

$$F = \frac{G m_1 m_2}{r^2} \quad \text{when} \quad G = 6.67 \times 10^{-11} \text{ N}\cdot\text{m}^2/\text{kg}^2$$

Chapter 12 – Multiple Choice

- ___ 1. Why did Newton think there was a force acting on the moon?
 - a. because the moon always has the same side facing the earth
 - b. because the moon is moving in a curved path around the earth
 - c. because the moon is moving

- ___ 2. Newton had the insight to see that the:
 - a. moon always keeps one side toward the earth
 - b. moon orbits the earth
 - c. force on the moon keeping it in orbit around the earth is of the same nature as the force that causes an apple to fall to the earth

- ___ 3. Newton hypothesized that the moon:
 - a. is attracted to the earth
 - b. is falling around the earth
 - c. has a tangential velocity that keeps it from falling into the earth
 - d. all of these

- ___ 4. Newton reasoned that the gravitational attraction between the earth and the moon must:
 - a. increase as the moon gets farther from the earth
 - b. be the same at all distances
 - c. decrease as the moon gets farther from the earth

- ___ 5. The earth is attracted to the sun. Why doesn't it fall into the sun?
 - a. because the earth has a tangential velocity
 - b. because there is an equal force holding it away from the sun
 - c. because it has too much mass to move toward the sun

- ___ 6. The gravitational force between two masses:
 - a. depends on how large the masses are
 - b. is always an attractive force
 - c. decreases as the masses become farther apart
 - d. all of these

- ___ 7. Gravitational forces are the weakest forces in nature. Therefore:
 - a. gravitational forces between atomic particles do not exist
 - b. we notice gravitational forces only when a large mass is involved
 - c. we do not experience a gravitational force between a pencil and the earth
 - d. none of these

- ___ 8. If the mass of the earth were increased with no change in its radius, your weight would:
a. increase b. decrease c. remain the same

- ___ 9. If the radius of the earth were increased with no change in its mass, your weight would:
a. increase b. decrease c. remain the same

- ___ 10. Suppose that the gravitational force between two masses is 10 N. If the distance between the masses is doubled, what is the new force between the masses?
a. 2.5 N b. 5 N c. 10 N d. 20 N e. 40 N

- ___ 11. Suppose that the gravitational force between two masses is 10 N. If the distance between the masses is cut in half, what is the new force between the masses?
a. 2.5 N b. 5 N c. 10 N d. 20 N e. 40 N

- ___ 12. Suppose that the gravitational force between two masses is 10 N. If the magnitude of one of the masses is doubled, what is the new force between the masses?
a. 2.5 N b. 5 N c. 10 N d. 20 N e. 40 N

- ___ 13. Suppose that the gravitational force between two masses is 10 N. If the magnitude of both of the masses is doubled, what is the new force between the masses?
a. 2.5 N b. 5 N c. 10 N d. 20 N e. 40 N

- ___ 14. Suppose that the gravitational force between two masses is 10 N. If the magnitude of both of the masses is doubled, and the distance between the masses is also doubled, what is the new force between the masses
a. 2.5 N b. 5 N c. 10 N d. 20 N e. 40 N
- ___ 15. By noticing that the orbit of Uranus was perturbed (or thrown out of kilter) and by using the law of gravitation, astronomers found that:
a. Uranus has several moons
b. Pluto exists
c. there are exceptions to the law of gravitation
d. the law of gravity fails at large distances
- ___ 16. A rock and a pebble fall at the same rate on the earth because:
a. the gravitational force on each is the same
b. the ratio of weight to mass is the same for both
c. both reasons
d. neither reason
- ___ 17. Suppose that several volcanoes on the moon exploded and tons of lunar rock was thrust into space and did not return to the moon. This would:
a. increase the gravitational force between the moon and earth
b. decrease the gravitational force between the moon and earth
c. leave the gravitational force between the moon and the earth unchanged
- ___ 18. Suppose that several volcanoes on the moon exploded underground so that no matter escaped, but the volume and hence the radius of the moon increased. This would:
a. increase the gravitational force between the moon and earth
b. decrease the gravitational force between the moon and earth
c. leave the gravitational force between the moon and the earth unchanged
- ___ 19. A 40 kg woman weighting 400 N stands on top of a very tall ladder, so that she is one earth radius above the earth. What is her mass at the top of the ladder.
a. 0 kg b. 10 kg c. 20 kg d. 40 kg
- ___ 20. A 40 kg woman weighting 400 N stands on top of a very tall ladder, so that she is one earth radius above the earth. What is her weight at the top of the ladder.
a. 0 N b. 100 N c. 200 N d. 400 N
- ___ 21. The value of "g", the acceleration of gravity, is about 10 m/s^2 on the earth. This value:
a. depends on the mass of the earth
b. depends on the radius of the earth
c. is different for different planets
d. all of the above
- ___ 22. The earth attracts a football player with a force of 800 N. Accordingly, the football player with a force of
a. more than 800 N b. less than 800 N c. 800 N
- ___ 23. A synonym for gravitational force is:
a. mass b. pressure c. weight d. potential energy
- ___ 24. At the surface of the earth which experiences the greater gravitational attraction?
a. a small stone b. a large stone c. both the same
-

Free Response

25. What is planetary perturbation?

26. If the Earth "falls" in its own orbit, why doesn't it fall into the Sun?