

Released Biology Keystone Exam #1

1. Which statement best describes a difference between prokaryotic cells and eukaryotic cells?

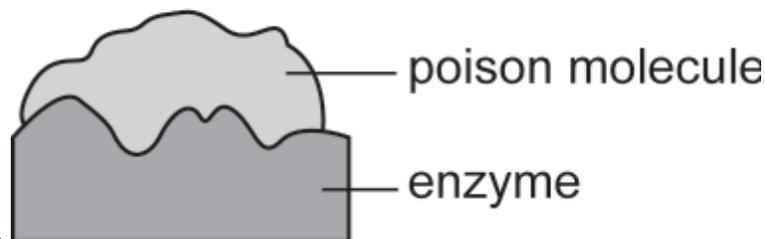
- A. The presence of both DNA and ribosomes in prokaryotic cells indicates that they are more complex than eukaryotic cells.
- B. The larger size of prokaryotic cells indicates that they are more complex than eukaryotic cells.
- C. The presence of membrane-bound organelles in eukaryotic cells indicates that they are more complex than prokaryotic cells.
- D. The larger size of eukaryotic cells indicates that they are more complex than prokaryotic cells.

2. Alveoli are microscopic air sacs in the lungs of mammals. Which statement best describes how the structure of the alveoli allows the lungs to function properly?

- A. They increase the amount of energy transferred from the lungs to the blood.
- B. They increase the flexibility of the lungs as they expand during inhalation.
- C. They increase the volume of the lungs, allowing more oxygen to be inhaled.
- D. They increase the surface area of the lungs, allowing efficient gas exchange.

Use the diagram below to answer question 3

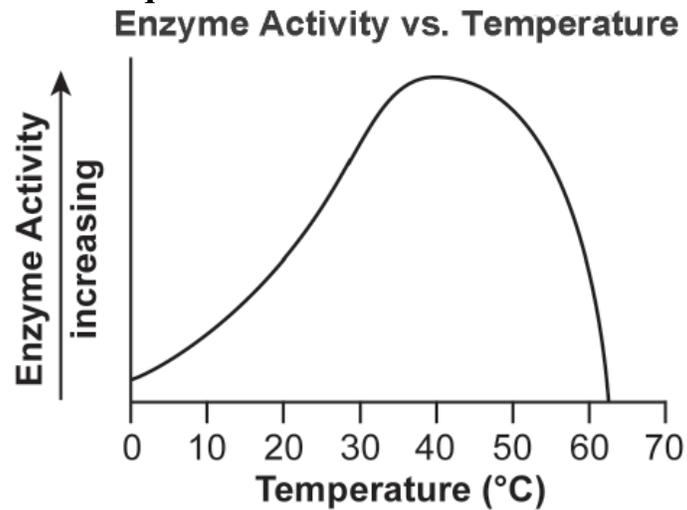
Poison Bonding to an Enzyme



3. The diagram models how a poison bonds to the active site of an enzyme. Which function is the enzyme most likely unable to perform because of the attachment of the poison molecule?

- A. the release of stored chemical energy
- B. the donation of electrons to the substrate
- C. the supply of activation energy for a reaction
- D. the catalysis of the reaction with the substrate

Use the graph below to answer question 4



4. The graph shows how the activity of an enzyme changes at different temperatures. Which statement best describes what happens to the enzyme when the temperature of the reaction increases to 63°C?

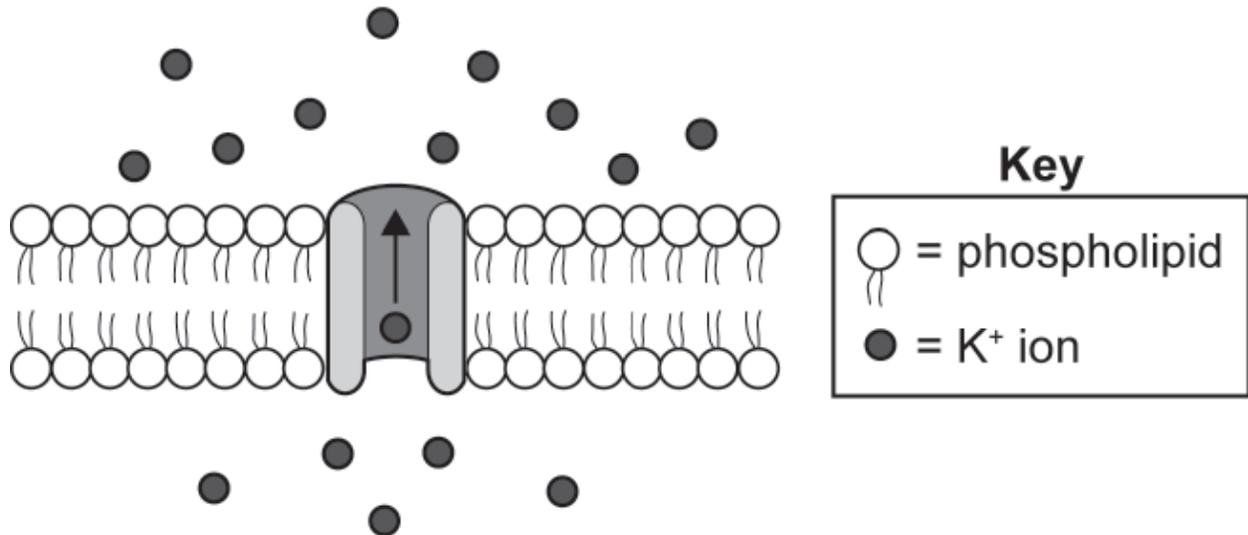
- A. The enzyme is used up and the reaction stops.
- B. The enzyme begins to decrease the rate of the reaction.
- C. The enzyme continues to increase the rate of the reaction.
- D. The enzyme changes shape and can no longer speed up the reaction.

5. Which statement best compares the energy transformations of photosynthesis and cellular respiration?

- A. Only photosynthesis uses oxygen to create energy.
- B. Only photosynthesis causes an increase in kinetic energy.
- C. Photosynthesis and cellular respiration both store energy in chemical bonds.
- D. Photosynthesis and cellular respiration both require chemical energy to make food.

Use the diagram below to answer question 6.

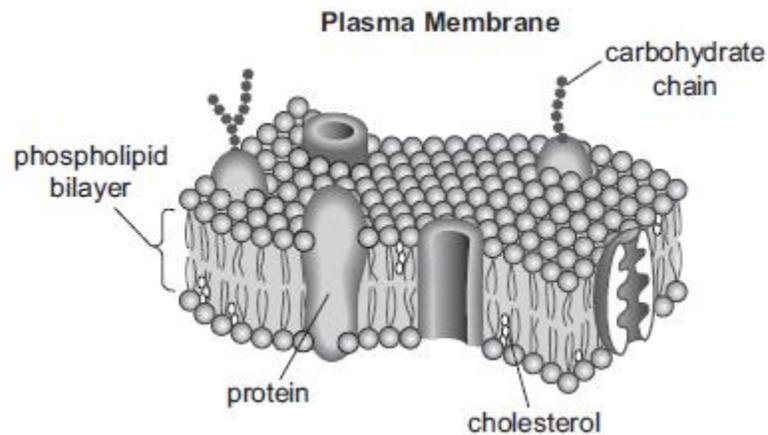
Ion Transport



6. The diagram shows the movement of ions against a concentration gradient to an area of higher concentration. Which molecule provides the energy needed for this movement to occur in a cell?

- A. ATP
- B. mRNA
- C. protein
- D. lipid

Use the diagram below to answer question 7.

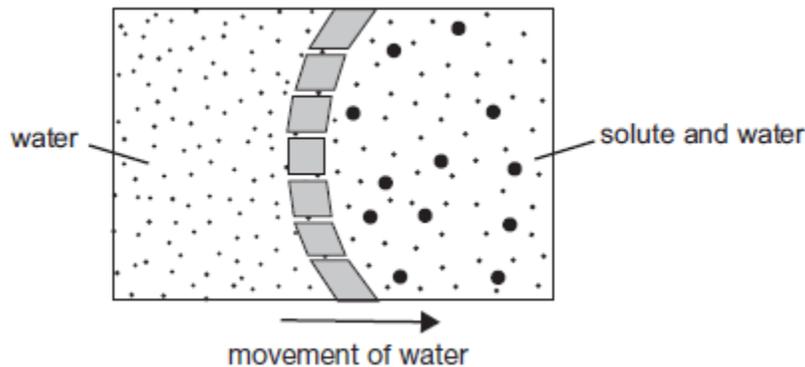


7. Which component of this membrane contains a hydrophobic region and acts as the primary barrier to most foreign substances?

- A. protein
- B. cholesterol
- C. carbohydrate chain
- D. phospholipid bilayer

Use the diagram below to answer question 8.

Water Movement and the Cell Membrane



8. The relative concentration of solute inside and outside a cell can cause water molecules to move across the membrane. Which phrase would be an alternate title to the diagram?

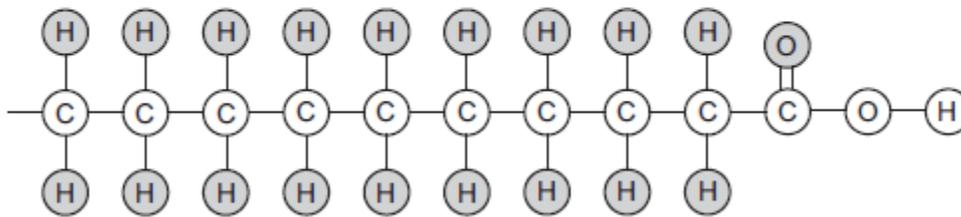
- A. Exocytosis in a Cell
- B. Active Transport in a Cell
- C. Osmosis Across a Membrane
- D. Facilitated Diffusion Across a Membrane

Use the information below about a chemical discovery to answer questions 9 and 10.

Chemical Discovery

A scientist formed Chemical X in a laboratory. The material was then analyzed by other scientists.

Molecular Structure of Chemical X



Analysis showed that the chemical was composed of long chains of repeated copies of CH_2 molecules.

9. A researcher noticed that a similar CH_2 molecular structure was also located in the plasma membrane of an animal cell. This CH_2 molecular structure contained a negatively charged phosphate group. Which statement best describes the primary function of the CH_2 and phosphate molecular structure located in the plasma membrane?

- A. It contains the genetic information needed for protein production.
- B. It catalyzes specific chemical reactions in the cytoplasm of a cell.
- C. It stores the energy that a cell needs to perform various life processes.
- D. It allows a cell to regulate the movement of materials into and out of a cell.

10. Which type of organic molecule was most likely formed by the scientist in the laboratory?

- A. lipid**
- B. protein**
- C. nucleic acid**
- D. carbohydrate**

11. Proteins are a major part of every living cell and have many different functions within each cell. Carbohydrates also perform numerous roles in living things.

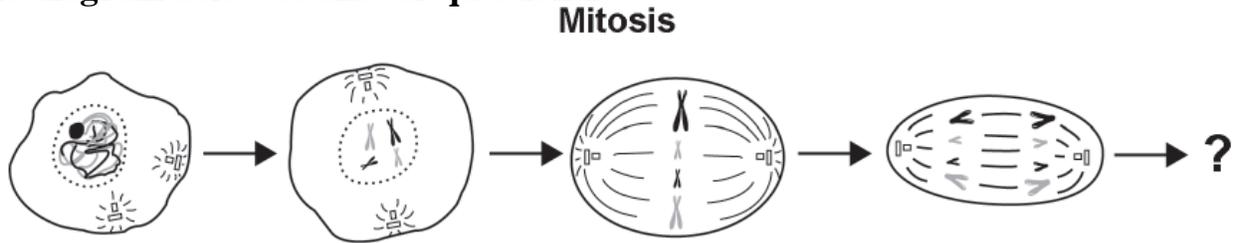
Part A: Describe the general composition of a protein molecule.

Part B: Describe how the structures of proteins differ from the structures of carbohydrates.

Part C: Describe how the functions of proteins differ from the functions of carbohydrates.

Released Biology Keystone Exam #2

Use the diagram below to answer question 1.



1. Which event most likely occurs next in mitosis?

- A. The chromatin condenses.
- B. The nuclear envelope dissolves.
- C. The chromosomes double in number.
- D. The cell membrane pinches inward to divide the cytoplasm.

2. Mitosis and meiosis are processes by which animal and plant cells divide. Which statement best describes a difference between mitosis and meiosis?

- A. Meiosis is a multi-step process.
- B. Mitosis occurs only in eukaryotic cells.
- C. Meiosis is used in the repair of an organism.
- D. Mitosis produces genetically identical daughter cells.

3. A scientist observes that a certain trait is determined by a single allele. An organism inherited one version of the trait from one parent and another version from the other parent. Both versions of the trait are expressed in the phenotype of the offspring. Which pattern of inheritance best classifies the observed trait?

- A. dominance
- B. sex-linkage
- C. co-dominance
- D. incomplete dominance

4. The bacterium *Acetobacter aceti* is found in acidic environments and has an acidic cytoplasm. For this reason, most of its proteins are able to function in acidic conditions. This property distinguishes *Acetobacter aceti* proteins from those of most other organisms. Which characteristic does *Acetobacter aceti* most likely share with other organisms?

- A. the method that the organism uses to reproduce itself
- B. the physical and chemical responses to environmental changes
- C. the type of organelle used to produce energy for cellular functions
- D. the process used to form proteins by transcription and translation

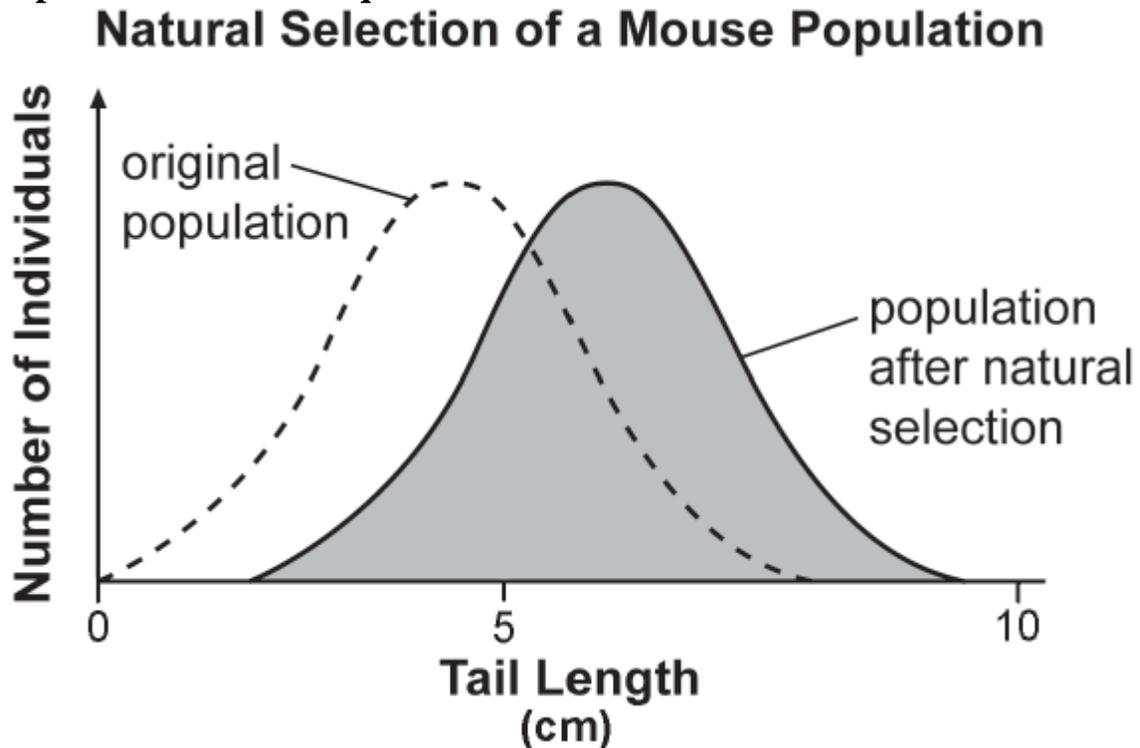
5. A mutation occurs at the midpoint of a gene, altering all amino acids encoded after the point of mutation. Which mutation could have produced this change?

- A. deletion of two nucleotides *
- B. deletion of three nucleotides
- C. insertion of six nucleotides
- D. insertion of twelve nucleotides

6. The frequency of an allele in a fly population changes from 89% to 20% after three generations. Which other events most likely occurred during the same time period?

- A. an environmental change and a fly population increase
- B. an environmental change and a fly population decrease *
- C. interbreeding of flies with an invasive species and fly population speciation
- D. interbreeding of flies with an established local species and fly population speciation

Use the graph below to answer question 7.



7. Tail length in mice varies within a population. Scientists observed change in the distribution of tail lengths in a mouse population over time. At the genetic level, what has most likely happened to the allele for the shortest tail lengths?

- A. The allele changed from being dominant to being recessive.
- B. The allele changed from being autosomal to being sex-linked.
- C. The allele became less frequent than the alleles for longer tail lengths.
- D. The allele began to code for long tail lengths instead of the shortest ones

Use the table below to answer question 8.

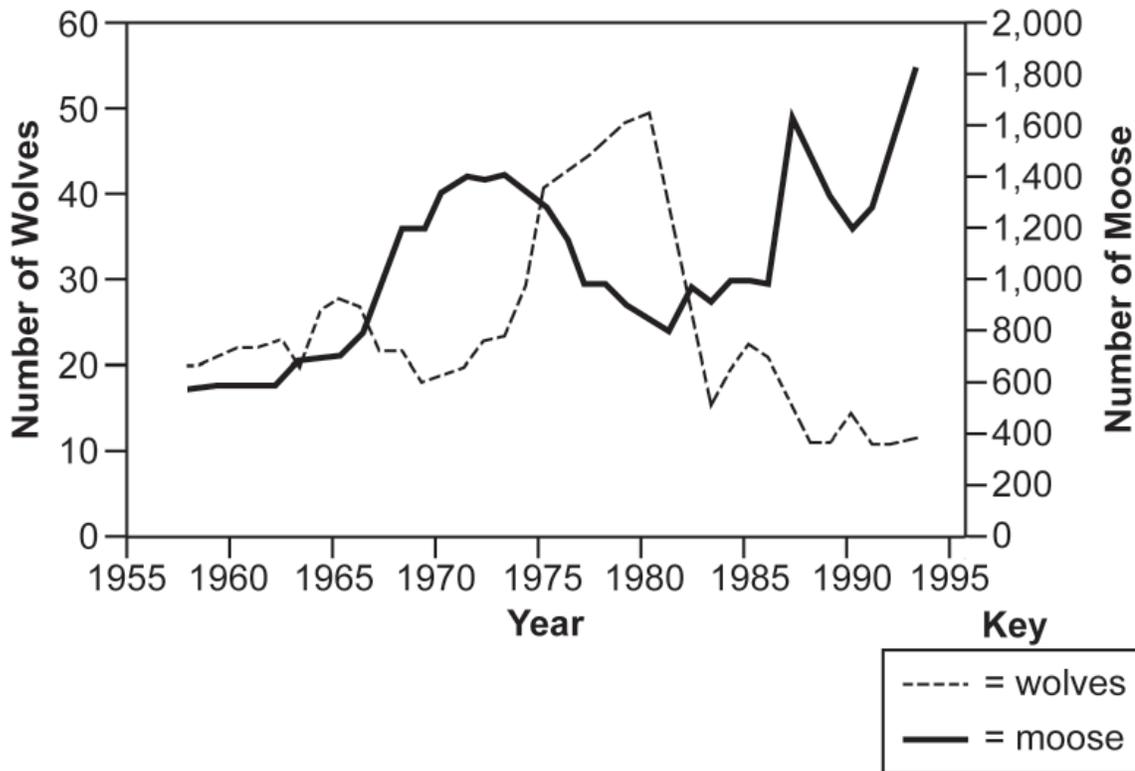
Students' Observations of a Pond Ecosystem

Quantitative	Qualitative
37 fish and 3 frogs	Leaves lie on the bottom of the pond.
2 types of aquatic grass	Water insects move along the water's surface.
12 small rocks and 1 medium rock	All 3 frogs are sitting on a pond bank.
sand	

- 8. A group of students measured a ten-square-meter section of a pond ecosystem and recorded observations. Which statement is a testable hypothesis?**
- A. The frogs living in the pond represent a population.**
 - B. Water is an abiotic component in the pond ecosystem.**
 - C. If the fish are given more food, then they will be happier.**
 - D. If the frogs are startled, then they will jump into the water.**
- 9. A researcher observing an ecosystem describes the amount of sunlight, precipitation, and type of soil present. Which factors is the researcher most likely describing?**
- A. biotic factors in a forest**
 - B. biotic factors in a tundra**
 - C. abiotic factors in a prairie**
 - D. abiotic factors in an ocean**
- 10. Scientists observed that the populations of top-level consumers in a particular ecosystem were rapidly decreasing. Further studies revealed that there was also a decline in producer productivity. Which other changes did the scientists most likely observe in the ecosystem?**
- A. increased producer diversity**
 - B. decreased population size at all levels ***
 - C. decreased primary consumer populations only**
 - D. increased primary and secondary consumer diversity.**

Use the graph below to answer question 11.

Wolf and Moose Populations Over 37 Years



11. Isle Royale is located in Lake Superior. Isle Royale is home to populations of wolves and moose. The interactions between the wolves and moose, as well as the individual population sizes, have been studied since 1958. The graph shows the population sizes over time for both wolves and moose.

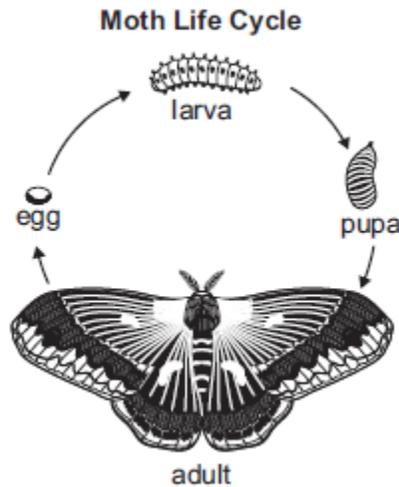
Part A: Describe one limiting factor for the moose population

Part B: Explain one likely reason why the wolf population rapidly increased between 1975 and 1980.

Part C: Predict what will happen to the moose population's size after 1994 by describing the shape of the curve. In your answer, be sure to explain the reasoning behind your prediction.

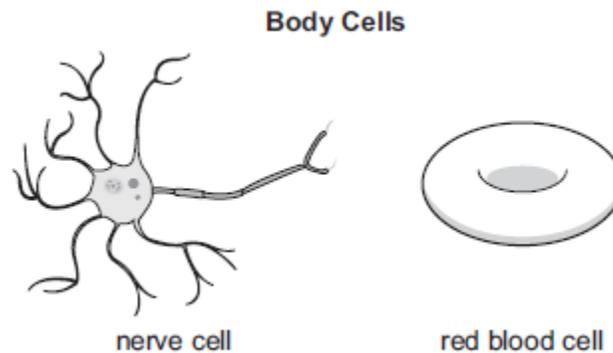
Released Biology Keystone Exam #3

Use the diagram below to answer question 1.



1. Which characteristic of life is best shown by this diagram?
- A. DNA is the genetic code in an organism.
 - B. An organism is made of one or more cells.
 - C. An organism responds to changes in its environment.
 - D. Changes occur in an organism as it grows and develops.

Use the illustrations below to answer question 2.



2. Which statement best explains why these cells have structural differences?
- A. The cells have different functions.
 - B. The cells evolved in different organisms.
 - C. One of the cells develops into the other type of cell.
 - D. One of the cells is more primitive than the other cell.

Use the illustration below to answer question 3.

Water Strider



3. Which of the following is a property of water that allows a water strider to walk on the surface of water?

- A. solubility
- B. cohesion
- C. high specific heat
- D. low freezing point

4. Which statement describes the formation of a protein molecule?

- A. Amino acids combine to form a protein chain.
- B. Fatty acid monomers dissolve to form a protein chain.
- C. Fatty acid monomers combine to form a protein chain.
- D. Amino acids dissolve monomers to form a protein chain.

Use the table below to answer question 5.

Students' Descriptions of Four Organic Compounds		
Student	Organic Compounds	Description
1	carbohydrates	complex compounds made of purines and pyrimidines that function as data-storage molecules
2	lipids	use the relatively high energy contained in carbon-hydrogen bonds to perform their primary function
3	proteins	chains of amino acids that can function as enzymes, hormones, or antibodies
4	nucleic acids	compounds, produced by photosynthetic plants, that contain only carbon, hydrogen, and oxygen

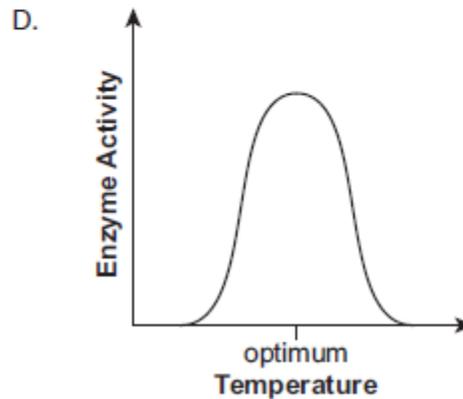
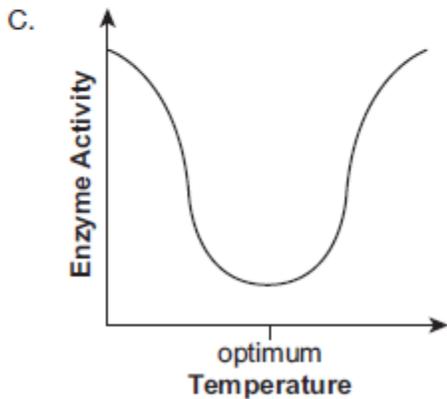
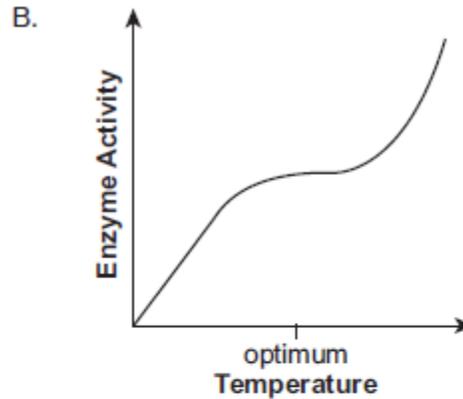
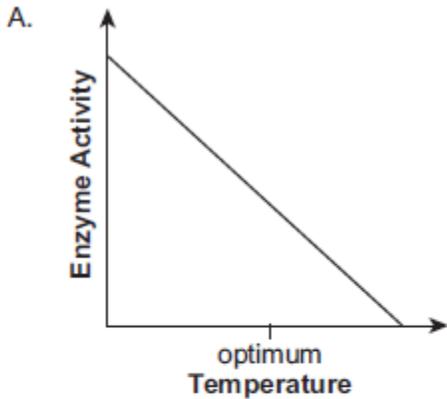
5. Which two students correctly described organic compounds?

- A. students 1 and 2
- B. students 2 and 3
- C. students 3 and 4
- D. students 2 and 4

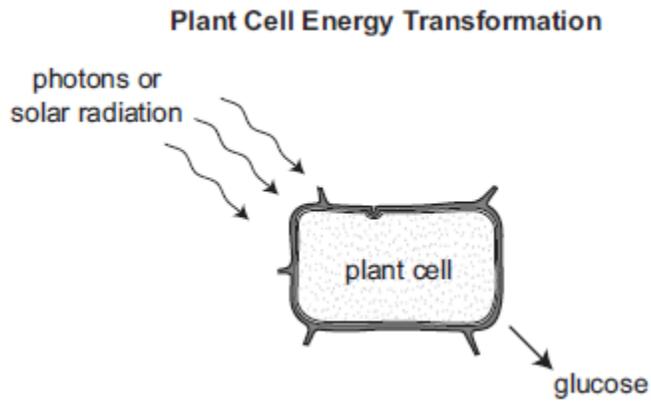
6. Carbonic anhydrase is an enzyme involved in the reaction of carbon dioxide with water to form a molecule that dissolves well in the liquid part of blood. How does carbonic anhydrase affect this reaction?

- A. by making the reaction reversible
- B. by changing chemical products of the reaction
- C. by increasing the time needed for the reaction to occur
- D. by decreasing the amount of energy needed to complete the reaction

7. Which graph best shows how enzyme activity changes as the temperature is adjusted above and below the enzyme's optimum temperature?



Use the diagram below to answer question 8.



8. The diagram shows an energy transformation that typically occurs in plant cell plastids. Which statement best describes this role of plastids in the plant cell?

- A. Chloroplasts transform light energy into chemical energy.
- B. Mitochondria transform light energy into chemical energy.
- C. Chloroplasts transform chemical energy into electromagnetic energy.
- D. Mitochondria transform chemical energy into electromagnetic energy.

Use the list below to answer question 9.

- 1. Cellular respiration and photosynthesis both involve water.
- 2. Cellular respiration uses sugar, and photosynthesis produces sugar.
- 3. Cellular respiration and photosynthesis both use light to produce energy.
- 4. Cellular respiration requires light energy, and photosynthesis requires chemical energy.

9. Which two statements correctly describe one similarity and one difference between cellular respiration and photosynthesis?

- A. statements 1 and 2
- B. statements 1 and 4
- C. statements 2 and 3
- D. statements 3 and 4

Use the list below to answer question 10.

Functions of a Cell Structure

- allows waste to exit the cell
- allows chemicals required for cellular respiration to enter the cell
- regulates movement of water into and out of the cell

10. The functions of which cell structure are described in this list?

- A. a lysosome**
- B. a mitochondrion**
- C. the plasma membrane**
- D. the endoplasmic reticulum**

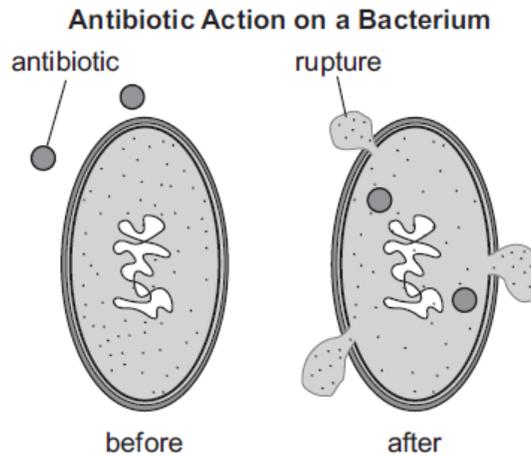
11. A jackrabbit has large ears containing blood vessels that help it maintain a constant body temperature by adjusting heat exchange with the surrounding environment. Which characteristic of life is best described by this example?

- A. growth**
- B. energy use**
- C. organization**
- D. homeostasis**

Directions: Use the information presented below to answer questions 12 and 13.

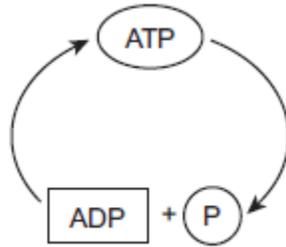
Bacteria and Antibiotics

Bacteria are single-celled microorganisms. The cell walls of these microorganisms serve as barriers to chemicals that might affect the processes that occur within a bacterial cell. Antibiotics are a type of substance used to stop bacterial growth. Some antibiotics cause the bacterial cell wall to rupture.



- 12. The function of which human organ is most like the cell walls of bacteria?**
- A. skin**
 - B. liver**
 - C. heart**
 - D. pancreas**
- 13. Which statement best describes how antibiotics affect cellular homeostasis?**
- A. Antibiotics remove chloroplasts from plant cells to cause starvation.**
 - B. Antibiotics interfere with the transport of intracellular and extracellular materials.**
 - C. Antibiotics increase the rate of DNA replication in human cells by forming nucleotides.**
 - D. Antibiotics decrease the rate of cellular respiration in animal cells by producing oxygen.**

Use the diagram below to answer question below.



Part A: Explain why ATP is important in biochemical reactions.

Part B: Give two examples of biochemical reactions and explain how an organism uses ATP within the reactions.

Example	Explanation

15. During physical education class, some students ran one mile. After their run, the students recorded changes they experienced.

- | |
|---|
| <p style="text-align: center;">Changes Experienced</p> <ul style="list-style-type: none">• sweating• muscle cramps• decreased energy• increased heart rate• increased breathing rate• increased thirst• increased body temperature |
|---|

Select three changes experienced by the students and explain how each change can represent a homeostatic mechanism.

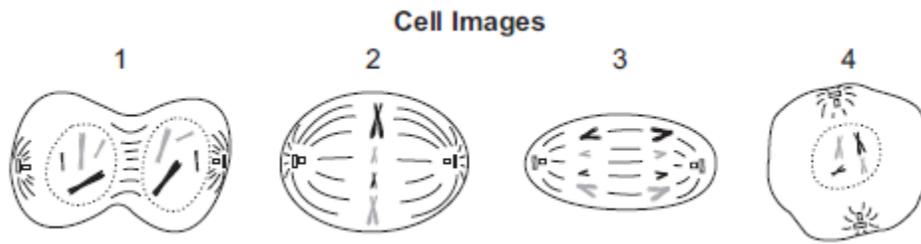
Change 1:

Change 2:

Change 3:

Released Biology Keystone Exam #4

Use the illustrations below to answer question 1.

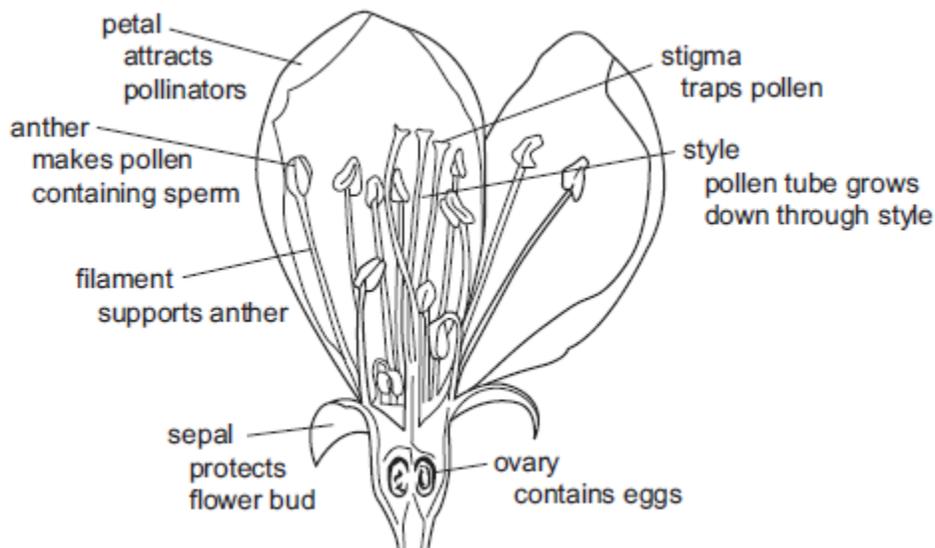


1. Which sequence lists the cell images in chronological order for mitosis?

- A. 1, 2, 3, 4
- B. 4, 3, 2, 1
- C. 1, 4, 3, 2
- D. 4, 2, 3, 1

Use the diagram below to answer question 2.

Parts of an Apple Flower



2. Which part of the apple flower produces cells by meiosis?

- A. style
- B. anther
- C. stigma
- D. filament

3. Which statement best describes the relationship between an allele and a gene?

- A. An allele is a variation of a gene that can be expressed as a phenotype.
- B. An allele is the part of a gene that attaches to messenger RNA molecules.
- C. An allele is a segment of a DNA molecule that controls replication of a gene.
- D. An allele is the primary protein made by a gene found in a developing embryo.

4. A trait in cows is determined by two alleles of a single gene: allele R is dominant, and allele r is recessive. What is the probability of the dominant trait being expressed in the offspring of one RR parent and one rr parent?
- A. 25%
 - B. 50%
 - C. 75%
 - D. 100%
5. Which form of genetic engineering was used by humans for many years before the discovery of DNA?
- A. gene splicing
 - B. gene insertion
 - C. animal cloning
 - D. selective breeding
6. Overuse of antibiotics has caused antibiotic resistance in some bacteria in a population. Which statement describes the most likely impact of natural selection on the bacterial population?
- A. Beneficial mutations have decreased, resulting in a larger population than normal.
 - B. Only the genes for antibiotic resistance are now expressed, eliminating other genes.
 - C. More antibiotic-resistant bacteria have survived, resulting in more offspring with this trait.
 - D. The bacteria have become genetically isolated, resulting in decreased reproductive rates.
7. Which statement is a hypothesis?
- A. The presence of an enzyme increased the reaction rate.
 - B. The reaction rate increased 100% once the enzyme was introduced.
 - C. Introducing an enzyme into a reaction did not increase the rate of the reaction.
 - D. When an enzyme is introduced into a reaction the reaction rate will increase by 100%.
8. A student studying the biosphere makes a list of biotic and abiotic characteristics of various biomes. Which characteristic is considered a biotic factor?
- A. dry, sandy, nutrient-poor soil in a desert
 - B. less than 25 cm of precipitation in a desert
 - C. evergreen trees present in a coniferous forest
 - D. temperature range of -40 to 40°C in a grassland
9. Which example describes a mutualistic relationship between organisms?
- A. Young wasps prey on caterpillars.

- B. Crabs eat the remains of dead fish.**
- C. Ants protect a tree on which they feed.**
- D. Tapeworms feed on food in the intestines of cats.**

10. Most of the water on Earth is located in the oceans and has a salinity of about 3.5%.

Which statement best explains why rain is fresh water and has a very low salinity?

- A. When water precipitates from oceans, most of the salt remains in the oceans.**
- B. When water evaporates from oceans, most of the salt remains in the oceans.**
- C. When water precipitates from clouds, most of the salt remains in the clouds.**
- D. When water evaporates from clouds, most of the salt remains in the clouds.**

11. Why are nonnative species often considered a disturbance in an ecosystem?

- A. They increase mutations.**
- B. They compete for resources.**
- C. They have special growth needs.**
- D. They cause increased biodiversity**

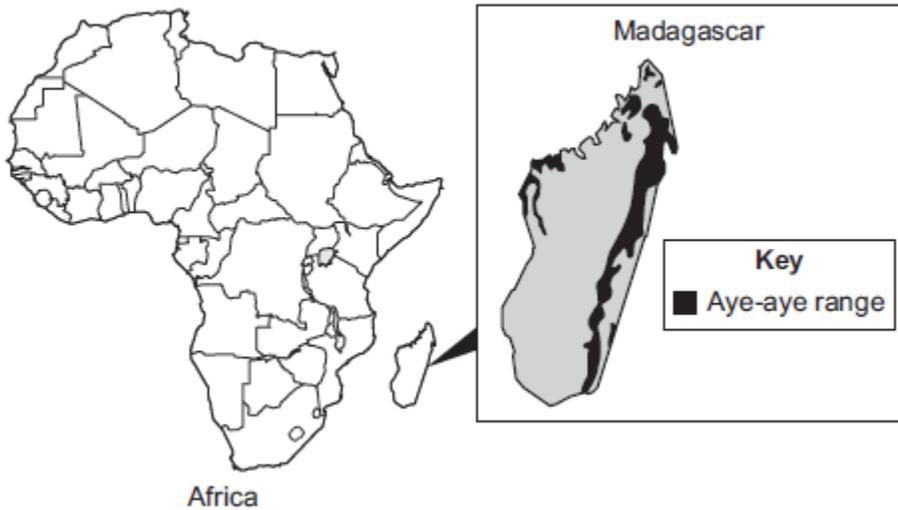
Directions: Use the information presented below to answer questions 12 and 13.

Aye-aye



An aye-aye is a small nocturnal lemur that weighs about four pounds. This endangered species is found in Madagascar, a large island off the east coast of southern Africa. The main food for aye-ayes is larvae that live in wood. Aye-ayes find the larvae by tapping on tree branches. They also eat nuts and fruit. Aye-ayes spend most of their time alone. Each animal occupies about 15 acres and marks the territory, which alerts other aye-ayes of the boundary.

Aye-aye Range



Use the map below to answer question 12.

Four Locations of Aye-Ayes



12. The map indicates four locations of aye-aye populations. Which location would most likely

have an aye-aye population with the greatest variation in allele frequencies?

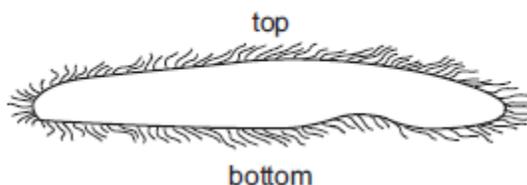
- A. location 1
- B. location 2
- C. location 3
- D. location 4

13. For the aye-aye species, what is most likely the primary value of individuals living alone?

- A. decreased space needs for the species
- B. increased survival rates with habitat loss
- C. reduced competition for natural resources
- D. greater genetic variability within the species

Use the illustration below to complete question 14.

Side View of *Trichoplax*



14. A *Trichoplax* is a simple multicellular animal that lives in water. This animal can reproduce asexually by simply dividing into two organisms.

Part A: Describe a cellular division process that could be used by *Trichoplax* when it reproduces asexually.

Part B: Describe one benefit and one limitation of how the *Trichoplax* can reproduce by simply dividing.

Use the table below to complete question 15.

Organism Relationships in an Ecosystem

Animal	Food Sources	Predators
beaver	tree bark, twigs, leaves, and roots; pond lilies	coyote, wolf, eagle, black bear
warbler birds	insects, earthworms, fruit	eagle, coyote, hawk
black bear	fish, insects, fruit, small mammals, eggs, carrion	brown bear, wolf

An ecosystem includes the organisms listed in the table.

Part A: Identify the initial source of energy for the ecosystem.

Part B: Using the table, complete a food chain that includes a producer, a primary consumer, and a secondary consumer.

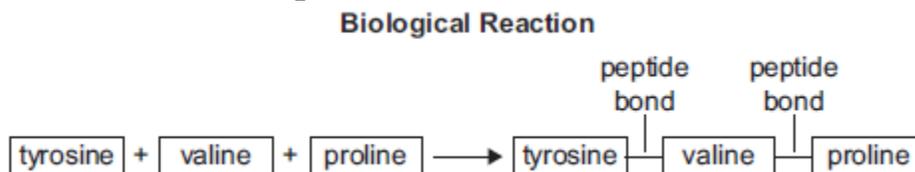
_____ → _____ → _____

Part C: The number of beavers in this ecosystem suddenly decreases. Describe the effect this may have on one other organism.

Released Biology Keystone Exam #5

1. Which characteristic is shared by all prokaryotic and eukaryotic organisms?
 - A. the ability to reproduce asexually
 - B. the ability to make their own food
 - C. the need for a source of energy
 - D. the need for oxygen for respiration
2. Life functions are performed at many levels of biological organization. Which level of biological organization is the simplest level at which a structure can support life functions?
 - A. cell
 - B. tissue
 - C. organelle
 - D. organ system
3. The opening of the stomata allows water to evaporate from inside the leaf in a process known as transpiration. As this occurs, water molecules cling to one another and pull water in a continuous stream up the stem of the plant from the roots to the leaves. Which property of water makes this movement possible?
 - A. cohesion
 - B. freezing point
 - C. high specific heat
 - D. temperature-dependent density
4. Cells are largely made of organic compounds that contain carbon. Which property of the carbon atom makes it an essential component of organic compounds?
 - A. Carbon is a nonmetal.
 - B. Carbon oxidizes to carbon dioxide.
 - C. Carbon is solid at room temperature.
 - D. Carbon can form four covalent bonds.

Use the diagram below to answer question 5.



5. Which statement best describes the event shown in the diagram?
 - A. Glucose is being synthesized in the chloroplast using nitrogen from plants.
 - B. Amino acid monomers are joining together to form a protein macromolecule.
 - C. A polymer in the nucleus is being broken into its individual monomer subunits.
 - D. Lipid molecules are forming fatty acid chains in a dehydration synthesis reaction.

6. Plant cells use sunlight to make their own food. Which structure allows plant cells to perform this function?

- A. nucleus**
- B. vacuole**
- C. chloroplast**
- D. mitochondrion**

7. Which statement best explains why cellular respiration in plants and other organisms is dependent on photosynthesis?

- A. Photosynthesis is one of the final steps in cellular respiration.**
- B. Photosynthesis provides the materials that fuel cellular respiration.**
- C. Photosynthesis absorbs excess energy produced by cellular respiration.**
- D. Photosynthesis absorbs materials that are catalyzed during cellular respiration.**

Use the list below to answer question 8.

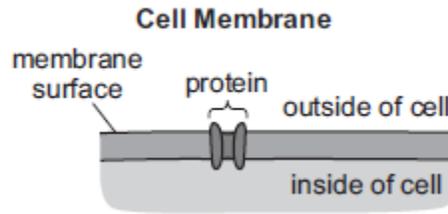
Molecules Needed for Protein Synthesis

- mRNA
- tRNA
- amino acids
- ATP molecules

8. A plant cell uses the molecules in the list to synthesize a protein. What role do the ATP molecules play in the protein synthesis process?

- A. They provide energy.**
- B. They increase activation energy.**
- C. They convert energy into hereditary information.**
- D. They absorb excess energy to prevent overheating.**

Use the diagram below to answer question 9.



9. The indicated protein is part of a cell membrane. What is the most likely purpose of this protein?

- A. It allows passage of particles into and out of the cell.
- B. It manufactures phospholipids to repair membrane damage.
- C. It releases stored chemical energy in membrane carbohydrates.
- D. It attracts unbalanced electrical charges in the cell's environment.

10. Which statement best describes how active transport differs from passive transport?

- A. Only active transport requires ATP.
- B. Only active transport moves small particles.
- C. Only active transport relies on a plasma membrane.
- D. Only active transport allows substances to leave a cell.

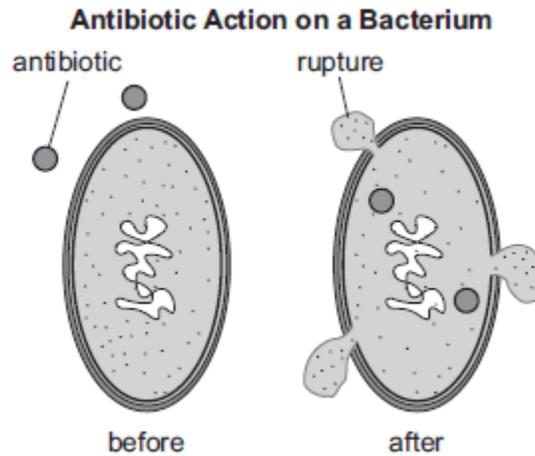
11. All living organisms must maintain homeostasis in order to survive. Which statement best describes one way humans maintain homeostasis?

- A. Temperature is regulated by giving off carbon dioxide.
- B. Water content is regulated by giving off carbon dioxide.
- C. Temperature is regulated by sweating.
- D. Water content is regulated by sweating.

Bacteria and Antibiotics

Bacteria are single-celled microorganisms. The cell walls of these microorganisms serve as barriers to chemicals that might affect the processes that occur within a bacterial cell.

Antibiotics are a type of substance used to stop bacterial growth. Some antibiotics cause the bacterial cell wall to rupture.



12. The function of which human organ is most like the cell walls of bacteria?

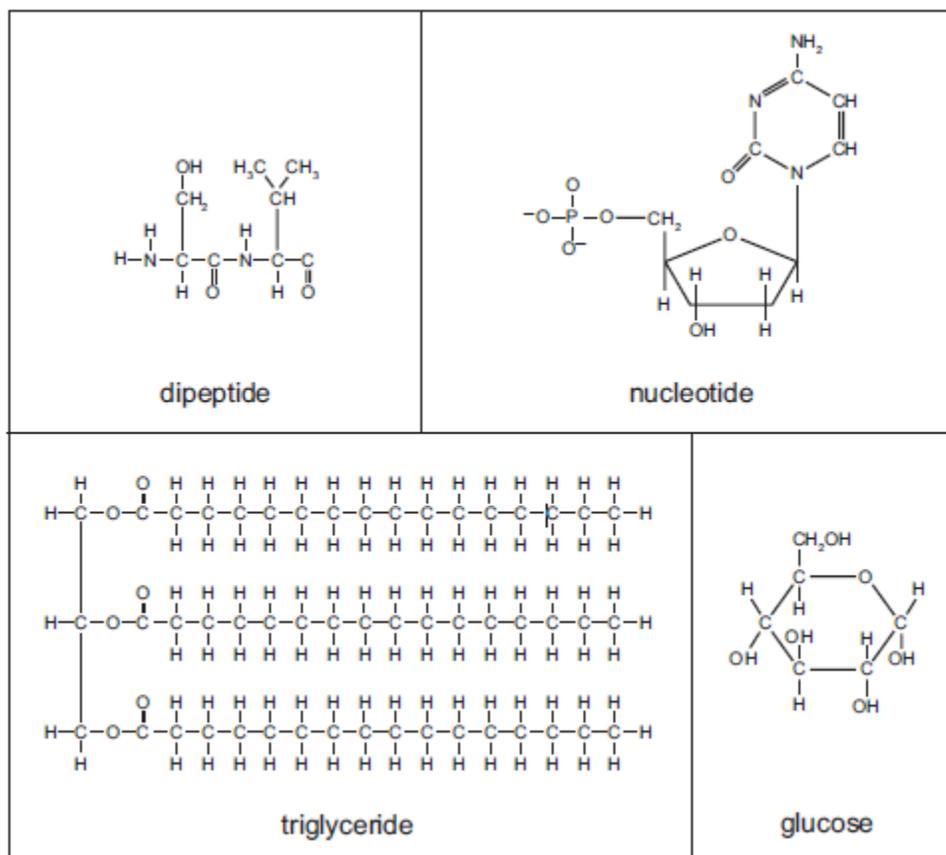
- A. heart
- B. liver
- C. pancreas
- D. skin

13. Which statement best describes how antibiotics affect cellular homeostasis?

- A. Antibiotics remove chloroplasts from plant cells to cause starvation.
- B. Antibiotics interfere with the transport of intracellular and extracellular materials.
- C. Antibiotics increase the rate of DNA replication in human cells by forming nucleotides.
- D. Antibiotics decrease the rate of cellular respiration in animal cells by producing oxygen

Use the illustration below to answer question 14.

Four Organic Molecules



14. Part A: Describe two similarities in the structure of the organic molecules shown.

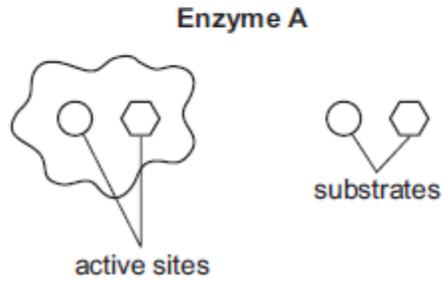
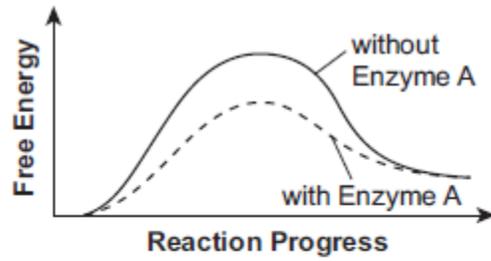
Similarity 1:

Similarity 2:

14. Part B: “Structure determines function” is an important concept to biology. Select one of the organic molecules shown and explain how its structure is related to its function.

Use the graph and diagram below to answer question 15.

Effects of Enzyme A



15. Part A: Explain how Enzyme A acts as a catalyst in the reaction.

15. Part B: Conditions around an enzyme change and affect the shape of the enzyme's active sites. Predict how this would affect the enzyme's ability to catalyze the reaction.

Released Biology Keystone Exam #6

- 1. What must be transmitted to new DNA strands during replication to maintain genetic information?**
 - A. individual atoms from existing DNA strands**
 - B. individual sugars from existing DNA strands**
 - C. the sequence of bases from existing DNA strands**
 - D. the sequence of phosphates from existing DNA strands**

- 2. The genetic material of two different individuals of the same species is analyzed. One individual has brown eyes. The other has blue eyes. Which characteristic for eye color would be the same for both individuals?**
 - A. the allele**
 - B. the DNA sequence**
 - C. the amount of pigment**
 - D. the location of the gene**

- 3. Which effect is most likely caused by nondisjunction during meiosis?**
 - A. an increase in nuclei**
 - B. an extra chromosome**
 - C. only two types of nitrogenous bases**
 - D. increased survival benefits from traits**

- 4. A genetic mutation involving a single base causes an error that affects the sequence of the next 500 amino acids in a protein. Which type of mutation could have produced this type of error in the protein?**
 - A. silent**
 - B. nonsense**
 - C. frame-shift**
 - D. substitution**

- 5. New technologies enable oils to be extracted from plants to make renewable biodiesel fuel. Scientists have altered the genome of a specific plant species to increase the amount of oil produced by each plant. Which statement explains why this technology most likely benefits farmers?**
 - A. It makes each plant more resistant to disease.**
 - B. It lowers the cost of each acre of plants cultivated.**
 - C. It increases the value of each acre of land cultivated.**
 - D. It eliminates the processing needed to extract plant oils.**

6. A population of squirrels was separated during the formation of the Grand Canyon. Over time the squirrels, separated by the canyon walls and the Colorado River, became unique species. Which mechanism most likely caused the development of the new species?

- A. habitat preference
- B. increased gene flow
- C. geographic isolation
- D. behavioral isolation

7. A researcher observes two species of frogs in the same area. Both species have a similar diet. One species breeds in fast-moving streams, while the other species breeds in ponds. Both species are similar in appearance and have very similar DNA. Which information provides the best evidence that these two species descended from a common ancestor?

- A. the species' similar diets
- B. the species' shared habitat
- C. the species' mating behaviors
- D. the species' physical characteristics

Use the statements below to answer question 8.

Statement 1: All living things are composed of cells.

Statement 2: If soil contains high levels of salt, the plants will die.

Statement 3: The temperature reading on the thermometer is 21°C.

Statement 4: It must have rained this morning because the soil is wet.

8. A teacher lists four statements for students to interpret. Which table of information correctly distinguishes between the statements?

A.

Statement 1	Statement 2	Statement 3	Statement 4
theory	hypothesis	observation	inference

B.

Statement 1	Statement 2	Statement 3	Statement 4
fact	theory	hypothesis	observation

C.

Statement 1	Statement 2	Statement 3	Statement 4
inference	observation	theory	fact

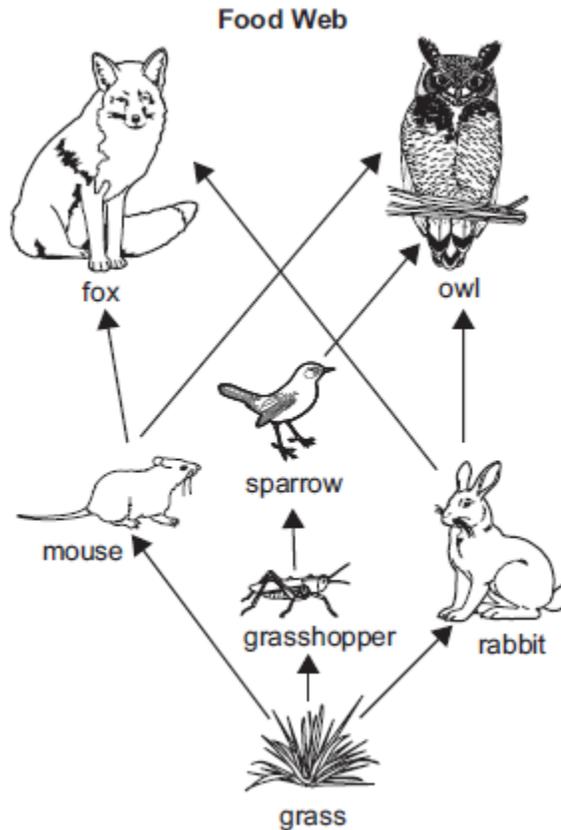
D.

Statement 1	Statement 2	Statement 3	Statement 4
observation	inference	fact	hypothesis

9. Which description is the best example of a population?

- A. all of the red foxes in a forest
- B. all of the red foxes in every forest
- C. all of the organisms in a forest
- D. all of the organisms in every forest

Use the diagram below to answer question 10.



10. Which energy transfer most likely occurs between organisms in the food web?

- A. from owl to fox
- B. from rabbit to fox
- C. from sparrow to grass
- D. from mouse to grasshopper

11. In Pennsylvania, a nonnative plant called stiltgrass out-competes native plants in many forest ecosystems. Which statement best describes how the spread of stiltgrass negatively affects native herbivores?

- A. Stiltgrass stops the life cycles of native herbivores.
- B. Stiltgrass reduces the size of the native plant populations.
- C. Stiltgrass increases the flow of energy through the ecosystem.
- D. Stiltgrass attracts other nonnative plants to the forest ecosystem.

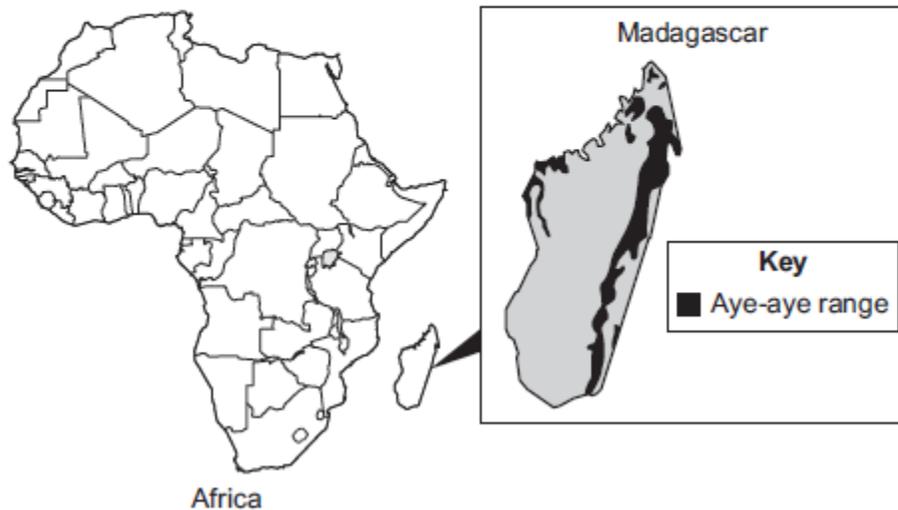
Directions: Use the information presented on page 58 to answer questions 12 and 13.

Aye-aye



An aye-aye is a small nocturnal lemur that weighs about four pounds. This endangered species is found in Madagascar, a large island off the east coast of southern Africa. The main food for aye-ayes is larvae that live in wood. Aye-ayes find the larvae by tapping on tree branches. They also eat nuts and fruit. Aye-ayes spend most of their time alone. Each animal occupies about 15 acres and marks the territory, which alerts other aye-ayes of the boundary.

Aye-aye Range



Use the map below to answer question 12.

Four Locations of Aye-ayes



12. The map indicates four locations of aye-aye populations. Which location would most likely have an aye-aye population with the greatest variation in allele frequencies?

- A. location 1
- B. location 2
- C. location 3
- D. location 4

13. For the aye-aye species, what is most likely the primary value of individuals living alone?

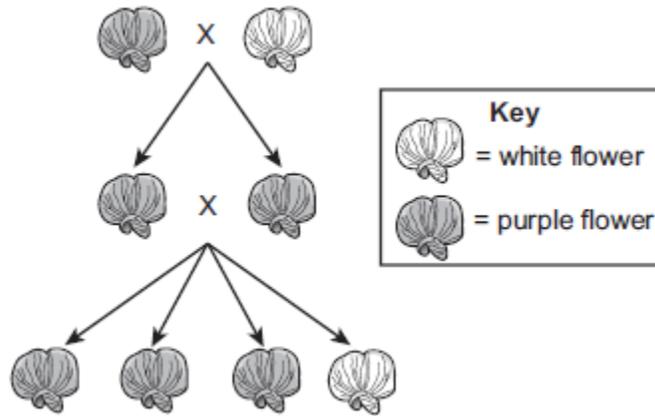
- A. decreased space needs for the species
- B. increased survival rates with habitat loss
- C. reduced competition for natural resources
- D. greater genetic variability within the species

14. White-tailed deer from North America were brought to the islands of New Zealand around the year 1900. This species of deer has survived in several regions in New Zealand.

Part A: Explain why the white-tailed deer population is considered a nonnative species in New Zealand.

Part B: Describe one possible effect that a nonnative species can have on a native ecosystem and explain why this effect might occur.

Use the diagram below to answer question 15.
Pea Flower Color Cross



15. In pea plants, the flowers can be purple or white. The diagram shows three generations of pea plant crosses.

Part A: Using the pea flower color cross, identify the pattern of inheritance shown and explain how the cross shows this pattern.

Part B: Explain how farmers could ensure that they only grow white flowers.