

Name _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- 1) Life is organized in a hierarchical fashion. Which one of the following sequences illustrates that hierarchy as it *increases* in complexity? 1) _____
- A) ecosystem, molecule, cell, tissue, organism, organ system, organ, community
 - B) cell, molecule, organ system, organ, population, tissue, organism, ecosystem, community
 - C) ecosystem, population, organ system, cell, community, molecule, organ, organism, tissue
 - D) organism, organ system, tissue, population, organ, community, cell, ecosystem, molecule
 - E) molecule, cell, tissue, organ, organ system, organism, population, community, ecosystem
- 2) A hypothesis 2) _____
- A) is an explanatory idea that is broad in scope and supported by a large body of evidence.
 - B) is a tentative explanation for a specific phenomenon.
 - C) is a widely accepted idea about a phenomenon.
 - D) is the same as a theory.
 - E) is a widely accepted theory that is broad in scope and supported by a large body of evidence.
- 3) Science cannot answer certain moral questions because: 3) _____
- A) scientists cannot express moral values.
 - B) scientists are not able to study human behavior.
 - C) morality requires deductive reasoning.
 - D) moral values differ among individuals.
 - E) there aren't enough variables.
- 4) To be scientifically valid, a hypothesis must be 4) _____
- A) phrased as a question.
 - B) based on faith.
 - C) metaphysical
 - D) biased
 - E) testable in an experiment
- 5) You notice that over the past month, many students have started wearing a new style of school sweat shirt. You think to yourself, maybe the bookstore recently started selling this new sweat shirt style. This prediction is 5) _____
- A) a type of control.
 - B) an experiment.
 - C) an example of an experimental question.
 - D) an example of a hypothesis.
 - E) a type of observation.

- 6) Which of these is NOT scientific? 6) _____
- A) A company uses different advertising methods for a product to determine which one produces the most sales.
 - B) A study determines differences in the species composition in two parks.
 - C) NASA sends tadpoles up in the space shuttle to see how gravity affects their development.
 - D) People are immunized with different vaccines to determine their relative effectiveness against the flu virus.
 - E) Consumers are asked which tomato variety produces the best-tasting spaghetti sauce.
- 7) The role of a control in an experiment is to 7) _____
- A) provide a basis of comparison to the experimental group.
 - B) ensure repeatability.
 - C) prove that a hypothesis is correct.
 - D) prove that a hypothesis is correct and ensure repeatability.
 - E) None of the choices are correct.
- 8) An independent variable is best defined as: 8) _____
- A) A type of experimental control
 - B) The effect of an observation
 - C) A response
 - D) The cause of an observation
- 9) Most biological molecules are joined by: 9) _____
- A) hydrogen bonds.
 - B) disulfide bonds.
 - C) covalent bonds.
 - D) ionic bonds.
 - E) peptide bonds.
- 10) Which four elements make up approximately 96% of living matter? 10) _____
- A) carbon, hydrogen, nitrogen, oxygen
 - B) oxygen, hydrogen, calcium, sodium
 - C) carbon, sulfur, phosphorus, hydrogen
 - D) carbon, oxygen, sulfur, calcium
 - E) carbon, sodium, chlorine, magnesium
- 11) The storage form of carbohydrates in animals is _____ and in plants is _____. 11) _____
- A) glycogen . . . cellulose
 - B) starch . . . glycogen
 - C) glycogen . . . starch
 - D) sucrose . . . glycogen
 - E) cellulose . . . glycogen
- 12) Organic compounds 12) _____
- A) always contain carbon.
 - B) are synthesized by cells.
 - C) always contain carbon and are synthesized by cells.
 - D) can only be synthesized in a laboratory.
 - E) always contain nitrogen.

- 13) Which one of the following lists contains only polysaccharides? 13) _____
- A) fructose, cellulose, and glucose
 - B) nucleotides, glycogen, and cellulose
 - C) sucrose, starch, and cellulose
 - D) cellulose, starch, and glycogen
 - E) starch, amino acids, and glycogen
- 14) A triglyceride 14) _____
- A) consists of three fatty acids attached to a glycerol.
 - B) is a type of fat.
 - C) is hydrophobic.
 - D) plays a role in energy storage.
 - E) All of the choices are correct.
- 15) Which molecule is a disaccharide? 15) _____
- A) water
 - B) fructose
 - C) lactose
 - D) glucose
- 16) You are telling your friend that organic molecules are all made up of carbon backbones with hydrogens. She doesn't understand how there can be so many different organic molecules if they all are made up of the same basic components. You explain that organic molecules: 16) _____
- A) actually all have the same structure but differ in the number of electrons.
 - B) vary because they possess different functional groups.
 - C) are different because of the different types of hydrogen bonds that form.
 - D) vary because they possess different isotopes of carbon.
- 17) A mutant plant cell with no chloroplasts would: 17) _____
- A) nonetheless be green.
 - B) still be able to capture energy as sunlight.
 - C) still be able to use carbohydrates as an energy source.
 - D) synthesize new chloroplasts in the ER.
- 18) Cells that primarily produce steroid hormones, such as testosterone and estrogen, have large quantities of: 18) _____
- A) DNA.
 - B) plasma membranes.
 - C) enzymes.
 - D) smooth endoplasmic reticulum.
 - E) cytoplasmic ribosomes.
- 19) All of the following are components of the modern cell theory EXCEPT: 19) _____
- A) Bacterial cells are eukaryotic.
 - B) The smallest living organisms are single cells.
 - C) Most living organisms are made up of one or more cells.
 - D) All cells arise from preexisting cells.
 - E) Cells are the functional units of multicellular organisms.
- 20) Which cellular organelle packages and moves cell products? 20) _____
- A) smooth ER
 - B) mitochondrion
 - C) Golgi apparatus
 - D) rough ER

- 21) Which one of the following is *true* about the ATP molecule? 21) _____
- A) It contains the six-carbon sugar hexose.
 - B) It contains two phosphate groups.
 - C) It fuels the kinetic energy needs of a cell
 - D) Extremely stable bonds link the second and third phosphate groups.
 - E) None of the choices are correct.
- 22) The formation of ATP in the mitochondria, which uses oxygen is called: 22) _____
- A) anaerobic metabolism.
 - B) aerobic metabolism.
 - C) catabolism.
 - D) phagocytosis.
 - E) endosymbiosis.
- 23) Which of the following groups includes carrier and channel proteins? 23) _____
- A) transport proteins
 - B) receptor proteins
 - C) recognition proteins
 - D) attachment proteins
- 24) In general, which of the following is largely responsible for moving substances across the cell membrane, communicating with other cells, and identifying the cell? 24) _____
- A) carbohydrates
 - B) proteins
 - C) phospholipids
 - D) nucleic acids
 - E) cytoskeleton
- 25) The *active site* of an enzyme is 25) _____
- A) the highly changeable portion of an enzyme that adapts to fit the substrates of various reactions.
 - B) the region of a product that detaches from the enzyme.
 - C) the region of a substrate that is changed by an enzyme.
 - D) the region of an enzyme that attaches to a substrate.
 - E) None of the choices are correct.
- 26) Which of the following molecules assist enzyme function? 26) _____
- A) alkaloids
 - B) ribosomes
 - C) vitamins
 - D) cyanide
 - E) None of the choices are correct.
- 27) Which of the following are products of cellular respiration? 27) _____
- A) glucose and carbon dioxide
 - B) oxygen and carbon dioxide
 - C) oxygen and energy to make ATP
 - D) energy to make ATP and carbon dioxide
 - E) oxygen and glucose

- 28) The net movement of molecules from a high concentration to a low concentration is BEST described by which of the following? 28) _____
- A) osmosis
 - B) facilitated diffusion
 - C) exocytosis
 - D) simple diffusion
 - E) active transport
- 29) For diffusion to occur, there must be: 29) _____
- A) a membrane.
 - B) a gradient.
 - C) ATP.
 - D) water.
- 30) When substances move through a plasma membrane and down gradients of concentration, this is called: 30) _____
- A) exocytosis
 - B) passive transport
 - C) active transport
 - D) pinocytosis
- 31) Osmosis can be defined as 31) _____
- A) the diffusion of a solute.
 - B) endocytosis.
 - C) active transport.
 - D) the diffusion of nonpolar molecules.
 - E) the diffusion of water.
- 32) The slowest rate of diffusion of dye particles in water will occur at: 32) _____
- A) 10°C.
 - B) 30°C.
 - C) 60°C.
 - D) 20°C.
- 33) The oxygen released into the air as a product of photosynthesis comes from 33) _____
- A) glucose.
 - B) carbon dioxide.
 - C) None of the above.
 - D) chlorophyll.
 - E) water.
- 34) The products of photosynthesis are: 34) _____
- A) glucose and carbon dioxide.
 - B) carbon dioxide, chlorophyll, and oxygen.
 - C) carbon dioxide, water, and energy.
 - D) glucose and water.
 - E) glucose and oxygen.
- 35) The cellular organelle that is responsible for photosynthetic activity is the: 35) _____
- A) mitochondrion.
 - B) ribosome.
 - C) nucleus.
 - D) chloroplast.
 - E) endoplasmic reticulum.
- 36) In a typical human body cell, how many sex chromosomes are there? 36) _____
- A) 1
 - B) 46
 - C) 23
 - D) 2

- 37) Genetic inheritance is based on the "blueprint" of: 37) _____
A) proteins. B) mRNA. C) enzymes. D) DNA.
- 38) The repeating sequence of cells dividing, growing, and dividing again is called: 38) _____
A) stem cell differentiation. B) the cell cycle.
C) cloning. D) homologous differentiation.
- 39) Which of the following are permanently differentiated cells that do not undergo division? 39) _____
A) stem cells B) newly formed daughter cells
C) bone marrow cells D) most brain cells
- 40) Each of your body cells: 40) _____
A) contains unique genetic information.
B) changes genetically as you grow and develop.
C) contains only the genetic information needed for that type of cell.
D) is genetically identical to all others.
- 41) Which of the following statements about stem cells is TRUE? 41) _____
A) They are found only in embryos.
B) They are "perpetual" parent cells that never produce daughter cells.
C) They are found only in embryos and in the bone marrow of adults.
D) They are able to differentiate into a variety of cell types.
E) They are permanently differentiated and cannot further divide.
- 42) Which of the following produces specialized cells during embryology? 42) _____
A) differentiation.
B) segmentation
C) mitosis.
D) meiosis
E) G1
- 43) During which phase of the eukaryotic cell cycle does DNA and chromosome replication occur? 43) _____
A) the mitotic phase B) the S phase of interphase
C) the G₁ phase of interphase D) cytokinesis
- 44) Which of the following represents the sequence in which most animals develop? 44) _____
A) zygote, blastula, gastrula, organ formation.
B) blastula, zygote, organ formation, gastrula.
C) zygote, gastrula, organ formation, blastula.
D) zygote, gastrula, blastula, organ formation.
E) zygote, organ formation, blastula, gastrula .
- 45) Genetic variations in natural populations develop due to: 45) _____
A) random mutations of the DNA.
B) environmental catastrophies.
C) changes in the environment.
D) individual activities.
E) changes in diet.

- 54) An antibiotic is given repeatedly to treat a recurrent ear infection. It worked initially but now is no longer effective. This indicates that the *Streptococcus* bacterium: 54) _____
- A) are infectious only if they are sensitive to the antibiotic.
 - B) is very sensitive to the antibiotic.
 - C) experienced natural selection that has allowed the resistant *Streptococcus* to survive and multiply.
 - D) is being treated with an antibiotic that has experienced a manufacturing error, making it infective.
- 55) Your tongue does not grow hair because: 55) _____
- A) skin cells have extra DNA that codes for hair proteins.
 - B) the genes for hair proteins have been deleted from the cells of your tongue.
 - C) different genes are expressed in different tissues.
 - D) saliva prevents hair from growing.
- 56) For a mutation to affect the evolution of an animal species, it must occur within: 56) _____
- A) somatic cells.
 - B) gametes.
 - C) diploid cells.
 - D) prokaryotic cells.
- 57) Inheritable mutations in the genes of an individual arise due to: 57) _____
- A) random chance.
 - B) artificial selection.
 - C) vigorous exercise or effort.
 - D) other species in the environment.
 - E) environmental change.
- 58) Scientists realized that most species produce many more offspring than is necessary to maintain a constant population. The "excess" individuals in a population: 58) _____
- A) evolve to become new species.
 - B) die before they can reproduce.
 - C) migrate to another location.
 - D) mutate and are able to adapt to new environments.
- 59) The theory of natural selection states that: 59) _____
- A) individuals that mutate in response to changes in their environment will contribute the most genes to the next generation.
 - B) all individuals live to reproduce in each generation.
 - C) the most well-adapted individuals in their environments survive and reproduce, contributing the most genes to the next generation.
 - D) random assortment of genes results in better physical characteristics in the following generations.
 - E) only the largest and strongest individuals survive.
- 60) Natural selection is BEST described as: 60) _____
- A) increasing the perfection of a species.
 - B) the ability to generate new traits that better suit the species.
 - C) working on the existing variation of traits to favor those better suited to the organism's environment.
 - D) causing the death of a significant proportion of the population.
 - E) driving the species toward an eventual endpoint in which the species possesses the best possible adaptations for that particular environment.

- 61) The controlled breeding of domestic plants and animals by humans in order to produce certain physical traits in those organisms is called: 61) _____
A) agricultural selection. B) natural selection.
C) artificial selection. D) physical selection.
- 62) Which of the following situations can occur to insect pests in due to the used of pesticides? 62) _____
A) Cockroaches not killed by the poison form the largest population
B) Cockroaches are only able to eat poison bait.
C) The poisoned bait caused a mutation that makes the roaches more sensitive to it.
D) Roaches that ate the poison bait became addicted to it.
- 63) Imagine that a biologist develops a strain of corn with a lower fat content by choosing low-fat variants and crossbreeding them over several generations. This is an example of: 63) _____
A) artificial mutation.
B) artificial selection.
C) inheritance of acquired characteristics.
D) convergent evolution.
E) natural selection.
- 64) Natural selection causes changes in the next generation of: 64) _____
A) communities B) individuals C) genes D) populations
- 65) Natural selection can be defined as: 65) _____
A) one species diverging into two species.
B) an individual changing into another species.
C) a change in the phenotype of an individual over his or her lifetime.
D) a change in the genetic makeup of a population over time.
E) a change in the genetic makeup of an organism over time.
- 66) Mutations are important because they: 66) _____
A) provide variation that can result in evolutionary change.
B) usually provide an individual with increased reproductive rates.
C) occur in response to environmental demands.
D) are always beneficial in the individuals affected by them.
- 67) Which of the following can be measured to estimate an organism's evolutionary fitness? 67) _____
A) the size of its offspring
B) the number of gametes it produces over its lifetime
C) the number of offspring it produces over its lifetime
D) the number of offspring it produces over its lifetime that survive to breed
E) the number of eggs it produces over its lifetime
- 68) If the tallest and shortest individuals of a population of humans do not survive and reproduce as well as the individuals of "average" height, which type of selection would most likely result? 68) _____
A) artificial selection B) stabilizing selection
C) directional selection D) disruptive selection

- 69) In a certain species of salmon, some adult males are extremely large whereas other adult males are very small, compared to the females. There are no intermediate-sized adult males in the population. This is probably due to: 69) _____
- A) disruptive selection.
 - B) directional selection.
 - C) artificial selection.
 - D) stabilizing selection.
- 70) In one butterfly species, the colors of individuals range from white to black, with many shades of gray in between. If the butterflies in a mountain population become more and more similar in color over several generations (for example, if most butterflies are the same shade of gray), what kind of evolutionary force is likely acting on the population? 70) _____
- A) disruptive selection
 - B) directional selection
 - C) stabilizing selection
 - D) artificial selection
- 71) Evolution by natural selection is: 71) _____
- A) a process that has occurred only in the past.
 - B) a rare event that has never been observed by scientists.
 - C) a process that occurs as a result of differences in fitness.
 - D) currently occurring but only in scientific laboratories.
 - E) constantly occurring at the same rate in all organisms.
- 72) Suppose a population of mostly sand-colored crabs migrates from a sand beach to a pebble beach and evolves a darker, speckled coloration that closely resembles the pebble beach. This is an example of: 72) _____
- A) genetic drift.
 - B) sexual selection.
 - C) stabilizing selection.
 - D) disruptive selection.
 - E) directional selection.
- 73) The elaborate courtship displays common among animals are the result of: 73) _____
- A) disruptive selection.
 - B) random mating.
 - C) spontaneous mutations.
 - D) sexual selection.
 - E) stabilizing selection.
- 74) Which one of the following is *false*? Natural selection 74) _____
- A) is contingent upon time and place.
 - B) is more of an editing process than a creative mechanism.
 - C) can be seen to be working in organisms alive today.
 - D) and evolutionary change can occur in a short time.
 - E) results from an organism's needs.
- 75) The degree of adaptation that can occur in a population is limited by 75) _____
- A) None of the choices are correct.
 - B) the amount and kind of genetic variation in a population.
 - C) the amount of genetic variation in a population.
 - D) the kind of genetic variation in a population.
 - E) the need of the individuals.

- 1) E
- 2) B
- 3) D
- 4) E
- 5) D
- 6) E
- 7) A
- 8) D
- 9) C
- 10) A
- 11) C
- 12) C
- 13) D
- 14) E
- 15) C
- 16) B
- 17) C
- 18) D
- 19) A
- 20) C
- 21) C
- 22) B
- 23) A
- 24) B
- 25) D
- 26) C
- 27) D
- 28) D
- 29) B
- 30) B
- 31) E
- 32) A
- 33) E
- 34) E
- 35) D
- 36) D
- 37) D
- 38) B
- 39) D
- 40) D
- 41) D
- 42) A
- 43) B
- 44) A
- 45) A
- 46) D
- 47) D
- 48) A
- 49) E
- 50) B
- 51) C

- 52) E
- 53) C
- 54) C
- 55) C
- 56) B
- 57) A
- 58) B
- 59) C
- 60) C
- 61) C
- 62) A
- 63) B
- 64) D
- 65) D
- 66) A
- 67) D
- 68) B
- 69) A
- 70) C
- 71) C
- 72) E
- 73) D
- 74) E
- 75) B