

Final Exam Gravity Review

Chapter 12 (13, 14 ?)

Equations:

$$F_g = \frac{Gm_1m_2}{d^2} \qquad g = \frac{GM_{planet}}{r_{planet}^2}$$

Constants:

$$G = 6.67 \times 10^{-11} \text{ Nm}^2/\text{kg}^2$$

$$m_{\text{earth}} = 6 \times 10^{24} \text{ kg}$$

$$r_{\text{earth}} = 6.4 \times 10^6 \text{ m}$$

Concepts:

- The earth exerts a gravitational force of 7000 N on a satellite. What force does the satellite exert on the earth?
 - 700 N
 - 7000 N
 - more than 7000 N
 - The answer cannot be calculated with the given information.
- According to the Law of Universal Gravitation, the force ____ as the mass increases and the force ____ as the distance increases.
 - Increases, increases
 - Decreases, increases
 - Increases, decreases
 - Decreases, decreases
- Why don't two people feel the gravitational force between them?
 - The action reaction forces cancel each other out.
 - They do feel the force.
 - The force too small to be noticeable.
 - Gravity is only a property of planets and moons, not people.
- Which of the following statements is true?
 - Your mass depends on where you are in the universe but your weight is constant.
 - Both your mass and your weight depend on where you are in the universe.
 - Both your mass and your weight are constant everywhere in the universe.
 - Your weight depends on where you are in the universe and your mass is constant.

Problems:

- A small satellite has a mass of 500 kg on the surface of the earth. The satellite is then put in orbit around the earth.
 - What is the weight of the satellite on the surface of the earth?

 - What is the mass of the satellite in its orbit?

 - Is the weight of the satellite in its orbit more than, less than or the same as the weight of the satellite on the surface of the earth?

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6. The gravitational force between two spheres in outer space is 1000 N.
 - a. How large would the force be if one sphere had twice the mass?

 - b. How large would the force be if both spheres had twice the mass?

 - c. How large would the force be if the spheres were half the distance apart?

 - d. How large would the force be if you doubled both masses and the distance between the masses?

7. Calculate the force of attraction between a 300 kg mass and 500 kg mass that are 20 cm apart.

8. The force between two 1000 kg spheres is 0.03 N. How far apart are the spheres?

9. Imagine an astronaut of mass 75 kg is on the planet Venus. What is the acceleration due to gravity on Venus? ($M_{\text{Venus}} = 4.9 \times 10^{24} \text{ kg}$ $R_{\text{Venus}} = 6 \times 10^6 \text{ m}$ $D_{\text{Venus-sun}} = 1.1 \times 10^{11} \text{ m}$)