ID Please _____Per____

People like you and I, though mortal of course like everyone else, do not grow old no matter how long we live...[We] never cease to stand like curious children before the great Mystery into which we were born. -- Albert Einstein

1. A space rock has a mass of 2.50 kg. It is 1 250 m from an asteroid. If the force of gravity is 0.225 N between them, what is the mass of the asteroid?

2. You weigh 458 N on Earth, but you are on Mars. Here's some data on Mars: radius = 3.38 x 10^6 m   mass = 6.42 x 10^{23} kg. (a) How much do you weigh on Mars? (b) What is the acceleration of gravity on Mars? (c) If you drop a 3.50 kg rock from 1.20 m above the surface of Mars, how fast will it be going just before it hits the surface? (d) What is its potential energy before you release it?

3. A 48.0 kg projectile is fired by the USS Goodship at an angle of 46.0° with a speed of 345 m/s. (a) What is the horizontal range of the projectile (ignoring wind resistance)? (b) What is the kinetic energy and potential energy when the projectile is at the highest point of its path? (c) What is the kinetic energy and potential energy just before it hits (ignore the initial height due to the ship)?

4. A 65 700 kg celestial body experiences a 0.115 nN force of attraction between it and a 75 500 kg space rock. How far apart are they?

5. A 4.50 kg ball traveling east at 10.5 m/s smacks into a 3.45 kg ball that is at rest. The first ball ends up going north at a speed of 3.50 m/s. For the second ball, what is the (a) eastward velocity, (b) northward velocity, and (c) kinetic energy after the collision?

6. What is the force of gravity between Earth and the moon? Earth's mass is 5.98 x 10^{24} kg, the average distance from Earth to the moon is 3.90 x 10^8 m. The mass of the moon is 7.30 x 10^{22} kg.