CH 7: GRAVITY REVIEW

1. Newton determined that the pull of Earth's gravity caused both apples and
   a. the moon to fall toward Earth.
   b. the moon to move away from Earth.
   c. the sun to move away from Earth.
   d. stars to fall toward Earth.

2. The moon falls toward Earth in the sense that it falls
   a. with an acceleration of 10 m/s^2, as apples fall on Earth.
   b. with an acceleration greater than 10 m/s^2.
   c. beneath the straight-line path it would take without gravity.
   d. above the straight-line path it would take without gravity.

3. Planets remain in orbit while falling around the sun due to their
   a. tangential velocities.
   b. zero tangential velocities.
   c. accelerations of about 10 m/s^2.
   d. centrifugal forces that keep them up.

4. Newton did not discover gravity, for early humans discovered it whenever they fell. What Newton did discover is that gravity
   a. tells us about why the universe expands.
   b. tells us how to discover new planets.
   c. accounts for the existence of black holes.
   d. extends throughout the universe.

5. Consider a space probe three times as far from Earth's center. Compared at Earth's surface, its gravitational attraction to Earth at this distance is about
   a. one third as much.
   b. one half as much.
   c. one ninth as much.
   d. zero.

6. Compared to the gravitational field of Earth at its surface, Earth's gravitational field at Earth's center is
   a. zero.
   b. half as much.
   c. twice as much.
   d. three times as much.

7. When an astronaut in orbit is weightless, he or she is
   a. beyond the pull of Earth's gravity.
   b. still in the pull of Earth's gravity.
   c. in the pull of interstellar gravity.
   d. beyond the pull of the sun's gravity.

8. The highest ocean tides occur when the Earth and moon are
   a. lined up with the sun.
   b. at right angles to the sun.
   c. at any angle to the sun.
   d. lined up during spring.

9. A black hole is
   a. simply a collapsed star.
   b. a two-dimensional surface in space.
   c. barely visible with high-powered telescopes.
   d. a new form of gravity.

10. If the mass of Earth increased, with no change in radius, your weight would _____.
    a. stay the same
    b. decrease
    c. increase also

11. The gravitational force between two massive spheres _____. (circle all that apply)
    a. is always an attraction.
    b. depends on how massive they are.
    c. depends inversely on the square of the distances between them.

12. A very massive object A and a less massive object B move toward each other under the influence of mutual gravitation. Which force, if either, is greater?
    a. The force on B
    b. The force on A
    c. Both forces are the same.

Problems

1. Suppose that an apple at the top of a tree is pulled by Earth's gravity with a force of 1 N. If the tree were twice as tall, would the force of gravity on the apple be only 1/4 as strong? Explain your answer.

2. Your weight depends on what factors?

3. The attractive force that exists between all objects is known as what

4. By what factor would your weight be multiplied if Earth's diameter were 2 times as big and Earth's mass remained unchanged?

5. Calculate the force of gravity between Earth (mass = 6.0 x 1024 kg) and the moon (mass = 7.4 x 1022 kg). The average distance between the earth and the moon is 3.8 x 108 m.

Use Newton's gravitational law in a conceptual manner in order to fill in the following blanks.

6. Two objects gravitationally attract with a force of 18 N. If the distance between the two objects' centers is doubled, then the new force of attraction is _____ N.

7. Two objects gravitationally attract with a force of 18 N. If the distance between the two objects' centers is tripled, then the new force of attraction is _____ N.

8. Two objects gravitationally attract with a force of 18 N. If the distance between the two objects' centers is halved, then the new force of attraction is _____ N.

9. Two objects gravitationally attract with a force of 18 N. If the distance between the two objects' centers is decreased by a factor of three, then the new force of attraction is _____ N.

10. Two objects gravitationally attract with a force of 18 N. If the distance between their centers is decreased by a factor of four, then the new force of attraction is ___ N.

11. Two objects gravitationally attract with a force of 18 N. If the **mass** of one of the objects is doubled and the **distance** between their centers is doubled, then the new force of attraction is _____ N.

12. Two objects gravitationally attract with a force of 18 N. If the **masses** of both of the objects are doubled and the **distance** between their centers is doubled, then the new force of attraction is _____ N.
13. Two objects gravitationally attract with a force of 18 N. If the **masses** of both of the objects are tripled and the **distance** between the two objects' centers is doubled, then the new force of attraction is _____ N.