of the rivet.) Solution a) \(\displaystyle 7.4×10^3m/s\) b) \(\displaystyle 1.05×10^3m/s\) c) \(\displaystyle 2.86×10^−−7}s\) d) \(\displaystyle 1.84×10^7N\) e) \(\displaystyle 2.76×10^4J\) \(\displaystyle 2.76×10^4J\71\71. Unreasonable Consequences (a) Based on information about Kepler's laws and the moon's orbital properties, 1.00 h. (b) Calculating an orbital radius for an Earth satellite that is unreasonable about this result? (c) What is the premise of a 1.00 orbit unreasonable or inconsistent? Solution a) \(\displaystyle 5.08×10^3km\) b) This radius is illogical because it is less than the earth radius. c) An hour-long orbital orbiter is inconsistent with the earth's known radius. 72. Build Your Own Problem on February 14, 2000, NEAR spacecraft was successfully placed into orbit around Eros, became the first artificial satellite of an asteroid. Create a problem where you determine the orbital speed of a satellite near Eros. You need to find the mass of the asteroid and think of such things as a safe distance for orbit. Although Eros is not sphering, at an average distance from the center of mass, calculate the acceleration caused by gravity on its surface. Your instructor may also ask you to calculate the speed at which Eros escapes from this point. Eros.

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