Name_____   Date_____   Period_____

Unit 9
Gravity Practice Test

Form P

1. The nucleus of Comet Navarrete has a mass of only 1.00×10^{14} kg and has a radius of 10.0 km. Its orbit around the sun is very elliptical with a perihelion distance (closest to the sun) of 1.00×10^7 km and an aphelion distance (furthest) of 1.00×10^{10} km.
   a. Calculate the strength of the sun's gravity on the comet at the perihelion.

   b. Calculate the strength of the sun's gravity on the comet at the aphelion.

   c. How many times stronger is the pull of the sun's gravity on the comet at the perihelion than the aphelion?

   d. What would the acceleration due to the gravity of the comet be at the surface of the comet's nucleus?

2. How much work is done by gravity on a satellite in a circular orbit around the earth at an altitude of 100 km?

3. Use Newton's Law of Universal Gravitation to show why freely falling objects accelerate at a rate of 9.8 m/s^2 near the surface of the earth.

4. If every object in the universe attracts every other, why don't we feel attracted to bears?

5. Answer the questions below
    a. What is the escape velocity for leaving the surface of the moon?

    b. How does this compare with that for the earth?

    c. Using your answers for part a and b to explain why the Saturn V rocket, used to launch spacecrafts from Earth, was so much larger than the rocket used to lift off from the moon?

6. We all know that the earth orbits the sun and that its period of revolution is 1 year. It is also very convenient to measure distances in the solar system in terms of the size of the earth's orbit and say that the distance from the sun to the earth is 1 astronomical unit (1 AU).
    a. Using years and AUs, what is the value of the constant in Kepler's Third Law?

    b. Use the above information to quickly fill in the table below:

Planet	sun-planet dist (AU)	Period (years)
Venus	0.7233	
Mars	1.5237	
Ceres		4.604
Jupiter		11.862
Saturn	9.5388	
Uranus	19.182	
Neptune		164.79
Pluto		248

How well do your calculated values match the accepted values?