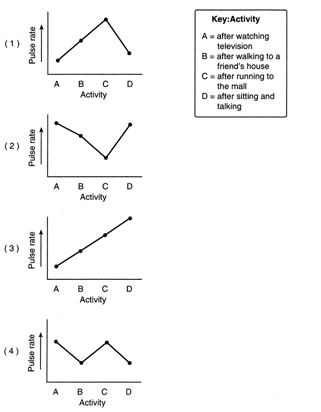
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| **Biology Unit 1 Part A**  **Scientific Method and Processes, Characteristics of Life, Energy, Structure and Function, Microscope** |
| **Established Goals:**  **BIO.A.1.1** Explain the characteristics common to all organisms.  **BIO.A.1.1.1** Describe the characteristics of life shared by all prokaryotic and eukaryotic organisms.  **BIO.A.1.2** Describe relationships between structure and function at biological levels of organization.  **BIO.A.3.2** Identify and describe how organisms obtain and transform energy for their life processes.  **BIO.A.4.2** Explain mechanisms that permit organisms to maintain biological balance between their internal and external environments.  **BIO.A.4.2.1** Explain how organisms maintain homeostasis (e.g., thermoregulation, water regulation, oxygen regulation).  **BIO.B.3.3.1** Distinguish between the scientific terms: hypothesis, inference, law, theory, principle, fact, and observation. |

1. When a person does strenuous exercise, small blood vessels near the surface of the skin increase in diameter. This allows the body to be cooled. Which characteristic of life does this best illustrate?
2. Synthesis
3. Excretion
4. Homeostasis
5. Adaptation
6. Which sequence represents the correct order of levels of organization in a complex organism?
   1. Cells, organelles, organs, organ systems, tissues
   2. Tissues, organs, organ systems, organelles, cells
   3. Organelles, cells, tissues, organs, organ systems
   4. Organs, organelles, cells, tissues, organ system
7. Which of the following characteristics is shared by all organisms?
   1. All organisms are composed of two cells.
   2. All organisms can move.
   3. All organisms can smell and taste.
   4. All organisms have cells that contain genetic information.
8. How do organisms carry out chemical activities of life?
   1. through sexual reproduction
   2. by using energy
   3. through asexual reproduction
   4. by increasing metabolism
9. The condition that changes in an experiment that results from changing conditions in the independent variable
   1. Independent variable
   2. Dependent variable
   3. Control
   4. Theory
10. A(n) \_\_\_\_\_\_\_ is a tentative, testable statement about the natural world that is capable of being supported or refuted by scientific evidence, whereas a(n) \_\_\_\_\_\_\_ is a well-established and highly-reliable explanation of a natural phenomenon
    1. Hypothesis; opinion
    2. Hypothesis; theory
    3. Opinion; theory
    4. Theory; hypothesis
11. Scientific inquiry involves
    1. Interpreting and processing data
    2. Asking questions
    3. Locating relevant and reliable information
    4. All of these
12. Dr. Harris believes that the fur thickness of a specific rabbit species is directly related to the outside temperature of the rabbit's habitat. Other scientists in his field believe that the fur thickness of this species of rabbit is actually determined by the amount of sunlight that the rabbit is exposed to daily.  
      
    Dr. Harris performs an experiment to test whether temperature or sunlight affects fur thickness in this species of rabbit. Which of the following is true about the results of Dr. Harris's experiment?
    1. The results of the experiment may reinforce or weaken either theory.
    2. The results of the experiment must support and reinforce Dr. Harris’s theory.
    3. The results of the experiment may prove either theory to be fact.
    4. The results of the experiment must support and reinforce the opposing theory.
13. Many scientists hypothesize that increased levels of carbon dioxide, generated by humans, are causing the Earth's temperature to rise dangerously fast.  
      
    What will happen if data is gathered over time that shows the Earth cooling rather than warming?
    1. Scientists will need to change the data to fit their current hypothesis.
    2. A new hypothesis will be needed to try to explain the temperature changes.
    3. Nothing will happen--a scientific hypothesis is considered law, and contradictory data can be disregarded.
    4. A hypothesis about global temperatures will never again be accepted by the scientific community.
14. A student measures his pulse rate while he is watching television and records it. Then he walks to a friend’s house nearby and when he arrives, measures and records hi pulse rate again. He and his friend decide to run to the mall a few blocks away. On arriving at the mall, the student measures and records his pulse rate once again. Finally, after sitting and talking for a half hour, the student measures his pulse rate for the last time.   
    Which graph below best illustrates the expected changes in his pulse rate according to the activities described above?



a. graph 1

b. graph 2

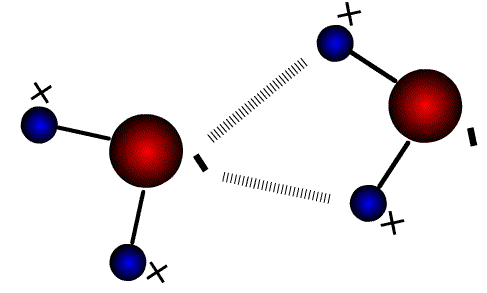
c. graph 3

d. graph 4

1. Which characteristic is shared by all prokaryotes and eukaryotes?
   1. ability to store hereditary information
   2. use of organelles to control cell processes
   3. use of cellular respiration for energy release
   4. ability to move in response to environmental stimuli
2. Red blood cells are shaped like smooth discs that allow them to flow easily through arteries and veins. What does this illustrate?
   1. Homeostasis
   2. Structure and function relationship
   3. Chemosynthesis
   4. Energy release
3. The sun’s energy is absorbed by plants and converted into glucose during \_\_\_\_\_\_\_\_\_\_\_. Animals eat the plants and convert the glucose into useable energy in a process called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
   1. Chemosynthesis; photosynthesis
   2. Photosynthesis; cellular respiration
   3. Cellular respiration; photosynthesis
   4. ATP; cellular respiration
4. Selina is studying blue birds and their feeding habits. In her notes, she records one blue bird visits the same feeder 13 times in an hour. She also recordings the same bird has a long beak compared to others. The number of visits to the feeder is an example of \_\_\_\_\_\_\_\_\_\_\_ data, while the long beak is an example of \_\_\_\_\_\_\_\_\_\_\_ data.
   1. true; false
   2. false; true
   3. qualitative; quantitative
   4. quantitative; qualitative
5. Isabella is examining a specimen of blood under her compound light microscope. The eye piece has a 10x magnification and she is using the scanning lens with a 4x magnification. What is the total magnification of the blood specimen Isabella is viewing?
   1. 14x
   2. 40x
   3. 400x
   4. 6x

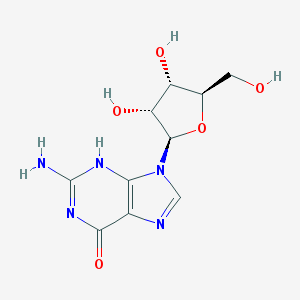
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| **Biology Unit 2 Part A**  **Chemistry of Life, Chemical Bonds, Carbon, Ions, Water, Macromolecules: Proteins, Nucleic Acids, Carbohydrates, Lipids Enzymes, ATP** |
| **Established Goals:**  **BIO.A.1.1.1** Describe the characteristics of life shared by all prokaryotic and eukaryotic organisms.  **BIO.A.2.1** Describe how the unique properties of water support life on Earth.  **BIO.A.2.1.1** Describe the unique properties of water and how these properties support life on  Earth (e.g., freezing point, high specific heat, cohesion).  **BIO.A.2.2** Describe and interpret relationships between structure and function at various levels of biochemical organization (i.e., atoms, molecules, and macromolecules).  **BIO.A.2.2.1** Explain how carbon is uniquely suited to form biological macromolecules.  **BIO.A.2.2.2** Describe how biological macromolecules form from monomers.  **BIO.A.2.2.3** Compare the structure and function of carbohydrates, lipids, proteins, and nucleic acids in organisms.  **BIO.A.2.3** Explain how enzymes regulate biochemical reactions within a cell.  **BIO.A.2.3.1** Describe the role of an enzyme as a catalyst in regulating a specific biochemical reaction.  **BIO.A.2.3.2** Explain how factors such as pH, temperature, and concentration levels can affect enzyme function.  **BIO.A.3.2** Identify and describe how organisms obtain and transform energy for their life processes.  **BIO.A.3.2.2** Describe the role of ATP in biochemical reactions. |

1. Which of the following are the important, life-sustaining properties of water?
2. Cohesive behavior
3. Ability to moderate temperature
4. Expansion upon freezing
5. Versatility of a solvent
   1. I, II, III, and IV
   2. I and II
   3. II and III
   4. I and IV
6. A water molecule is composed of two hydrogen atoms and one oxygen atom arrange in a bent shape. Since oxygen is significantly more electronegative than hydrogen, oxygen atoms have a much stronger attraction to shared electrons than does hydrogen. This unequal sharing of electrons and bent shape results in a ***polar molecule***. The oxygen end of the molecule has a slightly negative charge while the hydrogen ends of the molecule have a slightly positive charge.

  
  
The composition and polar covalent nature of water allow water molecules to be attracted to and form

* 1. hydrogen bonds with other water molecules.
  2. covalent bonds with nonpolar molecules
  3. ionic bonds with free radical ions.
  4. all of these

1. Water is the most abundant molecule found in living organisms. Most mammals, in fact, are approximately 70% water by weight. About two-thirds of this water is present inside cells. The other one-third is present outside cells (e.g., in blood plasma or other body fluids). Why is water so important to cells?
   1. Water is stored in the cells to be used when the organism gets thirsty.
   2. Almost all the chemical reactions in life processes occur in solutions with water.
   3. The main structural component found in plasma membranes and cell walls is water.
   4. Water determines which proteins are translated from the cellular DNA.
2. All living organisms contain carbon atoms. Which of the following is an important characteristic of carbon?
   1. Carbon atoms are highly reactive and form unstable bonds with any available atom.
   2. Carbon atoms can bond with any other atom, but they cannot form bonds with other carbon atoms.
   3. Carbon atoms are very stable and do not easily form bonds with other atoms.
   4. Carbon atoms can bond with many other kinds of atoms to form very stable molecules.
3. Carbon atoms have four electrons in their outer shell. This means that a single carbon atom can form up to \_\_\_\_\_\_\_ bonds with other atoms.
   1. 8
   2. 6
   3. 4
   4. 2
4. Nucleic acids are biological polymers that are comprised of nucleotide monomers covalently bonded together. This picture shows two monomer units of a nucleic acid chain. What are the components that make up each nucleotide monomer?

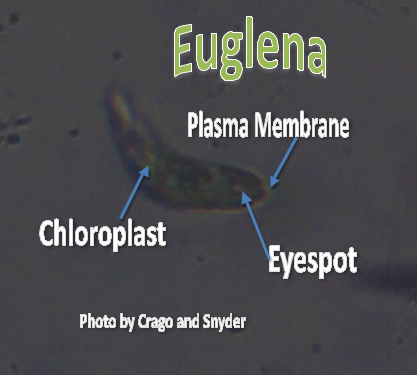


* 1. a five-carbon sugar, a phosphate group, and a nitrogenous base
  2. a five-carbon sugar, a phosphate group, and an amino acid
  3. glucose, a phosphate group, and an amino acid
  4. glucose, a phosphate group, and a nitrogenous base

1. Which of the following best describes a carbohydrate?
   1. Carbohydrates are organic macromolecules that are insoluble in water and have the ability to store energy for extended periods of time.
   2. Carbohydrates are composed of amino acid monomers and are involved in cell signaling, cell transport, immune responses, and the cell cycle.
   3. Carbohydrates are organic macromolecules that are made up of carbon, hydrogen, and oxygen atoms and are used for energy storage or as structural molecules.
   4. Carbohydrates always consist of a five-carbon sugar, a nitrogenous base, and one or more phosphate groups and are used to store genetic information.
2. Sugars such as glucose, fructose, and ribose are examples of \_\_\_\_\_\_\_.
   1. Lipids
   2. Proteins
   3. Carbohydrates
   4. Nucleic Acids
3. Which of the following are examples of nucleic acids?
   1. Collagen and keratin
   2. Glucose and starch
   3. Saturated fats and unsaturated fats
   4. DNA and RNA
4. What role does ATP play in living cells?
   1. provides structural support to cell membranes
   2. storing and transferring energy
   3. storing and transferring information
   4. involved in cell-to-cell signaling
5. A student is given a small amount of unknown tan-colored liquid substance. This unknown liquid is placed into a glass of water and mixed. Despite mixing, the tan liquid remains separated from the water and collects as a large droplet at the top. Which of the macromolecule groups is this liquid MOST likely to be a member of?
   1. Lipids
   2. Proteins
   3. Carbohydrates
   4. Nucleic acids
6. Cellular processes are carried out by many different types of molecules, mostly proteins. The function of each protein molecule depends on its shape which, in turn, is determined by the protein's specific sequence of                               .
   1. Amino acids
   2. Triglycerides
   3. Monosaccharides
   4. Nucleotides
7. Proteins are used for many structural functions such as in the actin and myosin in muscle or as a part of the cytoskeleton scaffolding that maintains cell shape. What other main function do proteins serve?
   1. as enzymes to control the rate of reactions and regulate cellular activity
   2. as waterproof membranes to regulate the transport of molecules in and out of the cell
   3. as coding for genotypic expression and phenotypic traits
   4. as cellulose to form the major structural component of plant cell walls
8. Carbohydrates and proteins are two types of macromolecules. Which functional characteristic of proteins distinguishes them from carbohydrates?
   1. large amount of stored information
   2. ability to catalyze biochemical reactions
   3. efficient storage of usable chemical energy
   4. tendency to make cell membranes hydrophobic
9. A scientist observes that, when the pH of the environment surrounding an enzyme is changed, the rate the enzyme catalyzes a reaction greatly decreases. Which statement best describes how a change in pH can affect an enzyme?
   1. A pH change can cause the enzyme to change its shape.
   2. A pH change can cause the enzyme to change its shape.
   3. A pH change can cause an enzyme to react with a different substrate.
   4. A pH change can remove energy necessary to activate an enzyme.

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| **Biology Unit 3 Part A**  **Cell Theory, Organelles, Types of Transport, Photosynthesis/Cellular Respiration, Mitosis/Meiosis,  Cell Specialization, Sexual Reproduction** |
| **Established Goals: BIO.A.1.1** Explain the characteristics common to all organisms.  **BIO.A.1.1.1** Describe the characteristics of life shared by all prokaryotic and eukaryotic organisms.  **BIO.A.1.2** Describe relationships between structure and function at biological levels of organization.  **BIO.A.1.2.1** Compare cellular structures and their functions in prokaryotic and eukaryotic cells.  **BIO.A.1.2.2** Describe and interpret relationships between structure and function at various levels of biological organization (i.e. Organelles, cells, tissues, organs, organ systems, and multicellular organisms).  **BIO.A.3.1** Identify and describe the cell structures involved in processing energy.  **BIO.A.3.1.1** Describe the fundamental roles of plastids (e.g., chloroplasts) and mitochondria in energy transformations.  **BIO.A.3.2** Identify and describe how organisms obtain and transform energy for their life processes.  **BIO.A.3.2.1** Compare the basic transformation of energy during photosynthesis and cellular respiration.  **BIO.A.3.2.2** Describe the role of ATP in biochemical reactions.  **BIO.A.4.1** Identify and describe the cell structures involved in transport of materials into, out of, and throughout a cell.  **BIO.A.4.1.1** Describe how the structure of the plasma membrane allows it to function as a regulatory structure and/or protective barrier for a cell.  **BIO.A.4.1.2** Compare the mechanisms that transport materials across the plasma membrane (i.e., passive transport—diffusion, osmosis, facilitated diffusion; and active transport—pumps, endocytosis, exocytosis).  **BIO.A.4.1.3** Describe how membrane-bound cellular organelles (e.g., endoplasmic reticulum, Golgi apparatus) facilitate the transport of materials within a cell.  **BIO.B.1.1** Describe the three stages of the cell cycle: interphase, nuclear division, cytokinesis.  **BIO.B.1.1.1** Describe the events that occur during the cell cycle: interphase, nuclear division (i.e. Mitosis or meiosis), cytokinesis.  **BIO.B.1.1.2** Compare the processes and outcomes of mitotic and meiotic nuclear divisions. |

1. Which organelle is the plant cell shown makes glucose from sunlight?
   1. Nucleus
   2. Cell Wall
   3. Mitochondrion
   4. Chloroplast
2. If the water concentration inside a cell is higher than the water concentration outside the cell, water flows out of the cell. This method of molecular transport is called
   1. A sodium Pump
   2. Exocytosis
   3. Osmosis
   4. Endocytosis
3. Eukaryotic cells contain organelles that harvest energy from organic compounds to make ATP. ATP is the main form of energy used by cells. Which cell organelles are responsible for making most of the cell's ATP?



* 1. Lysosomes
  2. Chloroplasts
  3. Endoplasmic Reticulum
  4. Mitochondria

1. This is a picture of a diagram of a single-celled organism known as a euglena. Which structure acts in a manner most similar to skin tissue in multicellular organisms?
   1. Plasma membrane
   2. Flagellum
   3. Chloroplasts
   4. Nucleus
2. Which of the following is the only cell organelle that is capable of converting light energy into chemical energy?
   1. Endoplasmic Reticulum
   2. Vacuole
   3. Chloroplast
   4. Mitochondrion
3. Each of the cells shown is in a different stage of mitosis. In what order does a cell go through the pictured stages?

* 1. V → Z 🡪 W 🡪 U 🡪 X 🡪 Y
  2. X → U→ W → Z → Y → V
  3. X → Y → V → W → U → Z
  4. V → Y → Z → W → U → X

1. Which picture(s) correctly show the process of meiosis (in the correct order)?
   1. I then II
   2. II then 1
   3. I only
   4. II only
2. \_\_\_\_\_\_\_ are RNA and protein complexes that are found in all cells. These complexes help cells during protein translation by joining amino acids together to form polypeptides.
   1. Lysosomes
   2. Ribosomes
   3. Vacuoles
   4. Chloroplasts
3. Adenosine triphosphate, or ATP, is primarily used as \_\_\_\_\_\_\_ in living organisms.
   1. A source of energy
   2. A reproductive enzyme
   3. A blood coagulant
   4. A muscle relaxing hormone
4. Materials are able to move across a cell membrane through one of two methods: active transport or passive transport. What is the difference between active transport and passive transport?
   1. Active transport requires the cell to expend energy, while passive transport does not.
   2. Passive transport is the only form of transport that requires the use of protein carriers.
   3. Active transport requires the cell to form vesicles, while passive transport requires the use of membrane pumps.
   4. Active transport is the only form of transport that requires the use of protein carriers.
5. In carrying out normal activities, cells use oxygen and produce carbon dioxide. The concentration of oxygen is higher in the blood than inside the cell, so oxygen moves into the cell. Similarly, carbon dioxide moves out of the cell into the blood because the concentration of carbon dioxide inside the cell is greater than the concentration outside the cell. How are the small molecules of oxygen and carbon dioxide moving through the cell membrane?
   1. passive transport by diffusion
   2. active transport by carrier proteins
   3. passive transport by osmosis
   4. active transport by endocytosis
6. The cell membrane, or plasma membrane, is made up of a lipid bilayer in which hydrophilic heads face outward and hydrophobic tails face inward. This arrangement within the cell membrane allows it to.
   1. fuse with ribosomes during DNA replication
   2. absorb water from the cytoplasm whenever necessary
   3. control the movement of substances in and out of the cell
   4. keep out all viral and bacterial infections
7. What are the most basic building blocks of all organisms?
   1. Bones
   2. Cells
   3. Muscles
   4. Organs
8. At the beginning of cellular respiration, energy is stored in the bonds of \_\_\_\_\_\_\_\_\_\_ molecules. At the end of the cellular respiration process, energy is stored in the bonds of \_\_\_\_\_\_\_\_\_ molecules.
   1. CO2, ATP
   2. Glucose, ATP
   3. ATP, Glucose
   4. CO2, Glucose
9. Cell Theory states that
   1. All of these answers are correct
   2. New cells are produces by existing cells
   3. Cells are the basic unit of structure and function in living things
   4. All living things are composed of cells
10. All living organisms share many characteristics necessary for life. For example, all organisms, including both prokaryotic and eukaryotic,
    1. have cells arranged into complex organ structures
    2. can sexually reproduce to produce unique offspring
    3. must obtain and use energy for life processes
    4. can use abiotic factors to make their own food
11. By the end of mitosis, \_\_\_\_\_\_\_ cells are produced, whereas by the end of meiosis, \_\_\_\_\_\_\_ cells are produced.
    1. Two; four
    2. Three; one
    3. One; three
    4. Four; one
12. Before a cell divides, what happens to the genetic information in that cell?
    1. The information is deleted
    2. The information is selectively mutated
    3. The information is completely changed
    4. The information is duplicated
13. Examine the diagrams of plant cells. Each cell has been placed in a different solution. The first cell shown has been placed in a solution that contains \_\_\_\_\_\_\_ the interior of the cell.
    1. A higher concentration of water than
    2. Water that is cooler than
    3. The same concentration of water as
    4. Water that is warmer than
14. The rough endoplasmic reticulum and Golgi apparatus work together in eukaryotic cells. What is one way that the rough endoplasmic reticulum assists the Golgi apparatus?
    1. It determines which protein molecules to synthesize
    2. It packages new protein molecules into vesicles.
    3. It assembles nucleic acids from monomers
    4. It breaks down old, damaged macromolecules.
15. Which of the following describes the fundamental difference between prokaryotic and eukaryotic cells?
    1. Prokaryotic cells do not have a true nucleus or membrane-bound organelles
    2. Eukaryotic cells are the only type of cells that can possess a cell wall.
    3. Eukaryotic cells are only found in protists, bacteria, and viruses
    4. Prokaryotic cells are all viruses and rely on the infection of a host cell to replicate
16. What is the name of the process that appears in the diagram?
    1. Mitosis
    2. Fertilization
    3. Meiosis
    4. Differentiation
17. Prokaryotic and eukaryotic cells have many differences, but they also share some common features. Which of the following may be found in either type of cell?
    1. Cell walls
    2. Mitochondria
    3. Nuclei
    4. Golgi bodies
18. How does the size of a eukaryotic organism normally compare to the size of a prokaryotic organism?
    1. Eukaryotes are usually much larger than prokaryotes.
    2. Eukaryotes and prokaryotes are both usually very small organisms
    3. Eukaryotes are usually much smaller than prokaryotes
    4. Eukaryotes and prokaryotes are both usually very large organisms.
19. Which of the following organelles plays a role in the disposal of cellular waste and is responsible for processing, sorting, and modifying proteins?
    1. Golgi Apparatus
    2. Plasma Membrane
    3. Ribosome
    4. Mitochondrion
20. Organisms undergo many different processes in order to be able to store energy and utilize that energy. Through which of the following processes is energy released in the form of ATP?
    1. Cellular respiration
    2. Photosynthesis
    3. Respiration
    4. Phototropism
21. Which of the following cells are produced through meiosis?
    1. Stem cells
    2. Somatic cells
    3. Sex cells
    4. All of these
22. Which of the following types of passive transport involves the movement of molecules via special transport proteins?
    1. Facilitated diffusion
    2. Osmosis
    3. Filtration
    4. Simple diffusion
23. Which of the following is true of prokaryotic cells?
    1. They function as individual organisms
    2. They are able to compartmentalize functions and are more efficient
    3. The tend to be large and very complex
    4. They may be found in unicellular or multicellular organisms
24. Photosynthesis and cellular respiration are two major processes of carbon cycling in living organisms. Which statement correctly describes one similarity between photosynthesis and cellular respiration?
    1. Both synthesize organic molecules as end products.
    2. Both convert light energy into chemical energy.
    3. Both include reactions that transform energy.
    4. Both occur in animal and plant cells.
25. Examine the picture of the chloroplast. Chloroplasts contain flattened disks known as thylakoids that are stacked into grana. In the thylakoids are proteins that.
    1. help capture light from the Sun during the process of photosynthesis
    2. help capture oxygen from the atmosphere during the process of cellular respiration
    3. help capture oxygen from the atmosphere during the process of photosynthesis.
    4. help capture light from the Sun during the process of cellular respiration
26. The elephant has 56 chromosomes in its body cells. When the elephant's body cells divide by mitosis, how many chromosomes will each daughter cell have?
    1. 28
    2. 56
    3. 168
    4. 112
27. Cellular reproduction in multicellular organisms occurs through the process of mitosis. What is the purpose of mitosis?
    1. To replace old chromosomes
    2. To form new somatic (body) cells
    3. To form gametes (Sperm and Ova)
    4. To replace old cells such as red blood cells
28. During photosynthesis, plant cells take in carbon dioxide, CO2, and release oxygen, O2. How is this different from cellular respiration?
    1. During cellular respiration, oxygen is inhaled and CO2 and H2O are exhaled.
    2. During cellular respiration, cells use oxygen to break down glucose and release CO2, H2O, and ATP
    3. During cellular respiration, cells use ATP to convert insulin into glucose and CO2.
    4. During cellular respiration, the mitochondria form CO2 during the process of fermentation
29. When new cells are formed through the process of mitosis, the number of chromosomes in the new cells.
    1. Remains the same as in the parent cell
    2. Decreases every time the cell divides
    3. Increased every time the cell divides
    4. Is half of that of the parent cell
30. Photosynthesis is carried out by which of the following?
    1. All living organisms
    2. Animals, but not plants
    3. Bacteria, but neither animal nor plants
    4. Plants, but not animals
31. Plant and animals cells are both eukaryotic, and thus they are similar in many ways. However, plant cells have some organelles that are not present in animal cells. Which of the following organelles is not found in animal cells?
    1. A DNA-containing mitochondrion
    2. A functioning Golgi complex
    3. A membrane-covered endoplasmic reticulum
    4. A large vacuole
32. Mitosis occurs all over our bodies, replacing dead cells and keeping tissues and organs functioning properly. Mitosis cannot occur until the genetic material inside of a cell has been copied. Where in the cell is this genetic material located?
    1. In the vacuole
    2. In the Golgi complex
    3. In the cell membrane
    4. In the nucleus
33. Within cells there is an intricate network of that all have unique functions.
    1. Vacuoles
    2. Mitochondria
    3. Chromosomes
    4. Organelles
34. This diagram shows the processes of fertilization and cell specialization. Which of the following statements is implied by the diagram?
    1. Even though all the cells in an individual organism come from a single cell, they can specialize into different types of cells.
    2. Specialized cells are produced immediately following fertilization, or the fusion of a sperm cell with an egg cell.
    3. Specialized cells, such as bone cells, skin cells, red blood cells, and muscle cells, cannot be produced from a single cell.
    4. Since all of the cells in an individual organism come from a single cell, they must all be identical.
35. Cytokinesis is a process that occurs during the cell cycle. During cytokinesis,
    1. the chromosomes of the cell are duplicated
    2. the cell grows and performs normal life processes
    3. the cytoplasm is divided to form two separate cells
    4. the nuclear material of the cell is divided
36. Cellular organelles have different structures. Mitochondria, for example, possess highly folded inner membranes in addition to their outer membranes. Vacuoles, on the other hand, are only surrounded by a single-layer membrane; they do not have an inner membrane. Why do cellular organelles have different structures?
    1. All of the organelles in a particular organism are identical, but organelles in different organisms are unique.
    2. Organelles that are less important to the cell have less sophisticated structures
    3. The structures of cellular organelles are related to their functions
    4. The structure of a cellular organelle mimics the appearance of the organism

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| **Biology Unit 4 Part A Mendelian Genetics** |
| **Established Goals:**  **BIO.A.1.1** Explain the characteristics common to all organisms.  **BIO.A.1.1.1** Describe the characteristics of life shared by all prokaryotic and eukaryotic organisms.  **BIO.B.1.2** Explain how genetic information is inherited.  **BIO.B.1.2.2** Explain the functional relationships between DNA, genes, alleles, and chromosomes and their roles in inheritance.  **BIO.B.2.1** Compare Mendelian and non-Mendelian patterns of inheritance.  **BIO.B.2.1.1** Describe and/or predict observed patterns of inheritance (i.e., dominant, recessive, co-dominance, incomplete dominance, sex-linked, polygenic, and multiple alleles).  **BIO.B.2.1.2** Describe processes that can alter composition or number of chromosomes (i.e., crossing-over, nondisjunction, duplication, translocation, deletion, insertion, and inversion).  **BIO.B.2.3** Explain how genetic information is expressed. |

1. Sarah is doing an experiment on pea plants. She is studying the color of the pea plants. Sarah has noticed that many pea plants have purple flowers and many have white flowers. Sarah crosses a homozygous white flower and a homozygous purple flower. The cross results in all purple flowers. What is true of the color of pea plants?
   1. White flowers are dominant to white flowers.
   2. Purple flowers are dominant to white flowers.
   3. Purple flowers and white flowers are recessive to red.
   4. White flowers and purple flowers are codominant.
2. An organism’s genotype can best be defined as its
   1. number of chromosomal pairs
   2. inherited physical appearance.
   3. inherited combination of alleles.
   4. number of recessive genes.
3. In pea plants, tall (T) plants are dominant over short (t) plants. If a heterozygous (Tt) pea plant is crossed with a homozygous dominant (TT) pea plant, all of the resulting pea plants should be tall (TT or Tt). Each plant will receive a dominant allele from the homozygous dominant plant, while they could receive either a dominant or recessive allele from the heterozygous plant. The fact that each plant gets only one allele from each parent plant is detailed in
   1. segregation
   2. independent assortment
   3. multiple alleles
   4. BB, Bb
4. The diagram illustrates a process that can occur during cell division and results in an alteration in the composition of a chromosome. Each letter in the diagram represents a specific gene on the chromosome. The diagram shows that a section of the chromosome was broken out and reinserted backwards. This is

known as

* 1. translocation
  2. deletion
  3. insertion
  4. inversion

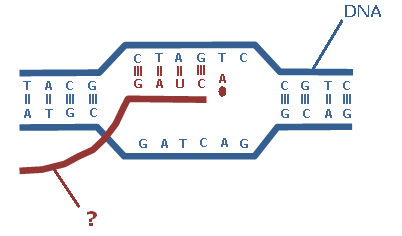
1. A\_\_\_\_\_\_ is a source of genetic variation that involves the swapping of sections of chromosomes during meiosis.
   1. transcription
   2. crossing over
   3. fertilization
   4. translocation
2. A(n) \_\_\_\_\_\_\_ is a characteristic arising from genes located on gender-determining chromosomes.
   1. sex-linked
   2. dominant
   3. allele
   4. genotype
3. Which population is likely to have the most genetic variation among its members?
   1. a population whose members are very similar to each other
   2. a population whose members have many different traits
   3. a population whose members are exactly the same
   4. it is impossible to identify genetic variation within a population
4. AB blood type is an example of \_\_\_\_\_\_\_\_\_.
   1. Independent assortment
   2. codominance
   3. incomplete dominance
   4. polygenic inheritance
5. Examine the Punnett square above. The letters represents the genotypes of a male and a female pear tree. What are the possible genetic variations that occur in their offspring?

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|  | *B* | *B* |
| *B* | ? | ? |
| *b* | ? | ? |

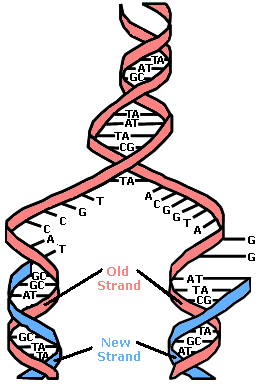
* 1. only BB
  2. only Bb
  3. BB, Bb
  4. BB, Bb, and bb

1. Carla receives an allele for blue eyes from her mother, and an allele for brown eyes from her father. If brown eye color is a dominant trait and blue eye color is a recessive trait, what can be determined about the color of Carla's eyes?
   1. Carla has green eyes.
   2. Carla has brown eyes.
   3. Carla’s eye color cannot be determined.
   4. Carla has blue eyes.
2. What is the term used to describe the heritable, physical characteristics of a living organism?
   1. phenotype
   2. allele
   3. gene
   4. pedigree
3. Gregor Mendel developed several laws of heredity over the course of his genetic research. What does the first law of heredity, the law of segregation, state about genes?
   1. Two alleles for a trait separate when gametes are formed.
   2. Alleles of different genes separate independently of one another during gamete formation.
   3. Mutations can only occur in heterozygous organisms.
   4. Dominant alleles are always more likely to be inherited.
4. It is possible for an organism to inherit a gene with two dominant alleles. What is a gene with two dominant alleles that are expressed at the same time?
   1. codominant
   2. heterozygous
   3. incomplete dominance
   4. polygenic inheritance
5. According to Mendel's Law of Segregation, meiosis involves the separation of a parent organism's alleles in order to form gametes. Since the alleles separate into different gametes, only one allele passes from each parent on to an offspring. This segregation of alleles during meiosis
   1. decreases the chance that an offspring will receive a dominant allele Inherited physical appearance.
   2. increases the chance that an offspring will receive a dominant allele.
   3. decreases the genetic variability of the offspring.
   4. increases the genetic variability of the offspring.
6. An allele is one of the alternative forms of a gene that governs a trait. If a fern plant is heterozygous for a particular trait, how can the alleles that control that trait be described?
   1. three recessive, one dominant
   2. two recessive
   3. two dominant
   4. one dominant, one recessive
7. Which of the following describes an allele whose characteristic phenotype is masked by the presence of a second, different allele?
   1. codominant
   2. recessive
   3. dominant
   4. polygenic
8. Mutations in genes can occur whenever a segment of DNA is \_\_\_\_\_\_\_\_\_.
   1. deleted
   2. substituted
   3. inserted
   4. all of these.
9. The diagram illustrates a process that can occur during cell division and results in an alteration in the composition of a chromosome. Each letter in the diagram represents a specific gene on the chromosome.
   1. inversion
   2. translocation
   3. nondisjunction
   4. deletion
10. A genetic mutation that does not result in a change in the amino acid sequence of the resulting protein is called
    1. a nonsense mutation
    2. a frame shift mutation
    3. a chromosomal mutation
    4. a silent mutation
11. A\_\_\_\_\_\_ is a source of genetic variation that refers to a random error in the genetic code.
    1. fertilization
    2. mitosis
    3. a mutation
    4. meiosis
12. The variation of kernel color in corn plants is an inherited trait. Assume that R is the dominant allele for red kernels in a corn plant and r is the recessive allele for yellow kernels. What is the probability that a corn plant with the genotype Rr crossed with a corn plant rr will have offspring with the genotype rr?
    1. 2/3
    2. 1/2
    3. 1/1
    4. 1/4
13. Punnett squares depict the genotypes of two parents and are used to predict the inherited traits of offspring. Which of the following would be the missing predicted trait in the table?
    1. OA
    2. AA
    3. AO
    4. OO
14. Mrs. Smith has blood type A. Her father has blood type A, and her mother has blood type B. If Mr. Smith has blood type AB, what is the probability that they will have a child with blood type AB?
    1. 25%
    2. 50%
    3. 0%
    4. 100%
15. A student crosses two true-breeding pea plants, one with green pods and the other with yellow pods. If yellow is dominant over green, what phenotypic results will the student find in the F1 generation ?
    1. 100% yellow
    2. 75% green, 25% yellow
    3. 100% green
    4. 75% yellow, 25% green
16. Which of the following is the term for one possible form of the gene for a particular trait?
    1. sex-linked trait
    2. codon
    3. allele
    4. autosomal trait

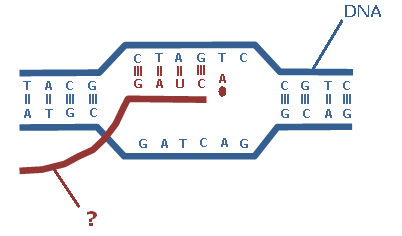
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| **Biology Unit 5 Part A DNA, Genes, Genetic Code, Protein Synthesis** |
| **Established Goals:**  **BIO.A.1.1** Explain the characteristics common to all organisms.  **BIO.A.1.1.1** Describe the characteristics of life shared by all prokaryotic and eukaryotic organisms.  **BIO.A.1.2** Describe relationships between structure and function at biological levels of organization.  **BIO.A.1.2.1** Compare cellular structures and their functions in prokaryotic and eukaryotic cells.  **BIO.B.1.2.1** Describe how the process of DNA replication results in the transmission and/or conservation of genetic information.  **BIO.B.1.2.2** Explain the functional relationships between DNA, genes, alleles, and chromosomes and their roles in inheritance.  **BIO.B.2.1.2** Describe processes that can alter composition or number of chromosomes (i.e., crossing-over, nondisjunction, duplication, translocation, deletion, insertion, and inversion).  **BIO.B.2.2** Explain the process of protein synthesis (i.e., transcription, translation, and protein modification).  **BIO.B.2.2.1** Describe how the processes of transcription and translation are similar in all organisms.  **BIO.B.2.3** Explain how genetic information is expressed. |



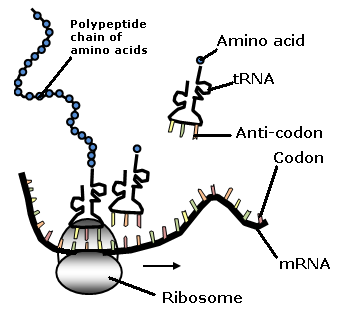
1. The genetic information that is passed from a parent to its offspring is found in \_\_\_\_\_\_\_.
   1. amino acids
   2. carbon atoms
   3. DNA molecules
   4. hydrogen bonds
2. Which of the following molecules is the subunit of DNA that links together to form strands of DNA?
   1. a nucleotide
   2. a polymerase
   3. a codon
   4. a phosphate base
3. Which of the following sets of molecules bond together to form a nucleotide?
   1. adenine, thymine, and cytosine
   2. a nitrogen atom, a phosphate atom, and a five-carbon sugar
   3. deoxyribose, a nitrogen base, a phosphate group
   4. a purine, a pyrimidine, and a five-carbon sugar
4. The sequence of bases on one strand of a DNA molecule is ATTGCCCATG. What will be the sequence on the complementary strand?
   1. GCCATTTGCA
   2. CGGTAAACGT
   3. ATTGCCCATG
   4. TAACGGGTAC
5. The DNA sequences that make up the genetic code of an organism determine which traits the organism will exhibit. How are the instructions coded by DNA translated into an organism's physical traits?
   1. Instructions coded by DNA sequences are translated into proteins which express an organism's physical traits.
   2. DNA sequences both code genetic instructions within an organism and express an organism's physical traits
   3. DNA sequences that code for genetic instructions attach to phosphate groups that express an organism's physical traits.
   4. Instructions coded by DNA sequences are translated into nucleotides which express an organism's physical traits.
6. What is a gene?
   1. a sex cell that aids in organism reproduction
   2. a characteristic of any organism
   3. a set of instructions in the DNA sequence of an organism
   4. any single amino acid in a multicellular organism
7. Heredity information is found in \_\_\_\_\_\_\_, which are located in the \_\_\_\_\_\_\_ of the cell.
   1. nucleotides; vacuoles
   2. ribosomes; cytoplasm
   3. genes; chromosomes
   4. mitochondria; endoplasmic reticulum
8. Which of the following correctly organizes genetic material from the broadest category to the most specific category?
   1. gene --> chromosome --> DNA --> genome
   2. genome --> chromosome --> gene --> DNA
   3. genome --> DNA --> chromosome --> gene
   4. genome --> chromosome --> DNA --> gene
9. The genetic code is a sequence of DNA nucleotides. In eukaryotic cells, the DNA is located in the nuclei of the cells. The genetic code is nearly universal in that
   1. the same codons are assigned to the same amino acids in most living things.
   2. None of these are correct.
   3. the same amino acids are assigned to the same DNA sequences in most living things.
   4. the same codons are assigned to the same DNA sequences in most living things.



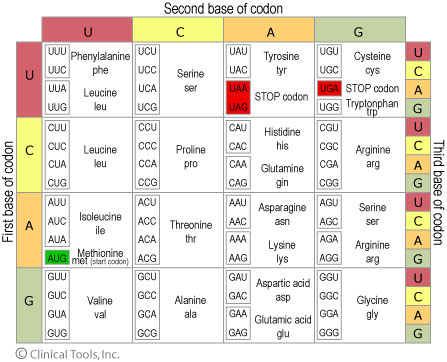
1. During the process shown above, the two strands of one DNA molecule are unwound. Then, DNA polymerases add complementary nucleotides to each strand which results in the formation of two identical DNA molecules. This process is known as DNA \_\_\_\_\_\_\_.
   1. translation
   2. transcription
   3. cloning
   4. replication
2. When a molecule of double-stranded DNA undergoes replication, it results in
   1. four double-stranded DNA molecules, each composed only of old strands of DNA.
   2. three double-stranded DNA molecules, each composed of sections of old and new strands.
   3. one double-stranded DNA molecule composed only of entirely new strands.
   4. two double-stranded DNA molecules, each composed of one new and one old strand.
3. During DNA replication, a primer attaches to a template strand of DNA and begins a new strand. After the primer has attached, an enzyme extends the new strand of DNA by adding nucleotides that correspond to the nucleotide sequences in the template strand. Which enzyme is responsible for adding nucleotides to the growing DNA molecule?
   1. DNA polymerase
   2. DNA isomerase
   3. DNA helicase
   4. DNA structase
4. DNA contains instructions for making the different molecules, such as proteins, that the cell needs for growth and function. To use these instructions, the first step is : the DNA must be \_\_\_\_\_\_\_ into \_\_\_\_\_\_\_.
   1. transcribed; amino acids
   2. translated; amino acids
   3. transcribed, mRNA
   4. translated; mRNA
5. In eukaryotic organisms, DNA transcription occurs in the \_\_\_\_\_\_\_ of a cell.
   1. cytoplasm
   2. mitochondria
   3. ribosome
   4. nucleus



1. The picture above shows the process of transcription. During transcription, enzymes bind to a molecule of DNA. Then, the enzymes unwind and separate the DNA's double helical strands. As the molecule unwinds, complementary nucleotides pair with one of the DNA strands to form
   1. an identical strand of DNA
   2. an mRNA molecule
   3. a DNA polymerase
   4. a protein molecule



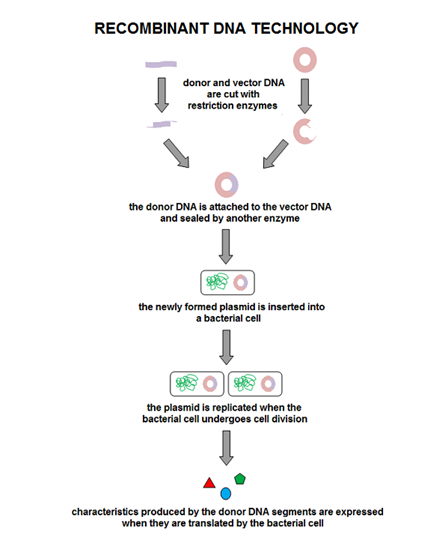
1. Which of the following is true regarding the process shown above?
   1. The process shown above is known as translation and involves the production of proteins from RNA.
   2. The process shown above is known as transcription and involves the production of proteins from DNA
   3. The process shown above is known as replication and involves the production of DNA from RNA.
   4. The process shown above is known as cloning and involves the production of RNA from protein molecules
2. Which of the following is a true statement about codons?
   1. In translation, an mRNA codon is recognized by its complementary amino acid.
   2. A codon is a sequence of three amino acids.
   3. In translation, an mRNA codon is recognized by its complementary tRNA.
   4. A codon is a sequence of four nitrogenous bases.
3. Which structure is the site of protein translation?
   1. a chloroplast
   2. a mitochondrion
   3. a vacuole
   4. a ribosome



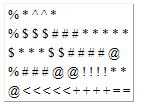
1. Above is the Genetic Code chart. Using this chart, choose the correct amino acid sequence that matches with the following mRNA: **AUGUGCAACGCU**
   1. methionine, valine, glycine, proline
   2. methionine, cysteine, asparagine, alanine
   3. stop, valine, asparagine, arginine
   4. lysine, methionine, cysteine, alanine
2. Which of the following contains an anticodon with an amino acid attached?
   1. nucleus
   2. DNA
   3. tRNA
   4. mRNA
3. Which statement describes a cell process that is common to both eukaryotic and prokaryotic cells?
   1. Both cell types assemble amino acids to carry out transcription.
   2. Both cell types use ribosomes to carry out translation
   3. Both cell types carry out transcription in the nucleus.
   4. Both cell types carry out translation in the endoplasmic reticulum.
4. How is the nucleus involved in the production of enzymes?
   1. The nucleus transcribes and releases messenger RNA signaling for the enzymes to be synthesized.
   2. The nucleus translates the ribosomal RNA for the enzymes to be synthesized in mitochondria.
   3. The nucleus is involved in the packaging and transportation of enzymes outside of the cell.
   4. The nucleus receives the messenger RNA and is the site where enzymes are synthesized
5. During a stage of protein synthesis, codons in mRNA molecules are used to specify the sequence of amino acids in polypeptide chains. What is this process called?
   1. transcription
   2. codification
   3. gene expression
   4. translation
6. Which of the following best describes the product of RNA translation?
   1. a chromosome
   2. an RNA molecule
   3. a protein
   4. a DNA molecule
7. From the follow, select the items that are used during RNA translation.   
   I. mRNA   
   II. tRNA   
   III. ribosome   
   IV. amino acid
   1. II, III, and IV only
   2. I, II, III, and IV
   3. III and IV only
   4. I, III, and IV only

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| **Biology Unit 1 and 2 Part B Protein Synthesis, Biotechnology, Evolution** |
| **Unit 1:**  **BIO.B.1.2** Explain how genetic information is inherited.  **BIO.B.2.4** Apply scientific thinking, processes, tools, and technologies in the study of genetics.  **BIO.B.2.4.1** Explain how genetic engineering has impacted the fields of medicine, forensics, and agriculture (e.g., selective breeding, gene splicing, cloning, genetically modified organisms, gene therapy).  **Unit 2:**  **BIO.A.1.1** Explain the characteristics common to all organisms.  **BIO.A.1.1.1** Describe the characteristics of life shared by all prokaryotic and eukaryotic organisms.  **BIO.B.3.1** Explain the mechanisms of evolution.  **BIO.B.3.1.1** Explain how natural selection can impact allele frequencies of a population.  **BIO.B.3.1.2** Describe the factors that can contribute to the development of new species (e.g., isolating mechanisms, genetic drift, founder effect, migration).  **BIO.B.3.1.3** Explain how genetic mutations may result in genotypic and phenotypic variations within a population.  **BIO.B.3.2** Analyze the sources of evidence for biological evolution.  **BIO.B.3.2.1** Interpret evidence supporting the theory of evolution (i.e., fossil, anatomical, physiological, embryological, biochemical, and universal genetic code).  **BIO.B.3.3** Apply scientific thinking, processes, tools, and technologies in the study of the theory of evolution. |

1. In the early to mid-1980's, police began using DNA evidence to convict criminals of violent crimes. Currently, techniques such as DNA fingerprinting are frequently used in criminal investigations, and some countries, such as England, even keep DNA databases so that persons who commit crimes may be more quickly apprehended. To what branch of science do these techniques belong?
2. quantum physics
3. comparative anatomy
4. inorganic chemistry
5. biotechnology
6. Biotechnology is used in a variety of areas from agriculture to pharmaceuticals to fuels. How is the use of biotechnology in agriculture beneficial to the environment?
7. Genetically altered crops require less pesticide.
8. Genetically altered crops produce less carbon dioxide.
9. Genetically altered crops are unable to reproduce.
10. Genetically altered crops are more delicious.
11. People suffering from diabetes need to be injected with insulin in order to keep their blood glucose levels stable. In the early 1900s, insulin for diabetes patients was extracted from slaughtered cows and pigs. However, in the 1970s, genetic engineering technology allowed scientists to engineer a bacterium to produce human insulin. How does this new form of biotechnology most likely benefit society?
12. There is no longer a large market for cow and pig organs.
13. Genetically engineered bacteria cannot become pathogenic to humans.
14. There are no benefits to this form of biotechnology.
15. Patients with diabetes now have a steady, inexpensive supply of insulin available.
16. Genetic engineering is the process of manipulating genes for practical purposes. Today, scientists have genetically engineered many types of organisms including crop plants. Which of the following is a current benefit gained from genetically engineered crops?
    1. Some food staples, such as rice, contain more nutrients.
    2. Some disease resistant fruits and vegetables are less flavorful.
    3. Some animals develop allergies to the genetically engineered crops.
    4. Some genes can be transferred to wild plants in the area.
17. Every year millions of crops are lost due to pests. In recent times, however, scientists have learned that they can insert a gene into the DNA of specific crops that gives them a higher pest-resistance than normal. This technology allows farmers to have higher crop yields and increases the supply of valuable food sources. This technology is an example of
    1. DNA transcription
    2. binary fission
    3. gene splicing
    4. crossing over
18. It has been found that the tenderness of beef can be predicted by analyzing a cow's genes. So, commercial tests are now available for farmers to be able to determine which of their cows possess the "tough" gene and which possess the "tender" gene. If a farmer routinely tests his cattle and only allows cows with the "tender" gene to mate, what is he doing?
    1. genetic bias
    2. forensic testing
    3. selective breeding
    4. recombinant DNA technology
19. In 1996, a group of scientists from Scotland used a somatic (non-sex) cell of an adult sheep to produce an identical copy of that sheep. The process through which a genetically identical cell or organism is produced is known as \_\_\_\_\_\_\_.
    1. xeroing
    2. cloning
    3. vector analysis
    4. carbon copying
20. All living organisms share some similarities in the chemical and structural properties of their DNA. These similarities allow scientists to transfer portions of DNA from one organism to another. This diagram shows one process through which scientists transfer DNA. What is this process called?



* 1. selective breeding
  2. spontaneous generation
  3. forensic toxicology
  4. recombinant DNA technology

1. Genetic disorders are caused by the insertion, deletion, or alteration of segments of DNA. However, in order for scientists to be able to determine which genes are faulty, they must first know the normal sequences of DNA. In 1990, an international effort began to analyze the human DNA sequence.
   1. The DNA Revolution
   2. The National Institute of Health
   3. The Human Genome Project
   4. The Geneva Conference
2. Genetic engineering has led to genetically modified plants that resist insect pests and bacterial and fungal infections. Which outcome would **most likely** be a reason why some scientists recommend **caution** in planting genetically modified plants?
   1. increased genetic variation and diversity
   2. reduced pesticide and herbicide use
   3. unplanned ecosystem interactions
   4. improved agricultural yield and profit
3. What does it mean to say that two different species of organisms are closely related?
   1. They have the same preferences in diet.
   2. They live in the same habitat.
   3. They have a common evolutionary ancestor.
   4. They have the same parents.
4. Scientists know that organisms that are more closely related will have DNA sequences more similar to each other than organisms that are distantly related. Which two organisms below would most likely have the fewest similar nucleotide sequences in a given gene?
   1. lion and horse
   2. scorpion and tarantula
   3. orangutan and howler monkey
   4. alligator and earthworm
5. Speciation is the process by which new species are formed. Which of the following circumstances is most likely to lead to speciation?
   1. A population begins to develop sexual dimorphism between the males and females of the species
   2. A population becomes separated by different environments and do not reproduce with one another
   3. A population is unable to compete with other species and becomes extinct.
   4. A population reproduces beyond the carrying capacity of the ecosystem in which the population lives
6. The fossil record shows that the forelimbs of humans, cats, dolphins, and bats have the same skeletal elements. These skeletal elements have evolved into different shapes and sizes based on their function. For example, the flipper of a dolphin is adapted for swimming and the wing of a bat is adapted for flying. What do the similarities between the skeletal structures of these four species most likely indicate about their evolutionary history?
   1. These four species are distantly related and share a common ancestor
   2. These four species are not related and do not share a common ancestor
   3. These four species all evolved from a common flying ancestor
   4. These four species are all descended from the same parent organism.
7. The human appendix is a \_\_\_\_\_\_\_ structure that suggests that humans evolved from plant-eating ancestors.
   1. Essential
   2. Behavioral
   3. Embryonic
   4. Vestigial
8. Evolution is the fundamental concept underlying all of biology and is supported by multiple forms of scientific evidence. Which of the following supports evolution?
   1. Molecular biology
   2. Biogeography
   3. Fossil records
   4. All of these
9. Several species of finch live on the Galapagos Island. They are very similar in appearance, but have adapted beaks of different sizes and shapes based on their major food source. Finches with large beaks eat mainly large seeds and cacti. Finches with small beaks eat mainly small seeds and insects. Which of the following best explains the variety of beaks found in finches on the Galapagos Island?  
   1. Evolution through natural selection always causes a decrease in the species diversity of an ecosystem.
   2. Evolution through natural selection can increase the species diversity of an ecosystem
   3. Biological evolution only affects the species diversity of plants in an ecosystem.
   4. Biological evolution does not have any effect on the species diversity of an ecosystem
10. Which of the following is true about natural selection?
    1. Natural selection acts upon asexually reproducing populations that lack genetic variation among individual organisms
    2. Natural selection acts upon individual organisms by changing their genetic code through a process known as gene flow
    3. Natural selection causes changes in individual organisms because individuals adapt during their lifetime to better suit their environment
    4. Natural selection causes changes in populations because of the differential reproductive success of genetically varied individuals.
11. Nearly all mammals have seven cervical (neck) vertebrae. This fact implies that
    1. all mammals have to stretch their necks to obtain food
    2. all animals can turn their heads the same amount
    3. predators prefer to eat animals with either six or eight cervical vertebrae
    4. all mammals descended from a common ancestor
12. The diagram below shows a variety of animals at different stages of development. Which of the following statements is supported by this diagram?  
    1. There are similarities in the developmental stages of different organisms in the animal kingdom.
    2. Humans undergo more stages of development than other animals, such as salamanders, tortoises, chickens, and pigs
    3. Diverse organisms in the animal kingdom possess more similarities during the fetal stages of development than during their embryonic stages.
    4. The developmental stages of animals are radically different; they do not possess any similarities at all
13. Which of the following is best defined as the transfer of genetic information from one population to another?
    1. Genetic recombination
    2. Gene flow
    3. Natural election
    4. Genetic drift
14. The leg of an iguana and the wing of a bird look different, but they have similar functions and likely evolved from the same distant ancestor. Structures such as these are said to be \_\_\_\_\_\_\_.
    1. Homologous
    2. Differentiated
    3. Heterogeneous
    4. Vestigial
15. Charles Darwin originally published the idea that all species have descended over time from common ancestors. This idea is known as evolution. Evolution is best categorized as
    1. an unproven observation about a small number of organisms
    2. a scientific fact that has not been modified since Darwin's time.
    3. a scientific theory that is supported by evidence
    4. a scientific hypothesis that has not been researched.
16. The study of structural differences and similarities among living things is called \_\_\_\_\_\_\_.
    1. Comparative anatomy
    2. Embryology
    3. Comparative biochemistry
    4. Neurology
17. Which of the following is an example of natural selection?
    1. Barn Owls sleep during the day, and doves sleep during the night
    2. An aloe vera plant species possessing a trait for extra thick leaves survives a long drought in a desert, and an aloe vera species that has thinner leaves does not
    3. A farmer breeds a certain cow that produces more milk than his other cows to produce more cows that produce a lot of milk.
    4. A species of corn is genetically modified to produce a natural insecticide, resulting in an increase in crop growth and a decrease in insect population
18. Some organisms have favorable traits that are well-suited to the environment at hand. Organisms with this advantage are more likely to thrive, reproduce, and pass their traits to future generations than organisms without favorable traits.
    1. Reproductive isolation
    2. Mimicry
    3. Natural selection
    4. Geographic isolation
19. In a population of a species of field mice, favorable traits in the mice are likely to \_\_\_\_\_\_\_ over time, and unfavorable traits are likely to \_\_\_\_\_\_\_ over time.
    1. Decrease, decrease
    2. Decrease, increase
    3. Increase, increase
    4. Increase, decrease
20. Genetic drift can best be defined as
    1. a change in the allelic frequency within a population due to random chance
    2. the transfer of alleles from one breeding population to another
    3. a change in the allelic frequency within a population due to differential reproductive success
    4. The adaptation of a population due to environmental changes.
21. Allele frequency refers to the fraction of individuals with a particular version of a given gene. What effect does natural selection have on the allele frequency of a population?
    1. It greatly reduces the total population, which increases the effects of genetic drift on allele frequency.
    2. It increases the frequency of alleles that improve a species' survival in a particular environment
    3. It causes random changes and the allele frequency of certain traits may increase or decrease
    4. It causes the allele frequency to resemble that of a small number of individuals that became separated from the rest of the population
22. The first organisms evolved on Earth around 4 billion years ago. The fossil record indicates that the first organisms were which of the following?
    1. Prokaryotes
    2. Plastids
    3. Mitochondria
    4. Eukaryotes
23. Look at the representation of a hillside below. The symbols in each stratus of the cross-section represent fossils of different organisms. Which of the following organisms must have evolved first?   
       
    1. #
    2. $
    3. @
    4. \*

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| **Biology Unit 3 and 4 Part B Taxonomy, Classification, Human Body Systems** |
| **Established Goals:**  **BIO.A.1.1** Explain the characteristics common to all organisms.  **BIO.A.1.1.1** Describe the characteristics of life shared by all prokaryotic and eukaryotic organisms.  **BIO.A.1.2** Describe relationships between structure and function at biological levels of organization.  **BIO.A.1.2.1** Compare cellular structures and their functions in prokaryotic and eukaryotic cells.  **BIO.A.1.2.2** Describe and interpret relationships between structure and function at various levels of biological organization (i.e. organelles, cells, tissues, organs, organ systems, and multicellular organisms).  **BIO.A.4.2** Explain mechanisms that permit organisms to maintain biological balance between their internal and external environments.  **BIO.A.4.2.1** Explain how organisms maintain homeostasis (e.g., thermoregulation, water regulation, oxygen regulation). |

1. In order to determine how various organisms are related, scientists have organized them into classification groups or taxa.  
     
   Which choice below lists the correct order of organism classification hierarchy, from most broad to most specific?

|  |  |
| --- | --- |
|  | a. kingdom, class, phylum, order, genus, family, and species |

|  |  |
| --- | --- |
|  | b. species, genus, family, order, class, phylum, and kingdom |

|  |  |
| --- | --- |
|  | c. kingdom, phylum, class, order, family, genus, and species |

|  |  |
| --- | --- |
|  | d. species, family, genus, order, phylum, class, and kingdom |

1. What are the three domains used to classify organisms?

|  |  |
| --- | --- |
|  | a. Protista, Fungi, and Animalia |

|  |  |
| --- | --- |
|  | b. Archaeabacteria, Fungi, and Animalia |

|  |  |
| --- | --- |
|  | c. Eubacteria, Archaeabacteria, and Eukaryotes |

|  |  |
| --- | --- |
|  | d. Bacteria, Protista, and Fungi |

1. Which of the following lists only those kingdoms which contain organisms that are capable of capturing and using energy from the Sun?

|  |  |
| --- | --- |
|  | a. fungi and plants |

|  |  |
| --- | --- |
|  | b. plants and animals |

|  |  |
| --- | --- |
|  | c. plants and protists |

|  |  |
| --- | --- |
|  | d. protists and fungi |

1. An organism that is being studied has prokaryotic cells, reproduces by binary fission, and does not have a nucleus. What type of organism is it?

|  |  |
| --- | --- |
|  | a. protist |

|  |  |
| --- | --- |
|  | b. virus |

|  |  |
| --- | --- |
|  | c. bacterium |

|  |  |
| --- | --- |
|  | d. plant |
|  |  |

1. Use the following key to answer the question.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| |  |  |  | | --- | --- | --- | | #1. | Larger than 1.5 inches | go to #2 | |  | Smaller than 1.5 inches | go to #3 | |  | | | | #2. | Larger than 6 inches | Cane Toad (*Bufo marinus*) | |  | Smaller than 6 inches | go to #3 | |  | | | | #3. | Skin is smooth | Green Tree Frog (*Litoria caerulea*) | |  | Skin has warts | go to #4 | |  | | | | #4. | Triangle between the eyes | Northern Cricket Frog (*Acris crepitans*) | |  | No triangular mark on head | go to #5 | |  | | | | #5. | Stripe on back from head to tail | Western Toad (*Bufo boreas)* | |  | X-shaped mark on back | Spring Peeper (*Pseudacris crucifer*) | |

What is the species name of a frog that is between 1.5 and 6 inches long, has warts on its skin, and has a triangular mark between its eyes?

|  |  |
| --- | --- |
|  | a. *Bufo boreas* |

|  |  |
| --- | --- |
|  | b. *Litoria caerulea* |

|  |  |
| --- | --- |
|  | c. *Pseudacris crucifer*  *d. Acris crepitans* |
|  |  |
|  |  |
|  |  |

|  |  |  |
| --- | --- | --- |
| 1. | Radial symmetry or asymmetry | go to number 2 |
|  | Bilateral symmetry | go to number 4 |
|  |  |  |
| 2. | Very porous surface | Phylum *Porifera* |
|  | Nonporous surface | go to number 3 |
|  |  |  |
| 3. | Has tube feet | Phylum *Echinodermata* |
|  | Has tentacles | Phylum *Cnidaria* |
|  |  |  |
| 4. | Individuals are smaller than 0.5 mm | Phylum *Ectoprocta* |
|  | Individuals are bigger than 0.5 mm | go to number 5 |
|  |  |  |
| 5. | Gelatinous | go to number 6 |
|  | Nongelatinous | go to number 7 |
|  |  |  |
| 6. | Has comb plates | Phylum *Ctenophora* |
|  | Has siphons | Phlylum *Chordata* |
|  |  |  |
| 7. | Segmented | go to number 8 |
|  | Not segmented | go to number 9 |
|  |  |  |
| 8. | Has an exoskeleton and jointed appendages | Phylum *Arthropoda* |
|  | No exoskeleton or jointed appendages | Phlylum *Annelida* |
|  |  |  |
| 9. | Has a foot, radula, arms and/or shell | Phylum *Mollusca* |
|  | Does not have a foot, radula, arms or shell | Phylum *Platyhelminthes* |

1. Marissa is walking along the beach and finds an unknown organism on the shore. It has bilateral symmetry, a gelatinous body that is bigger than 0.5 mm, and comb plates. In which phylum can the organism be classified?

|  |  |
| --- | --- |
|  | A. *C. lupus* and *C. latrans* |

|  |  |
| --- | --- |
|  | B. *Ctenophora* |

|  |  |
| --- | --- |
|  | C. *Bufo boreas* |

|  |  |
| --- | --- |
|  | D. *Otariidae* *odobeniadae* |

1. A scientist who studies organisms that inhabit the harsh climate of sulfurous hot springs most likely is studying members of which kingdom?

|  |  |
| --- | --- |
|  | a. Fungi |

|  |  |
| --- | --- |
|  | b. Animalia |

|  |  |
| --- | --- |
|  | c. Archaebacteria |

|  |  |
| --- | --- |
|  | d. Plantae |

1. Which of the following sequences represents the proper levels of organization (from simplest to most complex) in multicellular organisms?

|  |  |
| --- | --- |
|  | a. whole organisms, organ systems, organs, tissues, cells, organelles |

|  |  |
| --- | --- |
|  | b. organelles, cells, tissues, organs, organ systems, whole organisms |

|  |  |
| --- | --- |
|  | c. whole organisms, tissues, organ systems, organs, cells, organelles |

|  |  |
| --- | --- |
|  | d. organelles, tissues, cells, organs, organ systems, whole organisms |

1. Which of the following is an example of the respiratory and circulatory systems working together?

|  |  |
| --- | --- |
|  | a. The blood flows through the kidneys, and waste products are removed. |

|  |  |
| --- | --- |
|  | b. The lungs take in air, and the blood carries oxygen to the body's cells. |

|  |  |
| --- | --- |
|  | c. A virus enters the body, and the white blood cell levels rise. |

|  |  |
| --- | --- |
|  | d. The diaphragm flexes, and the lungs take in air. |

1. The digestive system breaks down nutrients so that they can be absorbed by the bloodstream and carried to all of the body's cells. Which of the following traces the path of food as it passes through the digestive tract?

|  |  |
| --- | --- |
|  | a. mouth, stomach, esophagus, small intestine, large intestine |

|  |  |
| --- | --- |
|  | b. mouth, esophagus, stomach, small intestine, large intestine |

|  |  |
| --- | --- |
|  | c. mouth, small intestine, large intestine, esophagus, stomach |

|  |  |
| --- | --- |
|  | d. mouth, stomach, large intestine, small intestine, esophagus |

1. The cardiovascular system transports blood throughout the body. Blood is made up of red blood cells, white blood cells, platelets, and plasma. What is the main function of red blood cells?

|  |  |
| --- | --- |
|  | a. transport nutrients |

|  |  |
| --- | --- |
|  | b. transport hormones |

|  |  |
| --- | --- |
|  | c. transport cellular wastes |

|  |  |
| --- | --- |
|  | d. transport oxygen |
|  |  |

1. The respiratory system's main function is to obtain and release gases. Which of the following describes the flow of gases into the respiratory system?

|  |  |
| --- | --- |
|  | a. bronchi, bronchioles, alveoli, pharynx, larynx, trachea |

|  |  |
| --- | --- |
|  | b. trachea, pharynx, larynx, bronchioles, bronchi, alveoli |

|  |  |
| --- | --- |
|  | c. alveoli, larynx, trachea, pharynx, bronchi, bronchioles |

|  |  |
| --- | --- |
|  | d. pharynx, larynx, trachea, bronchi, bronchioles, alveoli |

1. The main function of the muscular system is to allow the body to move. Muscles cause movement by contracting and relaxing. How do muscles contract?

|  |  |
| --- | --- |
|  | a. Z lines along a muscle fiber pull toward each other, causing actin filaments, and thus entire sarcomeres, to lengthen. |

|  |  |
| --- | --- |
|  | b. The heads of myosin filaments shorten the sarcomeres by attaching to the actin filaments and bending inward, pulling the actin filaments along with them. |

|  |  |
| --- | --- |
|  | c. Actin filaments shorten the sarcomeres by swelling to the size of myosin filaments; this causes the muscle fibers to swell. |

|  |  |
| --- | --- |
|  | d. The heads of myosin filaments that are attached to the actin filaments are released from their binding sites, slide apart, and lengthen the sarcomere. |

1. Excretion, the process that rids the body of toxic chemicals and excess water, salts, and carbon dioxide, is carried out by the excretory system in order to maintain the body's osmotic and pH balance. The kidneys are the main organs of the excretory system. Which other two organs perform excretion?

|  |  |
| --- | --- |
|  | a. the liver and the appendix |

|  |  |
| --- | --- |
|  | b. the tonsils and the lymph nodes |

|  |  |
| --- | --- |
|  | c. the pancreas and the large intestine |

|  |  |
| --- | --- |
|  | d. the skin and the lungs |

1. When respiration occurs within cells, carbon dioxide is released as waste. Which system transports carbon dioxide for removal from the body?

|  |  |
| --- | --- |
|  | a. excretory system |

|  |  |
| --- | --- |
|  | b. circulatory system |

|  |  |
| --- | --- |
|  | c. immune system |

|  |  |
| --- | --- |
|  | d. digestive system |

1. Materials, such as nutrients and oxygen, must be transported to every cell in the body in order for cells to be able to maintain homeostasis. Which organ system is involved in the delivery of materials to cells?

|  |  |
| --- | --- |
|  | a. excretory system |

|  |  |
| --- | --- |
|  | b. integumentary system |

|  |  |
| --- | --- |
|  | c. circulatory system |

|  |  |
| --- | --- |
|  | d. skeletal system |
|  |  |

1. Neurons communicate with each other and with other cells of the body mainly by releasing...

|  |  |
| --- | --- |
|  | a. DNA fragments. |

|  |  |
| --- | --- |
|  | b. electrochemical signals. |

|  |  |
| --- | --- |
|  | c. enzymes. |

|  |  |
| --- | --- |
|  | d. hormones. |

1. Almost all living things are able to produce offspring during their life cycles. In mammals, the organ system responsible for the production of offspring does not mature until the mammal reaches puberty. Which of the following organ system is involved in the production of offspring?

|  |  |
| --- | --- |
|  | a. immune system |

|  |  |
| --- | --- |
|  | b. reproductive system |

|  |  |
| --- | --- |
|  | c. respiratory system |

|  |  |
| --- | --- |
|  | d. integumentary system |

1. There are approximately 480 million alveoli present in human lungs. About 70% of the area of each alveolus is wrapped in capillaries. These factors make the alveoli a perfect location for

|  |  |
| --- | --- |
|  | a. gas exchange. |

|  |  |
| --- | --- |
|  | b. digestion. |

|  |  |
| --- | --- |
|  | c. waste storage. |

|  |  |
| --- | --- |
|  | d. hormone secretion. |

1. A person constantly comes in contact with pathogens that can infect body cells and cause disease. Which organ system is involved in protecting the body from both infectious and noninfectious diseases?

|  |  |
| --- | --- |
|  | a. reproductive system |

|  |  |
| --- | --- |
|  | b. muscular system |

|  |  |
| --- | --- |
|  | c. immune system |

|  |  |
| --- | --- |
|  | d. nervous system |

1. Carbohydrates are one of the easiest nutrients for the body to digest. Lipids, on the other hand, must undergo more complex chemical digestion. Bile is used in the digestive tract to help breakup large lipid particles in order for digestive enzymes to work more quickly. Which of the following digestive organs produces bile?

|  |  |
| --- | --- |
|  | a. pancreas |

|  |  |
| --- | --- |
|  | b. liver |

|  |  |
| --- | --- |
|  | c. stomach |

|  |  |
| --- | --- |
|  | d. gallbladder |
|  |  |

1. Immediately after eating, blood glucose levels increase. This stimulates the release of insulin, which promotes the uptake of glucose into the cells, and lowers blood glucose levels. This is an example of how the body

|  |  |
| --- | --- |
|  | a. promotes cell repair. |

|  |  |
| --- | --- |
|  | b. maintains homeostasis. |

|  |  |
| --- | --- |
|  | c. suppresses digestion. |

|  |  |
| --- | --- |
|  | d. conserves energy. |

1. The female reproductive system in humans differs from the human male reproductive system in that it is solely responsible for

|  |  |
| --- | --- |
|  | a. producing sex hormones. |

|  |  |
| --- | --- |
|  | b. nourishing a developing zygote. |

|  |  |
| --- | --- |
|  | c. creating offspring. |

|  |  |
| --- | --- |
|  | d. producing gametes. |

1. Which part of a flower plays the greatest role in sexual reproduction?

|  |  |
| --- | --- |
|  | a. petals |

|  |  |
| --- | --- |
|  | b. stigma |

|  |  |
| --- | --- |
|  | c. sepal |

|  |  |
| --- | --- |
|  | d. stem |

1. What is the main function of the human reproductive system?

|  |  |
| --- | --- |
|  | a. the production of hormones |

|  |  |
| --- | --- |
|  | b. the production of gametes |

|  |  |
| --- | --- |
|  | c. the production of enzymes |

|  |  |
| --- | --- |
|  | d. the production of somatic cells |

1. Movement of the human body is possible because the bones of the skeletal system are connected by tendons to the body's \_\_\_\_\_\_\_ system.

|  |  |
| --- | --- |
|  | a. endocrine |

|  |  |
| --- | --- |
|  | b. muscular |

|  |  |
| --- | --- |
|  | c. nervous |

|  |  |
| --- | --- |
|  | d. circulatory |

1. The digestive system takes in nutrients and breaks down these nutrients for energy. The solid waste products that are generated during digestion are removed from the human body by the

|  |  |
| --- | --- |
|  | a. excretory system. |

|  |  |
| --- | --- |
|  | b. respiratory system. |

|  |  |
| --- | --- |
|  | c. endocrine system. |

|  |  |
| --- | --- |
|  | d. circulatory system. |

|  |
| --- |
| **Biology Unit 5 Part B Ecosystems, Biomes, Food Chains/Food Web, Succession, Water/Nitrogen/Carbon Cycles, Pollution** |
| Established Goals:  BIO.A.2.1 Describe how the unique properties of water support life on Earth.  BIO.B.4.1 Describe ecological levels of organization in the biosphere.  BIO.B.4.1.1 Describe the levels of ecological organization (i.e. organism, population, community, ecosystem, biome, and biosphere).  BIO.B.4.1.2 Describe characteristic biotic and abiotic components of aquatic and terrestrial ecosystems.  BIO.B.4.2 Describe interactions and relationships in an ecosystem.  BIO.B.4.2.1 Describe how energy flows through an ecosystem (e.g. food chains, food webs, energy pyramids).  BIO.B.4.2.2 Describe biotic interactions in an ecosystem (e.g., competition, predation, symbiosis).—terminology?  BIO.B.4.2 Describe interactions and relationships in an ecosystem.  BIO.B.4.2.3 Describe how matter recycles through an ecosystem (i.e., water cycle, carbon cycle, oxygen cycle, and nitrogen cycle).  BIO.B.4.2.4 Describe how ecosystems change in response to natural and human disturbances (e.g., climate changes, introduction of nonnative species, pollution, fires).  BIO.B.4.2.5 Describe the effects of limiting factors on population dynamics and potential species extinction |

1. The carbon-oxygen cycle is shown below.

1. Carbon dioxide is removed from the air or water during which of the following?
2. photosynthesis
3. decomposition of plants and animals
4. erosion of limestone rock
5. burning of coal by power plants

|  |  |
| --- | --- |
|  | a. I, II, III, and IV |

|  |  |
| --- | --- |
|  | b. I only |

|  |  |
| --- | --- |
|  | c. I and IV only |

|  |  |
| --- | --- |
|  | d. I and III only |

1. Which of the following is exclusively a man-made source of carbon dioxide?

|  |  |
| --- | --- |
|  | a. decomposition |

|  |  |
| --- | --- |
|  | b. erosion of limestone |

|  |  |
| --- | --- |
|  | c. cellular respiration |

|  |  |
| --- | --- |
|  | d. combustion in cars |

1. In the carbon cycle, carbon is taken in by plants

|  |  |
| --- | --- |
|  | a. as water vapor in the process of photosynthesis. |

|  |  |
| --- | --- |
|  | b. as carbon dioxide in the process of photosynthesis. |

|  |  |
| --- | --- |
|  | c. as carbon dioxide in the process of decomposition. |

|  |  |
| --- | --- |
|  | d. as ammonia in the process of assimilation. |

1. Which of the following recycle matter through an ecosystem?

|  |  |
| --- | --- |
| I. | the water cycle |
| II. | the carbon cycle |
| III. | the nitrogen cycle |

|  |  |
| --- | --- |
|  | a. II and III only |

|  |  |
| --- | --- |
|  | b. I and II only |

|  |  |
| --- | --- |
|  | c. I, II, and III |

|  |  |
| --- | --- |
|  | d. I and III only |

1. The diagram above depicts the nitrogen cycle. According to this diagram, what is a major contributing factor to dissolved nitrogen found in rain?

|  |  |
| --- | --- |
|  | a. urine and dead animals and plants |

|  |  |
| --- | --- |
|  | b. emissions from industries as they burn fossil fuels |

|  |  |
| --- | --- |
|  | c. decomposers such as bacteria and fungi |

|  |  |
| --- | --- |
|  | d. nitrogen-fixing bacteria in plant roots and soil |
|  |  |

1. The diagram below depicts the water cycle.

Step 2 occurs when liquid water on the surface of the Earth changes from a liquid to a gas (water vapor) and is known as \_\_\_\_\_\_\_\_. Water vapor in the atmosphere can then undergo \_\_\_\_\_\_\_\_, shown as step 3, in order to change back to a liquid and eventually return to the surface of the Earth through \_\_\_\_\_\_\_, which is shown as step

|  |  |
| --- | --- |
|  | a. evaporation; condensation; precipitation |

|  |  |
| --- | --- |
|  | b. evaporation; precipitation; condensation |

|  |  |
| --- | --- |
|  | c. condensation; evaporation; precipitation |

|  |  |
| --- | --- |
|  | d. precipitation; condensation; evaporation |

1. Which choice below shows the organization of the biosphere from the most specific category to the broadest category?

|  |  |
| --- | --- |
|  | a. organism community population ecosystem biome |

|  |  |
| --- | --- |
|  | b. organism population community ecosystem biome |

|  |  |
| --- | --- |
|  | c. organism community population biome ecosystem |

|  |  |
| --- | --- |
|  | d. organism population community biome ecosystem |

1. Select the list below that would best exemplify a community.

|  |  |
| --- | --- |
|  | a. a school of sunfish |

|  |  |
| --- | --- |
|  | b. bees and wasps around a group of purple cornflowers |

|  |  |
| --- | --- |
|  | c. a warm, humid climate with plenty of rainfall |

|  |  |
| --- | --- |
|  | d. a nest of mockingbirds, some bullfrogs, a pond, and a sandy shore |

1. Which of the following best describes an ecosystem?

|  |  |
| --- | --- |
|  | a. all the living organisms in an area |

|  |  |
| --- | --- |
|  | b. all the living organisms in an area and their physical surroundings |

|  |  |
| --- | --- |
|  | c. a region with a distinct climate |

|  |  |
| --- | --- |
|  | d. all the living organisms of the same species throughout the world |

1. Stable ecosystems can be altered, either rapidly or slowly, through which of the following activities?

|  |  |
| --- | --- |
|  | a. human activity |

|  |  |
| --- | --- |
|  | b. natural disasters |

|  |  |
| --- | --- |
|  | c. climatic changes |

|  |  |
| --- | --- |
|  | d. all of these |

1. The amount of dissolved oxygen in a lake changes in a cycle throughout the year. Since many organisms, such as fish, breathe oxygen, these changes impact where organisms can live in the lake.  
     
   Study the table below showing the average amount of dissolved oxygen at various depths in the lake throughout the year.

Lake Oxygen Levels (mg/L)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Depth | Jan | Apr | Jul | Oct |
| 10 feet | 12 | 15 | 10 | 10 |
| 20 feet | 10 | 14 | 10 | 7 |
| 30 feet | 9 | 13 | 8 | 5 |
| 40 feet | 7 | 13 | 5 | 0 |
| 50 feet | 5 | 12 | 0 | 0 |

Based on the data table, where would you expect to find the most fish during the month of October?

|  |  |
| --- | --- |
|  | a. at depths of 30 feet or less |

|  |  |
| --- | --- |
|  | b. at depths of 30-40 feet |

|  |  |
| --- | --- |
|  | c. at depths of exactly 40 feet |

|  |  |
| --- | --- |
|  | d. at depths of 30 feet or greater |

1. Which of the following events would most likely contribute to lowering the carrying capacity of a population?

|  |  |
| --- | --- |
|  | a. a decrease in habitats due to human development or natural disasters |

|  |  |
| --- | --- |
|  | b. an increase in the water supply in the habitat |

|  |  |
| --- | --- |
|  | c. a decrease in the number of females in the population |

|  |  |
| --- | --- |
|  | d. an increase in the number of predators who eat the animal |

1. An organism makes glucose using energy from the Sun. The organism is a \_\_\_\_\_\_\_.

|  |  |
| --- | --- |
|  | a. decomposer |

|  |  |
| --- | --- |
|  | b. primary consumer |

|  |  |
| --- | --- |
|  | c. producer |

|  |  |
| --- | --- |
|  | d. secondary consumer |

1. A mushroom grows on a rotting log. As a result, water and nutrients from the log are released into the soil. What type of organism is the mushroom?

|  |  |
| --- | --- |
|  | a. predator |

|  |  |
| --- | --- |
|  | b. producer |

|  |  |
| --- | --- |
|  | c. decomposer |

|  |  |
| --- | --- |
|  | d. prey |

1. The food chain below shows an example of how energy flows through an ecosystem.

What is the ultimate source of all of the energy that flows through this food chain?

|  |  |
| --- | --- |
|  | a. bacteria |

|  |  |
| --- | --- |
|  | b. plant life |

|  |  |
| --- | --- |
|  | c. the sun |

|  |  |
| --- | --- |
|  | d. oxygen gas |
|  |  |

1. What does the following diagram illustrate?

|  |  |
| --- | --- |
|  | a. a trophic level |

|  |  |
| --- | --- |
|  | b. a food web |

|  |  |
| --- | --- |
|  | c. a food chain |

|  |  |
| --- | --- |
|  | d. a food pyramid |

1. Examine the food web below. If plants were removed from this ecosystem, which of the following organisms would be affected?

|  |  |
| --- | --- |
|  | a. wolves |

|  |  |
| --- | --- |
|  | b. rabbits |

|  |  |
| --- | --- |
|  | c. insects |

|  |  |
| --- | --- |
|  | d. all of these |

1. Which of the following represents the overall flow of energy in a typical ecosystem?

|  |  |
| --- | --- |
|  | a. sun plants & algae carnivores herbivores |

|  |  |
| --- | --- |
|  | b. sun herbivores plants & algae carnivores |

|  |  |
| --- | --- |
|  | c. sun plants & algae herbivores carnivores |

|  |  |
| --- | --- |
|  | d. carnivores herbivores plants & algae sun |

1. Human beings are part of Earth's ecosystems. Thus, human activities can, deliberately or unintentionally, alter the equilibrium in ecosystems.  
     
   Humans often change ecosystems as a result of population growth, consumption, and technology. Which of the following exemplifies a way in which humans modify ecosystems?

|  |  |
| --- | --- |
|  | a. cutting down trees to build new buildings and roads |

|  |  |
| --- | --- |
|  | b. redirecting and storing freshwater behind dams |

|  |  |
| --- | --- |
|  | c. factory and automotive emissions causing acid rain |

|  |  |
| --- | --- |
|  | d. all of these |

1. Most modern forms of transportation are powered by fossil fuels. Carbon dioxide, methane, carbon monoxide, and other gases are released into the atmosphere during the production and combustion of these fuels. How might these gases cause climatic changes?

|  |  |
| --- | --- |
|  | a. These gases cause more water vapor to condense, making climates wetter than they were in the past. |

|  |  |
| --- | --- |
|  | b. These gases reduce the amount of thermal energy escaping into space, effectively warming the atmosphere. |

|  |  |
| --- | --- |
|  | c. These gases have no effect on atmospheric temperatures, so they are unable to cause any type of climatic changes. |

|  |  |
| --- | --- |
|  | d. These gases block solar radiation, making the atmosphere cooler than it would otherwise be. |

1. Deforestation by burning has been described as a "double whammy" to the environment. Why is this description accurate?

|  |  |
| --- | --- |
|  | a. Deforestation reduces the number of plant and animal species by destroying habitat. |

|  |  |
| --- | --- |
|  | b. Forest burning releases CO2 while decreasing photosynthesis, which removes carbon. |

|  |  |
| --- | --- |
|  | c. Deforestation reduces the amount of oxygen in the atmosphere, which depletes the ozone layer. |

|  |  |
| --- | --- |
|  | d. Forest clearing is often followed by land development, which often leads to increased noise pollution. |
|  |  |

1. Which of the following natural resources is pumped out of the Earth and used to power automobiles?

|  |  |
| --- | --- |
|  | a. petroleum |

|  |  |
| --- | --- |
|  | b. oxygen |

|  |  |
| --- | --- |
|  | c. hydrogen |

|  |  |
| --- | --- |
|  | d. coal |
|  |  |

1. Which of the following is true about nonrenewable resources?

|  |  |
| --- | --- |
|  | a. Food is a nonrenewable resource. |

|  |  |
| --- | --- |
|  | b. Wind energy is a nonrenewable resource. |

|  |  |
| --- | --- |
|  | c. Nonrenewable resources cannot be replaced as fast as they are used. |

|  |  |
| --- | --- |
|  | d. Nonrenewable resources are resources that have run out. |

1. The following are examples of renewable sources of energy:

|  |  |
| --- | --- |
|  | a. fossil fuels and nuclear energy. |

|  |  |
| --- | --- |
|  | b. wind, tidal, geothermal and hydroelectricity. |

|  |  |
| --- | --- |
|  | c. hydroelectricity, petroleum, solar and wind. |

|  |  |
| --- | --- |
|  | d. coal, solar, wind and biomass. |

1. Plants require nitrogen and phosphorous but cannot efficiently absorb these nutrients from the soil. Instead, they obtain the nutrients through fungi that live in their roots. In return, the fungi have access to carbohydrates manufactured by the plants. Without the fungi, plants would not be healthy and abundant, and the food supply of all of the organisms in the ecosystem would be in danger.  
     
   This is an example of how \_\_\_\_\_\_\_\_\_ relationships maintain balance within an ecosystem.

|  |  |
| --- | --- |
|  | a. abiotic |

|  |  |
| --- | --- |
|  | b. divergent |

|  |  |
| --- | --- |
|  | c. symbiotic |

|  |  |
| --- | --- |
|  | d. competitive |

1. The zebra mussel is a non-native species of freshwater mussel that has firmly established populations throughout the Great Lakes. It is originally from southern Russia.  
     
   Zebra mussels breed quickly and can attach to any hard surface. Their shells can attach to each other in layers that clog pipes and waterways. They can also kill native mussels by attaching to their shells. However, zebra mussels are also very good at filtering the water. Many lakes infested with zebra mussels are cleaner.  
     
   Which statement about non-native species is supported by the story about zebra mussels?

|  |  |
| --- | --- |
|  | a. The impact that non-native species have on other ecosystems is small. |

|  |  |
| --- | --- |
|  | b. Non-native species can have both positive and negative effects. |

|  |  |
| --- | --- |
|  | c. The positive impact of non-native species always outweighs the negative. |

|  |  |
| --- | --- |
|  | d. Non-native species can only come from nearby ecosystems. |

1. Some species are symbiotic to each other, meaning they live together in a close, long-term association. What is the term for a symbiotic relationship in which one species benefits and the other is neither harmed nor helped?

|  |  |
| --- | --- |
|  | a. parasitism |

|  |  |
| --- | --- |
|  | b. symbiosis |

|  |  |
| --- | --- |
|  | c. commensalism |
|  | d. mutualism |

|  |  |
| --- | --- |
|  |  |
| |  | | --- | | 1. Deforestation increases the amount of water runoff, which increases the rate of | | 1. soil erosion 2. precipitation 3. evaporation 4. acid rain | |  | | 1. Two populations of birds in the same ecosystem begin to compete for the same food resources. What will most likely be the result of this interspecific competition?   a. There will be an increase in the population size of one or both species.  b. One or both species will emigrate to a new ecosystem.  c. One or both species will stop utilizing the shared food resources.  d. There will be a reduction in the population size of one or both species. | |  | | 30. Which of the following statements is true of all organisms in every environment?  a. They must compete for essential resources.  b. They must consume other organisms for energy.  c. They are able to produce their own food.  d. They avoid interaction as much as possible. | |  | |  |  1. . |  |
|  |  |

**Biology Unit 1 Part A Answers**

1. c- homeostasis

2. c- organelles, cells, tissues, organs, organ systems

3. d- all organisms have cells that contain genetic information

4. d- by increasing metabolism

5. b- dependent variable

6. b- hypothesis; theory

7. d- all of these

8. a- The results of the experiment may reinforce or weaken either theory

9. b- A new hypothesis will be needed to try to explain the temperature change.

10. a- graph 1

11. a- ability to store hereditary information

12. b- structure and function relationship

13. b- photosynthesis; cellular respiration

14. d- quantitative; qualitative

15. b- 40x

**Biology Unit 2 Part A Answers**

1. a- I, II, III, and IV

2. a- hydrogen bonds with other water molecules

3. c- The main structural component found in plasma membranes and cell walls is water

4. d- Carbon atoms can bond with many other kinds of atoms to form very stable molecules

5. c- 4

6. a- a five-carbon sugar, a phosphate group, and a nitrogenous base

7. c- Carbohydrates are organic macromolecules that are made up of carbon, hydrogen, and oxygen atoms and are used for energy storage or as structural molecules.

8. c- carbohydrates

9. d- DNA and RNA

10. b- storing and transferring energy

11. a- lipids

12. a- amino acids

13. a- as enzymes to control the rate of reactions and regulate cellular activity

14. b- ability to catalyze biochemical reactions

15. d- A pH change can remove energy necessary to activate an enzyme

**Biology Unit 3 Part A** **Answers**  
1. d - chloroplast  
2. c - osmosis  
3. d - mitochondria  
4. a – endoplasmic reticulum  
5. c - chloroplast  
6. d - v → y → z → w → u → x  
7. b - ii then i  
8. b - ribosomes  
9. a – a source of energy  
10. a – active transport requires the cell to expend energy, while passive transport does not.  
11. a – passive transport by diffusion  
12. c – control the movement of substances in and out of the cell  
13. b – cells   
14. b – glucose, ATP   
15. a – all the answers are correct  
16. c – must obtain and use energy for life processes  
17. a – two; four  
18. d – the information is duplicated  
19. a – a higher concentration of water than  
20. b – it packages new protein molecules into vesicles  
21. a – prokaryotic ells do not have a true nucleus or membrane-bound organelles  
22. a – mitosis   
23. a – cell walls  
24. a – eukaryotes are usually much larger than prokaryotes   
25. a – Golgi apparatus  
26. a – cellular respiration  
27. c – sex cells  
28. a – facilitated diffusion   
29. a – they function as organisms  
30. c – both include reactions that transform energy  
31. a – help capture light from the sun during the process of photosynthesis  
32. b – 56   
33. b – to form new somatic (body) cells  
34. b – during cellular respiration, cells use oxygen to break down glucose and release CO2, H2), and ATP  
35. a – remains the same as in the parent cell  
36. d – plants, but not animals  
37. d – a large vacuole  
38. d – in the nucleus  
39. d – organelles   
40. a – even though all the cells in an individual organism come from a single cell, they can specialize into different types of cells  
41. c – the cytoplasm is divided to form two separate cells  
42. c – the structure of cellular organelles are related to their function.

**Biology Unit 4 Part A Answers**

1. b- purple flowers are dominant to white flowers  
2. c- inherited combinations of alleles  
3. a- segregation  
4. d- inversion  
5. b- crossing over  
6. a- sex-linked   
7. b- a population whose members have many different traits   
8. b- codominance  
9. c- BB, Bb  
10. b- Carla has brown eyes.  
11. a- phenotype  
12. a- two alleles for a trait separate when gametes are formed.  
13. a- codominant   
14. d- increases the genetic variability of the offspring  
15. d- one dominant, one recessive  
16. b- recessive  
17. d- polygenic  
18. d- all of these   
19. d- a silent mutation   
20. c- meiosis  
21. b- 1/2  
22. d- OO  
23. a- 25%   
24. a- 100% yellow   
25. c- allele

**Biology Unit 5 Part A Answers**

1. c-DNA molecules  
2. a-nucleotide  
3. c- deoxyribose, nitrogen base, phosphate group  
4. d- TAACGGGTAC  
5. a- Instructions coded by DNA sequences are translated into proteins which express an organism's physical traits.   
6. c-a set of instructions in the DNA sequence of an organism  
7. c- genes, chromosomes  
8. d- genome-chromosome-DNA-gene  
9. a- the same codon  
10. d- replication  
11. d- two double-stranded DNA molecules each composed of one new and one old strand.   
12. a- DNA polymerase  
13. c- transcribed, mRNA  
14. d- nucleus  
15. b- an mRNA molecule  
16. a- The process shown above is known as translation and involves the production of proteins from RNA.   
17. c- In translation, an mRNA codon is recognized by its complementary tRNA.  
18. d- a ribosome  
19. b- methionine, cysteine, asparagine, alanine   
20. c- tRNA  
21. b- Both cell types use ribosomes to carry out translation   
22. a- The nucleus transcribes and releases messenger RNA signaling for the enzymes to be synthesized.   
23. d- translation  
24. c-protein  
25. b- I, II, III, IV

**Biology Unit 1 and 2 Part B Answers**

1. d- biotechnology.
2. a - genetically altered crops require less pesticide.
3. d - Patients with diabetes now have a steady, inexpensive supply of insulin available.
4. a - Some food staples, such as rice, contain more nutrients.
5. c- gene splicing
6. c - selective breeding
7. b – cloning
8. d - recombinant DNA technology
9. c- The Human Genome Project
10. c - unplanned ecosystem interactions
11. c - They have a common evolutionary ancestor.
12. d - alligator and earthworm
13. b – A population begins to develop sexual dimorphism between the males and females of the species
14. a - These four species are distantly related and share a common ancestor.
15. d – Vestigial
16. d– All of These
17. b – Evolution through natural selection can increase species diversity of an ecosystem
18. d – Natural selection causes changes in populations because of the differential reproductive success of genetically varied individuals.
19. d - all mammals descended from a common ancestor
20. a – There are similarities in the developmental stages of different organisms in the animal kingdom.
21. b - Gene Flow
22. a – Homologous
23. c - a scientific theory that is supported by evidence
24. a – Comparative anatomy
25. b – An aloe vera plant species possessing a trait for extra thick leaves survives a long drought in a desert, and an aloe vera species that has thinner leaves does not
26. c – Natural selection
27. d – Increase, decrease
28. a - a change in the allelic frequency within a population due to random chance
29. b - It increases the frequency of alleles that improve a species' survival in a particular environment
30. a – Prokaryotes
31. c- @

**Biology Unit 3 and 4 Part B Answers**

1. c- kingdom, phylum, class, order, family, genus, and species

2. c- Eubacteria, Archaeabacteria, and Eukaryotes

3. c- plants and protists

4. c- bacterium

5. d- *Acris crepitans*

6. b- *Ctenophora*

7. c- Archaebacteria

8. b- organelles, cells, tissues, organs, organ systems, whole organisms

9. b- The lungs take in air, and the blood carries oxygen to the body's cells.

10. b- mouth, esophagus, stomach, small intestine, large intestine

11. d- transport oxygen

12. d- pharynx, larynx, trachea, bronchi, bronchioles, alveoli

13. b- The heads of myosin filaments shorten the sarcomeres by attaching to the actin filaments and bending inward, pulling the actin filaments along with them.

14. d- the skin and the lungs

15. b- circulatory system

16. c- circulatory system

17. b- electrochemical signals

18. b- reproductive system

19. a- gas exchange

20. c- immune system

21. b- liver

22. b- maintains homeostasis

23. b- nourishing a developing zygote

24. b- stigma

25. b- the production of gametes

26. b- muscular

27. a- excretory system

**Biology Unit 5 Part B Answers**

1. b- I only  
2. d- combustion in cars

3. b- as carbon dioxide in the process of photosynthesis

4. c- I, II, and III

5. b- emissions from industries as they burn fossil fuels

6. a- evaporation; condensation; precipitation

7. b- organism population community ecosystem biome

8. b- bees and wasps around a group of purple cornflowers

9. b- all the living organisms in an area and their physical surroundings

10. d- all of these

11. a- at depths of 30 feet or less

12. a- a decrease in habitats due to human development or natural disasters

13. c- producer

14. c- decomposer

15. c- the sun

16. b- a food web

17. d- all of these

18. c- sun- plants & algae- herbivores- carnivores

19. d- all of these

20. b- These gases reduce the amount of thermal energy escaping into space, effectively warming the atmosphere.

21. b- Forest burning releases CO2 while decreasing photosynthesis, which removes carbon.

22. a- petroleum

23. c- Nonrenewable resources cannot be replaced as fast as they are used.

24. b- wind, tidal, geothermal and hydroelectricity

25. c- symbiotic

26. b- Non-native species can have both positive and negative effects.

27. c- commensalism

28. a- soil erosion

29. d- There will be a reduction in the population size of one or both species.

30. a- They must complete for essential resources.