

Physical Science Study Guide

Multiple Choice

Identify the choice that best completes the statement or answers the question.

- _____ 1. The electrons in a water molecule are gathered nearest to
a. the one oxygen atom. c. the four hydrogen atoms.
b. the two hydrogen atoms. d. None of the above
- _____ 2. Compounds that do not dissolve in water are usually
a. polar. c. homogenous.
b. dispersed. d. nonpolar.
- _____ 3. Loose sugar dissolves much faster than a sugar cube because loose sugar
a. has a greater surface area. c. has a higher temperature.
b. has less kinetic energy. d. has a greater surface tension.
- _____ 4. Molarity is a measure of concentration based on moles of
a. solute per liter of solution. c. solute per 100 g of solution.
b. solvent per liter of solution. d. solvent per 100 g of solution.
- _____ 5. What is a salt?
a. a solution that contains a strong acid
b. an ionic compound that does not contain oxide or hydroxide anions
c. a substance formed by mixing two strong acids together
d. a solution that contains more anions than cations and is strongly acidic
- _____ 6. Yogurt is made by changing
a. milk fat into an acid solution.
b. acid in milk into a strong base.
c. lactose (milk sugar) into lactic acid.
d. protein in milk into a denatured solid.
- _____ 7. A base forms which ions in solution?
a. oxygen c. hydronium
b. hydroxide d. hydrogen
- _____ 8. Which phrase is *not* true about strong acids?
a. conduct electricity well c. turn red litmus paper blue
b. ionize completely in water d. form H_3O^+ ions in solution
- _____ 9. What does the pH of a solution measure?
a. concentration of H_3O^+ ions c. concentration of metal ions
b. molarity of the solute d. solubility of the solute
- _____ 10. A 0.00001 M solution of the strong acid HCl has a pH of
a. 2 c. 4
b. 3 d. 5
- _____ 11. Soaps and detergents are
a. molecular compounds. c. ionic compounds.
b. nonpolar compounds. d. covalent compounds.
- _____ 12. When a solution of an acid reacts with a solution of a base, hydronium ions react with hydroxide ions to form
a. salt. c. a weaker base.
b. a stronger acid. d. water.

- _____ 13. Which solution is the most acidic?
- a. a solution with a pH = 10
 - b. a solution with a pH = 6
 - c. a solution with a pH = 3
 - d. a solution with a pH = 1
- _____ 14. A sample of plutonium-239 decays to one-eighth of its original amount after 7.236×10^4 years. What is its half-life?
- a. 2.412×10^4 years
 - b. 3.618×10^4 years
 - c. 7.236×10^4 years
 - d. 1.447×10^5 years
- _____ 15. In a stable nucleus, the attractive forces are _____ the repulsive forces.
- a. weaker than
 - b. stronger than
 - c. canceled out by
 - d. equal to
- _____ 16. The process of nuclear change in an atom of radioactive material is called
- a. radioactive decay.
 - b. isotopes.
 - c. nuclear mass.
 - d. radon.
- _____ 17. The opposite of fusion is called
- a. beta decay.
 - b. alpha decay.
 - c. fission.
 - d. neutron transmission.
- _____ 18. You prepare a large screened-in box, inside of which you place several dozen mouse traps. You set each trap, and on each mouse trap you place a table tennis ball. You then drop another ball into the box, which sets off one of the mouse traps, which sets off other mouse traps, and so on. You have just demonstrated
- a. a chain reaction.
 - b. the theory of relativity.
 - c. fusion.
 - d. alpha decay.
- _____ 19. On a speed-time graph, a line with a negative slope indicates that the object is
- a. speeding up.
 - b. slowing down.
 - c. not moving.
 - d. traveling at a constant speed.
- _____ 20. An object is in motion when
- a. you observe the object move.
 - b. the object's speed increases.
 - c. the object's displacement is greater than the distance traveled.
 - d. the object changes position relative to a stationary reference point.
- _____ 21. When the motion of an object is shown by a straight line on a distance vs. time graph with distance on the y-axis, the slope of the line is the
- a. distance traveled.
 - b. displacement.
 - c. speed.
 - d. time of travel.
- _____ 22. The distance traveled by an object divided by the time it takes to travel that distance is called
- a. average velocity.
 - b. average speed.
 - c. average acceleration.
 - d. negative acceleration.
- _____ 23. An object is in motion when
- a. the net force acting on the object is zero.
 - b. friction occurs.
 - c. the object's displacement is greater than the distance traveled.
 - d. the object changes position relative to a frame of reference.
- _____ 24. Acceleration is defined as the change in velocity divided by
- a. speed.
 - b. final velocity.
 - c. time.
 - d. distance.

- _____ 25. Which statement about weight is *incorrect*?
- An object weighs more on the moon than it weighs on Earth.
 - A change in an object's location can change the object's weight.
 - An object's weight is directly proportional to its mass.
 - The weight of an object depends on gravity.
- _____ 26. Which statement about action-reaction force pairs is *incorrect*?
- They act on the same object.
 - They always occur in pairs.
 - They occur at the same time.
 - They are equal and opposite.
- _____ 27. Two identical cars are traveling at equal speeds. One is going north and the other south. If they collide head-on and stick together, what will happen to the motion of the cars?
- Both cars will move north.
 - Both cars will move east.
 - Both cars will move south.
 - Both cars will stop.
- _____ 28. When a moving bowling ball hits a pin, some of the ball's momentum
- doubles in force.
 - increases the pin's mass.
 - is transferred to the pin.
 - is lost.
- _____ 29. Which of the following is *not* a factor in calculating momentum?
- mass
 - direction
 - acceleration
 - speed
- _____ 30. Whenever an object is standing still, which value is always zero?
- speed
 - velocity
 - momentum
 - All of the above
- _____ 31. Near Earth's surface, an object's free-fall acceleration increases as its
- mass increases.
 - weight increases.
 - speed increases.
 - None of the above
- _____ 32. What is the kinetic energy of a 1.40 kg discus with a speed of 22.5 m/s?
- 15.8 J
 - 31.5 J
 - 354 J
 - 709 J
- _____ 33. Mechanical energy can change to nonmechanical energy as a result of
- air resistance.
 - heat.
 - radiation.
 - None of the above
- _____ 34. An 84% efficient single pulley is used to lift a 230 kg piano 3.5 m. How much work must be input?
- 676 J
 - 9.6×10^2 J
 - 6.6×10^3 J
 - 9.4×10^3 J
- _____ 35. An inclined plane
- changes the direction of the force only.
 - changes the magnitude of the force only.
 - changes both the magnitude and the direction of the force.
 - decreases the amount of work done.
- _____ 36. What is the gravitational potential energy of a 54 kg box that is 8.0 m above the ground?
- 5,500 J
 - 4,300 J
 - 3,400 J
 - 550 J
- _____ 37. A man pushes a crate along a factory floor by exerting a force of 55 N. If the crate moves a distance of 4.0 m, how much work does the man perform?
- 165 N
 - 220 N
 - zero
 - 145 J

- ___ 38. What are the units of power?
 a. watts
 b. horsepower
 c. joules per second
 d. All of the above
- ___ 39. Which of the following is *not* in the inclined plane family?
 a. a wedge
 b. a screw
 c. a ramp
 d. a wheel and axle
- ___ 40. Which of the following statements about work and energy is *not* true?
 a. When work is done, energy is transferred or transformed.
 b. Energy may be defined as the ability to do work.
 c. Work and energy are always equal.
 d. Work and energy have the same units.
- ___ 41. The kind of energy associated with atomic bonds is
 a. nuclear energy.
 b. light energy.
 c. chemical energy.
 d. kinetic energy.
- ___ 42. When energy is transformed, the amount of usable energy
 a. decreases.
 b. remains constant.
 c. increases.
 d. None of the above
- ___ 43. Using the following table, determine which substance can absorb the most energy in a temperature increase of 1 K.

SPECIFIC HEATS AT 25°C

Substance	c (J/kg • K)	Substance	c (J/kg • K)
Water (liquid)	4,186	Copper	385
Steam	1,870	Gold	129
Ammonia (gas)	2,060	Iron	449
Ethanol (liquid)	2,440	Mercury	140
Aluminum	897	Lead	129
Carbon (graphite)	709	Silver	234

- a. liquid water
 b. aluminum
 c. gold
 d. lead
- ___ 44. How much heat energy will cause the temperature of 7.0 kg of iron to increase its temperature by 15 K? The specific heat of iron is 449 J/kg • K.
 a. 6.8×10^4 J
 b. 4.7×10^4 J
 c. 7.0×10^4 J
 d. 3.0×10^4 J
- ___ 45. Sound waves from a radio generally travel in which medium?
 a. air
 b. earth
 c. light
 d. water
- ___ 46. If a transverse wave is moving from right to left, the individual particles in the medium are moving
 a. right to left.
 b. left to right.
 c. up and down.
 d. None of the above
- ___ 47. The _____ is the time it takes for one full vibration of a particle in a medium.
 a. period
 b. frequency
 c. amplitude
 d. wave speed

Name: _____

ID: A

- _____ 48. The speed of a sound wave
- a. depends on wavelength.
 - b. depends on the medium.
 - c. depends on amplitude.
 - d. None of the above
- _____ 49. The frequency of a sound wave determines
- a. the pitch of the sound.
 - b. how loud the sound is.
 - c. how fast the sound travels.
 - d. the magnitude of the compression.
- _____ 50. The color of light is determined by the _____ of the light waves.
- a. medium
 - b. speed
 - c. frequency
 - d. amplitude