

Chapter 12-14 Worksheet

Chapter 12 - Universal Gravitation.

1. Why did Newton think that a force must act on the moon? (12.1)
2. Explain why the moon does not fall to Earth? If the gravitational forces of the sun on the planets suddenly disappeared, in what kind of path would the planets move? (12.2)
3. If the moon were twice as massive, would the attractive force of Earth on the moon be twice as large? Of the moon on Earth? (12.4)
4. Explain the effects on the force of gravity on two objects if: (12.5) --(don't use greater than or less than)
 - a. The mass of one object is tripled. _____
 - b. The distance between the two objects is double _____
 - c. The distance between the two objects is tripled _____
 - d. The distance between the two objects is cut in half _____
5. Earth and the moon are gravitationally attracted to each other. Does the more massive Earth attract the moon with a greater force, the same force, or less force than the moon attracts Earth? (Chapter 6)

Problems - Show all work on a separate sheet of paper

1. The gravitational force of attraction between Earth and the sun is 1.6×10^{23} N. What would this gravitational force have been if Earth had formed twice as far away from the sun?
2. Oliver, whose mass is 65 kg, and Olivia, whose mass is 45 kg, sit 2.0 m apart in their physics classroom.
A) What is the force of gravitational attraction between Oliver and Olivia? B) Why don't Oliver and Olivia drift toward each other?
3. The mass of the moon is 7.35×10^{22} kg. The radius of the moon is 1.74×10^6 m. What is the gravitational force between the moon and a 90.0 kg astronaut standing on the surface of the moon?
4. Find the mass of one object if the magnitude of the gravitational force acting on each particle is 2×10^{-8} N, the one mass is 25.0 kg and the objects are 1.20 meters apart.
5. An early planetary model of the hydrogen atom consisted of a 1.67×10^{-27} kg proton in the nucleus and a 9.11×10^{-31} kg electron in orbit around it at a distance of 5.0×10^{-11} m. In this model, what is the gravitational force between a proton and an electron?
6. What is the gravitational force between Harper, a 50.0 kg physics teacher, and the moon, a 7.35×10^{22} kg celestial body that is 3.84×10^8 m from her?
7. The tiny planet Mercury has a radius of 2400 km and a mass of 3.3×10^{23} kg. A) What would be the gravitational force between Mercury and an astronaut who has a mass of 85.0 kg? B) What would be the weight of the astronaut on Mercury?