

Physical Science 112 Homework for Chapters 11,12,15

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Chapter 11: Gravity

1. The distance between the centers of two bowling balls at rest on the classroom lecture desk is 1 meter. The bowling balls are moved farther apart so that their centers are now 2 meters apart.
 - a. The balls will each experience more gravitational pull by earth.
 - b. The balls will experience the same mutual gravitational attractive force as before.
 - c. The balls will experience less mutual gravitational attractive force.
 - d. A repulsive gravitational force will now exist between the two balls.
1. What would happen to the moon without the force of gravity?

It would fly off into space.

- a. True
- b. False

The equation for the Law of Universal Gravitation is: $F = Gm_1m_2/d^2$. Apply this equation for problems 3-6.

1. Suppose one of the masses (m_1) is doubled; Then $F_{\text{new}} = 2F_{\text{old}}$.
 - a. True
 - b. False
1. Suppose the distance d between m_1 and m_2 is doubled; Then $F_{\text{new}} = 1/4F_{\text{old}}$.
 - a. True
 - b. False
1. Suppose both masses are doubled; Then, $F_{\text{new}} = 3F_{\text{old}}$.
 - a. True
 - b. False
1. Suppose both masses are doubled and the distance between m_1 and m_2 is reduced by $\frac{1}{3}$; Then, $F_{\text{new}} = 18F_{\text{old}}$.
 - a. True
 - b. False
1. The value of g at the earth's surface is approximately 10 m/s^2 . The value of g at a distance of twice the earth's radius is 2.5 m/s^2 .
 - a. True
 - b. False
1. You weigh more if you weigh yourself in an elevator that was accelerating upward.
 - a. True
 - b. False

1. If you were in a car that drove off a cliff, you would be weightless and the value of g is zero.
 - a. True
 - b. False
1. What materials have gravitational pull?
 - a. Only the Earth
 - b. All matter has gravity
 - c. Everything has gravitational push
1. Why does an object weigh less on the Moon?
 - a. It has less mass on the Moon
 - b. There is no atmosphere on the Moon
 - c. The force of gravity is less on the Moon
1. Which falls faster: a 1 pound object or a 10 pound object?
 - a. The 10 pound object, because of its weight.
 - b. The 1 pound object, because of its lightness.
 - c. They both fall at the same speed.

Chapter 12: Work and Energy

13. Work

- a. has the units of force \times time
- b. is a vector quantity
- c. has the units of N-m
- d. can be measured in watts.

14. Energy

- a. has the same units as velocity.
- b. is measured in the same units as work
- c. is a vector quantity
- d. is the same thing as power

14. The joule

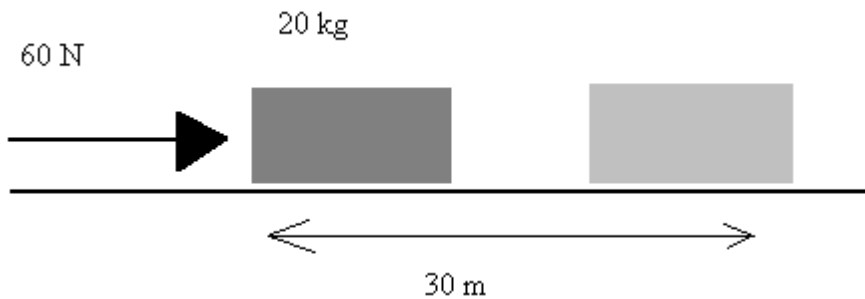
- a. Is a unit of power
- b. Can be used as a unit for either work or energy
- c. Is a unit in the British system
- d. Can only be used to designate mechanical kinetic energy.

14. The energy unit, the foot-pound

- a. Can also be used to express power
 - b. Equals 1 newton of force times 1 meter of distance
 - c. Is used in the British system for work as well as energy.
 - d. Is equivalent to the derived unit, the watt.
14. Any massive object that is moving will always have
- a. potential energy
 - b. kinetic energy
 - c. unbalanced force acting on it
 - d. angular momentum
15. The magnitude of an object's potential energy can be calculated by multiplying
- a. mass times height
 - b. weight times height
 - c. the mass times the velocity squared
 - d. Mass times velocity
16. The equation $\frac{1}{2}mv^2$ is used to determine
- a. momentum
 - b. potential energy
 - c. kinetic energy
 - d. horsepower
17. Which of the following is an expression used to calculate the potential energy of an object?
- a. $m g h$
 - b. weight / g
 - c. $F d / t$
 - d. v / t
18. After falling for 2 seconds, a ball that is dropped from the top of a building will have
- a. less kinetic energy than it had at the top of the building
 - b. more potential energy than it has when it started to fall.
 - c. the same kinetic energy that it had at the top, because energy is conserved.
 - d. a lower potential energy than it had at the top.
19. Two balls, one with a mass of 5.0 kg and the other with a mass of 7.5 kg, are allowed to fall freely from rest. If friction is ignored, at the end of 2 seconds they will have
- a. equal forces acting on them
 - b. the same kinetic energy
 - c. the same potential energy.

d. the same velocity.

20. A 64-kg student climbs a rope ladder on earth that is 16 m in vertical height. The work done by the student is
- 640 J
 - 1280 J
 - 10,000 J
 - 1000 J
21. A 60 N force is applied to a 20 kg mass moving it (horizontally) 30 m. The work performed is 1800 J.
- True
 - False
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22. A 30 N force is applied to a 30 kg mass at an angle of 20° to the horizontal with the mass moving horizontally 8.0 m. The work performed is 225.5 J.
- True
 - False

Chapter 15: Waves

23. When matter is disturbed, energy propagates outward from the disturbance. This propagation of energy is known as
- refraction
 - resonance
 - wave motion
 - dispersion
24. A transverse wave
- is made up of a series of compressions and rarefactions.
 - cannot travel through a vacuum.
 - can only oscillate at low frequencies.

- d. is representative of light and other electromagnetic waves.
25. If we know the frequency and the wave speed of a sound wave, which of the following can be determined.
- the sound intensity
 - the wavelength
 - the type of source producing the wave.
 - The amplitude of the longitudinal particle motion
26. In transverse wave motion
- the direction of particle vibration is *parallel* to the direction in which the wave is traveling.
 - the particles in the transport medium move in circles
 - the displacement is inversely proportional to the amplitude
 - the amplitude of the propagated waves is *perpendicular* to the direction of wave travel.
27. Energy is transferred by waves
- only if the waves are longitudinal
 - only when the waves propagate through a physical material
 - only if the waves are in resonance with each other
 - in the same direction as the propagation of the wave itself
28. By the amplitude of the wave, we mean the
- distance between molecules in the propagation medium
 - amount of time needed for the wave to perform one complete vibration
 - distance between the crests on the wave
 - maximum displacement of any particle from its position of equilibrium
29. The frequency of wave is measured in
- cycles
 - vibrations per meter
 - meters per second
 - hertz
30. The period of a wave is
- measured in cycles per second
 - equal to $1/\text{frequency}$
 - an indication of the energy transported by the wave.
 - always greater than 1
31. The distance from any point on a wave to the next identical point of that wave is called the
- amplitude
 - wavelength
 - period

d. pitch

32. Wave motion associated with sound is classified as

- a. transverse**
- b. longitudinal**
- c. compound**
- d. regular**

33. When studying light, the nanometer is a unit based for

- a. frequency**
- b. resonance**
- c. loudness**
- d. wavelength.**