High School Science

Study Guide

Cycle 1

Correct answers are in bold

1. EARTH SCIENCE: A lightning bolt is seen and its accompanying thunder is heard 15 seconds later. This means the storm is most likely how many miles away:
W) 3
X) 10
Y) 9
Z) 15

2. BIOLOGY: Human epidermis is mostly composed of which of the following basic animal tissues types:
W) epithelial
X) connective
Y) nervous
Z) muscle

3. PHYSICS: A constant force acting on a body experiencing no change in its environment will give the body:
W) constant acceleration
X) constant speed
Y) constant velocity
Z) zero acceleration

4. EARTH SCIENCE: Which of the following is LEAST accurate about minerals:
W) calcite has a hardness of 3 on most of its surfaces but a hardness of 4 along the crystal face perpendicular to its long axis
X) the Moh's scale doesn't measure the absolute hardness of minerals
Y) a mineral's chemical composition largely determines its crystal shape and cleavage pattern
Z) a mineral's color is the same as its streak

5. PHYSICS: Upon which of the following does the mass of a body MOST directly depend:
W) its magnetic properties
X) how much volume it has
Y) the amount of matter it contains
Z) its location

6. PHYSICS: Mary and Joe are on a merry-go-round. Mary is seated near the center of rotation and Joe is on the outer edge. Which of the following BEST describes their motion:
W) Mary has a greater acceleration than Joe
X) Joe has a greater acceleration than Mary
Y) neither Mary nor Joe are accelerating
Z) both Mary and Joe have the same acceleration

7. EARTH SCIENCE: Which of the following is NOT true of what occurs during an equinox:
W) equal length of day and night except at the poles
X) the Earth is not tilted with respect to the ecliptic
Y) the Sun is directly overhead at the equator
Z) the Moon is directly overhead at the poles

8. PHYSICS: Martin is swinging a yo-yo in a large room with a circular motion perpendicular to a level floor. If the yo-yo breaks away from its string at the top of the yo-yo's circular path, in what direction will the yo-yo initially move:
W) at an angle between horizontal and vertical
X) straight up, toward the ceiling
Y) straight down, to the floor
Z) horizontally, tangent to its original circular path

9. MATH: Which of the following numbers is evenly divisible by both 11 and 3:
W) 7791
X) 7553
Y) 5181
Z) 8769

10. EARTH SCIENCE: The principle constituent of most granites is:
W) feldspar
X) muscovite
Y) calcite
Z) dolomite

11. CHEMISTRY: Group 1 cations and group 7 anions combine to form:
W) metal alloys
X) alkali halides
Y) alkaloids
Z) organometallic compounds

12. PHYSICS: A child learns that mixing approximately equal amounts of the paint colors orange and green produces brown. This is an example of:
W) additive color mixing
X) summative color generation
Y) subtractive color synthesis
Z) neutral coloration

13. MATH: One-fifth of 0.04% is equal to:
W) $8 \times 10–2$
X) $8 \times 10–3$
Y) $8 \times 10–4$
Z) $8 \times 10–5$

14. EARTH SCIENCE: Mount Vesuvius in Italy is a typical:
W) mud volcano
X) caldera
Y) cinder cone
Z) composite volcano

15. GENERAL SCIENCE: Anthropogenic means:
W) generated by humans
X) created many years ago
Y) carried in primate genes
Z) harmful to elderly people

16. PHYSICS: Jay walks to his car and drives to the store. The trip takes 20 minutes. Jay figures how far he traveled on foot and by car and divides the distance by how long the trip took. Which of the following BEST describes what Jay has computed:
W) total velocity
X) average acceleration
Y) average speed
Z) instantaneous velocity

17. BIOLOGY: Which of the following BEST describes the function of the golgi (read as: GOAL-gee) complex:
W) metabolism of carbohydrates
X) production of peroxides
Y) modification and packaging of proteins for exocytosis
Z) storage of lipids

18. EARTH SCIENCE: In the oceans, waves and surf currents are generated by:
W) wind
X) El-Nino
Y) salinity and temperature gradients
Z) the Intertropical Convergence Zone

19. EARTH SCIENCE: Which of the following cloud types is classified as a low cloud:
W) altostratus
X) cirrostratus
Y) cumulonimbus
Z) nimbostratus

20. EARTH SCIENCE: Panning is a simple mining technique that is used for extracting gold deposited in:
W) banded gold formations
X) evaporite deposits
Y) placer deposits
Z) lode deposits

21. CHEMISTRY: A beaker of concentrated aqueous ammonia is placed next to a beaker of concentrated aqueous hydrochloric acid at room temperature. After a short while, a white cloud forms between the beakers. This is a demonstration of:
W) effusion
X) diffusion
Y) efflorescence
Z) effervescence

22. CHEMISTRY: In addition to the “sniff test”, which of the following is a standard laboratory test for a sulfide, such as hydrogen sulfide gas:
W) the gas passed over a filter paper soaked in colorless lead nitrate turns the paper brown
X) when inserted into a flame, a glowing wooden splint bursts into flames
Y) a flame test gives off a deep purple color
Z) paper chromatography

23. BIOLOGY: Which of the following BEST describes what the term virulence means:
W) the specificity of a virus to cause disease in a certain host
X) the ability of a microbe to cause cellular damage
Y) any transmissible disease caused by a microbe
Z) the degree to which a microbe causes disease or harm to its host

24. MATH: If triangle ABD is congruent with triangle EFG, which of the following MUST be true:
W) side AB is congruent to side EF
X) side AD is congruent to side FG
Y) measure of angle B = measure of angle G
Z) measure of angle A = measure of angle G

25. EARTH SCIENCE: Which of the following is LEAST accurate regarding earthquakes:
W) scientists agree that mega-quakes of magnitude 10 are very likely in the near future
X) the world's greatest earthquake zone is the circum-Pacific seismic belt
Y) Alaska has the greatest number of earthquakes in the U.S.
Z) deep earthquakes are much less likely to be followed by aftershocks than shallow earthquakes

26. CHEMISTRY: Which of the following is NOT an endothermic process:
W) sublimation
X) melting
Y) vaporization
Z) condensation

27. PHYSICS: Which of the following is TRUE of a sound wave traveling in dry air at STP at a constant velocity:
W) if frequency increases, wavelength increases
X) if frequency increases, wavelength decreases
Y) if frequency decreases, wavelength decreases
Z) if frequency increases, wavelength stays the same

28. ASTRONOMY: Most of the galaxies in the universe are classified as which of the following:
W) spiral
X) lenticular
Y) irregular
Z) dwarf

29. CHEMISTRY: A molecular solid will most typically have which of the following melting points:
W) very high
X) high to very high
Y) low
Z) variable

30. GENERAL SCIENCE: Bioluminescence is a phenomenon most common in which of the following environments:
W) marine
X) fresh water
Y) land
Z) atmosphere

31. GENERAL SCIENCE: Which of the following is a mixing incompatibility of common household products that can produce toxic products:
W) vinegar and baking soda
X) vinegar and bleach
Y) vinegar and borax
Z) castile soap and salt

32. BIOLOGY: Eggs exit a chicken's body through what specific structure:
W) rectal plexus
X) cloaca (read as: KLO-aye-ka)
Y) rostrum
Z) spiculum

33. MATH: Which of the following is NOT a Pythagorean triple:
W) 15, 20, 25
X) 10, 24, 26
Y) 16, 24, 30
Z) 33, 44, 55

34. EARTH SCIENCE: Cirrus clouds are typically found at elevations of:
W) 20,000 feet and above
X) 10,000 to 20,000 feet
Y) 5,000 to 10,000 feet
Z) 2,000 to 5,000 feet

35. GENERAL SCIENCE: Which of the following is the main reason why Africanized honey bees are much more dangerous to humans and animals than European honey bees:
W) they defend their nests more intensely
X) their venom is 10-times more potent
Y) they can sting multiple times
Z) they are larger and carry more venom

36. BIOLOGY: From which of the following is the cell wall of plants mostly composed:
W) protein
X) lipid monolayer
Y) lipid bilayer
Z) polysaccharide

37. CHEMISTRY: The conversion of solid $CaSO_4$ into solid CaO and SO_2 gas is an example of what class of chemical reaction:
W) decomposition
X) hydrolysis
Y) combustion
Z) single replacement

38. BIOLOGY: Which of the following BEST describes how Pasteur attenuated the rabies virus to create an effective vaccine:
W) by heat-treating the purified virus
X) by treating the live virus with a weak solution of formaldehyde
Y) by passing the rabies infection through a successive series of rabbits
Z) by purifying the protein from the viral capsids

39. EARTH SCIENCE: Which of the following is commonly accepted as the engine that most directly drives plate tectonic motion:
W) mantle convection
X) volcanic off-gassing
Y) a molten iron core
Z) gravitational pull of the Moon and Sun

40. GENERAL SCIENCE: What is the MOST accurate term for predicting values of data that are located between known data points on a line graph:
W) extrapolation
X) extension
Y) interpolation
Z) cheating

41. ASTRONOMY: At which of the following locations would Betelgeuse most likely be found by a stargazer at mid-northern latitudes during January at about midnight:
W) at the beginning of the handle of the big dipper
X) at the zenith near the star Vega
Y) about 10º north of Orion's belt in the southern sky
Z) in the northern sky just above the star Capella

42. CHEMISTRY: $Ca(OH)_2$, NaOH, and $Ba(OH)_2$, are all:
W) weak bases
X) completely ionized in water
Y) alkali halides
Z) standard buffers

43. CHEMISTRY: Which of the following compounds is most SOLUBLE in water at 10ºC:
W) KNO_3
X) $CaSO_4$
Y) $BaSO_4$
Z) AgBr

44. PHYSICS: Which of the following BEST explains why gravitational acceleration on Earth varies from one place to another:
W) the Sun's gravitational pull varies irregularly
X) the Earth is not a uniform sphere
Y) the Moon and the Sun exert a complex combination of gravitational pulls on the Earth
Z) the changing angular momentum of the Earth varies during its yearly orbit

45. EARTH SCIENCE: Which of the following is NOT true:
W) Mount Everest is a volcanic mountain
X) shield volcanoes have surface slopes of only a few degrees
Y) the depression on the top of a typical composite volcano is known as a crater
Z) Mount Kilimanjaro is a stratovolcano

46. GENERAL SCIENCE: Biomagnification is MOST likely to result in the concentration of toxic chemicals in:
W) chemoautotrophs
X) eutrophic lakes
Y) primary consumers
Z) primary producers

47. CHEMISTRY: The electronegativity of oxygen is 3.4 and the electronegativity of calcium is 1.0. Which of the following best describes the formation of the calcium oxide:
W) 2 electrons are transferred from calcium to oxygen
X) 2 electrons are transferred from oxygen to calcium
Y) 2 electrons are shared between calcium and oxygen
Z) 1 electron is shared and another is transferred from calcium to oxygen

48. BIOLOGY: By words or numbers, name all of the following 3 functions that meiosis accomplishes:
reducing the copies of alleles in the ovum and sperm
reducing the numbers of chromosomes in the ovum and sperm
increasing genetic diversity through chromosomal exchange events
all

49. EARTH SCIENCE: Which of the following is igneous and pyroclastic in nature, and is of variable composition:
W) pumice
X) obsidian
Y) gabbro
Z) tuff

50. GENERAL SCIENCE: Which of the following is an all but obsolete battery technology stopped by government regulations in this country because of toxicity issues:
W) nickel-cadmium cells
X) zinc-oxide cells
Y) zinc-air cells
Z) aluminum-air cells

51. GENERAL SCIENCE: Which of the following best explains why carbon monoxide is very harmful to animals:
W) it binds very strongly to hemoglobin
X) it is an irritant to the alveolar lining
Y) it is a highly potent neurotoxin
Z) it causes a severe allergic reaction

52. CHEMISTRY: Charles law is particularly useful in explaining which of the following:
W) dry air is more dense than humid air
X) CO_2 escapes from a bottle of soda when opened
Y) the change in enthalpy when nitrogen and oxygen react to form nitrogen dioxide
Z) a hot-air balloon rises when the air in the balloon is heated

53. PHYSICS: A boat's velocity has a northward velocity component of 15 kilometers per hour and an eastward component of 10 kilometers per hour. Which of the following BEST represents the direction of the boat's motion:
W) 35 kilometers per hour northeast
X) 35 kilometers per hour southwest
Y) 18 kilometers per hour northeast
Z) 12 kilometers per hour northeast

54. EARTH SCIENCE: Which of the following happens to the shells of snails and limpets as seawater becomes increasingly acidic:
W) they begin to dissolve
X) they become thicker
Y) they develop much later in the organism's life
Z) they become darker

55. EARTH SCIENCE: Continental margins facing the edges of diverging tectonic plates are called:
W) passive margins
X) Pacific-type margins
Y) transform fault margins
Z) active margins

56. CHEMISTRY: Which of the following is a molecule having a nonpolar covalent bond:
W) bromine gas
X) hydrogen fluoride
Y) water
Z) hydrogen bromide

57. GENERAL SCIENCE: Which of the following is NOT true:
W) only a few harmful algal bloom species actually produce toxins that are poisonous to people
X) algal blooms occur in marine and freshwater environments
Y) algal blooms can occur in the open ocean far from any coastal inlets
Z) pollution is always to blame for harmful algal blooms along coastal waters

58. GENERAL SCIENCE: 500 metric gigatons is approximately equal to how many pounds:
W) 1.1 trillion
X) 11 trillion
Y) 110 trillion
Z) 1,100 trillion

59. ASTRONOMY: If a star is seen just above the eastern horizon at sunset, where would it most likely be found just before the following sunrise:
W) just above the eastern horizon
X) half-way up in the eastern sky
Y) low in the western sky
Z) directly overhead

60. CHEMISTRY: Which of the following are elements in the Periodic Table whose outer shell electrons are on two principal energy levels:
W) alkali metals
X) noble gases
Y) alkaline Earth metals
Z) transition elements

61. GENERAL SCIENCE: Which of the following BEST describes the function of boric acid in the manufacture of Pyrex or borosilicate glass:
W) makes the glass more scratch-resistant
X) makes the glass more brittle
Y) reduces the linear coefficient of expansion of the glass
Z) reduces the effect of detrimental ultraviolet light exposure

62. EARTH SCIENCE: Which of the following are intrusive masses of igneous rock that extend downward to unknown depths and do not show signs of a definite floor:
W) laccolith
X) batholith
Y) sill
Z) volcanic neck

63. EARTH SCIENCE: Which of the following is NOT a common mineral in igneous rock but rather an accessory that typically occurs in small amounts:
W) quartz
X) muscovite
Y) plagioclase
Z) orthoclase

64. CHEMISTRY: Which of the following is NOT true:
W) hydrogen gas found in nature exists as a monatomic molecule
X) when 2 oxygen atoms combine to form O2, energy is released
Y) when chlorine gains 1 electron, it becomes larger
Z) noble gases tend not to bond because of their stable valence configurations

65. BIOLOGY: Which of the following is the term for the transfer of genes by viruses from one prokaryote to another:
W) transduction
X) conjugation
Y) transformation
Z) relaxation

66. CHEMISTRY: Which of the following is NOT true of ideal gases:
W) 2 or more gases form homogeneous mixtures in all proportions
X) collisions between gas particles are both elastic and inelastic
Y) they diffuse rapidly
Z) they assume the shapes of their containers

Physics

67. **What is the term for the resistance of an object to change its state of motion?**
    a) Force
    b) Momentum
    c) Inertia
    d) Acceleration
    Correct Answer: c) Inertia

68. **What is the term for the force that opposes motion between two surfaces?**
    a) Tension
    b) Friction
    c) Gravity
    d) Normal force
    Correct Answer: b) Friction

69. **What is the term for the amount of work done per unit of time?**
    a) Force
    b) Power
    c) Energy
    d) Momentum
    Correct Answer: b) Power

70. **What is the term for the product of an object's mass and velocity?**
    a) Force
    b) Momentum
    c) Acceleration
    d) Inertia
    Correct Answer: b) Momentum

71. **What is the term for a push or pull that acts on an object?**
    a) Friction
    b) Force
    c) Energy
    d) Momentum
    Correct Answer: b) Force

72. **What is the term for the transfer of energy by electromagnetic waves?**
    a) Conduction
    b) Convection
    c) Radiation
    d) Refraction
    Correct Answer: c) Radiation

73. **What is the term for the point where an object pivots or rotates?**
    a) Center of mass
    b) Fulcrum
    c) Axis
    d) Lever
    Correct Answer: b) Fulcrum

74. **What is the term for the force of gravity on an object?**
    a) Mass
    b) Weight
    c) Volume
    d) Pressure
    Correct Answer: b) Weight

75. **What is the term for the upward force exerted by a fluid on an object?**
    a) Friction
    b) Buoyant force
    c) Tension
    d) Compression
    Correct Answer: b) Buoyant force

76. **What is the term for the energy stored in an object due to its position?**
    a) Thermal energy
    b) Chemical energy
    c) Potential energy
    d) Kinetic energy
    Correct Answer: c) Potential energy

77. **What is the term for the force that keeps an object moving in a circular path?**
    a) Centripetal force
    b) Gravitational force
    c) Frictional force
    d) Tensional force
    Correct Answer: a) Centripetal force

78. **What is the term for a circuit with only one path for current to flow?**
    a) Series circuit
    b) Parallel circuit
    c) Closed circuit
    d) Open circuit
    Correct Answer: a) Series circuit

Chemistry

79. **What is the term for the smallest unit of an element that retains its properties?**
    a) Molecule
    b) Atom
    c) Compound
    d) Ion
    Correct Answer: b) Atom

80. **What is the term for the number of protons in the nucleus of an atom?**
    a) Atomic weight
    b) Atomic number
    c) Mass number
    d) Isotope number
    Correct Answer: b) Atomic number

81. **What is the term for a substance dissolved in a solution?**
    a) Solvent
    b) Solute
    c) Mixture
    d) Precipitate
    Correct Answer: b) Solute

82. **What is the term for the reaction between an acid and a base?**
    a) Neutralization
    b) Decomposition
    c) Synthesis
    d) Combustion
    Correct Answer: a) Neutralization

83. **What is the term for the energy required to start a chemical reaction?**
    a) Activation energy
    b) Kinetic energy
    c) Potential energy
    d) Bond energy
    Correct Answer: a) Activation energy

84. **What is the term for a positively charged ion?**
    a) Anion
    b) Cation
    c) Proton
    d) Electron
    Correct Answer: b) Cation

85. **What is the term for the vertical columns on the periodic table?**
    a) Groups
    b) Periods
    c) Families
    d) Blocks
    Correct Answer: a) Groups

Biology

86. **What is the term for the basic unit of life?**
    a) Atom
    b) Cell
    c) Molecule
    d) Tissue
    Correct Answer: b) Cell

87. **What is the term for an organism that can produce its own food?**
    a) Consumer
    b) Decomposer
    c) Producer
    d) Parasite
    Correct Answer: c) Producer

88. **What is the term for the process by which organisms release energy from glucose?**
    a) Photosynthesis
    b) Fermentation
    c) Cellular respiration
    d) Transpiration
    Correct Answer: c) Cellular respiration

89. **What is the term for the molecule that carries genetic information?**
    a) RNA
    b) DNA
    c) Protein
    d) Lipid
    Correct Answer: b) DNA

90. **What is the term for the fluid-filled part of the cell where organelles are located?**
    a) Nucleus
    b) Cytoplasm
    c) Mitochondria
    d) Ribosome
    Correct Answer: b) Cytoplasm

91. **What is the term for the specific role an organism plays in its ecosystem?**
    a) Habitat
    b) Niche
    c) Population
    d) Community
    Correct Answer: b) Niche

92. **What is the term for a cell with a nucleus and membrane-bound organelles?**
    a) Prokaryotic
    b) Eukaryotic
    c) Bacterial
    d) Archaeal
    Correct Answer: b) Eukaryotic

Earth Science

93. **What is the term for the layer of gases surrounding Earth?**
    a) Lithosphere
    b) Atmosphere
    c) Hydrosphere
    d) Biosphere
    Correct Answer: b) Atmosphere

94. **What is the term for the supercontinent that existed millions of years ago?**
    a) Gondwana
    b) Pangaea
    c) Laurasia
    d) Atlantis
    Correct Answer: b) Pangaea

95. **What is the term for the process by which sediment is compacted and cemented to form rock?**
    a) Weathering
    b) Erosion
    c) Lithification
    d) Deposition
    Correct Answer: c) Lithification

96. **What is the term for the layer of Earth that includes the crust and upper mantle?**
    a) Lithosphere
    b) Asthenosphere
    c) Core
    d) Hydrosphere
    Correct Answer: a) Lithosphere

97. **What is the term for the process of water seeping into the ground?**
    a) Percolation
    b) Infiltration
    c) Evaporation
    d) Transpiration
    Correct Answer: b) Infiltration

98. **What is the term for the layer of the atmosphere closest to Earth?**
    a) Troposphere
    b) Stratosphere
    c) Mesosphere
    d) Thermosphere
    Correct Answer: a) Troposphere

99. **What is the term for the process by which heavier elements sink to the center of a planet?**
    a) Subduction
    b) Differentiation
    c) Erosion
    d) Compaction
    Correct Answer: b) Differentiation

100. **What is the term for the slow movement of Earth's continents over time?**
    a) Plate tectonics
    b) Continental drift
    c) Subduction
    d) Erosion
    Correct Answer: b) Continental drift