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APPENDIX A

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TOPIC 1

PRE-LABORATORY QUIZ

THE SCIENTIFIC METHOD

1. Which of the following are characteristics of a scientific hypothesis?
   a. It must be true.
   b. It must be testable through objective observations about the world.
   c. It cannot invoke a supernatural cause or effect.
   d. It is a tentative explanation about how something works or why a particular event occurred.
   e. More than one of the above is correct.
2. The statement "Biology lab is more fun than a barrel of monkeys" is not a scientific hypothesis. Why not?
   a. It was not proposed by a scientist.
   b. It cannot be tested objectively as stated.
   c. It is not true.
   d. Statements that cannot be tested with experiments are not scientific.
   e. There are no data to support the hypothesis.
3. Experimental controls _____:
   a. ensure that the data collected are statistically significant
   b. ensure that the data are collected objectively
   c. help minimize the chance that another factor could explain a difference between treated and untreated individuals
   d. are used to make predictions about the outcome of an experiment
   e. prevent scientists from falsifying their results
4. Measurements collected for tests of hypotheses are called _____:
   a. data
   b. statistics
   c. controls
   d. predictions
   e. samples
5. Statistical tests test for _____:
   a. whether the hypothesis is true
   b. whether the data were collected objectively
   c. whether the hypothesis is scientific
   d. whether the experiment was well controlled
   e. whether the difference between the experimental and control group is larger than expected by chance

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TOPIC 2

PRE-LABORATORY QUIZ

CELLS AND ENERGY

1. "Biology" is defined as the study of:
   a. cells
   b. life
   c. heredity
   d. evolution
   e. animals and plants
2. The structure inside of cells that contains the DNA is called:
   a. the karyote
   b. the kernel
   c. the nucleus
   d. the membrane
   e. the cell sac
3. Cells that contain a nucleus are called:
   a. eukaryotes
   b. prokaryotes
   c. superkaryotes
   d. viruses
   e. more than one of the above is correct
4. Homeostasis is:
   a. the ability to move
   b. reproduction
   c. a category of living organisms
   d. the maintenance of internal conditions
   e. the ability to convert solar energy to chemical energy
5. Homeostasis requires:
   a. sunlight
   b. a constant energy input
   c. the consumption of other organisms
   d. cells with nuclei
   e. an unchanging external environment

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TOPIC 3

PRE-LABORATORY QUIZ

NUTRITION AND METABOLISM

1. Enzymes:
   a. Are able to catalyze reactions involving many different substrates in the same active site
   b. Are composed of differently ordered carbohydrates
   c. Have active sites that are specific to one substrate
   d. Of different individuals catalyze reactions at the same rate
   e. Are composed of different numbers of one individual amino acid
2. The cellular organelle that converts the products of digestion into ATP is:
   a. Found only in plants
   b. Found in plants and animals
   c. The endoplasmic reticulum
   d. The nucleus
   e. The amino acid
3. Cellular respiration:
   a. Uses oxygen to produce ATP and releases carbon dioxide
   b. Occurs in mitochondria found in the nucleus
   c. Releases the oxygen we breathe as a by-product
   d. Results in the production of sugars from carbon dioxide and water
   e. Both b and c are correct
4. Denaturation of an enzyme:
   a. Changes the order of amino acids in the enzyme
   b. Changes the order of nucleotides in the enzyme
   c. Might alter the shape of the active site
   d. Allows the enzyme to catalyze the same reaction many times
   e. Usually speeds up the rate at which the enzyme catalyzes the reaction
5. A person's weight might be affected by:
   a. The rate at which their enzymes catalyze metabolic reactions
   b. Heart rate and exercise level
   c. The number of metabolic enzymes active in their cells
   d. The number of calories consumed
   e. All of the above are true

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TOPIC 4

PRE-LABORATORY QUIZ

MITOSIS

1. The process of cell division in eukaryotes is known as:
   a. Interphase
   b. Mitosis
   c. Prophase
   d. Epidemiology
   e. Tumor suppression
2. During interphase of the cell cycle:
   a. DNA is replicated
   b. Chromosomes condense
   c. Sister chromatids are separated
   d. The cell physically divides into two daughter cells
   e. Proto-oncogenes mutate
3. Metaphase and anaphase result in the separation of:
   a. Microtubules
   b. Cytokinesis
   c. Sister chromatids
   d. Nuclear membranes
   e. Daughter cells
4. A proto-oncogene:
   a. Causes cancer
   b. Is a known risk factor
   c. Is not found in normal cells
   d. Helps to control cell division in normal cells
   e. Is not replicated during interphase of the cell cycle
5. Cancer:
   a. Results from mutations in genes that control the cell cycle
   b. Results from mutations in genes that stop cells with damaged DNA from dividing
   c. Can result from exposure to environmental factors that cause DNA damage
   d. a and b are correct
   e. a, b, and c are correct

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TOPIC 5

PRE-LABORATORY QUIZ

MEIOSIS AND GENETICS

1. DNA:
   a. Is passed from an adult to his or her siblings
   b. Stands for deoxygenated nuclear assortment
   c. Is what genes are made of
   d. Is dominant when wrapped around proteins
   e. All of the above are true
2. Chromosomes:
   a. Carry hundreds of genes along their length
   b. Can be arranged in pairs carrying the same genes, called homologous pairs
   c. Are composed of DNA and protein
   d. Of a homologous pair are separated from each other during meiosis
   e. All of the above are true
3. Meiosis:
   a. Occurs in body cells
   b. Always separates dominant from recessive alleles
   c. Occurs in the ovaries and testes and produces cells with homologous pairs of chromosomes
   d. Only occurs in yeast
   e. Is a type of cell division that produces gametes
4. The genotype:
   a. Is the assortment of alleles present in a given individual
   b. Is produced by the phenotype
   c. Is the appearance of the individual
   d. Is visible in the karyotype
   e. All of the above are true
5. Fertilization:
   a. Occurs inside the testes and ovaries
   b. Is followed by meiosis, which decreases the chromosome number
   c. Allows sperm and egg cells to combine their genetic information
   d. Occurs during meiosis
   e. Allows alleles of a gene to separate from each other

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TOPIC 6

PRE-LABORATORY QUIZ

DNA STRUCTURE, SYNTHESIS, AND FINGERPRINTING

1. Which of the following is a false statement about DNA structure?
   a. DNA is composed of two anti-parallel strands.
   b. The sugars that comprise part of the backbone differ from one nucleotide to the next.
   c. Nitrogenous bases can have four different structures (A, G, C, and T).
   d. Nitrogenous bases are connected to each other by hydrogen bonds.
   e. Nucleotides are composed of a sugar, a phosphate, and a nitrogenous base.
2. DNA:
   a. Sequences for different genes can be the same
   b. Is single stranded
   c. Is found in the ribosomes of most cells
   d. Is composed of three parallel strands of nucleotides
   e. Codes for the production of proteins
3. If a parental DNA strand has the sequence CGT, the daughter strand will have the sequence:
   a. CGT
   b. TCA
   c. TGC
   d. GCA
   e. TGC
4. Deoxyribose:
   a. Is the sugar found in DNA
   b. Is a nucleotide
   c. Is part of a nitrogenous base
   d. Is found only in A, C, and T
   e. All of the above are true
5. DNA fingerprinting is based on the fact that no two (nonidentical twin) individuals:
   a. Have all the same DNA sequences
   b. Have some identical DNA sequences
   c. Can produce any of the same proteins
   d. Can produce any of the same mRNA molecules
   e. All of the above are true

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TOPIC 7

PRE-LABORATORY QUIZ

TRANSCRIPTION, TRANSLATION, AND GENETICALLY MODIFIED ORGANISMS

1. DNA sequences that code for the production of proteins are called:
   a. RNAs
   b. Ribosomes
   c. Codons
   d. Proteinaceous materials
   e. Genes
2. Transcription:
   a. Converts mRNA into protein
   b. Occurs on structures called cytochromes
   c. Is the synthesis of an RNA molecule that is complementary to the DNA
   d. Is the synthesis of DNA from RNA
   e. Uses uracil in place of cytosine
3. Translation:
   a. Uses DNA to synthesize RNA
   b. Uses RNA to synthesize DNA
   c. Is the synthesis of protein using information coded for in RNA
   d. Is the synthesis of amino acids from ribosomes
   e. Incorporates uracils in place of thymines
4. The universality of the genetic code refers to the fact that:
   a. All organisms make the same proteins.
   b. All proteins are composed of the same order of amino acids.
   c. Different organisms incorporate the same amino acid in response to the same codon.
   d. The mRNA produced by transcription of bacterial proteins is always the same.
   e. Ribosomes of all living organisms are identical.
5. Genetically modified organisms:
   a. Are produced by high-tech breeding procedures
   b. Are organisms that have had their DNA manipulated
   c. Are produced by transcription
   d. Are produced by translation
   e. Are produced by changing which codons code for a given amino acid

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TOPIC 8

PRE-LABORATORY QUIZ

THE THEORY OF EVOLUTION

1. The theory of common descent states that:
   a. Humans evolved from chimpanzees.
   b. All organisms are essentially the same.
   c. All modern organisms are related to each other.
   d. All modern organisms arose from common nonliving materials.
   e. Each species originated separately and has changed over descent.
2. The branch of science that concerns itself with attempting to understand the hypothetical evolutionary history of life is known as:
   a. Systematics
   b. Phylogeny
   c. Darwinism
   d. Hypothesis testing
   e. Common ancestry
3. A homology:
   a. Is a similarity in appearance due to shared environmental conditions
   b. Is a similarity that occurs as a result of shared common ancestry
   c. Provides evidence of evolutionary relationship among organisms
   d. b and c are correct
   e. a, b, and c are correct
4. On a phylogenetic tree, a branch point that unites two groups of organisms and that appears near the base of the tree indicates:
   a. A lack of evidence for a common ancestor
   b. Abundant evidence of a common ancestor
   c. A relatively recent common ancestor
   d. A relatively ancient common ancestor
   e. The universal common ancestor
5. Which of the following similarities between the organism pairs is most likely analogy rather than homology?
   a. Both bees and wasps have membranous wings.
   b. Both bats and whales use sonar to locate food.
   c. Both crocodiles and snakes are covered with scales.
   d. Both birds and fish have hearts.
   e. Both dandelions and daisies produce flowers for reproduction.

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TOPIC 9

PRE-LABORATORY QUIZ

NATURAL SELECTION

1. The process of natural selection causes:
   a. Mutation
   b. Environmental change
   c. Higher fitness
   d. Competition
   e. Evolution
2. An adaptation is:
   a. The result of a mutation
   b. A trait that increases survival and/or reproduction
   c. Likely to become common in the population it appears in
   d. b and c are correct
   e. a, b, and c are correct
3. "Evolutionary fitness" is best defined as:
   a. Chance of survival and reproduction compared to other individuals in the same population
   b. Only the strongest survive
   c. The ability to escape predation
   d. Adaptation to the environment over time
   e. A change in allele frequency over the course of generations
4. An adaptation spreads throughout a population over time because:
   a. Other organisms see that it is successful and copy it
   b. Predators avoid killing individuals with particular adaptations
   c. It can be passed to the next generation in genes
   d. It allows individuals who possess it to live longer
   e. The population is human
5. The modern definition of the theory of evolution connects traits to genes and can be restated as:
   a. Some mutations can be harmful and some beneficial
   b. All traits result from genes
   c. Natural selection causes the appearance of new genes
   d. Evolution is the change in the frequency of particular alleles in a population
   e. Each species of organisms has a completely unique set of genes

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TOPIC 10

PRE-LABORATORY QUIZ

SPECIES AND RACES

1. Biological species are defined by:
   a. Reproductive isolation from other species
   b. Physical separation from other species
   c. Differences in appearance from other species
   d. A lack of natural selection within the species
   e. Convergence with other, related species
2. After two or more populations of a species become physically isolated from each other:
   a. Their gene pools become separate
   b. They may evolve independently of one another
   c. They will inevitably become reproductively incompatible
   d. a and b are correct
   e. a, b, and c are correct
3. A biological race:
   a. Is equivalent to a species
   b. Is reproductively isolated from other biological races
   c. Can be easily distinguished by differences in coloration
   d. Is a population that has diverged from other populations of the same species
   e. Forms when males exhibit clear preferences for certain female characteristics
4. Which of the following is an example of convergent evolution?
   a. Two species of rose both have thorns.
   b. Penguins use their wings to swim, while their close relatives use their wings to fly.
   c. The parasitic plant Indian Pipe does not produce chlorophyll for photosynthesis.
   d. Ferruginous Hawks and Monarch Butterflies both migrate to Mexico during the northern winter.
   e. Blue Jays and blueberries are both blue.
5. Sexual selection acts on characteristics that influence:
   a. Mating success
   b. The likelihood a male will be selected as a mate by a female
   c. The likelihood a female will be selected as a mate by a male
   d. a and b are correct
   e. a, b, and c are correct

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TOPIC 11

PRE-LABORATORY QUIZ

BIODIVERSITY

1. Among the characteristics that place individual species in different domains is (are):
   a. The presence or absence of a nucleus
   b. The ability to make their own food from sunlight
   c. Characteristics of the cell wall, if present
   d. a and c are correct
   e. a, b, and c are correct
2. "Biodiversity" refers to:
   a. The ability of humans to classify the living world
   b. The theorized evolutionary relationships among living organisms
   c. The variety of living organisms
   d. The racial diversity of biologists
   e. The survival of the fittest
3. Which of the following classification categories is most inclusive (that is, contains the broadest grouping of species)?
   a. Phylum
   b. Class
   c. Order
   d. Family
   e. Species
4. All of the following are kingdoms in the Domain Eukarya EXCEPT:
   a. Archaea
   b. Fungi
   c. Plantae
   d. Animalia
   e. Protista
5. The theory of evolution refers to:
   a. The hypothesis that humans evolved from chimpanzees
   b. The idea that all organisms were separately created
   c. The ability to classify organisms according to similarities
   d. The hypothesis that all organisms derive from a single common ancestral species
   e. The principle that only the strongest species survive

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TOPIC 12

PRE-LABORATORY QUIZ

POPULATION AND ECOSYSTEM ECOLOGY

1. Human populations in the past two centuries have increased as a result of _____.
   a. an increase in birth rate
   b. a decrease in birth rate
   c. an increase in death rate
   d. a decrease in death rate
   e. more than one of the above is correct
2. The maximum population size an environment can support indefinitely is known as the _____ of that environment.
   a. exponent
   b. carrying capacity
   c. growth rate
   d. population max
   e. population overshoot
3. Growth rates of a population approaching an environmental limit decline as a result of _____
   a. a change in carrying capacity
   b. increasing death rates
   c. decreasing birth rates
   d. both b and c could be correct
   e. a, b, and c could be correct
4. All of the interacting living and non-living factors in a given environment are referred to as the:
   a. biological community
   b. food chain
   c. biomagnifier
   d. ecosystem
   e. carried capacity
5. Biomagnification:
   a. occurs as a result of how energy flows within ecosystems
   b. is the tendency for environmentalists to overstate environmental damage
   c. is only possible under controlled laboratory settings
   d. occurs as a result of disrupted nutrient cycles and results in the death of waterways
   e. is more of a problem for plants than for top predators

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TOPIC 13

PRE-LABORATORY QUIZ

COMMUNITY ECOLOGY AND CONSERVATION BIOLOGY

1. An ecosystem is:
   a. a group of individuals of the same species
   b. all of the organisms and physical features in a given environment
   c. created by humans for the conservation of endangered species
   d. unable to survive when humans intervene
   e. a concept that has little biological meaning
2. Ecologists seek to explain the factors that influence:
   a. the distribution of particular species
   b. the abundance of particular species
   c. why species are found in particular regions of Earth
   d. a and c are correct
   e. a, b, and c are correct
3. Which of the following interactions between organisms is an example of competition?
   a. a bee gathering honey from, and spreading the pollen of, a flowering plant
   b. a cleaner fish picking small bits of food and parasites from the jaws of a reef shark
   c. chickadees and nuthatches taking seeds from a bird feeder
   d. wolves stalking and killing an elderly moose
   e. eagles and hawks migrating south for the winter
4. The loss of genetic diversity that occurs as a result of random changes is known as:
   a. genetic drift
   b. species endangerment
   c. loss of ecosystem services
   d. homozygosity
   e. allele infrequency
5. An increased rate of inbreeding:
   a. occurs when the population is so small that there is a high likelihood of close relatives mating
   b. can result in high levels of homozygosity
   c. can lead to inbreeding depression
   d. can result in poorly surviving offspring
   e. all of the above

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TOPIC 14

PRE-LABORATORY QUIZ

GENDER DIFFERENCES AND ATHLETICISM

1. Which endocrine organ becomes active at puberty?
   a. the ovary
   b. the penis
   c. the oviduct
   d. the cervix
   e. the vagina
2. Which of the following is a false statement about female skeletal structure?
   a. A female's bones are composed of different minerals than a male's bones.
   b. A female's bones tend to be shorter than a male's bones.
   c. Females have a lower center of gravity than males.
   d. Females have a larger Q angle than males.
   e. A female's bones tend to have less muscle mass attached than a male's bones.
3. The female pelvis:
   a. has a less angled tilt than the male pelvis
   b. has a more oval opening than the male pelvis
   c. has fewer bones than the male pelvis
   d. is broader and flatter than the male pelvis
   e. has a different point of attachment to the tail bone than the male pelvis
4. Because puberty tends to start later in boys:
   a. boys make fewer gametes than girls
   b. boys have longer legs and arms than girls
   c. boys are less likely to play sports
   d. boys have a smaller Q angle than girls
   e. boys are less likely to use birth control than girls
5. True or False? The proteins found in female muscles are different in amino acid composition than those found in males.

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TOPIC 15

PRE-LABORATORY QUIZ

FERTILIZATION, BIRTH CONTROL, AND SEXUALLY TRANSMITTED DISEASES

1. Pelvic Inflammatory Disease is caused by:
   a. infection with certain protozoans
   b. viral infection
   c. infection with either of two different bacteria
   d. simultaneous infection by bacteria and viruses
   e. infection with certain insects
2. Assume that a certain type of bacterium divides once every minute. If you start with one bacterial cell in culture, after six minutes there should be _____ bacterial cells.
   a. 6
   b. 12
   c. 32
   d. 64
   e. several million
3. Pubic lice:
   a. is also called the clap
   b. is caused by a protozoan
   c. transmission can be prevented with the use of condoms
   d. can affect both males and females
   e. all of the above are true
4. An epidemiologist tries to determine:
   a. the source of an infection
   b. who is at risk for infectious diseases
   c. when the disease might strike a population
   d. the cause of infectious (not genetic) diseases
   e. all of the above
5. Birth control methods can:
   a. block sperm and egg contact
   b. change the environment of the female reproductive tract, making it less hospitable to sperm
   c. prevent ovulation
   d. block gamete-carrying ducts
   e. all of the above

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TOPIC 16

PRE-LABORATORY QUIZ

THE HUMAN NERVOUS SYSTEM

1. The cells of the nervous system are called:
   a. nerves
   b. neurons
   c. reflexes
   d. synapses
   e. neurotransmitters
2. A nerve impulse is transmitted along a neuron by:
   a. the release of neurotransmitters
   b. the reuptake of neurotransmitters
   c. the increased activity of synapses
   d. a change in electrical charge that is self-propagating
   e. the actions of the brain and spinal cord
3. Which organ integrates and processes sensory information?
   a. Brain
   b. Spinal cord
   c. Nerves
   d. Neurons
   e. Synapses
4. Drugs that affect the brain often are mimics of, or affect the longevity of:
   a. neurotransmitters
   b. special senses
   c. synapses
   d. neurons
   e. nerve impulses
5. Which of the following is a special sense, rather than a general sense?
   a. Temperature
   b. Pain
   c. Touch
   d. Taste
   e. Pressure

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TOPIC 17

PRE-LABORATORY QUIZ

PLANT STRUCTURE AND FUNCTION

1. All of the following are plant organs or tissues EXCEPT:
   a. roots
   b. stems
   c. carbon dioxide
   d. phloem
   e. xylem
2. Water is essential to plants because:
   a. it is required to convert carbon dioxide to sugar in photosynthesis
   b. it provides support to the tissues of plants, giving the plant its shape
   c. the evaporation of large amounts of water provides the pulling force bringing water from the roots to the leaves
   d. a and b are correct
   e. a, b, and c are correct
3. The ultimate source of energy for life on Earth is:
   a. The sun
   b. Water
   c. Carbon dioxide
   d. Inorganic fertilizer
   e. Domestic animals
4. The process that moves water from the roots to the leaves of a plant is called:
   a. respiration
   b. photosynthesis
   c. transpiration
   d. evaporation
   e. circulation
5. Stomata on the surface of a plant:
   a. open and close to regulate carbon dioxide entry and water evaporation
   b. help absorb water from the soil
   c. protect the plant from damage by animals and fungi
   d. are eliminated by the immune system's guard cells
   e. are part of a plant-to-plant communication system

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PRE-LABORATORY QUIZ ANSWERS

Topic 1: The Scientific Method
1.e 2.b 3.c 4.a 5.e

Topic 2: Cells and Energy
1.b 2.c 3.a 4.d 5.b

Topic 3: Nutrition and Metabolism
1.c 2.b 3.a 4.c 5.e

Topic 4: Mitosis
1.b 2.a 3.c 4.d 5.e

Topic 5: Meiosis and Genetics
1.c 2.e 3.e 4.a 5.c

Topic 6: DNA Structure, Synthesis, and Fingerprinting
1.b 2.e 3.d 4.a 5.a

Topic 7: Transcription, Translation, and Genetically Modified Organisms
1.e 2.c 3.c 4.c 5.b

Topic 8: The Theory of Evolution
1.c 2.a 3.d 4.d 5.b

Topic 9: Natural Selection
1.e 2.e 3.a 4.c 5.d

Topic 10: Species and Races
1.a 2.d 3.d 4.d 5.e

Topic 11: Biodiversity
1.d 2.c 3.a 4.a 5.d

Topic 12: Population And Ecosystem Ecology
1.d 2.b 3.d 4.d 5.a

Topic 13: Community Ecology and Conservation Biology
1.b 2.e 3.c 4.a 5.e

Topic 14: Gender Differences and Athleticism
1.a 2.a 3.d 4.b 5.False

Topic 15: Fertilization, Birth Control, and Sexually Transmitted Diseases
1.c 2.d 3.d 4.e 5.e

Topic 16: The Human Nervous System
1.b 2.d 3.a 4.a 5.d

Topic 17: Plant Structure and Function
1.c 2.e 3.a 4.c 5.a

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