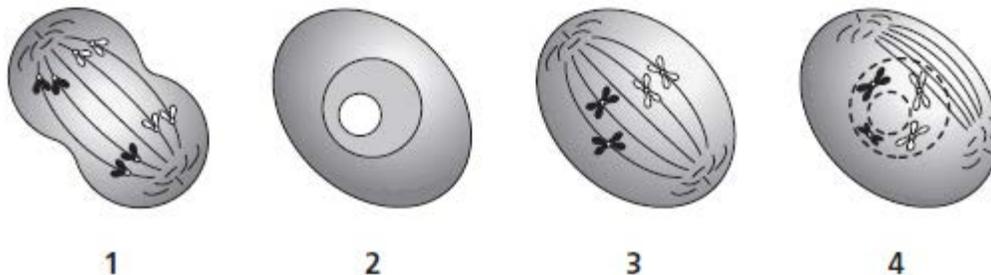


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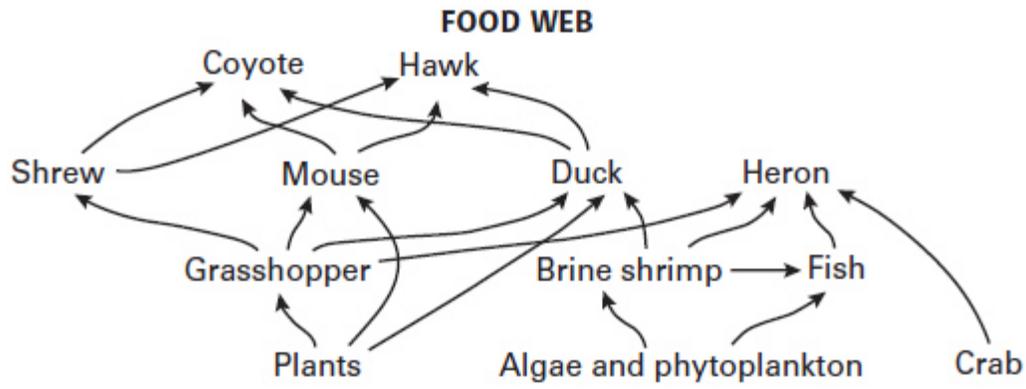
EOC REVIEW

1. The diagram below shows four stages of a cell undergoing mitosis.



Which of the following is the correct sequence of stages as they occur in the cell cycle?

- 1, 3, 4, 2
 - 2, 1, 3, 4
 - 2, 4, 3, 1
2. After a forest fire, new plants can grow from the decaying organic matter left behind. What is the gradual, sequential regrowth of a community of species after a forest fire?
- Pioneer succession
 - Primary succession
 - Secondary succession
3. Which feedback mechanism maintains the equilibrium of your body temperature when your surroundings are very hot?
- The brain sends a message to the skin. The muscles in the skin contract, or shiver. Shivers cool the body.
 - Heat receptors in the skin send a message to the brain. The brain sends the skin a response telling the skin to start sweating. Sweat cools the body.
 - The skin starts sweating. The sweat sends a message to the brain. The brain sends a response to the skin to stop sweating, which cools the body.
4. A disease wipes out a population of ducks in the ecosystem represented by the food web below.



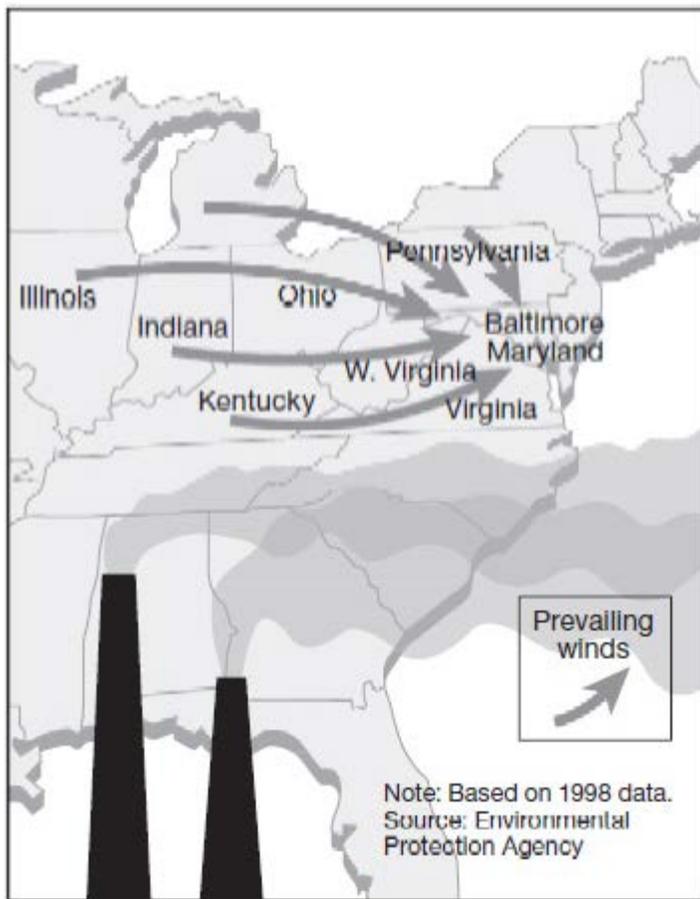
How will this

most likely affect the ecosystem?

- a. The population of brine shrimp will increase.
- b. The population of coyotes will increase.
- c. The population of grasshoppers will decrease.

5. A Maryland environmental agency designs the promotional poster shown below.

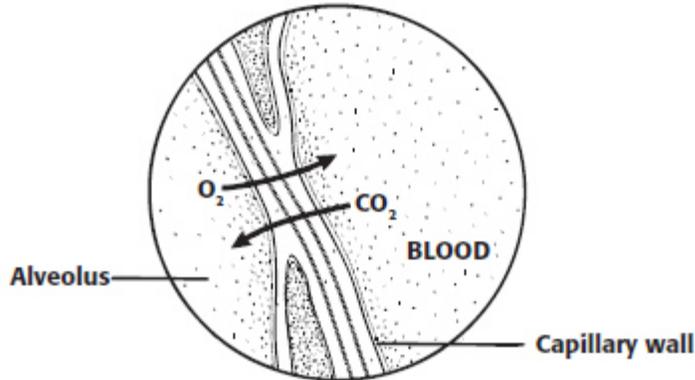
Movement of Air Pollution



Which statement is the best caption for the poster?

- a. Baltimore is the new windy city.
- b. Reducing Maryland's Air Pollution: The Answer Is Blowing in the Wind
- c. What happens in the Midwest stays in the Midwest.

6. Which cellular structure is unique to plant cells and not found in bacterial cells?
- Cell wall
 - Chloroplasts
 - Ribosomes
7. The diagram below shows the exchange of oxygen and carbon dioxide through a capillary wall in the lungs.

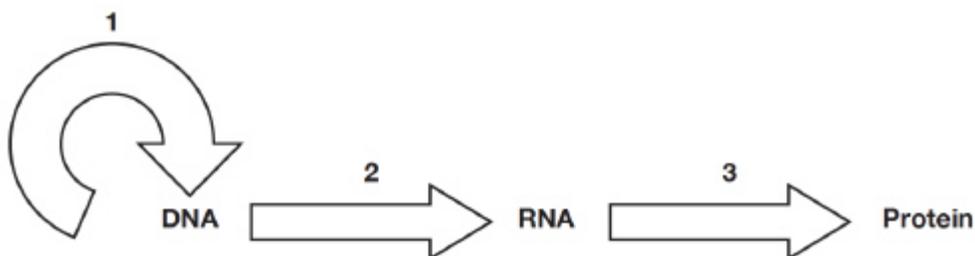


- This diagram shows the exchange of gases between which two body systems?
- Respiratory and endocrine.
 - Circulatory and respiratory
 - Endocrine and circulatory
8. In the immune system, inflammation occurs when a pathogen enters the body. How does the inflammatory response act as a defense against infection?
- Histamine is released, increasing blood flow and bringing white blood cells to fight the infection.
 - The high body temperature kills the disease-causing pathogen.
 - Antigens are produced in response to the antibodies on the pathogen's surface.
9. Which type of evidence provides the best support for the hypothesis that the ancestors of tetrapods (amphibians, reptiles, and mammals) evolved legs before tetrapods were first seen on land?
- DNA sequencing
 - Fetal development
 - Fossil record
10. Miller and Urey exposed hydrogen gas, water vapor, ammonia, and methane gases to sparks in a reacting chamber. What was produced, giving support to certain hypotheses about how life began on Earth?
- Membrane-bound organelles
 - Organic compounds
 - Single-celled organisms
11. The Punnett square below shows a cross between two rabbits. Black fur (*B*) is dominant to brown fur (*b*).

		<i>B</i>	<i>b</i>
<i>Bb</i> × <i>Bb</i>	<i>B</i>	1	2
	<i>b</i>	3	4

If individuals from box 1 and box 4 were crossed, what would be the genotypes of the offspring?

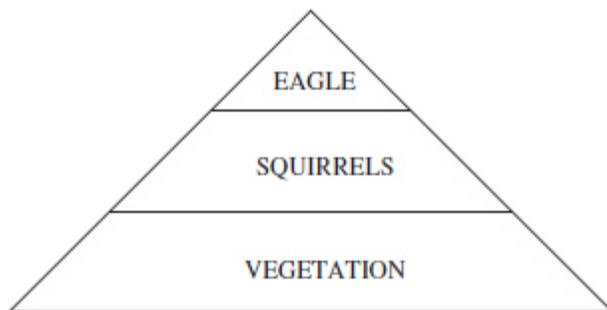
- a. All *Bb*
 - b. *Bb* and *bb*
 - c. *BB* and *bb*
12. Changes in DNA organization over the course of the cell cycle help the cell carry out its functions. What is the difference between the terms *chromatin* and *chromatid*?
- a. Chromatid is a loose combination of DNA and proteins; a chromatin is one of two sister structures into which the chromatid coils during DNA replication.
 - b. Chromatid is a long, uncoiled strand of DNA; when the sister chromosomes separate, each is considered a chromatin.
 - c. Chromatin is a loose combination of DNA and proteins; a chromatid is one half of a duplicated chromosome.
13. The diagram below shows the processes that occur during gene expression.



Which of the following is represented at number 2 ?

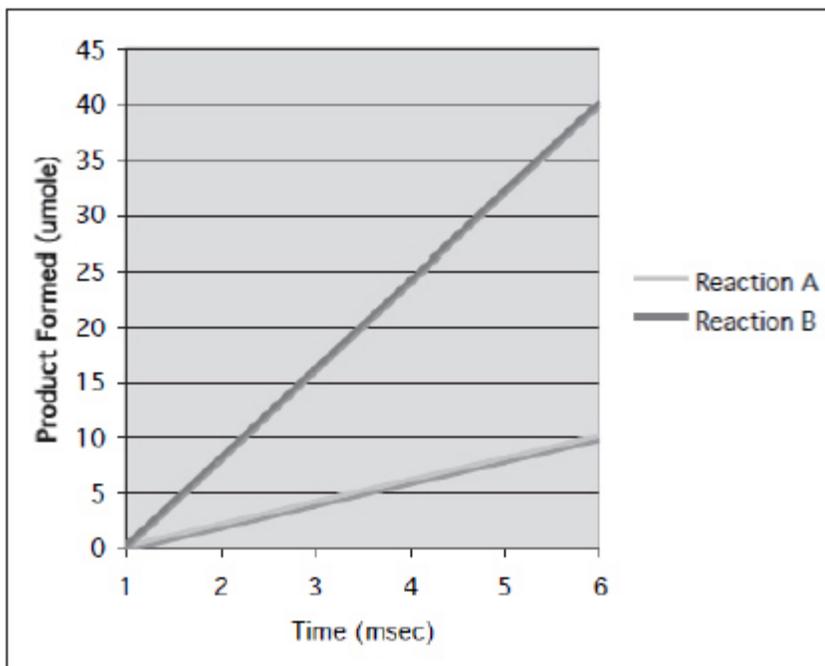
- a. Translation
 - b. Transcription
 - c. Protein synthesis
14. A silkworm farmer's entire population of silkworms is repeatedly infected with a deadly type of bacteria. The first time he treats the population with an antibiotic, he kills 99% of the bacteria. The second time only 50% of the bacteria are killed. Which statement best describes why the antibiotic was not as effective the second time?
- a. The bacteria that survived reproduced, passing on their genes for antibiotic resistance to the next generation.
 - b. The bacteria developed a gene that helped them be resistant to antibiotics.
 - c. The bacterial population already had developed the antibodies for the antibiotic.
15. Many of the proteins in the human body are enzymes that catalyze chemical reactions. What is the relationship between enzymes and activation energy?
- a. When an enzyme catalyzes a reaction, it increases the activation energy of the reaction.
 - b. When an enzyme catalyzes a reaction, it increases the activation energy of the product.
 - c. When an enzyme catalyzes a reaction, it decreases the activation energy of the reaction.

16. The diagram below shows a terrestrial energy pyramid.



Which of the following is the correct flow of energy shown in the pyramid?

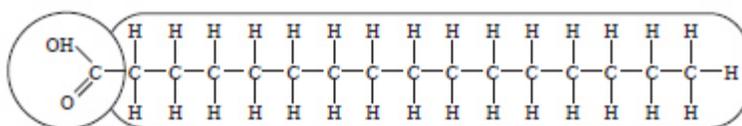
- a. The eagle gets energy from eating the squirrels.
 - b. The vegetation gets energy from the squirrels.
 - c. None of the above
17. When fossil fuels (coal, oil, and natural gas) are burned, they release a gas that can be used by plants for photosynthesis. High levels of this gas in the atmosphere are typically associated with warmer periods on Earth. What greenhouse gas is released when fossil fuels are burned and also plays a major role in photosynthesis?
- a. Carbon dioxide
 - b. Nitrogen
 - c. Ozone
18. Photosynthesis and cellular respiration involve many of the same substances because these two processes are interrelated. Which two substances are the products of cellular respiration and the reactants of photosynthesis?
- a. Oxygen and water
 - b. Carbon dioxide and water
 - c. Oxygen and glucose
19. A botanist notices that one of his house plants has drooping leaves. Which description explains what happens when he waters the plant?
- a. The sudden movement of water by osmosis into the plant cells causes the cells to swell and burst.
 - b. The environment changes from hypotonic to hypertonic, the central vacuole swells, and the leaves stop drooping.
 - c. The environment changes from isotonic to hypotonic, water moves into cells by osmosis, vesicles in the plant cells swell, and the leaves stop drooping.
20. The graph below shows the reaction rates of two different reactions.



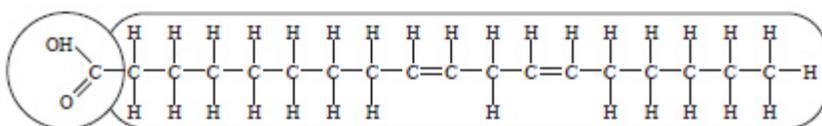
Which of the following statements could explain the difference in the two reactions?

- Reaction A is catalyzed by an enzyme.
- Reaction B is catalyzed by an enzyme.
- Reaction A occurs at a faster rate than Reaction B.

21. The diagram below shows the structural formulas for two fatty acids.



Palmitic acid



Linoleic acid

Based on the structures of the two fatty acids, which statement is true?

- Palmitic acid is an unsaturated fat and linoleic acid is a saturated fat.
- Linoleic acid is an unsaturated fat and palmitic acid is a saturated fat.
- Both are saturated fats.

22. New fields of biology have added support to Darwin's theory of evolution by natural selection. What type of evidence is now available to scientists, but was not available during Darwin's time?
- Comparing the DNA sequences of different species
 - Comparing the biogeography of different species around the world
 - Comparing the anatomies of different species
23. Today, biologists classify sponges as animals rather than plants. What evidence supports today's classification?

- a. Sponges do not have a backbone.
 - b. Sponges cannot make their own food.
 - c. Sponges do not have tissues or organs.
24. The naturalist Charles Darwin speculated that, over time, natural selection could change a population to the point of producing a new species. Which of the following is an example of natural selection within a population?
- a. A giraffe continuously stretches its neck to reach food in the upper branches of a tree, resulting in a longer neck over time.
 - b. A grasshopper develops an appetite for a new food source after its current food source has been destroyed.
 - c. A small number of grapevines are resistant to an insect infestation, allowing them to survive and reproduce.
25. Sexual reproduction increases genetic variation in a population. Which is a way that meiosis and fertilization lead to genetic variation?
- a. Alleles are recombined when gametes from different parents join together.
 - b. DNA is replicated when a fertilized egg becomes a growing embryo through mitosis.
 - c. Parents that are homozygous for the same trait will have offspring that are also homozygous for that trait.
26. The base sequences below show two different sequences of the same gene.

Wild Type: TTGACTCGGTA

Mutant: TTGACTCGTA

What type of mutation is illustrated?

- a. Deletion
 - b. Insertion
 - c. Substitution
27. By comparing amino acid sequences, scientists can determine how similar one species is to another. The table below compares amino acids in a number of species.

Hemoglobin Comparison	
Animal with hemoglobin	Amino acids that differ from human hemoglobin
Gorilla	1
Rhesus monkey	8
Mouse	27
Chicken	45
Frog	67
Lamprey	125

Based on the information in the table, which animal is most closely related to humans?

- a. Gorilla
- b. Lamprey
- c. Rhesus monkey

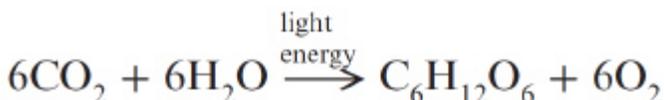
28. Speciation is the formation of new species as a result of evolution by natural selection. What most likely effect on speciation could separation of populations have?
- One half of the species will go extinct if the population is separated.
 - By separating, the populations will no longer be able to interbreed and will die off.
 - If the environments differ enough, the separated populations may evolve differently.
29. Which of the following mutations would most likely improve the chances that an organism would survive and reproduce?
- A stronger scent that makes a flower more attractive to predators
 - Stronger leg muscles that allow an animal to jump away from danger
 - All of the above
30. If the structure of DNA is common to all organisms, what leads to genetic diversity among organisms?
- The type of sugar in each nucleotide
 - The sequence of nucleotides in the DNA molecule
 - How the DNA bases pair with each other
31. James Watson and Francis Crick built a model showing that the structure of DNA is like a twisted ladder called a double helix. How is the double helix structure related to the function of DNA?
- The double helix shows that one strand of the DNA ladder is inherited from each parent.
 - The double helix structure allows DNA to be separated into two identical strands during mitosis.
 - The pattern of complimentary bases on each side of the DNA ladder ensures that exact copies of the DNA are made during replication.
32. Antibiotic resistance occurs when antibiotics no longer work against disease-causing bacteria. In what way can a single person most contribute to the production and spread of antibiotic-resistant bacteria?
- By carrying and introducing bacteria to new environments
 - By washing the hands frequently
 - By not completing a full course of prescribed medication
33. Proteins are used to enable movement, provide structure and support, and carry out important chemical reactions inside the body. What is needed in order for the human body to synthesize proteins?
- a diet rich in amino acids
 - sufficient sunlight and water
 - minerals and fats in sufficient amounts
34. Mistletoe is a plant that grows on trees. If mistletoe benefits from the relationship and the tree is harmed, what kind of relationship exists between the two organisms?
- Parasitism
 - Mutualism
 - Predation
35. The list below describes the characteristics of the organism *Penicillium notatum*.

Characteristics of *P. notatum*

- eukaryotic
- heterotrophic
- has a cell wall made from chitin
- unicellular or multicellular

To which kingdom does the organism belong?

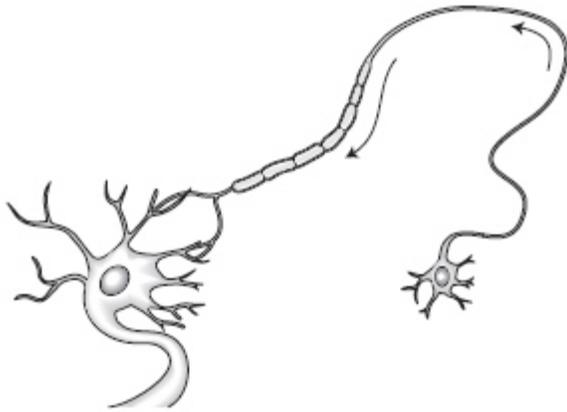
- a. Bacteria
 - b. Fungi
 - c. Plantae
36. Although viruses affect organisms, the viruses themselves are not living. Which of the following characteristics do viruses share with organisms?
- a. Growth
 - b. Reproduction
 - c. Metabolism
37. Which of the following correctly describes the two types of vascular tissue in plants?
- a. Xylem—water and inorganic nutrients flow in one direction; phloem—water and organic nutrients flow in any direction
 - b. Xylem—water and organic nutrients flow in one direction; phloem—water and inorganic nutrients flow in any direction
 - c. Xylem—water and organic nutrients flow in any direction; phloem—water and inorganic nutrients flow in one direction
38. If the sequence of bases on a strand of DNA is ACGCTTGCA, what is the sequence of bases on the corresponding strand?
- a. TGCGAACGT
 - b. TTATCCATC
 - c. TGAGCCAGT
39. A student finds the equation below in a textbook about cells.



What process is described by this equation?

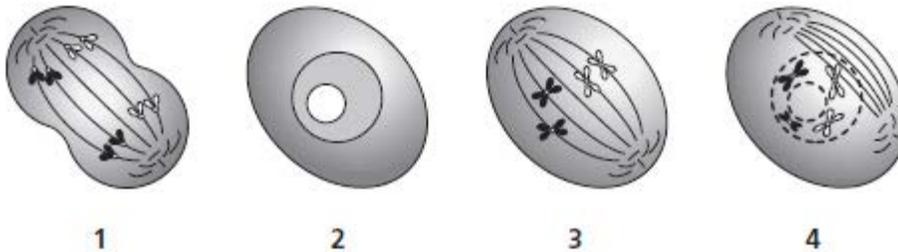
- a. Cellular respiration
 - b. Fermentation
 - c. Photosynthesis
40. Bacteria living in termites' digestive system break down cellulose for the termites. Both the termites and the bacteria benefit from this relationship. What is this type of relationship called?
- a. Commensalism
 - b. Mutualism
 - c. Parasitism

41. Which of the following events could lead to primary succession?
- A volcanic eruption that forms a new island
 - A farmer abandoning a field that used to grow crops
 - A flood drowning all of the land plants and animals in a field
42. In the laboratory, students press hulled, raw sunflower seeds between two pieces of paper cut from a brown lunch bag. Oily dark spots appear on the paper. The test confirms the presence of which biomolecule in the sunflower seeds?
- Carbohydrate
 - Lipid
 - Protein
43. Students look at the cell shown below using a microscope.



What is the function of the cell?

- To absorb nutrients
 - To transport oxygen
 - To transmit signals
44. The diagram below shows four stages of a cell undergoing mitosis.

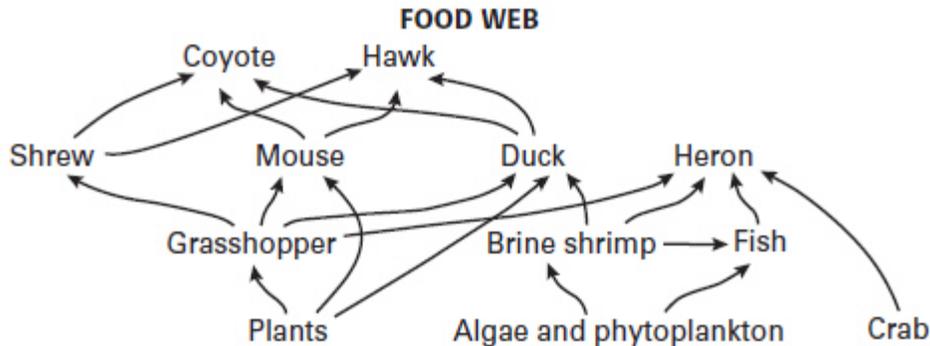


Which of the following is the correct sequence of stages as they occur in the cell cycle?

- 1, 3, 4, 2
 - 2, 1, 3, 4
 - 2, 4, 3, 1
 - 4, 3, 2, 1
45. Forest fires can destroy all the established plants living in an area. However, new growth can spring from the decaying organic matter left behind. What is the gradual, sequential regrowth of a community of species after a forest fire?
- Adaptation
 - Pioneer succession
 - Primary succession
 - Secondary succession

46. Which feedback mechanism maintains the equilibrium of your body temperature when your surroundings are very hot?
- The brain sends a message to the skin. The muscles in the skin contract, or shiver. Shivers cool the body.
 - The muscles in the skin contract, which sends a message to the brain that you feel hot. The brain sends a message to the skin? 's receptors.
 - Heat receptors in the skin send a message to the brain. The brain sends the skin a response telling the skin to start sweating. Sweat cools the body.
 - The skin starts sweating. The sweat sends a message to the brain. The brain sends a response to the skin to stop sweating, which cools the body.

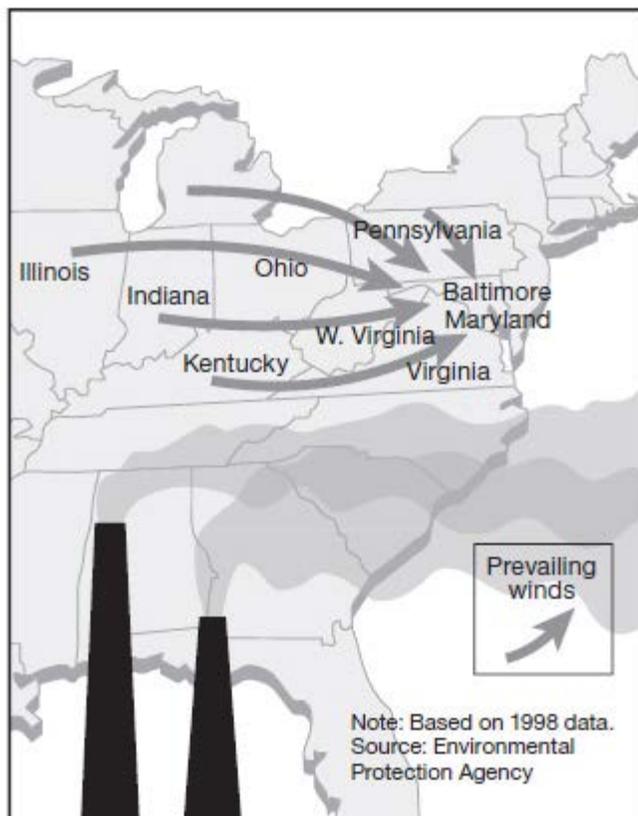
47. A disease wipes out a population of ducks in the ecosystem represented by the food web below.



How will this most likely affect the ecosystem?

- The population of brine shrimp will increase.
 - The population of coyotes will increase.
 - The population of grasshoppers will decrease.
 - The population of crab will decrease.
48. A Maryland environmental agency designed the promotional poster shown below.

Movement of Air Pollution



Which statement is the best caption for the poster?

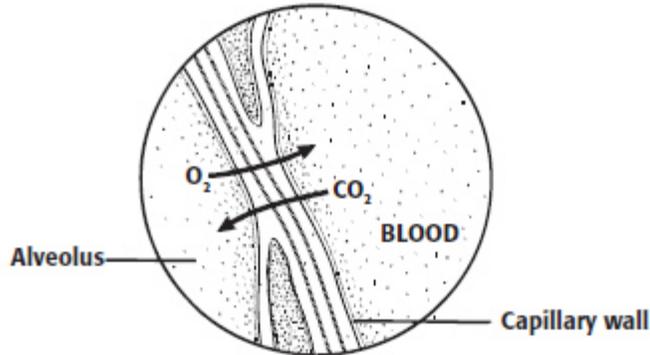
- Baltimore is the new windy city.
 - Reducing Maryland's Air Pollution: The Answer Is Blowing in the Wind
 - What happens in the Midwest stays in the Midwest.
 - Clean air is here to stay.
49. Water movement into and out of cells is important to all living things. A single-celled organism has organelles called contractile vacuoles to move water from inside to outside the cell. The data presented in the table below were obtained in an experiment in which an organism was placed in water with different salt concentrations.

Salt concentration outside the cell	Rate of contractile vacuole contractions per minute
Very high	2
High	8
Medium	15
Low	22
Very low	30

The rate at which the contractile vacuole contracted to pump out excess water was recorded. How could you explain the observed relationship between the rate of contractile vacuole contractions and the salt concentration?

- When the salt concentration outside the cell is very high, water moves inside the cell, and the contractile vacuole has to contract more rapidly.
- When the salt concentration outside the cell is very low, water moves outside the cell, but it has no impact on the contractile vacuole contractions.
- When the salt concentration outside the cell is very high, water moves outside the cell, and the contractile vacuole does not need to contract as rapidly.

- d. When the salt concentration outside the cell is very low, water moves outside the cell, and the contractile vacuole does not need to contract as rapidly.
50. Which of the following cell structures can be observed in both plant cells and bacterial cells?
- Chloroplast
 - Nucleus
 - Vesicles
 - Cell wall
51. The diagram below shows the exchange of oxygen and carbon dioxide through a capillary wall.



- This diagram shows the exchange of gases between which two body systems?
- Circulatory and digestive
 - Circulatory and respiratory
 - Endocrine and circulatory
 - None of the above
52. The inflammatory response is one of the immune system's nonspecific responses to infection. How does the inflammatory response act as a defense against infection?
- The high body temperature kills the disease-causing bacteria.
 - Oil and sweat on the surface of the skin inhibit bacterial growth.
 - Body heat destroys cellular proteins needed by the invaders to reproduce.
 - Release of histamine increases blood flow, which brings white blood cells.
53. Which type of evidence provides the best support for the hypothesis that the ancestors of tetrapods evolved legs before tetrapods were first seen on land?
- DNA sequencing
 - Fetal development
 - Fossil record
 - Skeletal morphology
54. Miller and Urey exposed hydrogen gas, water vapor, ammonia, and methane gases to sparks in a reacting chamber. What was produced, giving support to certain hypotheses about how life began on Earth?
- Primitive plants
 - Organic compounds
 - Single-celled organisms
 - Membrane-bound organelles
55. In humans, having freckles (F) is dominant to not having freckles (f). Having dimples (D) is also dominant to not having dimples (d). Which statement is true of the offspring whose parents are

both heterozygous for both traits ($FfDd$)?

- An offspring with freckles will not have dimples.
- An offspring who does not have freckles may or may not have dimples.
- An offspring with freckles will always have dimples.
- All of the offspring will have freckles and dimples.

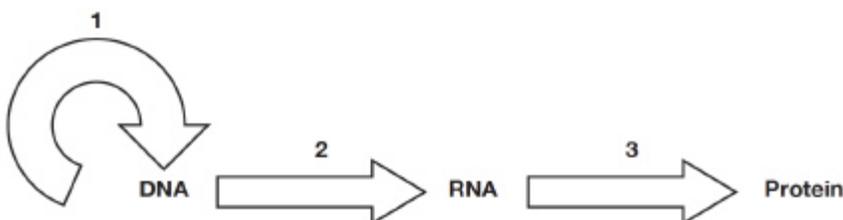
56. The Punnett square below shows a cross between two rabbits.

		<i>B</i>	<i>b</i>
<i>Bb</i> × <i>Bb</i>	<i>B</i>	1	2
	<i>b</i>	3	4

Black fur (B) is dominant to brown fur (b). If individuals from box 1 and box 4 were crossed, what would be the genotypes of the offspring?

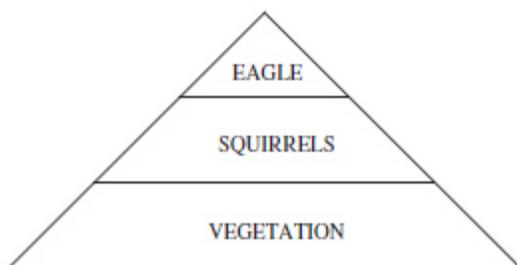
- All Bb
 - Bb and bb
 - BB and bb
 - BB and Bb
57. Changes in DNA organization over the course of the cell cycle help the cell carry out its functions. What is the difference between the terms *chromosome*, *chromatin*, and *chromatid*?
- Chromatid is a long, uncoiled strand of DNA; a chromatin is one of two sister structures produced during DNA replication; when the sister chromatins separate, each is considered a chromosome.
 - Chromatin is a long, uncoiled strand of DNA; a chromatid is an “X-shaped” structure that contains two strands of identical DNA; a chromosome is one half of a duplicated chromatid.
 - Chromatid is a long, strand of DNA and proteins; a chromosome is an “X-shaped” structure produced during DNA replication; when the chromosome separates, each half is considered a chromatin.
 - Chromatin is a loose combination of DNA and proteins; a chromosome is a long, condensed strand of DNA and associated proteins; a chromatid is one half of a duplicated chromosome.
58. How could a change in the DNA sequence of a single gene affect an organism?
- DNA could change into RNA.
 - The function of a protein encoded by the gene could change.
 - The organism would likely no longer be able to produce offspring.
 - The gene could code for carbohydrates instead of proteins.

59. The diagram below shows the processes that occur during gene expression.

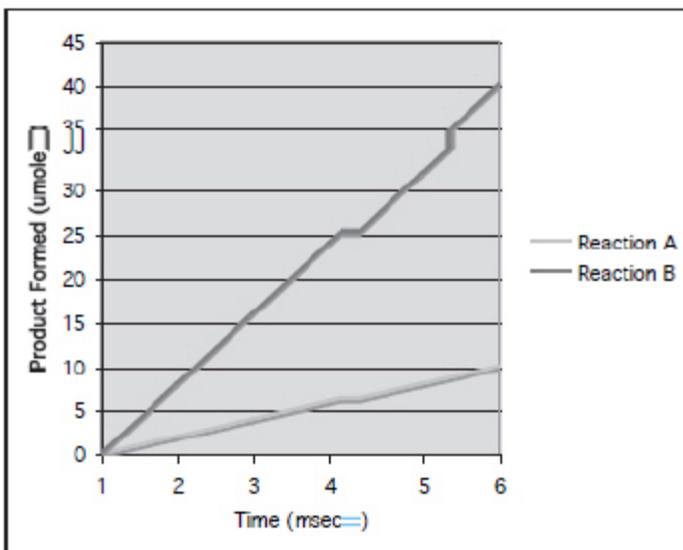


Which of the following is represented at number 2 ?

- a. Translation
 - b. Replication
 - c. Transcription
 - d. Protein synthesis
60. A silkworm farmer's entire population of silkworm larvae was infected with a deadly strain of bacteria. He treats the silkworms with an antibiotic spray that kills 99% of the bacteria. A month later, the silkworm farm is once again infected with the bacteria. The farmer treats the larvae with the antibiotic spray once more. This time only 50% of the bacteria are killed. Which statement best describes why the antibiotic is not as effective the second time?
- a. The bacteria that survived reproduced, passing on their genes for antibiotic resistance to the next generation.
 - b. The bacteria developed a gene that helped them be resistant to repeated treatments of antibiotics.
 - c. A symbiotic relationship between the silkworm and the bacteria evolved, making the bacteria less susceptible to the antibiotics.
 - d. The antibiotic was less effective the second time because the bacterial population already had developed the antibodies for the antibiotic.
61. A crop of wheat has been genetically engineered to be resistant to infection by fungal pathogens. Which of the following might occur as a result of gene flow?
- a. Drug-resistant bacteria may evolve.
 - b. There would be no movement of alleles from the genetically engineered crop of wheat to other nearby wheat crops.
 - c. The genetically engineered wheat may eventually lose its fungal pathogen resistance as it wears off.
 - d. The wheat crops in nearby fields may become resistant to infection by fungal pathogens.
62. Many of the proteins in the human body are enzymes that catalyze chemical reactions. What is the relationship between enzymes and activation energy?
- a. When an enzyme catalyzes a reaction, it increases the activation energy of the reaction.
 - b. When an enzyme catalyzes a reaction, it increases the activation energy of the product.
 - c. When an enzyme catalyzes a reaction, it decreases the activation energy of the reaction.
 - d. When an enzyme catalyzes a reaction, it does not affect the activation energy of the reaction.
63. Increased crop production in the U.S. can have negative effects on nearby ecosystems. Since crop biomass is removed from farmland, there are fewer plants to take up nitrogen. Much of the excess nitrogen and other nutrients from fertilizers, along with runoff from animal waste, are released into streams, rivers, and lakes. How do these environmental changes most likely affect aquatic ecosystems?
- a. They can affect only those organisms at lower trophic levels who directly take in the excess nutrients.
 - b. They can cause nutrient depletion so that photosynthetic organisms do not receive the nutrients they need to produce food.
 - c. The excess nitrogen and other nutrients leads to greater biodiversity.
 - d. They can increase eutrophication, which leads to oxygen depletion and the suffocation of aquatic species.
64. Which of the following is the correct flow of energy in the energy pyramid shown below?

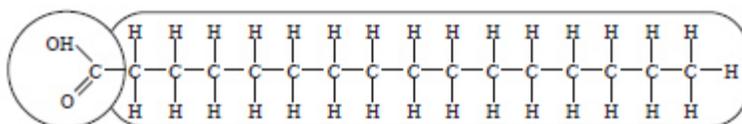


- a. The eagle gets energy from eating plants.
 - b. The vegetation gets energy from the squirrels.
 - c. The squirrels get energy from eating the eagle.
 - d. The eagle gets energy from eating the squirrels.
65. One contribution to the buildup of greenhouse gases in the atmosphere is from humans' use of fossil fuels. Fossil fuels result from the gradual transformation of layers of organic matter in sediment into natural gas, coal, and petroleum. When fossil fuels are burned, they release a gas that can be used by plants for photosynthesis. High levels of this gas in the atmosphere are typically associated with warmer periods on Earth. What greenhouse gas is released when fossil fuels are burned and also plays a major role in photosynthesis?
- a. CO_2
 - b. O_2
 - c. N_2
 - d. O_3
66. The chemical equations that summarize photosynthesis and cellular respiration involve many of the same substances because these two processes are interrelated. Which two substances are the products of one of these processes and the reactants of the other process?
- a. Oxygen and water
 - b. Oxygen and glucose
 - c. Carbon dioxide and water
 - d. Carbon dioxide and glucose
67. A botanist notices that one of his house plants has drooping leaves. Which description best explains what happens when he waters the plant?
- a. The sudden movement of water by osmosis into the plant cells causes the cells to swell and burst.
 - b. The environment changes from hypotonic to hypertonic, the central vacuole swells, and the leaves stop drooping.
 - c. The environment changes from isotonic to hypertonic, mitochondria in the plant cells take up the additional water, and the leaves stop drooping.
 - d. The environment changes from isotonic to hypotonic, water moves into cells by osmosis, vesicles in the plant cells swell, and the leaves stop drooping.
68. The graph below shows the reaction rates of two different reactions.

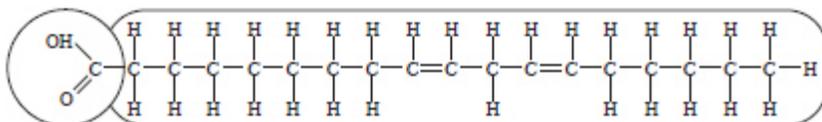


Which of the following statements could explain the difference in the two reactions?

- Reaction A is catalyzed by an enzyme.
 - Reaction B is catalyzed by an enzyme.
 - Reaction A occurs at a faster rate than Reaction B.
 - Reaction A and reaction B have the same reaction rate.
69. In 1998, forest fires swept through the forests of Yellowstone National Park. After the fires, biologists observed that new lodgepole pine seedlings began to sprout in the burned areas. The lodgepole pine cones are sealed with a resin that requires great heat to break open and release seeds. What inference could you make from this observation?
- Lodgepole pine seeds sprout easily.
 - Lodgepole pine is adapted to frequent forest fires.
 - Lodgepole pine will grow where other plants cannot.
 - Not all lodgepole pine seeds are contained in a cone.
70. The diagram below shows the structural formulas for palmitic acid and linoleic acid.



Palmitic acid



Linoleic acid

Based on the structures of the two fatty acids, which statement is true?

- Palmitic acid is polyunsaturated.
 - Linoleic acid is polyunsaturated.
 - Palmitic acid is monounsaturated.
 - Linoleic acid is monounsaturated.
71. Which is an example of evidence that has led biologists to accept modern evolutionary theory?
- Comparing the sequence of DNA of different species

- b. Comparing different literary accounts of the origin of life on Earth
 - c. Comparing the anatomies of domesticated species
 - d. Comparing only the fossil evidence in particular geographic areas
72. Today, biologists classify sponges as animals rather than plants. What evidence supports today's classification?
- a. Sponges have asymmetry.
 - b. Sponges do not have a backbone.
 - c. Sponges cannot make their own food.
 - d. Sponges do not have tissues or organs.
73. Darwin speculated that natural selection is the mechanism that drives evolution, resulting in population changes that eventually can lead to new species. Which of the following is an example of natural selection within a population?
- a. A male peacock grows longer feathers in brighter colors in order to attract more females than other males do.
 - b. A giraffe continuously stretches its neck in order to reach food in the upper branches of a tree, resulting in a longer neck over time.
 - c. A grasshopper develops an appetite for a new food source after its current food source has been destroyed by herbicides and insecticides.
 - d. A small number of grapevines are resistant to an insect infestation, allowing them to survive and reproduce.
74. Sexual reproduction increases genetic variation in a population. Which is a way that meiosis and fertilization lead to genetic variation?
- a. Alleles are recombined when gametes from different parents join together.
 - b. Mutations are usually repaired by cellular machinery before genes are expressed.
 - c. DNA is replicated when a fertilized egg becomes a growing embryo through mitosis.
 - d. Parents that are homozygous for the same trait will have offspring that are also homozygous for that trait.

75. The base sequences below show two different sequences of the same gene.

Wild Type: TTGACTCGGTATAC

Mutant: TTGACTCGTATAC

What type of mutation is illustrated?

- a. Deletion
 - b. Insertion
 - c. Inversion
 - d. Substitution
76. Modern scientists have observed that genetic changes happen over time in all natural populations. Therefore, by comparing amino acid sequences, scientists can determine how similar one species is to another. The table below compares amino acids in a number of species.

Hemoglobin Comparison	
Animal with hemoglobin	Amino acids that differ from human hemoglobin
Gorilla	1
Rhesus monkey	8
Mouse	27
Chicken	45
Frog	67
Lamprey	125

Based on the information in the table, which animal is most closely related to humans?

- Chicken
 - Gorilla
 - Lamprey
 - Rhesus monkey
77. Speciation is the formation of new species as a result of evolution by natural selection. What most likely effect on speciation could separation of populations have?
- One half of the species will go extinct if the population is separated.
 - The separated populations will always evolve into at least two different species.
 - If the environments differ enough, the separated populations may evolve differently.
 - By separating, the populations will no longer be able to interbreed and will die off.
78. Which of the following mutations would most likely improve the chances that an organism would survive and reproduce?
- A stronger scent that makes an animal easier to find
 - A weaker scent that makes a flower less attractive to bees
 - Weaker eyesight that makes an animal less likely to find prey
 - Stronger leg muscles that allow an animal to jump away from danger
79. A genetic engineer is cultivating stem cells from a mouse embryo. The stem cells, like all cells, have a complete copy of the organism's DNA. What element of gene expression in the stem cells would the engineer control in order to ensure the cells grow into muscle cells?
- Repressor proteins that enable RNA polymerase to transcribe the genes for muscle proteins
 - Transcription factors that bind to sections of the DNA that express genes for muscle cells
 - The processing of messenger RNA, such that only introns coding for muscle cell proteins will be included in the final nucleotide sequence
 - The *lac* operon, which will turn certain genes on and off in the stem cells
80. James Watson and Francis Crick built a model showing that the structure of DNA is like a twisted ladder called a double helix. How is the double helix structure related to the function of DNA?
- The double helix shows that one strand of the DNA ladder is inherited from each parent.
 - The double helix structure allows DNA to be separated into two identical strands during mitosis.
 - The double helix structure of DNA is a random occurrence, and DNA could just as easily be a straight, single-strand molecule.
 - The pattern of complimentary bases on each side of the DNA ladder ensures that exact copies of the DNA are made during replication.
81. Antibiotic resistance occurs when antibiotics no longer work against disease-causing bacteria, as

seen in methicillin-resistant *Staphylococcus aureus*, or MRSA. In what way can a single person most contribute to the production and spread of antibiotic-resistant bacteria?

- a. By carrying and introducing bacteria to new environments
- b. By combining prescribed and over-the-counter medications
- c. By washing his or her hands and drinking pasteurized beverages
- d. By not completing a full course of prescribed medication

82. The Miller-Urey theory proposed how early organic molecules appeared on Earth. A weakness of the theory was that it required the presence of methane and ammonia in early Earth's atmosphere, which scientists today speculate were not in fact present. What was a second weakness in the Miller-Urey theory?

- a. Chemical reactants would have been diluted in the mixture of other compounds present in the early atmosphere and not concentrated enough for reactions to occur.
- b. Solar radiation, volcanic eruptions, and lightning would not have provided sufficient energy to activate the reactions.
- c. The source of the methane and ammonia could not be identified.
- d. The ancient atmosphere provided a strongly oxidizing environment.

83. Proteins are used to enable movement, provide structure and support, and carry out important chemical reactions inside the body. What is needed in order for the human body to synthesize proteins?

- a. A diet rich in amino acids
- b. Sufficient sunlight and water
- c. 1,200 calories of nutrients per day
- d. Minerals and fats in sufficient amounts

84. Mistletoe grows on trees. It sends its roots into the tree and uses the nutrients that could otherwise be used by the tree. If mistletoe benefits from the relationship and the tree is harmed, what kind of relationship exists between the two organisms?

- a. Commensalism
- b. Mutualism
- c. Parasitism
- d. Predation

85. How can a few cells found at a crime scene be used to identify a criminal?

- a. The DNA from the cells can be copied, and then a unique DNA profile can be made.
- b. The DNA from the cells can be compared to known physical characteristics.
- c. The DNA from the cells can be compared to DNA profiles in a database.
- d. The DNA can be used to reconstruct tissue, and then the tissue can be used to identify the criminal.

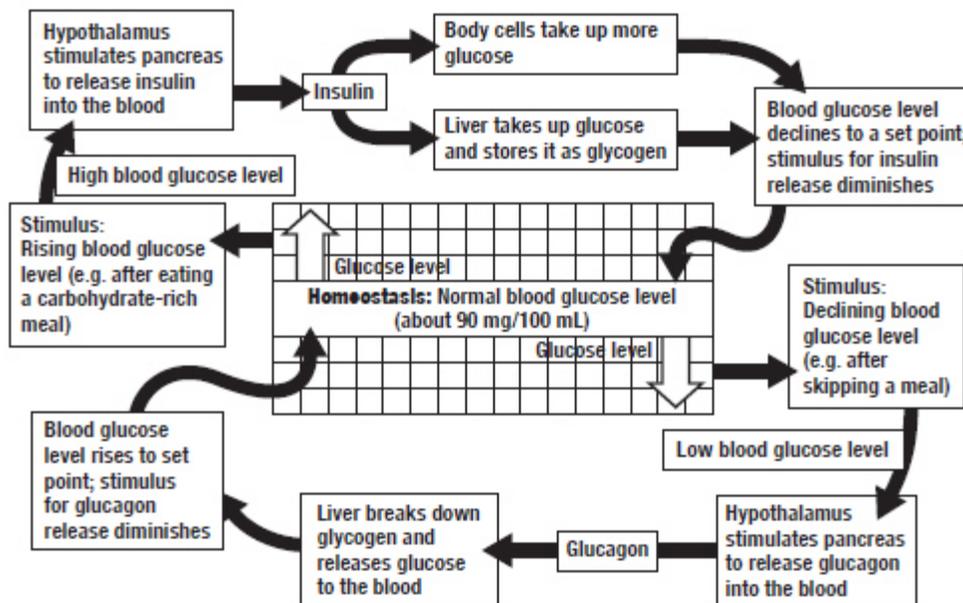
86. *Penicillium notatum* is an organism that is eukaryotic and heterotrophic, has a cell wall made from chitin, and can be either unicellular or multicellular. To which kingdom does *P. notatum* belong?

- a. Bacteria
- b. Fungi
- c. Plantae
- d. Protista

87. Although viruses enter living cells and can cause diseases such as chicken pox and hepatitis A and B, the viruses themselves are not living. Which of these characteristics do viruses share with organisms?

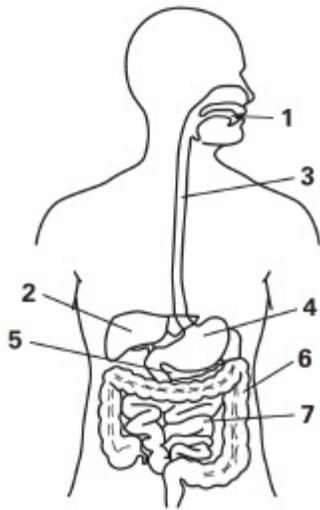
- Growth
- Homeostasis
- Metabolism
- Reproduction

88. Which of the following correctly represents the two plant vascular tissues, the types of material they carry, and their direction of flow?
- Xylem—water and inorganic nutrients flow in one direction; phloem—water and organic nutrients flow in any direction
 - Xylem—water and organic nutrients flow in one direction; phloem—water and inorganic nutrients flow in any direction
 - Xylem—water and inorganic nutrients flow in any direction; phloem—water and organic nutrients flow in one direction
 - Xylem—water and organic nutrients flow in any direction; phloem—water and inorganic nutrients flow in one direction
89. When a person eats food, the digestive, nervous, and endocrine systems work together to regulate nutrient absorption in the body by releasing and restricting the hormones insulin and glucagon. The feedback mechanism of the two hormones is shown in the illustration below.



A scientist tests how the other systems react when there is a change in one system. She treats mice with a chemical that blocks the release of insulin by the pancreas and then feeds them a diet high in carbohydrates. What would be a logical hypothesis for her experiment?

- Insulin will build up in the mice's blood and they may develop diabetes.
 - The mice's blood glucose levels will increase to levels high above normal.
 - Blood glucose levels will decrease until the mice's next meal.
 - The liver will breakdown glycogen, releasing glucose into the blood.
90. Which of the following is not an adaptation that helps birds of prey catch and eat other animals?
- Two types of feathers
 - Sharp claws on their feet
 - Very good vision
 - A sharp, curved beak
91. Bile, produced by the liver and stored in the gallbladder, is released when food is ingested to aid in the process of lipid digestion.

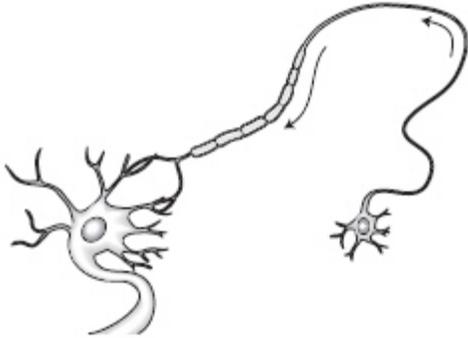


Into which organ of the digestive system is bile released to digest fat?

- Organ 1
 - Organ 2
 - Organ 4
 - Organ 7
92. If the sequence of bases on a strand of DNA is AGGACGCTTGCA, what is the sequence of bases on the corresponding strand?
- TCCTGCGAACGT
 - TAACTATCCATC
 - TAATGAGCCAGT
 - TTTGATACCTAG
93. A student found the equation below in a textbook about cells.
- $$6\text{CO}_2 + 6\text{H}_2\text{O} \xrightarrow[\text{energy}]{\text{light}} \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$$
- What process is described by this equation?
- Cellular respiration
 - Fermentation
 - Glycolysis
 - Photosynthesis
94. Termites use the cellulose in wood as the main energy source in their diet. However, termites do not produce the enzymes necessary to break down the sugars in cellulose. Bacteria living in termites' digestive system break down cellulose for the termites. Both the termites and the bacteria benefit from this relationship. What is this type of relationship called?
- Commensalism
 - Mutualism
 - Parasitism
 - Predation
95. Which of the following events could lead to primary succession?
- A volcanic eruption that forms a new island
 - A natural fire killing all of the trees in a forest
 - A farmer abandoning a field that used to grow crops
 - A flood drowning all of the land plants and animals in a field

96. In the laboratory, students pressed hulled, raw sunflower seeds between two pieces of paper cut from a brown lunch bag. Oily dark spots appeared on the paper. The test confirmed the presence of which biological macromolecule in the sunflower seeds?
- Carbohydrate
 - Lipid
 - Nucleic acid
 - Protein

97. Students look at the cell shown below using a microscope.

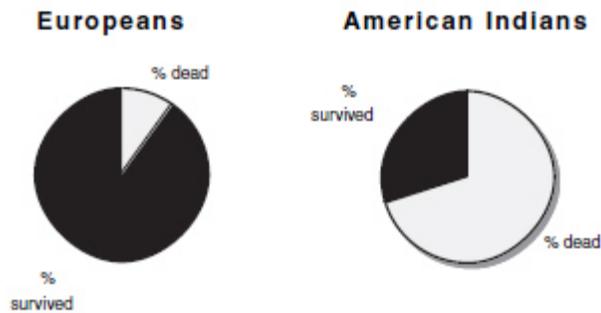


What is the function of the cell?

- To absorb nutrients
 - To transport oxygen
 - To transmit signals
 - To contract and expand
98. The tropical rain forests have been called the lungs of the planet. They take huge quantities of carbon dioxide from the atmosphere during photosynthesis and give off large quantities of oxygen. Vast tracts of tropical rain forests are being cleared for farms by people cutting down and burning the trees. Which of the following is the best hypothesis about the effect that rain forest destruction may have on atmospheric carbon dioxide levels?
- Rain forest destruction will not influence overall carbon dioxide levels, because it will affect only areas around the equator.
 - Any carbon dioxide added to the atmosphere because of rain forest destruction will fall into the oceans and be used in building coral reefs.
 - Cutting down rain forest trees will decrease atmospheric carbon dioxide levels, because plants give off carbon dioxide as a result of cellular respiration.
 - Cutting down trees, which take carbon dioxide from the atmosphere, and burning the trees, which adds carbon dioxide to the atmosphere, will increase atmospheric carbon dioxide levels.
99. If a heterozygous individual (Aa) was crossed with another heterozygous individual (Aa), which correctly identifies the chance that their offspring would have a heterozygous genotype?
- 0%
 - 50%
 - 75%
 - None of the above
100. Which of the following statements describes a way in which a healthy kidney helps maintain homeostasis?
- The kidney removes proteins and fats from the bloodstream.
 - The kidney helps the body maintain proper hydration.

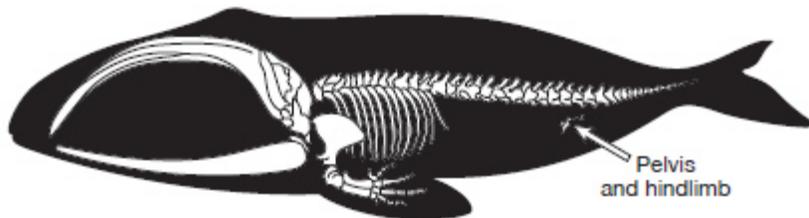
- c. The kidney removes water for excretion when the body is dehydrated.
- d. The kidney removes water for excretion when the body is dehydrated.

101. In the 1520s, the Spanish explorer Cortes and his armies carried the virus that causes smallpox to North America and South America.



The graphs above illustrate the death rate among both Europeans and American Indians from smallpox at that time. Which of the following statements best explains the difference in death rates?

- a. People in Europe were healthier than American Indians.
 - b. Antibiotics were available in Europe but not in North America.
 - c. American Indians had never been exposed to the smallpox virus, so resistant individuals had not yet become common.
 - d. American Indians were exposed to a virus that was different from the virus for smallpox in Europe.
102. Some whale species have pelvic and upper and lower limb bones as shown in the illustration below.



These bones are greatly reduced in size and do not appear to play a role in the whale's motion. What is the most likely explanation for the presence of these bones in modern day whales?

- a. Modern whales use the pelvis and limb bones for purposes other than motion.
 - b. All vertebrates have the same bones, but they are much smaller in organisms that don't use them.
 - c. The bones are common anatomical structures inherited from a terrestrial ancestor.
 - d. Modern whales are beginning to evolve structures for walking on land as global warming threatens to dry up the oceans.
103. Scientists once grouped fungi with plants. Which of the following is a major factor that determines why fungi are not classified as part of the plant kingdom?
- a. Fungi do not have leaves.
 - b. Fungi grow close to the ground.
 - c. Fungi can reproduce either sexually or asexually.
 - d. Fungi are heterotrophs.
104. According to the primordial soup model, the first organic molecules could have formed from simpler inorganic substances in Earth's early oceans, but only if there were a source of energy to cause such chemical reactions to take place. Which are possible sources of energy that could have led to the production of these first precursors to life?

- Lightning and cellular respiration
- Nuclear radiation and photosynthesis
- Photosynthesis and cellular respiration
- Solar radiation, volcanic eruptions, and lightning

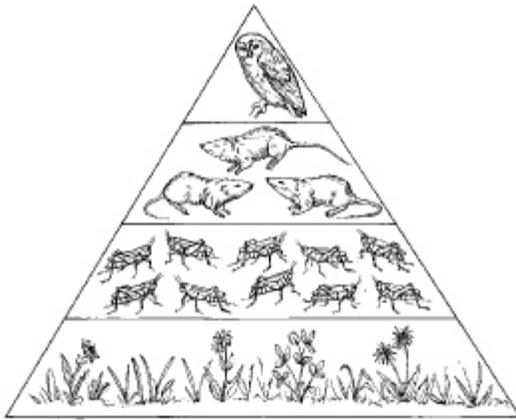
105. The Punnett square below shows a cross between two rabbits.

		<i>B</i>	<i>b</i>
<i>Bb</i> × <i>Bb</i>	<i>B</i>	1	2
	<i>b</i>	3	4

Black fur (*B*) is dominant to brown fur (*b*). What would be the phenotype of the offspring indicated by box 3?

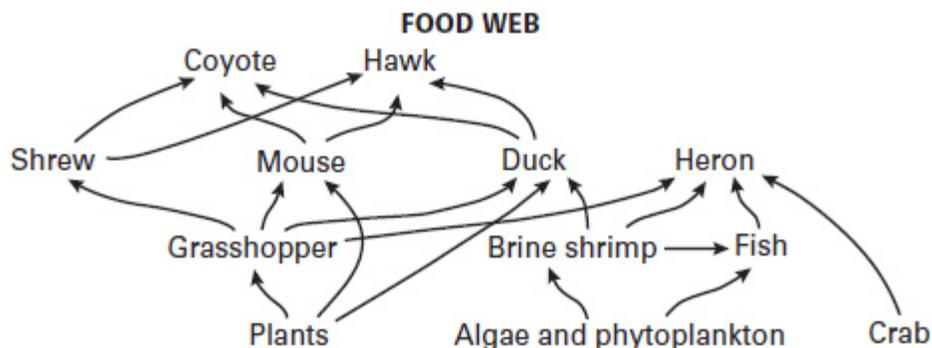
- Black
 - White
 - Brown
 - A mixture of brown and black
106. Cancer is one of the leading causes of death in the United States. Which of the following best describes cancer?
- An infection of foreign bodies called tumors
 - An uncontrolled growth and division of cells
 - An infectious cellular disease that you inherit
 - An individual's immune system attacking itself
107. Cells and the organisms they make up reproduce through cell division. Some organisms reproduce through mitosis, while others reproduce through meiosis and fertilization. What advantage does meiosis give to organisms that reproduce sexually?
- Meiosis ensures that offspring inherit genes from their parents.
 - Meiosis ensures that offspring will not inherit any genetic disorders.
 - Meiosis ensures that offspring are genetically different from their parents.
 - Meiosis ensures that offspring will have identical phenotypes to their parents.
108. Rivers and the aquatic life that live within them can change over time due to human activity and natural forces. Which of these changes would likely have the greatest effect on a river system?
- A city being built near the mouth of the river
 - A bridge that crosses the river high in the mountains
 - A change in the salinity of the ocean into which it flows
 - A dam on the river near where it flows from the mountains
109. Noxious weeds are weeds that invade ecosystems and grow very quickly and aggressively. How do noxious weeds affect the biodiversity of an ecosystem?
- The biodiversity increases slightly because they represent another species in the area.
 - They increase the biodiversity because they increase the total energy of the producers.
 - The biodiversity usually decreases greatly as the noxious weeds outcompete the local plants.
 - The biodiversity is not affected at all since the noxious weeds simply replace the dominant plant in the ecosystem.

110. The diagram below shows an energy pyramid.



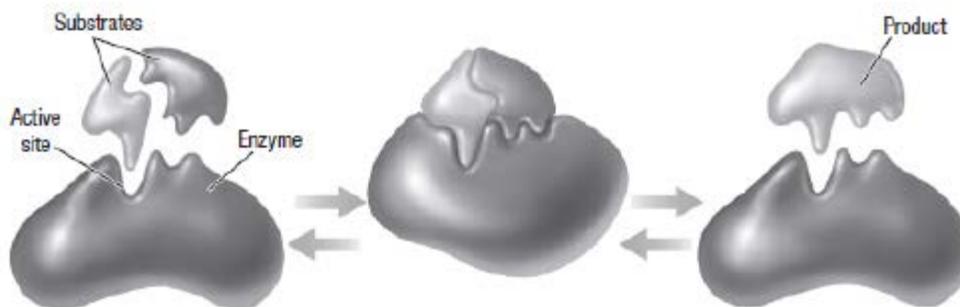
What level has the least amount of available energy?

- The level that contains rats
 - The level that contains grasses
 - The level that contains the owl
 - The level that contains grasshoppers
111. Photosynthesis and cellular respiration are important processes that help transfer energy through ecosystems. Which of the following statements correctly describes the relationship between the products and reactants of photosynthesis and cellular respiration?
- An increase in glucose production among plants results in an increase in energy intake among animals.
 - An increase in carbon dioxide production among plants results in an increase in energy intake among animals.
 - A decrease in glucose production among plants results in an increase in carbon dioxide production among animals.
 - A decrease in glucose production among plants results in a decrease in oxygen production among animals.
112. Which of these evolutionary mechanisms is most likely to lead to an increase in genetic diversity in a population?
- Natural Selection
 - Gene flow
 - Genetic drift
 - Sexual selection
113. The food web below represents the interactions between organisms in a salt marsh ecosystem and organisms in an old field ecosystem.



Which group of organisms is missing from this diagram?

- a. Consumers are missing from this diagram.
 - b. Producers are missing from this diagram.
 - c. Decomposers are missing from this diagram.
 - d. All the different types of organisms are included.
114. Enzymes catalyze chemical reactions that keep cells alive. Imagine that a cell had no enzymes. How would having no enzymes affect the chemical reactions in the cell?
- a. Enzymes catalyze chemical reactions that keep cells alive. Imagine that a cell had no enzymes. How would having no enzymes affect the chemical reactions in the cell?
 - b. They would happen too rapidly to support cellular processes.
 - c. They would happen at the same rate as they do with enzymes.
 - d. They would happen normally, only they would use different reactants.
115. A researcher studies the role of proteins in the transport of polar molecules through cell membranes. His data show that the number of polar molecules that can pass through the membrane when proteins are present is nearly five times greater than when proteins are absent from the lipid bilayer. What does this investigation indicate about the transport of molecules?
- a. All molecules must be carried through the cell membrane on receptor proteins.
 - b. The lipid bilayer is permeable to nonpolar molecules, but not to polar molecules.
 - c. Proteins create passageways that allow polar molecules to pass through the semipermeable membrane.
 - d. All polar molecules pass through the cell membrane at the same rate.
116. The diagram below shows how living things use enzymes in chemical reactions.



- Which statement describes how enzymes affect the reactions in which they take part?
- a. Most enzymes slow down chemical reactions.
 - b. Enzymes are converted into products in the reaction.
 - c. Enzymes increase the activation energy of the reaction.
 - d. Enzymes decrease the activation energy of the reaction.
117. Disorders caused by recessive alleles may not be expressed in an individual who carries only one of these alleles, but the allele may be passed on to future generations. Only characteristics that are expressed can be targets of natural selection. Therefore, natural selection cannot operate on recessive alleles, even if they are unfavorable. What does this explain?
- a. Why recessive alleles are never expressed
 - b. Why genetic disorders can persist in a population
 - c. Why advantageous offspring are more likely to survive and reproduce
 - d. Why natural selection can act only against heterozygous carriers of a recessive disorder
118. Imagine that a mouse has white fur because of a mutation in its DNA. Which of the following conclusions can be drawn?

- a. The white mouse increases the diversity of the species.
 - b. The white mouse decreases the diversity of the species.
 - c. The internal organs of the white mouse must not function as well as those of other mice.
 - d. The white mouse is more likely to survive than other mice because it is more visible to predators.
119. In the presence of the protein lactose, bacterial cells produce enzymes that break down lactose. When lactose is not present, how do bacterial cells stop the production of the enzymes?
- a. The *lac* operon is turned off, disrupting the production of RNA polymerase.
 - b. The *lac* operon is turned off, disrupting transcription.
 - c. The *lac* operon is turned on, disrupting translation.
 - d. The *lac* operon is turned on, disrupting DNA replication.
120. Which of the following is an example of a microorganism maintaining the healthy balance of an ecosystem?
- a. Nitrogen-fixing bacteria become depleted from the soil of farmland.
 - b. Phytoplankton masses produce a red tide in an estuary ecosystem.
 - c. An algal bloom blocks sunlight and takes up excessive oxygen in a lake ecosystem.
 - d. Hydrocarbon-eating bacteria clean up oil spills in an aquatic ecosystem.
121. *Bt* corn contains a gene from a bacterium. How did genetic engineers most likely begin the process of creating *Bt* corn containing this bacterial gene?
- a. By using ligase to insert the desired gene into corn DNA
 - b. By removing a plasmid from the bacterium
 - c. By using restriction enzymes to cut the bacterial DNA on either side of the desired gene
 - d. By cloning the corn plant
122. *Daphnia* are small, aquatic invertebrates that are almost transparent. Like all animals, *Daphnia* require chemical energy to live. Which statement below describes how *Daphnia* obtain chemical energy and convert it to a usable form?
- a. *Daphnia* obtain glucose from ingested algae and then use fermentation to release chemical energy in the form of ATP.
 - b. *Daphnia* obtain pyruvate from ingested algae and then use gluconeogenesis to release chemical energy in the form of ADP.
 - c. *Daphnia* obtain glucose from ingested algae and then use cellular respiration to release chemical energy in the form of ATP.
 - d. *Daphnia* obtain glucose from ingested algae and then use cellular respiration to release chemical energy in the form of NADP.
123. During the time in which the Grand Canyon formed, the canyon divided a single population of squirrels into two populations. One of these squirrel populations now lives on the North Rim of the canyon, and the other population lives on the South Rim. Which of the following factors would make the evolution of the populations into separate species less likely?
- a. Different predators live on the North and South rims of the canyon.
 - b. A few of the squirrels manage to cross the canyon and breed with squirrels on the other side.
 - c. Different trees in which squirrels make their homes grow on the North and South rims of the canyon.
 - d. A disease attacks one population of squirrels and kills most of them. The squirrels on the other side of the canyon are not affected.
124. Although the arms of a human, the wings of a bat, and the fins of a whale have different functions,

they have similar structures, suggesting these organisms evolved from a common ancestor. What type of evidence are these examples of?

- Analogous structures
- Anatomical homologies
- Biogeography
- Molecular homologies

125. The fossil record indicates that mass extinctions have happened over Earth's history. Which of the following statements describes how the physical world, and the subsequent fossil record, changed after a mass extinction?

- Fossil layers indicate large gaps where there appeared to be no life on Earth.
- Fossil layers show large layers of sediment that contain volcanic ash.
- Fossil layers contain evidence of the disappearance of old, dominant species and the appearance of new species.
- Fossil layers contain evidence of the disappearance of old, dominant species and the fossil evidence of their immediate descendants.

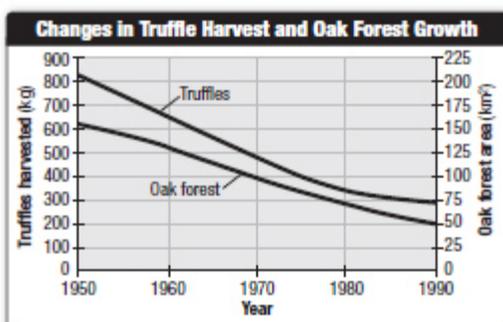
126. Prokaryotes can be divided by the way they obtain energy and nutrients. Which of the following correctly matches the name of a group of prokaryotes with the source of their energy and nutrition?

- Chemoautotrophs—from sunlight through photosynthesis
- Photoautotrophs—from sunlight through photosynthesis
- Heterotrophs—from molecules that contain sulfur or nitrogen
- Chemoautotrophs—from other organisms

127. According to the endosymbiont theory, organisms similar to cyanobacteria most likely develop into which organelle?

- Chloroplasts
- Nucleus
- Ribosomes
- Endoplasmic reticulum

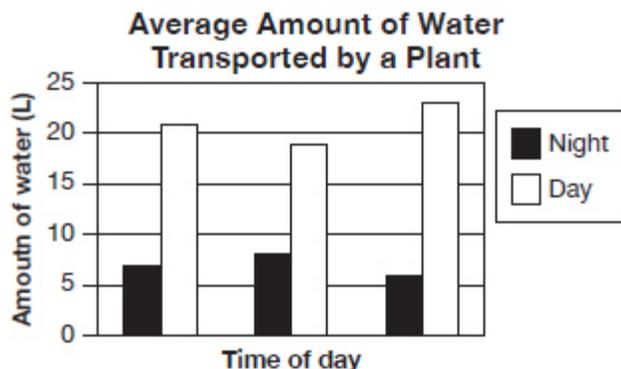
128. The graph below shows changes in truffle harvesting in an oak forest over a period of 40 years.



Which statement best describes the relationship between the oak forest and the truffle population?

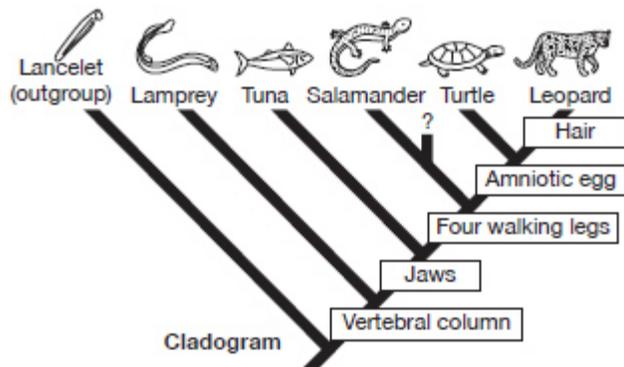
- As the amount of oak forest increased, the number of truffles available for harvest also increased.
- As the amount of oak forest declined, the number of truffles available for harvest also decreased.
- As the amount of oak forest declined, the number of truffles available for harvest remained the same.
- As the amount of oak forest increased, the number of truffles available for harvest decreased.

129. Because plants are unable to move as much as animals, on what does their ability to reproduce depend?
- Vascular tissue
 - Roots
 - Seeds and spores
 - Leaves
130. A botanist measures the amount of water absorbed through the roots of a plant and into the vascular system over several days. Her research data are shown below.



Which of the following statements accurately explains the relationship between time of day and water transport through the plants?

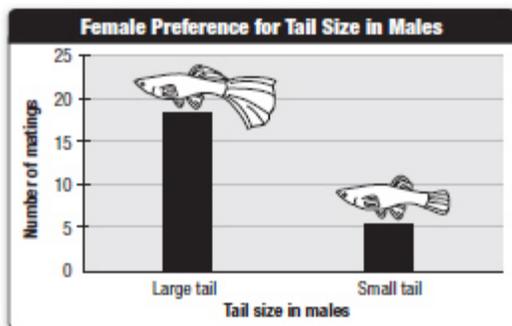
- At night, the stomata are closed so water in the leaves cannot evaporate, which reduces the need for absorption of water at the roots.
 - At night, transpiration through the stomata increases, requiring less water absorption through the roots.
 - During the day, photosynthesis in the leaves generates water molecules, requiring less water transport through the vascular system.
 - During the day, the plant's cellular activity decreases, allowing it to transport more water through the vascular system.
131. A cladogram shows the hierarchical relationships between organisms based on similarities and differences among groups. The illustration below is a cladogram of Kingdom Animalia.



Recently scientists discovered a new species of animal in the rainforests of Indonesia, indicated by a question mark on the cladogram. Based on the placement of its branch, what characteristics must this newly discovered animal have?

- amniotic egg, hair
- four walking legs
- vertebral column, jaws, four walking legs, amniotic egg
- vertebral column, jaws, four walking legs

132. Each cell within a developing body will express different genes, depending on the cell's age and the location within the body. How is gene expression regulated?
- By external and environmental cues
 - By messenger RNA
 - By temperature and light exposure
 - By mutations caused by imperfect gene replication
133. The diagram below shows guppy mating preferences.



- How will the frequency of the genes that result in long tails change over the next few generations?
- Sexual selection will cause the genes that result in long tails to become less and less frequent.
 - Sexual selection will cause the genes that result in long tails to become more frequent.
 - The frequency of the genes that result in long tails will fluctuate slightly but remain relatively stable.
 - There is not enough information to draw a conclusion about future gene frequency.
134. The general equations for photosynthesis and cellular respiration show how the two processes are interconnected in natural cycles. Which substance is a product of cellular respiration and a reactant in photosynthesis?
- Carbon dioxide
 - Glucose
 - Oxygen
 - Water
135. A species of bacteria lives in human intestines. The bacteria get food from the person in whom they live, and the person gets vitamins that the bacteria produce. What kind of relationship do these bacteria and humans have?
- Commensalism
 - Mutualism
 - Parasitism
 - Predation
136. A population of sea turtles comes ashore to lay their eggs each breeding season on a beach along the northeast coast of Texas. One year a resort and an amusement park are built along part of the beach. A team of naturalists that counts the turtle nests on the beach each year collects the data shown below from three sites.

Number of Sea Turtle Nests Found on Beach

	Site 1 (hotel)	Site 2 (amusement park)	Site 3 (no building)
Before construction	110	95	104
1 year after construction	65	60	83
2 years after construction	42	39	40

Which of the

following statements best explains the data for Site 3?

- The naturalists made an error when counting the nests.
- Habitat destruction on the other beaches drove the turtles to Site 3 for nesting.
- The construction had no impact on the breeding population at Site 3.
- The whole turtle population declined as a result of external influences that destroyed their nesting habitat.

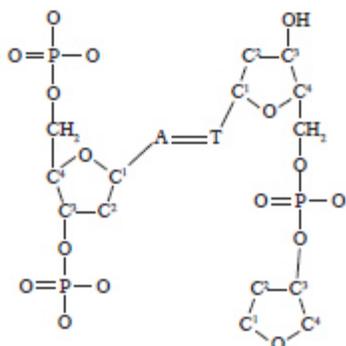
137. The cells of your body need energy to carry out life functions. Which of the following body responses is a sign that your cells need more energy?

- Your breathing rate increases.
- You begin to shiver.
- You feel hungry.
- You feel thirsty.

138. Several organ systems work together to maintain homeostasis when body temperatures rise. Sensory neurons in the skin sense when the internal temperature rises. They send signals to the brain, which triggers blood vessels near the skin to dilate and sweat glands to release sweat. As the sweat evaporates, the body is cooled. Which of the following systems interact in the example of thermoregulation described above?

- respiratory system, muscular system, excretory system
- immune system, digestive system, circulatory system
- muscular system, immune system, nervous system
- nervous system, excretory system, circulatory system

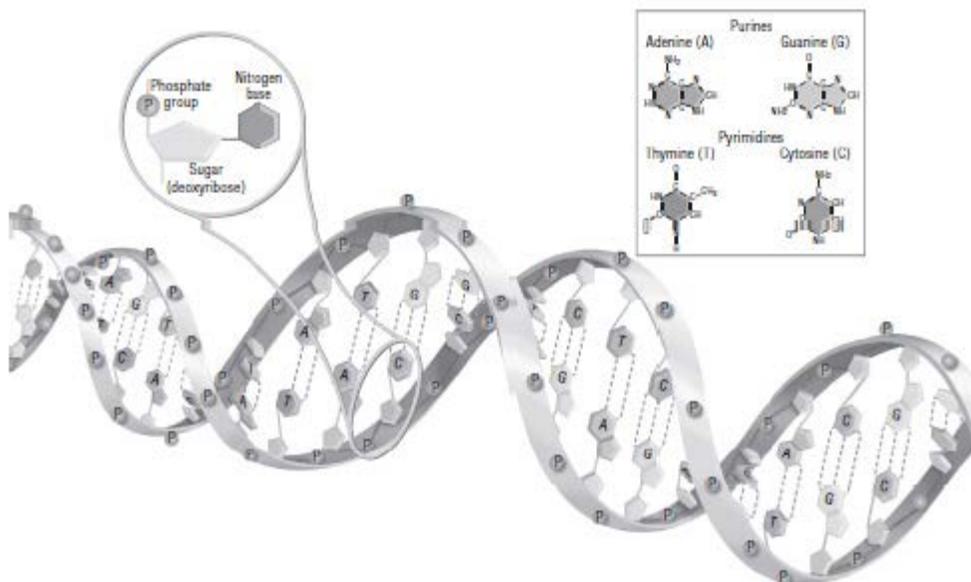
139. Carbon is part of many different compounds because of its unique ability to form a variety of structures. One of the carbon-based biomolecules is shown below.



How does the function of this biomolecule compare to the function of a lipid?

- This biomolecule is an important source of energy for organisms; while lipids are important for insulating and waterproofing organisms.
- This biomolecule is important in catalyzing chemical reactions; while lipids are important

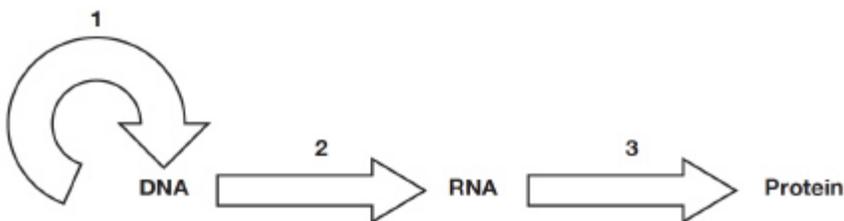
- in storing energy.
- This biomolecule contains an organism's genetic material; while lipids make up cell membranes.
 - This biomolecule is a light-absorbing compound that is important to photosynthesis; while lipids direct protein synthesis.
140. Tay-Sachs disease is a genetic disorder in which the body has a malfunctioning enzyme that is responsible for breaking down certain fatty acids. The buildup of these fatty acids destroys nerve cells in the brain, until eventually the entire nervous system stops working. Researchers have discovered that a point mutation changing a guanine to a cytosine is one cause of Tay-Sachs. Which of the following statements describes a general mechanism during which this nucleotide switch could occur?
- Genetic information in DNA is transcribed into RNA, which is translated into proteins that determine an organism's phenotype.
 - Genetic information in DNA undergoes semiconservative replication and is passed to daughter cells.
 - Crossing over of sections of chromosomes during meiosis results in genetic variation.
 - Multiple three-letter codons on the RNA strand code for the same amino acid.
141. The cell cycle allows organisms to grow from a single cell into large, complex individuals. The cell cycle has several stages. Which stage is not paired with its function?
- M: Chromosomes line up in the center of the cell and then move to opposite ends and separate, forming daughter cells.
 - S: DNA undergoes replication, resulting in two copies of every chromosome.
 - G2: Chromosomes condense and form distinct shapes as the nuclear membrane forms.
 - G1: There is intense cell growth, including synthesis of proteins and organelles.
142. DNA is composed of strands of nucleotides that pair in regular patterns and are held together by the forces shown in the diagram below.



What forces, represented by dotted lines, hold together the two strands of DNA shown in the diagram above?

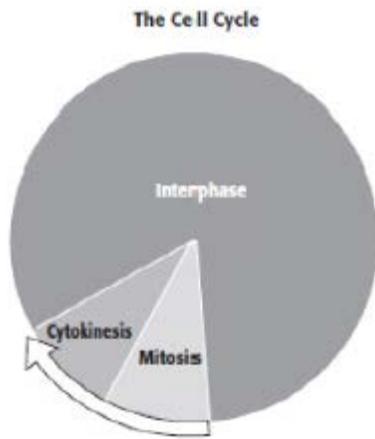
- Ionic bonds
- Covalent bonds
- Hydrogen bonds
- Carbon-carbon bonds

143. A strand of messenger RNA is attached to a ribosome and is directing protein synthesis. The next exposed codon of this messenger RNA has the code GAA. What will the code in the anticodon be?
- GAA
 - CTT
 - CUU
 - GUU
144. The diagram below shows the processes that occur during gene expression.



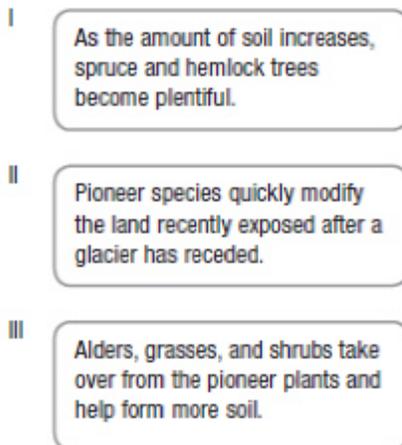
At which step would transfer RNA (tRNA) be necessary?

- Step 1
 - Step 2
 - Step 3
 - Steps 1, 2, and 3
145. Most biomolecules are made up of monomers, or smaller units joined together to make larger compounds. Which of the following is the best example of a monomer?
- The protein amylase
 - A sample of cooking oil
 - The sugar glucose
 - A strand of DNA
146. In the past, smallpox, which is caused by a virus, was a common and deadly disease. Now, people no longer get smallpox. Which method eradicated the smallpox virus?
- Vaccination
 - Cooking food thoroughly
 - Water purification programs
 - More sanitary living conditions
147. Many body systems interact to help the body maintain homeostasis. For example, the primary function of the kidneys is filtering waste from the blood. Hormones are released in response to salt concentrations, pH, and sugar levels in the blood. These hormones help regulate how the kidneys function. For example, if salt concentrations in the blood are too high, the hormone ADH may be secreted by the pituitary gland to signal the kidneys to excrete less water in the urine. Which systems are interacting in this description?
- Excretory, circulatory, digestive
 - Excretory, endocrine, respiratory
 - Endocrine, digestive, respiratory
 - Endocrine, circulatory, excretory
148. The chart below shows the lengths of the different stages of the cell cycle.



How is the cell occupied most of the time?

- Growing and carrying out normal functions
 - Separating chromatids
 - Splitting into two daughter cells
 - Dissolving the nuclear membrane
149. Several organ systems contribute to an animal's defense system against foreign invaders, or pathogens. Which of the following statements describes the role an organ system plays in general, nonspecific defense against illness?
- The skeletal system produces leucocytes that engulf and destroy pathogens.
 - The integumentary system blocks most foreign invaders from entering the body.
 - The nervous system produces hormones that block the chemical signaling of antigens.
 - The immune system produces antibodies that bind to antigens and helps destroy them.
150. A biologist compares how different ecosystems undergo succession. She divides the series of events that happen during succession into three different stages below.



In what order do the events occur?

- I, III, II
 - II, III, I
 - II, I, III
 - I, II, III
151. A remora is a fish that attaches itself to larger marine animals such as sharks. Remoras “hitch a ride” and feed on scraps of food left by sharks. The remoras benefit from this relationship, while sharks are unaffected. What is this type of relationship called?
- Commensalism

- b. Mutualism
- c. Parasitism
- d. Predation

152. What is the first thing you should do in the event of an accident in the laboratory?

- a. Call the emergency number.
- b. Set off the nearest fire alarm.
- c. Inform your teacher immediately.
- d. Decide whether it is minor or major.

153. Which of the following statements is true?

- a. It is best to take shortcuts in laboratory experiments because saving time is important.
- b. Only take shortcuts in laboratory experiments when you think there is no danger in doing so.
- c. Never take shortcuts in a laboratory experiment unless your teacher instructs you to do so.
- d. Only take shortcuts in laboratory experiments when there are no safety symbols in the instructions.

154. The directions for a lab include the safety icons shown below.



What do these icons mean?

- a. You should be careful.
 - b. You are going into the laboratory.
 - c. You should wash your hands first.
 - d. You should wear safety goggles, a lab apron, and gloves during the lab.
155. After notifying and consulting with the teacher, a student uses a gloved hand and paper towels to clean up a small amount of a chemical that has spilled on the laboratory table. How should the student deal with disposal of the paper towel?
- a. Crumple up the paper towel and throw it in the garbage can.
 - b. Crumple up the paper towel up and throw it in the paper recycling bin.
 - c. Rinse the chemical from the paper towel by running water on it, and then allow the towel to dry for reuse.
 - d. Check with the teacher to find out how to properly dispose of the paper towel.
156. Many materials that are used to carry out laboratory investigations can be used only once, while others can be used many times. Which of these materials is best suited for reuse in a laboratory setting?
- a. Glass thermometer
 - b. Paper towel
 - c. Disposable gloves
 - d. Unused chemical that is poured back into its original container
157. A student observes the symbol shown on the bottom of a glass jar while cleaning up after a scientific investigation.



What does this symbol indicate?

- a. The container should be thrown in the trash.
 - b. The container can be recycled.
 - c. The container needs to be handled as hazardous waste.
 - d. The container is fragile.
158. Biological materials that can be potentially harmful to organisms or the environment if discarded improperly are classified as biohazards. Which of the following materials would be considered a biohazard?
- a. An unused aquarium
 - b. Used science journal
 - c. A mold culture
 - d. A sample of ocean water
159. An investigation requires the use of a small amount of a strong acid. Which practice helps to conserve the acid that is being used?
- a. Carefully measure the amount of acid needed.
 - b. Return unused acid to its original container.
 - c. Discard unused acid in the sink.
 - d. Place the unused acid in a sealed container and throw the container in recycle bin.
160. During a field study, a student uses a plastic cup to obtain water samples from a local stream. How should the student dispose of the cup at the end of the field study?
- a. Throw it in the nearest trash can.
 - b. Leave it on the stream bank so others can use it.
 - c. Place it in a recycle bin.
 - d. Place it in a hazardous waste container.
161. How can you identify whether an article about a study is science or pseudoscience?
- a. Ask other people for their opinion.
 - b. Examine whether scientific methods are used.
 - c. Read the article to see if a hypothesis is stated.
 - d. Look to see if the article says it is a scientific study.
162. Which example describes a scientific study?
- a. Aluminum is heated over and over to try to turn it into another metal.
 - b. The stars are used to predict whether someone will have a good month.
 - c. Stars other than the sun are observed to see if they have planets orbiting them.
 - d. The numbers of a person's street address are added to see if he or she will have good luck.
163. Which of the following questions about a flower can be most readily answered by scientific methods?
- a. Would this kind of flower make a good gift?
 - b. What kind of flower is the most beautiful?
 - c. How pretty is the flower?

- d. What kinds of pollinators are attracted to this flower?
164. Which of the following is true of a question that can be answered by using scientific methods?
- The question is broad and creative.
 - The question has many different answers.
 - The question requires the use of models to answer.
 - The question can be answered by observation and experimentation.
165. Throughout a cold winter, salt is used to melt ice that forms on a sidewalk. In the spring, a group of students observes that no grass grows in a strip of soil that borders the sidewalk. Which of the following is the best example of a hypothesis related to this observation?
- At certain concentrations, salt will prevent the growth of grass in soil.
 - Grass will not grow in soil due to extreme changes in temperature.
 - Salt prevents the growth of vegetation in urban locations.
 - The amount of salt in soil is a measurable quantity.
166. When experimental data confirm a hypothesis, what else must occur before the hypothesis is considered a viable part of a scientific theory?
- The hypothesis should be modified and tested by another team of scientists.
 - Many more questions must be asked to check for errors in the hypothesis.
 - Nothing else must occur; the experiment has already yielded a positive scientific result.
 - The hypothesis must be retested multiple times and verified by many other researchers.
167. A marine biologist observes that the number of humpback whales has decreased significantly during the last 20 years. Which of the following is a testable hypothesis that seeks to explain the reason for the decrease in humpback populations?
- The migration patterns of humpback whales have changed dramatically.
 - Humpback whales are less likely to find a mate.
 - An increase in ocean temperature has negatively affected krill populations, a major food source for humpback whales.
 - The oceans are far more polluted now than they were 20 years ago.
168. Which element of the scientific process must occur before a hypothesis can be formed?
- Observation of phenomena
 - Analysis of data
 - Experimental design
 - Peer review
169. A scientist claims to have discovered a new type of bacteria that feeds on toxic waste more quickly than other types of bacteria that have the same food source. Soon after her discovery, there is a large oil spill off the coast of Alaska. Her colleagues encourage her to share her discovery with the bioremediation teams handling the cleanup. Should she encourage the bioremediation teams to use her new bacteria for cleaning up the oil spill? Why or why not?
- No. The bacteria has not been tested reliably and repeatedly yet. The byproducts of the feeding process also may harm the Alaskan ecosystem.
 - Yes. The Alaskan ecosystem is fragile; the risk of additional harm to animals and their habitats through the bacteria's use is necessary.
 - No. The bacteria will not function at the low ocean temperatures in the Alaskan ecosystem.
 - Yes. The researcher will be acclaimed for her discovery and will benefit from assisting the bioremediation teams.
170. A drug researcher observes that nursing babies are more resistant to the coxsackie virus than

both their formula-fed counterparts and their milk-drinking older siblings. Which of the following is a testable hypothesis that could be made to investigate this issue further?

- a. Compound “x” in mother’s milk provides immunity to nursing babies.
- b. The coxsackie virus does not affect young infants.
- c. Babies with stronger immune systems prefer being nursed than fed formula.
- d. Nursing babies stay inside more than bottle-fed babies, which improves their immunity.

171. Which is an example of a scientific theory?

- a. After describing DNA’s structure, Francis Crick stated that genetic information flows from DNA to RNA to proteins.
- b. HIV, the virus that causes AIDS, mutates rapidly, making it difficult for scientists to develop a vaccine against it.
- c. A scientist suspects that a particular drug can cause apoptosis (programmed cell death) in breast cancer cells.
- d. The H1N1 flu virus, or “swine flu” was declared a pandemic in 2009.

172. In order for a confirmed hypothesis to become scientific theory, which must occur?

- a. The results must be observed by multiple independent researchers.
- b. The hypothesis must be tested multiple times by the same group of researchers.
- c. The hypothesis must be tested and supported by multiple independent researchers.
- d. The data must lead to the development and testing of at least one new hypothesis.

173. Despite being widely accepted, why has the cell theory changed over the last 300 years?

- a. Scientists have rejected the early researchers’ discoveries in favor of their own understanding of how cells function and reproduce.
- b. The development of new imaging technologies has allowed scientists to see and understand how cells function and reproduce in greater detail.
- c. Modern technological developments have allowed scientists to see that earlier researchers incorrectly reported how cells function and reproduce.
- d. Cells have evolved significantly during the last 300 years, forcing researchers to modify cell theory to account for these changes.

174. A researcher wants to know how temperature affects the egg-laying rate of chickens. Which of the following is the best hypothesis for this investigation?

- a. Chickens lay more eggs in the winter than the summer.
- b. Chickens lay eggs when it is warm.
- c. At 25°C, chickens lay an average of 3 eggs per day.
- d. As temperature increases, the number of eggs a chicken lays increases.

175. Which of the following distinguishes a theory from a hypothesis?

- a. Theories explain scientific phenomena.
- b. Theories are supported with observation and data.
- c. Theories explain a broad range of data in the natural world.
- d. Theories can be changed if evidence does not support them.

176. For his science fair project, a biology student proposes the idea that the adult gypsy moth, *Lymantria dispar*, will not emerge from the pupal stage at temperatures less than 10C. After planning and implementing an investigation to test it, he finds that his data support his idea. He concludes that his idea is now a theory. Which best explains why his idea is a hypothesis and not a theory?

- a. The data were proven true by other scientists.

- b. Other scientists have not tested his idea over time.
 - c. He has not published his work in a scientific journal.
 - d. His idea does not explain a wide range of scientific data.
177. In the mid 19th century, Gregor Mendel conducted many experiments on pea plants. His work marked the beginning of genetics. Which of the following represents a hypothesis from Mendel's experiments?
- a. Alleles representing a trait are separated during meiosis.
 - b. Genes controlling traits are independently assorted during meiosis.
 - c. A cross between a dominant purple flower and a recessive white flower will result in a 3:1 ratio of purple flower offspring.
 - d. Inherited traits are passed from parent to offspring through chromosomes.
178. Charles Darwin's ideas on the theory of evolution by natural selection were first published in 1859. Since then the theory of evolution has continued to change over time. Which of the following statements does not describe why the theory has changed?
- a. New evidence for punctuated equilibrium altered Darwin's ideas of gradual evolution.
 - b. Protein comparisons provided evidence that some organisms were more closely related than originally thought.
 - c. Genes were identified as the factors that offspring inherited from parents.
 - d. Certain species of finches on the Galapagos Islands were similar to species on the mainland of South America.
179. A group of students want to design an experiment to determine whether the height of tree saplings can be used to predict whether or not the saplings will survive through the winter in their northern climate. The equipment they are likely to need includes-
- a. GPS, radio tags, and binoculars
 - b. a tape measure, plastic tags, and a field notebook
 - c. a shovel, plastic bags, and transect string
 - d. fencing, a tarp, and portable heaters
180. A scientist performs a scientific literature review in order to learn about the development of a certain coral species. He reads that after the coral releases its larvae into the ocean, the larvae settle within a few days and attach themselves permanently to the coral reef. The scientist is interested in determining the cue that causes the larvae to settle. The scientist should next-
- a. determine if the results are statistically significant
 - b. select the equipment needed for the experiment
 - c. formulate a testable hypothesis to guide the investigation
 - d. collect as many coral heads of this species as possible
181. The technology that would be used most likely to identify a victim by his or her DNA includes a —
- a. computer and microscope
 - b. PCR and gel electrophoresis
 - c. fingerprint kit and UV light
 - d. camera and dental x-ray
182. The table below shows a series of mass measurements of a rock by four students.

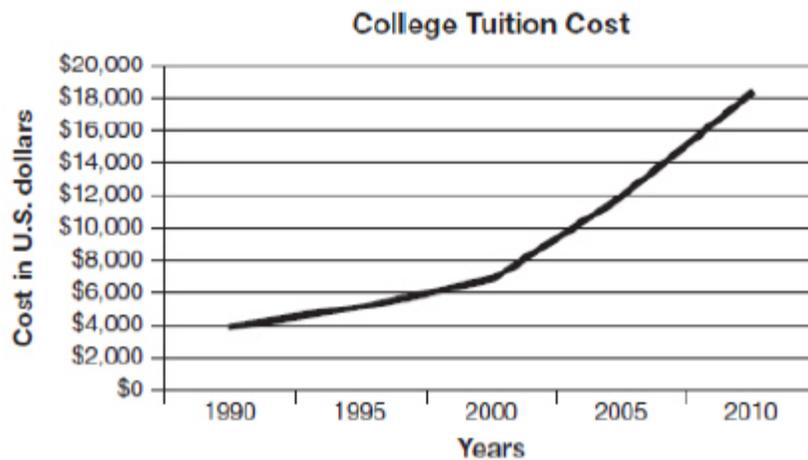
Mass of Rock (actual mass value of 15.5 g)				
	Trial 1	Trial 2	Trial 3	Trial 4
Student A	13.8 g	16.3 g	16.9 g	14.5 g
Student B	15.1 g	15.3 g	15.6 g	15.4 g
Student C	12.8 g	12.4 g	12.6 g	12.5 g
Student D	11.9 g	15.5 g	15.5 g	15.5 g

Which student's measurement could be described as accurate but not precise?

- Student A
- Student B
- Student C
- Student D

183. You throw three darts at a dartboard. The darts all hit the board near the same spot close to the edge but far away from the bull's-eye. How could you describe your throws?
- Accurate and precise
 - Accurate but not precise
 - Precise but not accurate
 - Neither precise nor accurate
184. As part of a field investigation on the thermal pollution of waterways, a scientist needs to measure the temperature of a nearby river. Which of the following pieces of equipment would be the best choice for making the measurement?
- Barometer
 - Metric ruler
 - Electronic balance
 - Thermometer
185. A student investigates the effects of 24-hour sunlight on plants. Her setup involves the following: (A) exposing three plants to a lamp, simulating sunlight, for 24 hours; (B) exposing three plants to a lamp for 12 hours; and (C) keeping three plants in total darkness. She measures the growth of the plants each day for 2 weeks. One night during the experiment, her lab loses electricity for six hours. Which statement is an accurate evaluation of the student's experimental data for that day?
- The student's data are valid because her setup controls for changes in variables.
 - The student's data are valid because the electricity went out for such a short period of time that it did not affect the results.
 - The student's data are invalid because the lamp was off for six hours, potentially affecting the results for setups A and B.
 - The student's data are invalid because the lamp was off for six hours, affecting the results for setup A only.
186. A student comes home from school to find his garbage can knocked over and a pile of bones by the patio door. What is the best inference he can make based on his observations?
- An animal got into the trash and ate the chicken from last night's dinner.
 - The garbage can was dumped on its side, causing trash to spill on the patio.
 - Tomorrow he will find the garbage can knocked over and a pile of pizza crust by the patio door.
 - He will have to clean the floor and dump the trash outdoors tonight.

187. The graph below shows how a Texas college's tuition has changed over time.



Using the trend shown in the graph, what will be the most likely cost of tuition in 2015?

- \$17,900
- \$19,000
- \$27,500
- \$60,000

188. A researcher at a pharmaceutical company is investigating ways to alleviate food sensitivities in children. She has discovered that a certain concentration of microbes in the intestines prevents adverse skin reactions in children with sensitivity to wheat. Which method should she use to communicate her findings in order for others to replicate her study?

- A formal lab report
- Raw data
- Summary paragraph
- Diagram of results

189. A wildlife biologist working in Texas is studying how animal populations change over time. He uses observational studies and animal tracking to study the population of endangered gray wolves in the local ecosystem. He submits his research to be published in a scientific journal with the data shown below.

DATE	RABBIT (population)	GRAY WOLVES (population)
March 2010	568	27
September 2010	503	41
March 2011	411	36
September 2011	420	51
March 2012	352	47
September 2012	278	63

He concludes that the wolf population will continue to increase until there are no rabbits left. What is the most likely reason why a colleague who reviewed his research rejected it for publication?

- The procedure is not valid because the biologist did not identify his variables, nor include a control.
- The results are not valid because the biologist did not perform his investigation in a laboratory setting.
- The conclusion is not valid, based on what is generally known about predator/prey relationships.
- The results are not valid because the biologist only focused on one ecosystem.

190. A researcher has developed a new drug to treat leukemia, a cancer that affects the blood. She

must present her findings to the FDA to secure approval and funding for additional clinical trials for her drug. What is the best way for her to communicate her hypothesis, procedure, and results?

- a. A graphic organizer that includes raw data
- b. A detailed lab report
- c. A summary of her hypothesis and the data that support her hypothesis
- d. Descriptions of observations and journal entries

191. Which of these best lists what a lab report should include?

- a. Purpose, hypothesis, procedure, data, analysis, conclusion
- b. Purpose, procedure, analysis, photos with captions
- c. Procedure, hypothesis, data, journal entries, charts
- d. Graphic organizers, data, analysis, labeled drawings

192. A marine biologist observes the behavior patterns of sea lions in their natural environment. He must record his findings as he observes them. Which reporting method will he most likely use?

- a. Lab report
- b. Technology-based presentation
- c. Peer-reviewed journal
- d. Journal entries

193. A professor of genetics and his team of student researchers travel to a national genetics conference to present their findings on a successful genetics experiment. How could this team best share their study with the attendees of the conference and answer questions?

- a. Using a technology-based presentation that includes visuals
- b. Distributing copies of their article published in a peer-reviewed journal
- c. Conducting the experiment on site for the attendees
- d. Reading aloud from their observational journals

194. A new breakfast cereal makes the claim that it contains the vitamins and nutrients necessary for a healthy diet. How could this claim be analyzed?

- a. Study the history of the company and its other products.
- b. Review the television commercials and magazine advertisements that are used to sell the product.
- c. Examine the nutritional information provided on the packaging carefully and in detail.
- d. Judge the quality of the product by eating it for breakfast.

195. Scientific explanations should be based on-

- a. an opinion determined by one's political views
- b. an educated guess that led to experimental or observational testing
- c. a need for a product or service in the market
- d. methodical measurements and observations

196. Two groups of researchers conducted similar experiments to determine if a pesticide used on crops is safe for the environment. Both groups obtained similar results. One group concluded that the pesticide was safe. The other group concluded that it was toxic for organisms other than insects and should not be spread on crops. Which of the following best explains why the two groups made different conclusions from similar data?

- a. Both groups were scheduled to present their study at the same conference.
- b. One group's data may not have supported their hypothesis.
- c. One group may be funded by the pesticide company.

d. One group may not have used scientific methods.

197. Which of these best describes why the results of an experiment may not be valid?

- a. The results do not support the hypothesis.
- b. The experimental design is not logical.
- c. The procedure calls for observation only.
- d. The experiment has not been repeated and validated by another scientist.

198. Two students in a physical education class were talking about the air temperature in the gymnasium. One student thought it was very warm, while the other student thought it was cold. Both students complained to the teacher, who checked the thermostat and found it was set at 23°C (73°F). The thermostat reading is an example of-

- a. empirical evidence
- b. scientific thinking
- c. logic
- d. bias

199. A father has a cleft chin and a mother has a smooth chin. All of their children have cleft chins, as shown below.



It is logical to conclude that cleft chins-

- a. are a dominant trait
- b. are a recessive trait
- c. are found only in males
- d. are found only in females

200. On May 1, 2008, *Nature* published a journal article entitled “Mapping and sequencing of structural variation from eight human genomes.” This article is about—

- a. the differences between a human’s genes and the genes of eight other species
- b. how maps have different structures in different areas of the world
- c. putting the human genome in the correct sequence
- d. how gene sequences from eight humans differ from one another

201. The World Health Organization released the following statement about genetically modified (GM) crops and the environment:

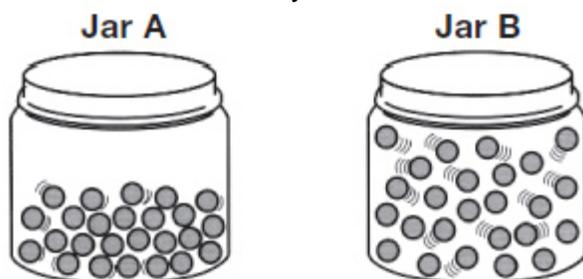
The movement of genes from GM plants into conventional crops or related species in the wild (referred to as “outcrossing”), as well as the mixing of crops derived from conventional seeds with those grown using GM crops, may have an indirect effect on food safety and food security. This risk is real, as was shown when traces of a maize type which was only approved for feed use appeared in maize products for human consumption in the United States of America. Several countries have adopted strategies to reduce mixing, including a clear separation of the fields within which GM crops and conventional crops are grown.

What is the main point of this statement?

- a. There is some risk of GM crops mixing genes with crops that are not genetically modified. Care should be taken in keeping the two types of crops from being grown near

each other.

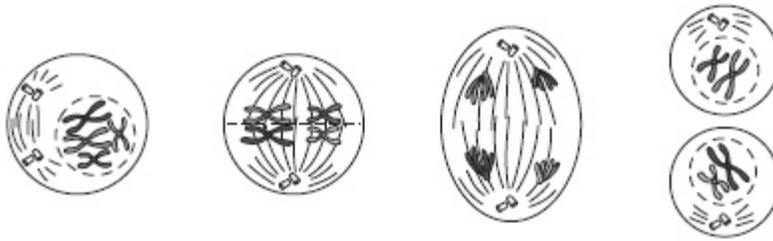
- b. There is nothing to be concerned about with GM crops because wild crops mix with related species all of the time.
 - c. Food safety is not a concern, because GM corn that was meant to be used as animal feed was introduced into the human food chain in the United States and there were no negative effects.
 - d. It is not possible for GM plants to outcross, or mix, with related species and so food safety or security is not an issue with GM crops.
202. A nutritional supplement company sells a pill that the company claims can make you two inches taller within a week by elongating body cells. It offers a 30-day money back guarantee if you are not completely satisfied. The advertisement has several quotes and before-and-after pictures from satisfied customers who do appear to have grown taller. A person reading this advertisement should—
- a. immediately try the pills because there is a money-back guarantee
 - b. feel confident that the pills will work because they have a scientific basis
 - c. be skeptical because elongating body cells would not make you taller
 - d. not buy the pills because before-and-after photos are always altered
203. A team of scientists added a jellyfish gene for bioluminescence to a sample of zebrafish in order to study pollution. They manipulated the gene to be expressed in the presence of certain metals, causing zebrafish to glow when exposed to pollutant metals in waterways. Recently, zebrafish that glow continuously have started appearing in pet shops. What is the most accurate title for a news report that discusses the glowing zebrafish?
- a. Fish that Glow in the Dark Are Taking over Pet Stores
 - b. Glowing Fish Have Moved From Science Laboratories to a Pet Store near You
 - c. Scientists Create New Species of Zebrafish
 - d. Scientists “Pollute” Waterways with Glowing Fish
204. Companies are marketing many of their household cleaning products as “biodegradable” or “earth-friendly” even though they contain ingredients that are harmful to people and the environment. What is one way consumers can be sure that they are getting the ecologically-safe products that they are paying for?
- a. Look for the word “natural” on the label.
 - b. Avoid the words “poison” or “danger”.
 - c. Make sure the liquid in the bottle is clear.
 - d. Check to make sure there is no fragrance.
205. An advertisement claims that the sample in Jar A contains fewer seeds than the sample in Jar B, because Jar A is only half full.



Why might you dispute this claim?

- a. The jars are different sizes.
- b. The seeds in the jars weigh different amounts.
- c. The seeds in the jars take up different amounts of space.

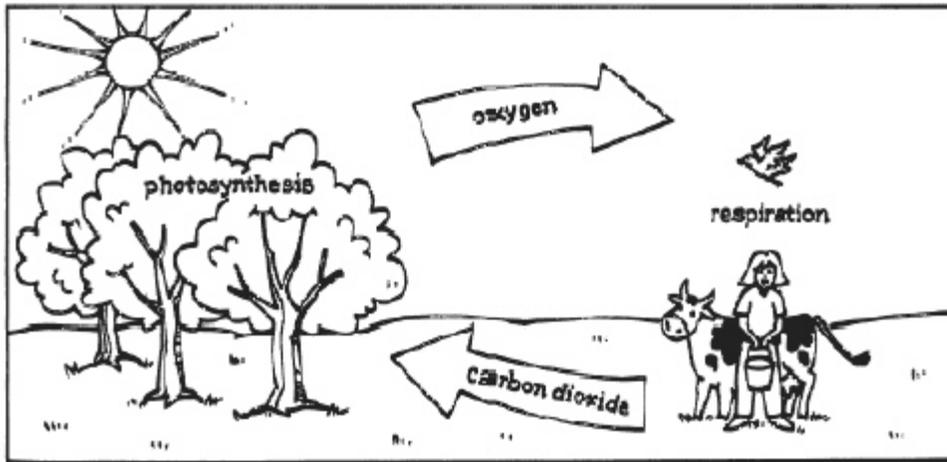
- d. It is not possible to count the number of seeds in each jar.
206. Maria sees an advertisement for a cough medicine on television. The person promoting the cough medicine is an actor known for playing a doctor on a popular television show. Why might Maria question the claims she hears on the ad?
- Actors are always wrong.
 - Advertising is always misleading.
 - The cough medicine has not been tested.
 - The actor is probably not a medical expert.
207. A beauty magazine ad makes the following claim: "Leading doctors say that 5 servings of orange juice a day can prevent heart disease." Why might you question the claim in this ad?
- One of your friends disagrees with this ad.
 - Beauty magazines do not cover factual stories.
 - An ad is not a reliable source of scientific information.
 - Doctors rarely perform scientific studies about nutritional health.
208. In commercial farming, many crops have been genetically modified to ensure that plants express certain traits, such as pesticide-resistance. What might be a drawback of genetically modifying crops?
- Less genetic diversity
 - Less money spent on replanting crops
 - Decreased need for pesticides
 - Greater productivity
209. Which of the following is a benefit of cloning mammals?
- Some clones are born with disease and birth defects.
 - Cloning could be used to save species that are almost extinct.
 - The long-term health and survival of these clones is uncertain.
 - There is less genetic diversity within the population.
210. Genetic testing is used to identify those individuals who are at risk for certain genetic diseases. Which of the following is not an ethical question of genetic screening?
- Who should have access to the information?
 - Can insurance providers deny someone coverage based on their genetic profile?
 - Should genetic testing be used by parents to artificially select traits in children?
 - Does blood, skin, hair, or amniotic fluid provide the best sample for genetic testing?
211. Fossil fuels are nonrenewable natural resources, such as coal, oil, and natural gas, that form from the remains of organisms on Earth. These fuels are the primary source of energy for powering our homes, businesses, and transportation. Which of these is not a negative impact of using fossil fuels?
- The price of some fossil fuels is affected by worldwide socio-political forces.
 - They provide more energy when burned than other fuels such as biomass.
 - Once extracted from Earth, they take millions of years to form again.
 - Pollution and habitat destruction can occur when extracting and transporting fossil fuels.
212. The models below show meiosis I.



Though the diagram clearly illustrates the steps of meiosis I, it does not—

- describe how a cell divides
- show crossing over, which causes increased genetic variation
- show how homologous pairs separate
- show the nucleus reforming

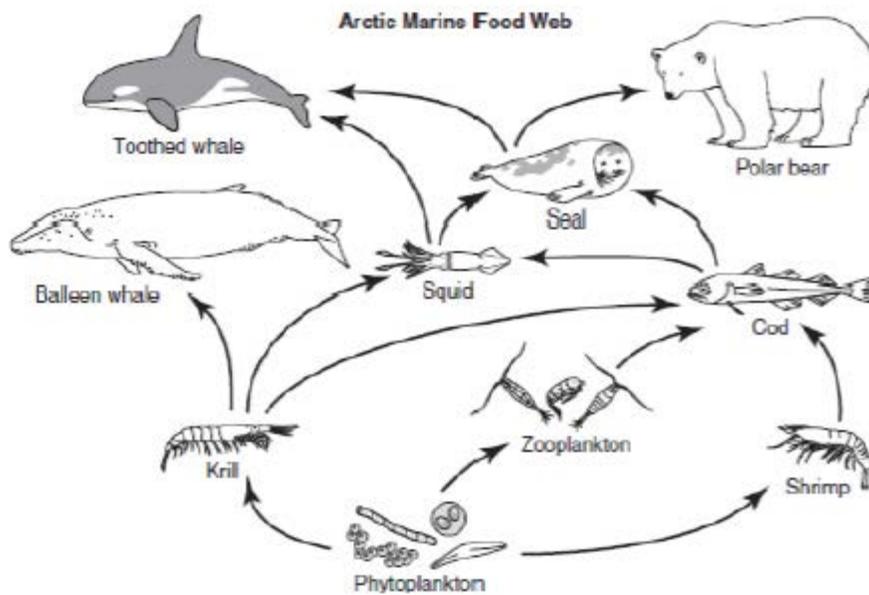
213. The model below is used to represent the oxygen cycle.



One of the limitations of this model is that it does not account for deforestation. How could deforestation affect the oxygen cycle?

- Less oxygen would be released into the atmosphere.
- Fewer trees would survive in the soil.
- Carbon dioxide levels would drop.
- More oxygen would be available for animals to breathe.

214. The model below shows a marine food web.



Based on the relationships between the different consumers in the web, what is the initial source of energy in this food web?

- a. Cod
 - b. Shrimp
 - c. Killer whale
 - d. Phytoplankton
215. People who contribute to advancing scientific thought—
- a. always get credit for their contributions
 - b. are always scientists in the field they contribute to
 - c. often build upon the work of earlier researchers
 - d. are never in competition with one another
216. People who helped advance evolutionary thought include—
- a. Pasteur and Hooke
 - b. Lyell and Wallace
 - c. Lister and Koch
 - d. Schleiden and Leeuwenhoek
217. The most useful way to describe the progression of contributions to an idea by scientists is through—
- a. a time line
 - b. a bar graph
 - c. a Venn diagram
 - d. a pie chart
218. When researching the contributions of a specific scientist to the field of biology, the best reference would be—
- a. from an Internet search
 - b. the scientist's published papers
 - c. an encyclopedia entry
 - d. a movie about the scientist's life

