Chapter 16

Right Answers and Explanations for the Practice Questions for the *General Science: Content Knowledge* Tests

Right Answers and Explanations for the Practice Questions

Now that you have answered all of the practice questions, you can check your work. Compare your answers with the correct answers in the table below.

Question Number	Correct Answer	Content Category
1	C	History and Nature of Science
2	C	History and Nature of Science
3	B	History and Nature of Science
4	B	History and Nature of Science
5	B	History and Nature of Science
6	A	History and Nature of Science
7	B	History and Nature of Science
8	A	History and Nature of Science
9	D	Physical Sciences - Basic Principles, Matter and Energy
10	C	Physical Sciences - Basic Principles, Matter and Energy
11	A	Physical Sciences - Basic Principles, Matter and Energy
12	B	Physical Sciences - Basic Principles, Atomic and Nuclear Structure
13	D	Physical Sciences - Basic Principles, Heat and Thermodynamics
14	C	Physical Sciences - Basic Principles, Heat and Thermodynamics
15	A	Physical Sciences - Basic Principles, Atomic and Nuclear Structure
16	B	Physical Sciences - Physics, Waves
17	C	Physical Sciences - Physics, Waves
18	C	Physical Sciences - Physics, Waves
19	A	Physical Sciences - Physics, Waves
20	C	Physical Sciences - Physics, Electricity and Magnetism
21	C	Physical Sciences - Physics, Electricity and Magnetism
22	C	Physical Sciences - Physics, Electricity and Magnetism
23	B	Physical Sciences - Physics, Electricity and Magnetism
24	C	Physical Sciences - Physics, Mechanics
25	A	Physical Sciences - Physics, Mechanics
26	C	Physical Sciences - Physics, Mechanics
27	B	Physical Sciences - Physics, Mechanics
28	A	Physical Sciences - Chemistry, Chemical Reactions
29	D	Physical Sciences - Chemistry, Periodicity
30	C	Physical Sciences - Chemistry, Moles and Bonding, Nomenclature
31	C	Physical Sciences - Chemistry, Moles and Bonding
32	B	Physical Sciences - Chemistry, Chemical Reactions
33	C	Physical Sciences - Chemistry, Chemical Reactions, Endothermic and Exothermic
34	D	Physical Sciences - Chemistry, Kinetics Molecular Theory and States of Matter
35	A	Physical Sciences - Chemistry, Kinetics Molecular Theory and States of Matter
36	C	Physical Sciences - Chemistry, Solutions and Solubility
37	B	Physical Sciences - Chemistry, Solutions and Solubility
38	D	Physical Sciences - Chemistry, Chemical Reactions
39	B	Life Sciences - The Cell
40	D	Life Sciences - Diversity of Life
41	A	Life Sciences - Ecology
42	A	Life Sciences - Plants
43	D	Life Sciences - Animals
44	A	Life Sciences - The Cell
45	A	Life Sciences - Classical Genetics
46	C	Life Sciences - Ecology
47	C	Life Sciences - Animals
48	D	Life Sciences - Diversity of Life
49	D	Life Sciences - Molecular Basis of Heredity / Evolution
50	A	Life Sciences - Animals
51	A	Life Sciences - Evolution
52	D	Life Sciences - Ecology
53	B	Life Sciences - The Cell
54	C	Earth/Space Sciences - Astronomy, Seasons
55	C	Earth/Space Sciences - Astronomy, units of distance
56	C	Earth/Space Sciences - Historical Geology, fossil record
57	A	Earth/Space Sciences - Physical Geology, identify minerals
58	A	Earth/Space Sciences - Physical Geology, stratigraphy
59	B	Earth/Space Sciences - Physical Geology, plate tectonics
60	D	Earth/Space Sciences - Physical Geology, faulting
61	D	Earth/Space Sciences - Historical Geology, relative vs. absolute time
62	D	Earth/Space Sciences - Physical Geology, identify minerals
63	C	Earth/Space Sciences - Oceanography, property of sea water
64	D	Earth /Space Sciences - Physical Geology, plate tectonics
65	C	Earth/Space Sciences - Physical Geology, topography
66	D	Earth/Space Sciences - Meteorology, low-pressure system
67	C	Earth/Space Sciences - Meteorology, dew point
68	D	Earth /Space Sciences - Astronomy, moon phases
69	B	Science, Technology and Social Perspectives
70	D	Science, Technology and Social Perspectives
71	A	Science, Technology and Social Perspectives
72	D	Science, Technology and Social Perspectives
73	A	Science, Technology and Social Perspectives
74	C	Science, Technology and Social Perspectives
75	D	Science, Technology and Social Perspectives

Explanations of Right Answers

1. This question requires fundamental understanding of how to interpret graphic data. You must also understand the relationship between the numerical values on the pH scale and the classification of these values as acidic or basic. The data show that only drugs *X* and *Y* reduce acid (increase the pH value) as compared to the saline control. Drug *Y*'s maximal effects last 9 to 10 hours, while drug *X*'s effects last only 3 to 4 hours. The correct answer, therefore, is (C).

2. This question requires an understanding of dependent versus independent variables in experimental design. In this experiment, changes in the stomach pH depend on the presence of different drugs over a 24-hour time period. The correct answer, therefore, is (C).

3. Hypotheses are testable statements that lead to predictions that can be confirmed or rejected experimentally. They do not need to be proposed by a famous scientist (A), nor are they accepted until supported by data and observations gathered under controlled conditions (C). These data may be obtained in the field as well as the laboratory, i.e., under the appropriate condition for testing the validity of the hypothesis. The correct answer, therefore, is (B).

4. One method of soil classification is based on the percentages of silt, clay, and sand present in the soil sample. To identify the soil, follow the percent lines for the three categories and find where all three lines intersect. The correct answer, therefore, is (B).

5. Water has a very high specific heat capacity. The excess water can absorb much of the heat released by the dissolving process when it is in greater amount. If water is added to acid, the water is in a lesser amount and will boil. A boiling solution of concentrated sulfuric acid is quite dangerous. The correct answer, therefore, is (B).

6. Burets are read to the nearest 0.01 mL. Estimate one decimal beyond the calibration. The correct answer, therefore, is (A).

7. A significant digit in a measurement is used to express the precision of the measure. All nonzero digits in a measurement are considered significant digits. In our example, the digits 1 and 2 from 0.0120 meter are significant. Zeros are significant if their purpose is to express precision. Zeros that hold decimal location do not express precision. In our example, the two 0's to the left of the 1 in 0.0120 meter are placeholders and therefore are not significant. The 0 to the right of the 2 expresses the precision of the measure to the nearest 0.0001 meter and is therefore significant. The total number of significant figures in the measurement is three. The correct answer, therefore, is (B).

8. Mendel was a biologist directly associated with the development of concepts involving inheritance that he developed while studying pea plants and their offspring. Mendeleev, on the other hand, was a Russian chemist who was one of the major contributors to the development of the periodic table. The correct answer, therefore, is (A).

9. Substances with greater densities will sink when placed in liquids of lesser densities. Physical states have no bearing on the situation. The correct answer, therefore, is (D).

10. One kilogram is approximately 2.2 pounds [60.0 kg ≈ 132.0 pounds]. The correct answer, therefore, is (C).

11. Inertia is the natural tendency of an object to remain at rest or in motion at a constant speed along a straight line. The mass of the object is a quantitative measure of inertia. The deformation of the sponge will not affect the mass or inertia of the object. The weight is dependent on the mass and acceleration due to gravity, which remain constant. The volume of the sponge is equal to the length, L, times the width, W, times the height, H [$V = L \times W \times H$]. Compressing the sponge decreases one or all of these measurements. The correct answer, therefore, is (A).

12. Isotopes have the same number of protons but different numbers of neutrons. The number of electrons is irrelevant. The correct answer, therefore, is (B).

13. As the temperature of a gas increases, the kinetic energy of the molecules also increases. Under conditions of constant pressure, a fixed amount of gas will occupy a greater volume as temperature increases. This means that the gas should have its smallest volume at the lowest temperature. The fact that there are fewer molecules present in piston I than in piston III means that the temperature would be even greater in piston I. This is true because the volume of a gas at a fixed pressure is also proportional to the number of molecules. The only reason that the gas occupies a greater volume must be that there is an even greater increase in temperature. The correct answer, therefore, is (D).

14. The amount of heat needed to raise the temperature of a substance over a specific temperature range is determined by multiplying the specific heat × the mass × the change in temperature.

    $Q = C \times m \times \Delta t$, $Q = 4.19\ J/g{\cdot}°C \times 10.0\ g \times (50.0°C - 30°C) = 838$ joules

    The correct answer, therefore, is (C).

15. Alpha decay occurs when an unstable parent nucleus emits an alpha (α) particle and is converted into a different nucleus in the process. The alpha particle has two protons and a nucleon number of 4.

    $$^{220}_{86}Rn \rightarrow {}^{4}_{2}He + {}^{216}_{84}Po$$

    The mass number and electric charge are conserved. The correct answer, therefore, is (A).

16. A plane mirror, a diverging lens, and a convex mirror always produce a virtual image. A converging lens produces a real image when the object is placed beyond the focal point. The correct answer, therefore, is (B).

17. The Doppler effect is a change in the frequency of a sound as detected by an observer that results because the sound source and the observer have different velocities with respect to the medium of sound propagation. The frequency f is detected when the source is stationary relative to the observer. A greater frequency f' is detected when the source is moving towards the detector. A smaller frequency f is detected when the source is moving away from the detector. The correct answer, therefore, is (C).

18. A wavelength is the horizontal length of one cycle of the wave or the horizontal distance between two successive points in phase. A wavelength for a standing wave is the distance between every other node or every other antinode. The distance between two nodes is half a wavelength. The speed of the wave is equal to the frequency times the wavelength [$v = f\lambda$ = (100.0 Hz)(1.0 m) = 100.0 m/s]. The correct answer, therefore, is (C).

19. When light strikes the interface between two media, part of the light is reflected, and the remainder is transmitted. The part that is transmitted changes speeds and might change direction depending on the angle of entry. The change in direction or speed is due to the different refractive indexes of the media. The refractive index n of a material is the ratio of the speed of light in a vacuum, c, to the speed of light in the material, v, [$n = c/v$]. Water (1.33) has a larger refractive index than air (1.0). The smaller the refractive index the faster light will travel in that medium. When light travels from water to air, the speed and wavelength will increase, but the frequency in both media will remain the same [$f = v/\lambda$]. The correct answer, therefore, is (A).

20. When a rubber rod is rubbed against fur, electrons from the fur are transferred to the rod. This transfer gives the rod a negative charge and leaves a positive charge on the fur. The correct answer, therefore, is (C).

21. When the charged rubber rod is brought near the neutral paper, a separation of charge occurs on the paper. On the paper, unlike charges will be attracted to the charged rubber rod and like charges will be repelled. The unlike charges will be closer to the charged rod. The electrostatic force between two objects is dependent on the distance. The electrostatic force of attraction between rod and paper will be larger for the unlike charges than for the like charges since the distance between unlike charges is less than that between like charges. The correct answer, therefore, is (C).

22. A charged particle moving in a magnetic field will experience a force **F** that is perpendicular to both the velocity **v** and the magnetic field **B**. [$\mathbf{F} = q\mathbf{v} \times \mathbf{B}$ or $F = q$vB(sinθ), where θ is the angle between the velocity **v** and the magnetic field **B**]. The particle will not accelerate since there is no force when the particle's motion is parallel to the magnetic field. The correct answer, therefore, is (C).

23. When resistors are connected in parallel, they have the same difference in potential [$V_1 = V_2 = V_3 = 4$ volts]. The power dissipated in a resistor is equal to the current times the potential difference [$P = IV$]. Solving for the current in resistor R_3, [$I_3 = P_3/V_3 = 1.5$ amps]. The correct answer, therefore, is (B).

24. There is no air resistance at the top of the path because the object is not moving. The only force acting on the object is gravity, the force of Earth on the object. The force is directed toward Earth or downward. The acceleration due to gravity is 9.8 m/s^2 down near Earth's surface. The correct answer, therefore, is (C).

25. The work, W, done on an object is dependent on the force **F** and the displacement **d** [$W = F \times d(\cos\theta)$]. **F** is the magnitude of the force, **d** is the magnitude of the displacement, and θ is the angle between the force and displacement. No work was done on the object since there was no displacement. The correct answer, therefore, is (A).

26. The period of a simple pendulum is dependent on the length and the acceleration due to gravity. The period of the pendulum does not depend on the mass of the pendulum bob. Acceleration due to gravity does not change because the location did not change. A long pendulum has a greater period than a short pendulum. The correct answer, therefore, is (C).

27. Newton's third law states that for every action there is an equal and opposite reaction. There are two objects and two forces that interact. The reaction of the "tractor on wagon" equals "wagon on tractor." These forces are equal and opposite. The correct answer, therefore, is (B).

28. Oxygen has space for two electrons in its valence shell. As such, the most common oxidation number for oxygen is -2. The correct answer, therefore, is (A).

29. As you proceed down a group (column) on the periodic table, atomic radius typically increases. This is the case in option (D). The correct answer, therefore, is (D).

30. The charge of tin, Sn, is $+2$, as indicated by the (II) part of the name. The formula and charge of the phosphate polyatomic ion is PO_4^{3-}. In order to maintain charge neutrality, three tin(II) ions and two phosphate ions are required. The subscripts in option (C) represent such a combination. The correct answer, therefore, is (C).

31. The atoms of metal elements have atoms in the valence shell with only weak attractions to the nuclei of the atoms. These weak attractions result in a "sea of electrons." This means that the electrons flow between atoms with little resistance. The correct answer, therefore, is (C).

32. This equation is tricky. An initial thought might be to balance the hydrogen atoms by using a coefficient of 2 before the H_2O. This process causes a conflict with respect to the number of oxygen atoms. Keeping in mind that the ratio of hydrogen atoms to oxygen atoms is 2 to 1, using a 3 for OH^- will give 3 oxygen atoms and 6 hydrogen atoms on the product side. Using a coefficient of 3 for the water will balance these elements. The remaining elements can be balanced by using the concept that the subscripts on one side often suggest the coefficients on the other side. When the coefficients used are $Li_3N(s) + 3\ H_2O(l) \rightarrow 3\ Li^+(aq) + 3\ OH^-(aq) + NH_3(g)$, the number of atoms of each element is the same on both sides of the equation. The correct answer, therefore, is (B).

33. The heat of reaction equals the difference between the heat stored in the products and the heat stored in the reactants. The concept is often illustrated by an enthalpy profile. The stored energy of the products and reactants are indicated by the vertical displacement on the profile. The difference between the two in this case is represented by letter *C*. The actual value would be +30 kJ, since the stored energy in the products is greater than that of the reactants. This reaction would be endothermic in the forward direction. During these types of reactions, the temperature of the surroundings decreases as the reaction absorbs the heat. The correct answer, therefore, is (C).

34. In the sample, the individual molecules of gas travel at different speeds. Because there are so many collisions, the speeds of the molecules vary from almost zero to some very high value, well above the average. At a given temperature, the number of molecules that move at very high or very low speeds is small, while the number of molecules at intermediate speeds is much greater and centered around some average speed. At a higher temperature, the whole curve shifts to higher speeds. The correct answer, therefore, is (D).

35. As the ice is heated, it first increases in temperature, as indicated by the sloped line to the lower left on the scale in graph (A). Once the melting point (0°C) is reached, the temperature stops increasing until all of the solid is melted. Once only liquid is present, the temperature again rises with time, as indicated by a second sloped line segment. The boiling point (100°C) is reached. Again, the temperature stops increasing while the liquid goes through a phase change to gas. The final sloped segment represents the increasing temperature of the gas form once only gas is present. The correct answer, therefore, is (A).

36. A solution that resists changes in pH upon the addition of small amounts of an acid or a base is called a buffer. Buffers are solutions or mixtures of a weak acid and one of its soluble salts or of a weak base and one of its soluble salts. In option (C), $HC_2H_3O_2$ is a weak acid and $NaC_2H_3O_2$ is a soluble salt containing the $C_2H_3O_2^-$ ion. The correct answer, therefore, is (C).

37. The freezing point of a solution depends on the concentration of the ions in solution as well as other factors. In this specific case, (A) forms no ions, (B) forms approximately four ions, (C) forms approximately three ions, and (D) forms approximately two ions. The correct answer, therefore, is (B).

38. According to the law of conservation of mass, the total mass during any physical or chemical change remains constant. If no atmospheric gases are involved in the reaction, then the total mass of the test tube and its contents after the reaction should be the sum of 17, 4, and 7, or 28 grams. Adding the masses of the test tube, the iron, and the sulfur will give the total mass. The correct answer, therefore, is (D).

39. This question requires knowledge of cell structure and function. Phagocytic cells engulf large particulate substances and degrade them (e.g., destruction of bacteria by leukocytes). Lysosomes are organelles that contain hydrolytic enzymes and function in intracellular digestion. The correct answer, therefore, is (B).

40. This question requires knowledge of the general characteristics of viruses, viral replication, and HIV specifically. HIV is a retrovirus, but retroviruses carry RNA as their genetic material and then synthesize DNA, using reverse transcriptase, to incorporate their genetic material into the host's genome. The correct answer, therefore, is (D).

41. This question requires you to understand interspecies relationships and predator-prey relationships within a community. In this scenario, the caribou population will weaken due to lack of food (caribou are herbivores), making the caribou easier prey for the wolves. With the increase in food, more wolves will survive, and they will produce more offspring. The correct answer, therefore, is (A).

42. This question requires an understanding of factors that regulate transpiration in plants. Transpiration is the evaporation of water through stomata in plant leaves, which creates a negative pressure and causes water to be absorbed into the plant through the roots. In this setup, an increase in transpiration rate will be indicated by a decrease in water level in the pipet. Of the choices, only increasing the light intensity will increase the transpiration rate. Additional light will allow photosynthesis to occur more rapidly, causing the stomata to open more fully and possibly also increasing the temperature on the leaf surface. The correct answer, therefore, is (A).

43. This question requires an understanding of the causes of a common health problem, high blood pressure. Blockage of the arteries, high cholesterol, and high salt intake (by causing an increase in blood volume) are all causes of hypertension. Anemia, or low blood cell / low hemoglobin count, can result in hypotension (low blood pressure). The correct answer, therefore, is (D).

44. This question requires you to distinguish between the phases and resulting genetic makeup of cells in mitosis and meiosis. Mitosis results in the production of genetically identical, diploid cells, whereas meiosis results in genetically unique, haploid daughter cells. The first diagram is the only one to depict a cell during a mitotic event. The correct answer, therefore, is (A).

45. This question requires you to predict the outcome of a genetic cross and understand Mendelian genetics. (Assume standard nomenclature for a dominant/recessive trait: *D* for a "normal" allele, *d* for a diseased allele.) Since CF is an autosomal recessive trait, the woman must have a *dd* genotype. If the man is homozygous dominant, he must have a *DD* genotype. When *dd* is crossed with *DD*, all the F1 generation offspring will have a *Dd* genotype. Heterozygotes will not express the recessive disease trait. The correct answer, therefore, is (A).

46. This question requires knowledge of population ecology and the trend of human population growth. The human population has continued to grow exponentially since the mid-1600's. Earth's ultimate carrying capacity is debatable. Defining the carrying capacity for humans is difficult because it has been observed to change with the evolution of human culture, e.g., the advent of agriculture and the influence of industrial technology. The correct answer, therefore, is (C).

47. This question requires an understanding of thermoregulation in warm-blooded animals. Sweat gland activation will release sweat onto the surface of the skin and allow for evaporative cooling. All of the other responses would lead to an increase in metabolic heat production and therefore raise the body temperature. The correct answer, therefore, is (C).

48. This question requires knowledge of taxonomic classification and animal characteristics. Human beings, reptiles, birds, and fish are all members of the Phylum *Chordata* but have unique Classes, Orders, and Families. The correct answer, therefore, is (D).

49. This question tests knowledge of the mechanisms of evolution. Mutations in DNA may result in changes in protein structure and expression. These changes may impact the fitness of the individual in its environment. If these changes occur in gametes (i.e., sperm, ova), not in somatic cells, then the changes can be inherited and influence the population's gene pool. Inherited changes may lead to evolution of a population. Changes in somatic cells will affect only the individual. The correct answer, therefore, is (D).

50. This question requires understanding of animal behavior. Fixed action patterns are a sequence of behaviors, triggered by an external sensory stimulus that remain unchanged. Male sticklebacks will act aggressively toward anything that bears a red marking on its underside. The correct answer, therefore, is (A).

51. This question tests understanding of Darwin's concept of the process of natural selection versus that of artificial selection. Artificial selection is employed when a farmer selectively breeds corn to produce a drought-resistant variety. In this case, the farmer, not nature, i.e., the environment, selects for particular traits. The correct answer, therefore, is (A).

52. This question requires understanding of interspecific relationships in a community. In the relationship between the insect and plant, the insect is protected and gains nutrients from the plant but the plant is damaged by the insect. The correct answer, therefore, is (D).

53. This question tests your knowledge of cell division and cancer. Chemotherapy generally targets rapidly dividing cells, whether they are cancerous or not. Muscle cells do not actively divide after their initial development. The correct answer, therefore, is (B).

54. The seasons are due to the tilt of Earth's axis at 23.5 degrees. On the first day of summer, the Northern Hemisphere is tilted toward the Sun and the perpendicular rays of the Sun are directly overhead at local noon on the Tropic of Cancer (23.5 degrees north). The correct answer, therefore, is (C).

55. A light-year is one of the ways astronomers measure distances in space. A light-year is defined as the distance light travels in one year and is equal to 9.5×10^{12} kilometers.

Since the number of years $= \frac{\text{distance in kilometers}}{\text{speed in kilometers per year}}$,
then the number of years $= \frac{8.3 \times 10^{13} \text{ kilometers}}{9.5 \times 10^{12} \text{ kilometers per year}}$,
which is 8.7 years. The correct answer, therefore, is (C).

56. A fossil is any evidence of past life. It is not necessarily the actual organism preserved in some way (such as petrification, permineralization, lucky burial, tar pits, etc.). A footprint or impression (mold or cast) may be all that a paleontologist has found. The correct answer, therefore, is (C).

57. The most common field test for whether or not a rock specimen contains calcium carbonate is the acid test. A few drops of cold dilute hydrochloric acid (HCl) are placed on the surface of the rock and observed. If bubbles are produced, the sample contains a carbonate mineral, most likely $CaCO_3$. Calcite is the most common carbonate mineral. The correct answer, therefore, is (A).

58. The law of superposition states that in a sequence of sedimentary strata that has not been overturned, the oldest rock layer is on the bottom and the youngest layer is at the top.

The rock layers in the two stratigraphic columns can be correlated. The Kaibab Formation is found in both canyons, being the youngest formation shown in the Grand Canyon stratigraphic column and the oldest formation shown in the Zion Canyon column. The Coconino sandstone is below the Kaibab Formation, and therefore is the oldest of the four choices given. The correct answer, therefore, is (A).

59. Subduction zones mark a convergent plate boundary at which one plate slides beneath the other. The subducting plate is destroyed in the mantle, frequently becoming the ingredients of eruptions on the surface above. New material is added to the edges of plates at the midocean ridges, where paleomagnetism has revealed the history of seafloor spreading. The correct answer, therefore, is (B).

60. No vertical faults are indicated. The arrows show a movement in the strike direction of the fault. In a left-lateral strike-slip fault, the side opposite the observer appears to be displaced to the left. The correct answer, therefore, is (D).

61. Three of the four choices are consistent with the data given. Although statistical fluctuations are present in the data, the fact that the counts decrease by approximately one half each hour indicates that the half-life is approximately one hour. In option (D), an increasing count rate in the coming hours is not consistent with the data. The correct answer, therefore, is (D).

62. Color is not always a reliable characteristic in helping to identify minerals. In this case, both specimens could be the same color. Streak, the color of the powder of the mineral obtained by rubbing the mineral on an unglazed tile, is also an aid. Both specimens have a colorless or white streak. Luster is the way the mineral's surface reflects light. Fluorite and quartz have the same luster. Hardness is the mineral's resistance to scratching. Quartz has a hardness of 7 on Mohs' scale, and fluorite has a hardness of 4. The correct answer, therefore, is (D).

63. In subtropical regions, rates of evaporation exceed precipitation, thereby resulting in relatively high salinity. Abundant rainfall in equatorial areas results in low salinity. It is possible to note where large rivers drain into the oceans. Lower salinity at the Arctic and Antarctic regions is related to melting ice. The isolines summarize salinity that is, on average, about 35 parts per thousand. The correct answer, therefore, is (C).

64. The present continents were derived from the supercontinent Pangaea through fragmentation and continental drift. The maps show several stages in this breakup. The correct answer, therefore, is (D).

65. Contour lines on a topographic map are used to show shape and elevation. In this case, the close spacing of contour lines in a short distance must mean rapid change in elevation. The correct answer, therefore, is (C).

66. Air in the center of a low typically flows inward, rises, and cools, with the surface winds generating a counterclockwise spiral. The correct answer, therefore, is (D).

67. The dew point is the temperature at which air would be saturated (100% relative humidity). The dew point is related to the rate of evaporation and can be determined by using a psychrometer and a table like the one in the question. To find the dew point, subtract the wet-bulb reading from the dry-bulb reading. Locate that number (in this case 6°F) in the top row of numbers in the table. Interpolate where 73°F would be in the leftmost column, and move to the right until you get to the column with the 6°F wet-bulb depression. The dew point is between 61°F and 66°F. The correct answer, therefore, is (C).

68. The Moon does not emit its own light but reflects light received from the Sun. The half of the Moon facing the Sun is lit, and the phases of the Moon, as observed from Earth, are based on how much of the lit portion of the Moon is visible at the time of observation. The amount changes as the Moon revolves around Earth. The correct answer, therefore, is (D).

69. This question requires understanding the importance of the ozone layer and how its integrity has been influenced by humankind. Liberation of chlorine atoms from CFCs has been a major factor in formation of the "ozone hole" above Antarctica and thinning of the layer around the globe. Once in the atmosphere, chlorine atoms can remain there for decades, destroying ozone molecules and thus allowing increased penetration of ultraviolet light through the atmosphere. The correct answer, therefore, is (B).

70. This question tests understanding of how scientific evidence can be used in criminal investigations. Identification of individuals based on their genetic makeup is one of the most accurate techniques used in crime solving. DNA sequence analysis can distinguish between billions of different individuals, giving an accuracy rating of greater than 99.9 percent. The only major error that can occur with this type of technology is that it cannot distinguish between genetically identical individuals (i.e., identical twins). The correct answer, therefore, is (D).

71. Fertilizers contain nitrates, phosphates, and potassium that can cause excessive growth of algae when allowed to pollute lakes, leading to cultural eutrophication. These algal blooms may result in increased oxygen production during the day, but they may also cause oxygen depletion at night due to respiration. Oxygen depletion will cause the death of other organisms within the lake. As the algae die, decomposers break down the organic matter, and this leads to further oxygen depletion. The correct answer, therefore, is (A).

72. Many lakes in southeastern Canada and the northeastern United States are becoming depleted of living organisms because the lakes have a low pH. This low pH renders the lakes uninhabitable by many forms of aquatic life. Power plants that burn fossil fuels emit sulfur oxides and nitrogen oxides into the atmosphere. Prevailing winds carry these compounds, which react with water to form acid deposition. The correct answer, therefore, is (D).

73. The triangle made of circling arrows surrounding a number is used to symbolize the type of plastic of which the object is made. Generally speaking, the lower the value of the number the easier the recycling of the plastic. The correct answer, therefore, is (A).

74. Leachate from landfills, industrial effluent, and agricultural chemicals all contribute significantly to water pollution. Chlorofluorocarbons are implicated in the destruction of the stratospheric ozone layer. The correct answer, therefore, is (C).

75. Radon is a major contributor to natural background radiation. There is a growing concern about radon as a health hazard because it can be trapped in houses, entering primarily through cracks in walls and floors in the foundation and in the drinking water. The entry of radon can be reduced significantly by sealing the foundation against the entry of the gas and providing good ventilation so that it does not accumulate. The correct answer, therefore, is (D).