Name: _____

Assignment #4: Centripetal Force and Gravitational Potential Energy not on Earth

1. Sketch a labeled graph that shows how the gravitational field of a body varies with distance from its center. Describe the relationship between the strength of the gravitational field and the distance

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2. Oberon is a satellite of the planet Uranus. It has an orbital radius of 5.83×10^8 m and an orbital period of 1.16×10^6 s. What is the mass of Uranus?

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3. A planet of radius 7.0 x10^7 m has a gravitational field strength of 68 N kg at its surface. What is the period of a satellite orbiting this planet at a radius of 1. 4 x10^8 m (twice the planet's radius)?

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4. On Earth, the maximum speed without skidding for a car on a level circular curved track of radius 40 m is 15 m/s. This car and track are then transported to another planet for the Indy Galactic 500.The maximum speed without skidding is now 8.4 m/s. What is the value of the acceleration due to gravity on this other planet?

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5. The equation Ep = mgh, in which g is 9.8 m/s^2 , cannot be used for calculating the gravitational potential energy of an orbiting Earth satellite because

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6. A 1570 kg satellite orbits a planet in a circle of radius 5.94 $x10^6$ m. Relative to zero at infinity the gravitational potential energy of this satellite is - 9.32 $x10^{11}$ J. What is the mass of the planet?

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7. A 120 kg astronaut stands on the surface of an asteroid of radius 600 m. The astronaut leaves the surface with 15 J of kinetic energy and reaches a maximum height of 300 m above the surface. What is the mass of the asteroid?
