Physics 12

**Practice Gravitation**

Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Bk. \_\_\_\_\_\_\_

Written Response – Answer each question in the space provided.

1. A 25000 kg rock is located at a distance of 7.6 x 108 m away from a small planet of mass 7.8 x 1023 kg. What is the mutual force of attraction between these two objects? *(3 marks)*
2. A 5800 kg object is lifted from the Earth’s surface to a radius of 2.3 x 107 m. What is the gravitational field strength of the Earth at this location? *(3 marks)*
3. A 1500 kg satellite orbits the earth at a radius of 8.2 x 106 m. What is the period (time to complete one orbit) for the space shuttle? *(4 marks)*
4. A 6800 kg space probe is in a circular orbit of radius 8.0 x 109 m about our Sun.
   1. What is the orbital speed of this space probe*? (3 marks)*
   2. Suppose the Sun was to suddenly collapse to 1/10 of its present radius ***without*** any change in mass. The space probe’s orbital speed about the Sun will:

\_\_\_\_ Increase

\_\_\_\_ Decrease

\_\_\_\_ Stay the same *(1 mark)*

* 1. Using principles of physics explain your answer. *(2 marks)*

1. A 2500 kg rocket is lifted from the surface of the earth to a vertical height of 18000 m above the earth’s surface.
   1. What is the potential energy of the rocket while it is sitting on the Earth’s surface? *(3 marks)*
   2. What is the potential energy of the rocket when it is at 18000 m above the Earth’s surface? *(3 marks)*
   3. What work did the rockets on the rocket do in lifting this rocket from the Earth’s surface to a height of 18000 m? *(2 marks)*
2. A 6500 kg satellite is in geostationary orbit around the Earth at a radius of 4.2 x 107 m/s.
   1. What does Geostationary mean? *(1 mark)*
   2. What is the total energy of this satellite at this distance from the earth? *(3 marks)*