Example problems – gravitation

1. Object *A* has a mass of 200 kg. Object *B* has a mass of 600 kg. Objects *A* and *B* are

4 m apart. What is the gravitational force each object exerts on the other object?

2. Object *A* has a mass of 400 kg. Object *B* has a mass of 600 kg. Objects *A* and *B* are

4 m apart. What is the gravitational force each object exerts on the other object?

3. Object *A* has a mass of 200 kg. Object *B* has a mass of 600 kg. Objects *A* and *B* are

8 m apart. What is the gravitational force each object exerts on the other object?

4. An astronaut is outside her spacecraft in deep space. The mass of the astronaut is 200 kg and the mass of the spacecraft is 100,000 kg. The astronaut is 20 m from the spacecraft.

(a) What is the gravitational force the spacecraft exerts on the astronaut?

(b) What is the acceleration of the astronaut?

(c) Assuming the motion of the spacecraft is negligible, how long will gravity take to pull the

astronaut to the spacecraft?

5. What is the acceleration due to gravity at an altitude of 250 miles, 400 km, above the surface of the earth? The radius of the earth is 4000 miles, 6400 km.

6. The International Space Station (ISS) orbits Earth in a nearly circular orbit at an altitude of about 400 km. The radius of Earth is 6.4 X 10 6 m and the mass of Earth is 6 X 10 24 kg.

(a) What is the radius of the orbit of the ISS?

(b) What is the acceleration of the ISS?

(c) What is the orbital speed of the ISS?

(d) What is the orbital period of the ISS?

(e) What is the acceleration of the astronauts in the ISS relative to Earth?

(f) What is the acceleration of the astronauts in the ISS relative to the ISS?

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