

Georgia Coach, GSE Edition, Biology

# Practice Test 2

Name: \_\_\_\_\_

## Section 1

Directions: Fill in the bubble for each answer you select.

1. What is one way in which bacteria are different from viruses?
  - (a) Bacteria have nucleic acids.
  - (b) Bacteria contain proteins.
  - (c) Bacteria can cause disease.
  - (d) Bacteria contain cytoplasm.
  
2. Tetrapoda is a taxonomic "superclass" — a group that is larger than a class but smaller than a phylum. Tetrapods are descended from a long-extinct group of fishlike organisms. These organisms lived in water and had air-filled sacs connected to the backs of their throats. These sacs could be used either to help them swim or for breathing air. Although the word *tetrapod* means *four-footed*, the superclass includes some animals, such as snakes, that are entirely limbless.

Which argument BEST supports the claim that snakes share a common ancestor with all other tetrapods?

  - (a) Snakes use lungs to breathe. The sac in the fishlike organism had a structure similar to lungs.
  - (b) Whales need to breathe air to survive. Whales have no feet but are classified as tetrapods.
  - (c) Modern fish have air sacs that help them swim. Fish and snakes both have scales.
  - (d) Some snakes are able to swim. The fishlike organism lived in water.

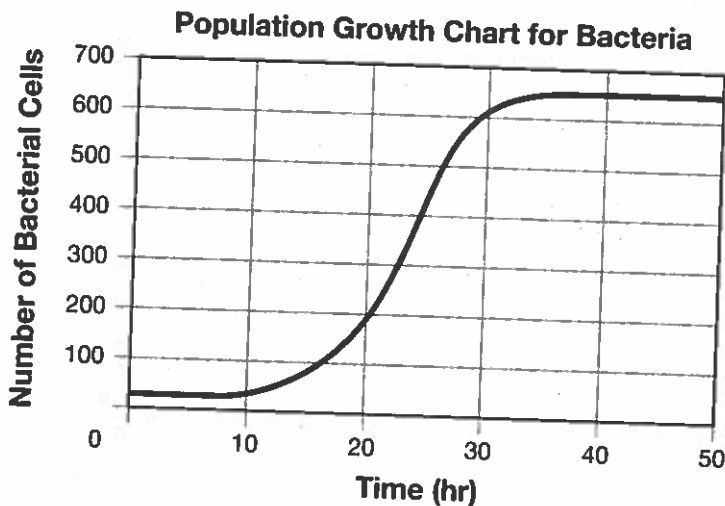
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3. A student asked this question:

*How does temperature affect the rate of cellular respiration?*

The student planned an investigation to find an answer to this question. How could she gather data about the rate of cellular respiration in single-celled algae cells at different temperatures?

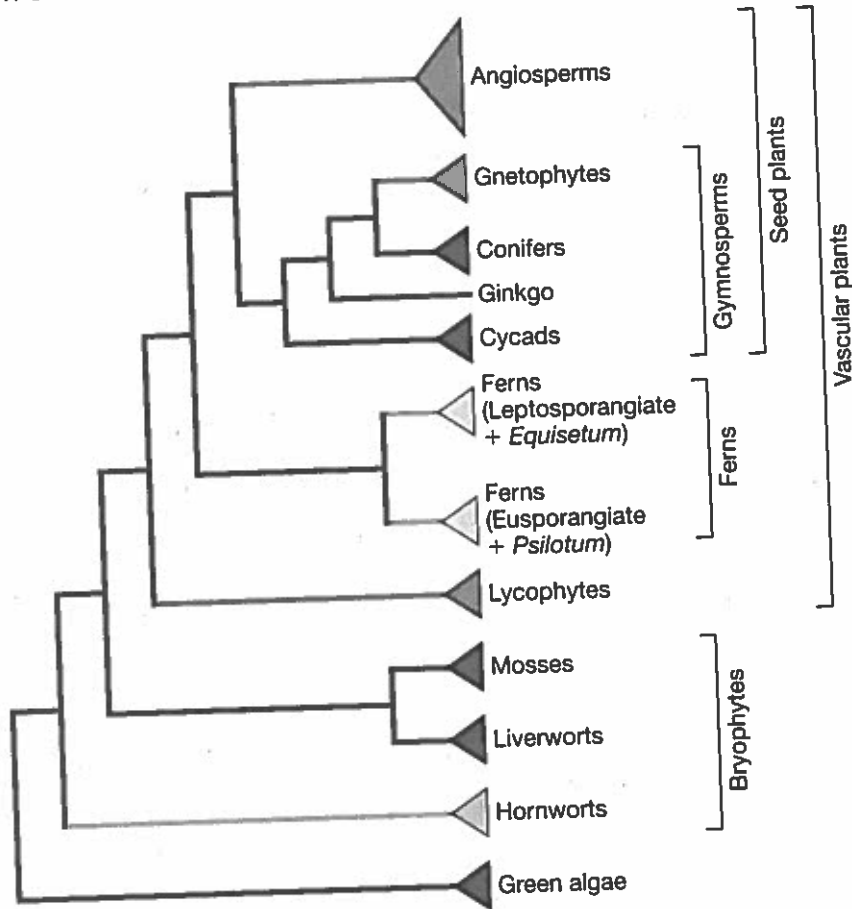
- (a) Measure the rate at which carbon dioxide is consumed.
  - (b) Measure the rate at which carbon dioxide is produced.
  - (c) Measure the rate at which glucose is produced.
  - (d) Measure the rate at which oxygen is produced.
4. A team of students planned and carried out an investigation of population growth in bacteria for a state science fair project. They placed a starting culture of a single species of bacteria in a flask with nutrients. They placed the flask at 37°C. At regular intervals, they measured and recorded the population size using the colony-forming unit assay method. At the conclusion of the investigation, they graphed their results.



Which is the MOST LIKELY explanation for the change in population growth rate that occurred at 30 hours?

- (a) A population of predators is keeping the bacteria population from growing.
- (b) The bacteria population has started to exhaust the supply of available nutrients.
- (c) The biodiversity in the flask is dropping, causing a leveling off of the population.
- (d) The bacteria are changing from logistic to exponential growth due to ideal conditions.

5. The diagram shows the relationships among plant groups.



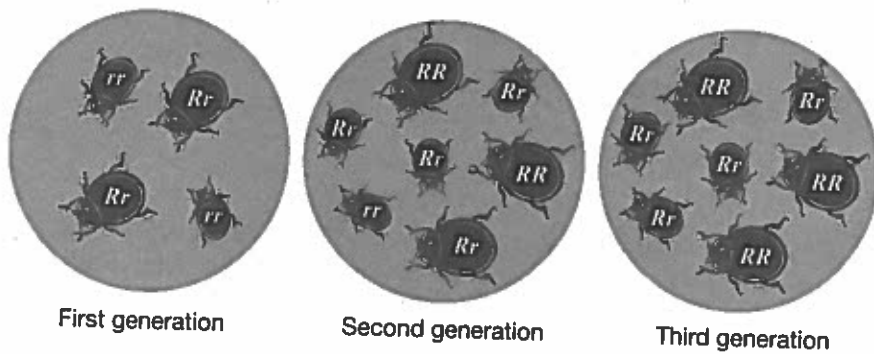
Which statement does this diagram support?

- (a) Plant groups share a distant common ancestor with green algae.
- (b) Mosses and liverworts do not have a common ancestry with the other groups of plants.
- (c) Ferns and angiosperms are the two most similar groups of plants.
- (d) Cycads are the plant group that most recently evolved.

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6. Many lawn grasses turn brown during hot, dry periods in summer. Their roots send up new green shoots during cool, damp periods in fall. The grasses turn brown again during cold winter weather and send up new shoots again in spring. Which statement BEST describes how these lawn grasses are adapted to seasonal changes?
- The grasses die off in summer and winter and grow from seeds in fall and spring.
  - The grasses become dormant to survive summer drought and grow from seeds in spring.
  - The grasses die off during unfavorable environmental conditions.
  - The grasses become dormant to survive unfavorable environmental conditions.

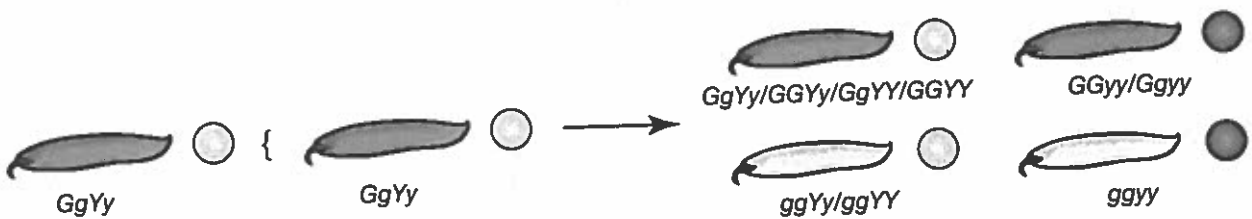
7. The model shows three generations of a beetle population. The third generation is entirely resistant to a pesticide.



Which statement could be included in an explanation about how this population of beetles became resistant to the pesticide?

- Individuals with an  $r$  allele were more likely to find a mate than those without.
- Individuals with an  $RR$  genotype were less likely to reproduce than any other genotype.
- Individuals with an  $R$  allele were better able to survive the pesticide.
- Individuals with an  $rr$  genotype were more likely to survive the pesticide than individuals with an  $RR$  genotype.

8. What evidence would BEST support the argument that the structures of carbohydrates and lipids are related to their roles in energy storage?
- (a) Both types of molecules have many carbon-hydrogen bonds.
  - (b) Both types of molecules are made up of long chains of atoms.
  - (c) Both types of molecules are primarily made up of oxygen and nitrogen atoms.
  - (d) Both types of molecules have a structure that makes them insoluble.
9. The diagram represents a dihybrid cross in pea plants.



The parent plants each display the same combination of phenotypes: green pods and yellow seeds. A student examining the diagram posed the following question:

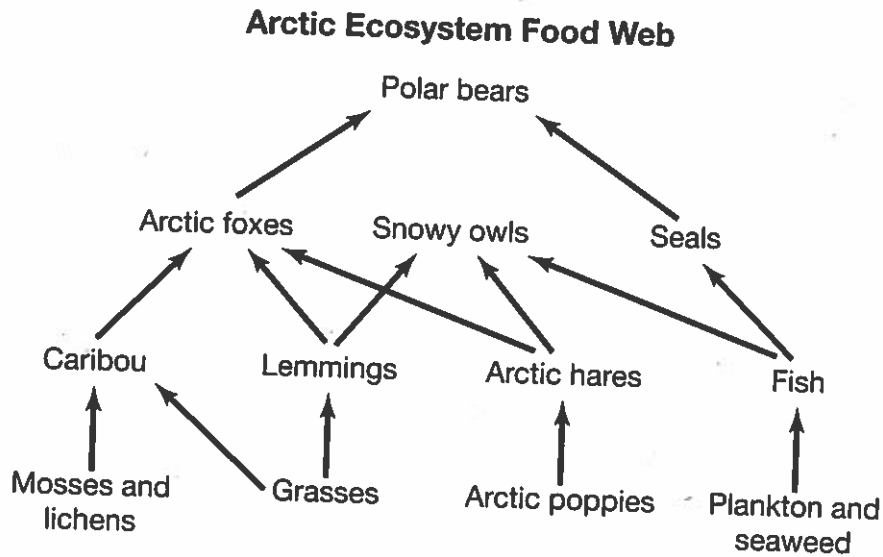
*Why do the offspring show all four possible combinations of phenotypes?*

Which of Mendel's laws BEST answers the student's question?

- (a) law of dominance
- (b) law of independent assortment
- (c) law of alleles
- (d) law of segregation

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10. The diagram below shows a food web in an arctic ecosystem.



**Part A**

Which food chain arranges components of this food web according to energy flow?

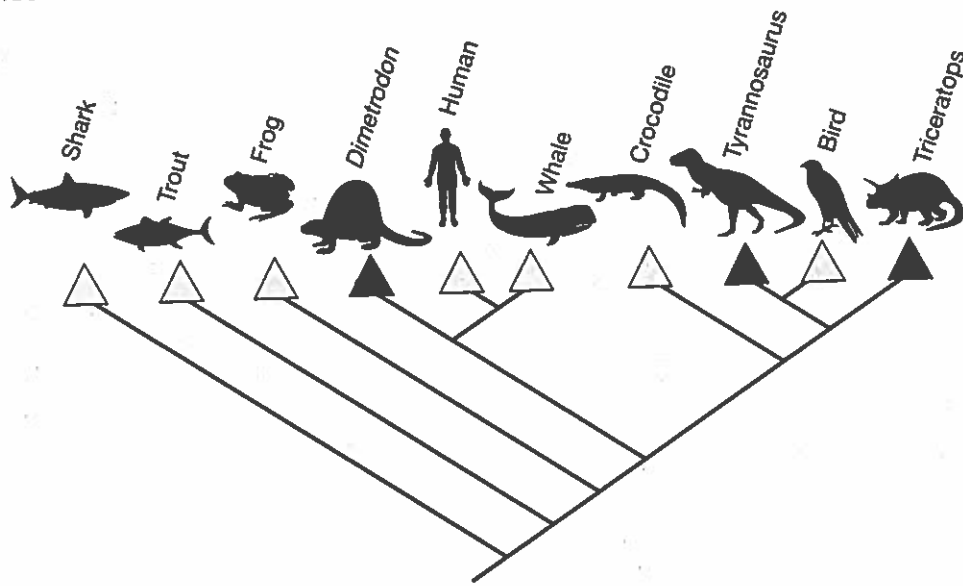
- (a) arctic poppies → arctic hares → seals
- (b) grasses → caribou → arctic foxes → polar bears
- (c) grasses → lemmings → snowy owls → arctic hares
- (d) plankton and seaweed → fish → seals → snowy owls

**Part B**

Which statement correctly compares the energy available at various trophic levels in this food web?

- (a) Available energy is highest in the polar bears and lowest in the seals, snowy owls, and arctic foxes.
- (b) Available energy is highest in the fish, arctic hares, lemmings, and caribou and lower in all other trophic levels.
- (c) Available energy is lowest in the polar bears and highest in the mosses, lichens, grasses, poppies, plankton, and seaweed.
- (d) The same amount of energy is available to organisms occupying all trophic levels.

11. The diagram shows relationships among some groups of animals. The dark-shaded triangles indicate extinct organisms.



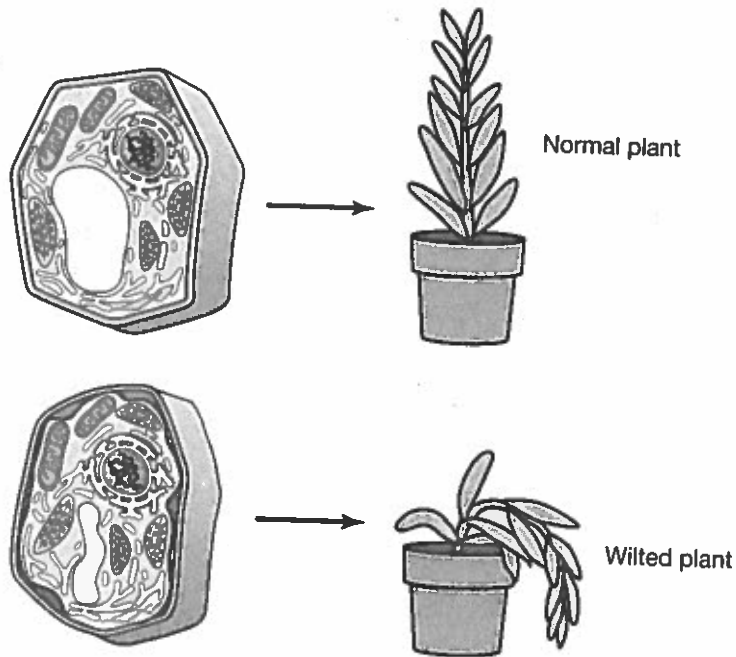
Based on the information in the diagram, which pairs of organisms share the most characteristics?

- (a) frogs and humans
- (b) humans and whales
- (c) trout and frogs
- (d) sharks and whales

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12. This image shows the cells in a plant before and after it has wilted.



Which explanation BEST describes how a change to cellular structures causes the change seen in the plant as a whole?

- (a) The mitochondria have not produced enough energy to keep the cells rigid.
- (b) The chloroplasts have not captured enough light energy to fill the cells.
- (c) The amount of water in the vacuoles has decreased, so they are not supporting the cells.
- (d) The nuclei have stopped controlling the cells' activity, leading to a change in cell structure.

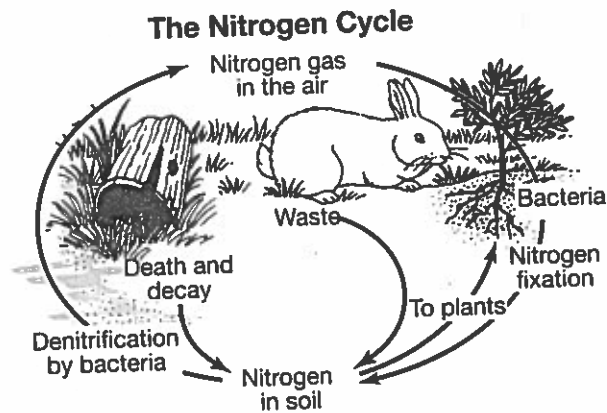
13. A student has researched an organism and made a list of its characteristics.

- *eukaryotic*
- *multicellular*
- *heterotrophic*
- *cell walls*

Which clade does this organism belong to?

- (a) bacteria
- (b) archaea
- (c) fungi
- (d) plants

14. The diagram summarizes the nitrogen cycle.

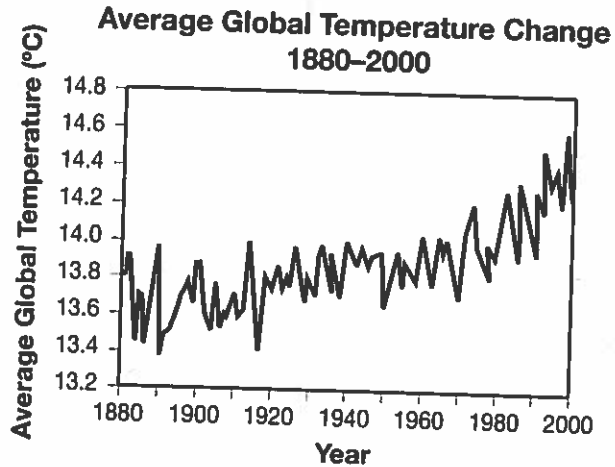


Based on the information shown, what happens to the nitrogen in a rabbit's body when it dies?

- (a) The nitrogen is broken down and destroyed.
- (b) The nitrogen is trapped and removed from the cycle.
- (c) The nitrogen is converted into a usable form through nitrogen fixation.
- (d) The nitrogen is broken down and returned to the cycle through denitrification.

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15. The graph shows the trend in global temperatures from 1880 through 2000.



Scientists think that increased burning of fossil fuels caused most of the trend shown in the graph. Which TWO engineered solutions could reduce the impact of global temperature change on living things?

- (a) crops that require fewer pesticides and fertilizers
- (b) alternative energy sources to reduce use of fossil fuels
- (c) a process that makes recycling of plastic more efficient
- (d) a system that removes industrial chemicals from factory wastewater
- (e) a system that uses the energy from fossil fuels to replace melted sea ice in polar areas
- (f) a system that prevents carbon dioxide released from fossil fuels from entering the atmosphere

16. An ecosystem near a coast has been affected by a hurricane. Trees and nesting sites are destroyed, and many organisms die in the flooding and winds. What statement BEST predicts the impact of this environmental change on the ecosystem?
- (a) Biodiversity and stability will both increase.
  - (b) Biodiversity and stability will both decrease.
  - (c) Biodiversity will increase, and stability will decrease.
  - (d) Biodiversity will decrease, and stability will increase.

17. The table below shows one section of the genetic code.

First Base	Second Base		Third Base
	A	G	
U	tyrosine	cysteine	U
U	tyrosine	cysteine	C
U	(stop)	(stop)	A
U	(stop)	tryptophan	G

The transcription of which DNA nucleotide sequence signals the end of a protein during translation?

- (a) ACA
- (b) ACC
- (c) ATC
- (d) ATG

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18. Which statement correctly compares the roles of different types of organic molecules in the body?
- (a) Carbohydrates provide insulation for the body, while nucleic acids provide long-term energy storage.
  - (b) Nucleic acids provide support and structure for the body, while carbohydrates provide insulation.
  - (c) Lipids provide long-term energy storage for the body, while carbohydrates provide quickly available energy.
  - (d) Proteins provide cushioning for organs, while lipids carry the body's genetic information.
19. A katydid is a kind of insect. In the North American species, newly-hatched katydids come in two colors: pink and green. Most green katydids stay green as they grow, but a few turn orange or yellow. It is estimated that the ratio of pink to green katydids caught in the wild is about 1:500. A biologist catches both pink and green katydids to breed in the lab. The table shows the resulting ratio of pink to green katydid offspring from each cross.

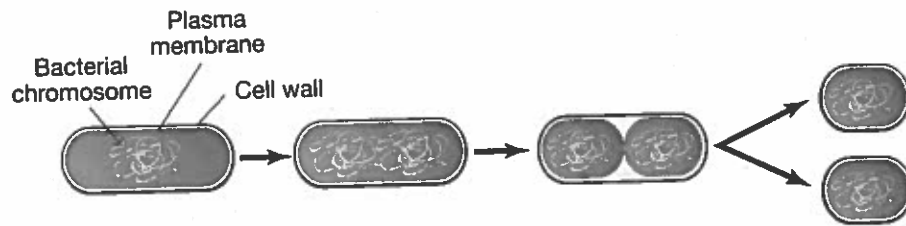
Parent Colors	Ratio of Pink to Green in Offspring
pink × pink	31:4
pink × green	12:14
green × green	1:29

Which explanation about katydid color is BEST supported by these data?

- (a) Genetic drift is not able to occur in wild populations of katydids.
- (b) There are more green katydids in the wild because their population is in genetic equilibrium.
- (c) There are no alleles for pink katydids in wild populations.
- (d) Natural selection favors green, even though green is a recessive trait.

20. The spiny hedgehog is a small, insect-eating animal whose body is covered by spines. When threatened, the hedgehog rolls itself into a ball, with all its spines facing outward. Which type of adaptation does the spiny hedgehog exhibit when threatened?
- (a) camouflage
  - (b) chemical defense
  - (c) mechanical defense
  - (d) mimicry

21. A student develops a model of binary fission as shown in the diagram.



The student uses color coding to show the similarities and differences in the genetic material of a parent cell and of the two daughter cells. The student decides to use red to color the bacterial chromosome in the parent cell. She uses red to color any other chromosomes in the model that are identical to the parent chromosome. She decides to use blue and green to color chromosomes that are different from the parent chromosome.

How should the student color the chromosomes in the offspring cells?

- (a) The chromosomes in both daughter cells should be colored red.
- (b) The chromosome in one daughter cell should be colored blue, and the chromosome in the other daughter cell should be colored green.
- (c) The chromosomes in both daughter cells should be colored blue.
- (d) The chromosome in one daughter cell should be colored red, and the chromosome in the other daughter cell could be colored either blue or green.

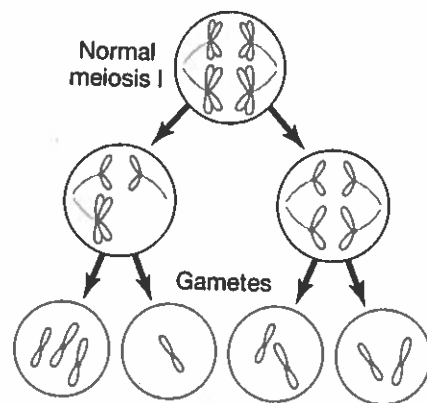
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22. A single species of ground squirrel once lived in the area of the Grand Canyon. As the Grand Canyon formed, the squirrels gradually lost the ability to breed with members on the other side of the canyon. Today, scientists recognize that there are now two separate species of ground squirrel. One lives on the Grand Canyon's north rim, and one lives on its south rim.

Assuming that speciation occurred due to the geographic isolation of the two squirrel populations, which TWO conclusions can be drawn from the evidence in the paragraph?

- (a) New populations of squirrels will continue to evolve.
- (b) The biodiversity in the canyon region has increased.
- (c) Natural selection acted on at least one different trait in each group of squirrels.
- (d) The number of other animal species in the region will increase over time.
- (e) The two species will interbreed, forming a new species.
- (f) The resources available for each population will decline.

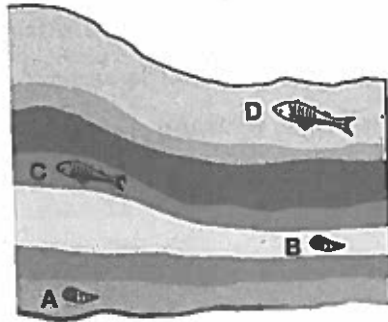
23. This diagram was included in a student report on Down syndrome.



Which argument is BEST supported by the evidence shown in the diagram?

- (a) Errors occurring during replication can result in genetic variations.
- (b) Substitution mutations can be caused by environmental factors.
- (c) Deletion mutations decrease the total number of chromosomes.
- (d) New genetic combinations can be produced during meiosis.

24. Which argument supports the claim that sexual reproduction is an advantage over asexual reproduction in an environment that changes frequently?
- (a) Sexual reproduction generally requires less energy.
  - (b) Sexual reproduction results in a genetically varied population.
  - (c) Sexual reproduction guarantees that the offspring will be identical.
  - (d) Sexual reproduction has a higher rate of success in producing offspring.
25. The diagram shows fossil species in layers of undisturbed sedimentary rock.



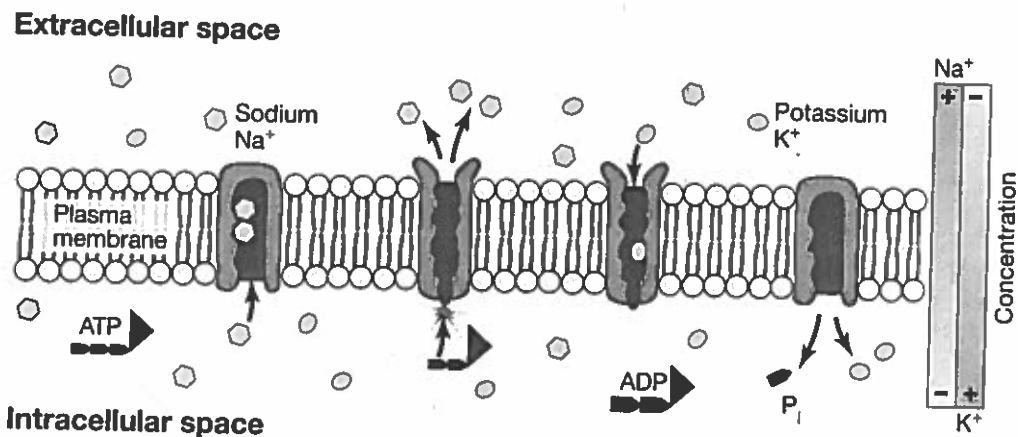
- Which inference can be made from the information in the diagram?
- (a) Organism B shared homologous structures with organism A.
  - (b) Organisms C and D lived in different climates.
  - (c) Organism D was most recently alive.
  - (d) Organism A lived on land.

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26. Several groups of scientists have worked on cloning cats and dogs. A few companies have sold clones of people's pets. However, some of the cloned dogs had birth defects even though the donor animals were healthy. Scientists in a different group have claimed that they have developed a new method that solves this problem of birth defects. Which is the BEST source of reliable information to answer questions about the new group's claim?
- (a) a television interview with a scientist who has worked on cloning animals
  - (b) a magazine article about a pet owner who was happy with her cloned dog
  - (c) an advertisement that includes photographs of healthy-looking cloned puppies
  - (d) a scientific paper written by the scientists who developed the new cloning method

27. This diagram shows the sodium-potassium pump.

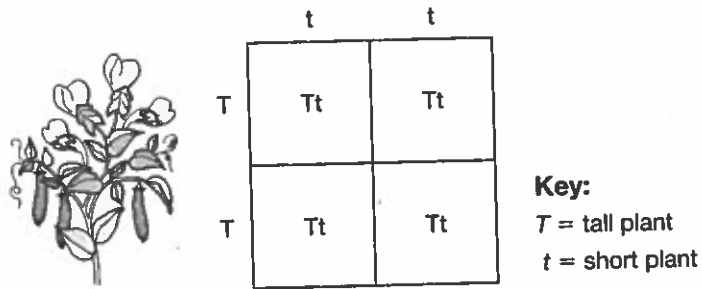


Which statement describes this process?

- (a) Sodium and potassium ions are moved from areas of lower concentration to areas of higher concentration.
- (b) A pocket of the cell membrane engulfs either a sodium or a potassium ion and then detaches from the membrane.
- (c) Sodium and potassium ions diffuse across the membrane.
- (d) The movement of sodium and potassium ions continues until the concentration on both sides of the membrane is equal.

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28. The Punnett square shows a cross between two homozygous pea plants, one tall and one short.



**Part A**

What is the phenotypic ratio of the offspring of this cross?

- (a) 100% tall plants
- (b) 100% medium-height plants
- (c) 50% tall plants, 50% short plants
- (d) 75% medium-height plants, 25% tall plants

**Part B**

Based on your response to the previous question, which best explains the inheritance of height in pea plants?

- (a) The trait of plant height is controlled by multiple alleles.
- (b) The alleles for tall plants and short plants are codominant.
- (c) The alleles for tall plants and short plants display incomplete dominance.
- (d) The allele for tall plants is dominant, and the allele for short plants is recessive.



## Section 2

Directions: Fill in the bubble for each answer you select.

29. For a population of small plants, the amount of sunlight is a limiting factor. The small plants grow in the same area as a population of large trees. If a disease kills off the population of trees, what effect will this MOST LIKELY have on the population of small plants?
- (a) The small-plant population will increase without limit.
  - (b) The small-plant population will decrease and then die out.
  - (c) The small-plant population will increase and then level off.
  - (d) The small-plant population will decrease and then level off.
30. A group of students investigated how the salt content of water affects a plant that lives in an aquatic ecosystem. On one slide, the students placed a piece of a leaf of an aquatic plant and then added a drop of tap water. On a second slide, they placed a piece of the same leaf and then added a drop of 10% salt solution. The students observed both leaf pieces with a microscope. They repeated the process three times. The table below summarizes their findings.

**Observations of Aquatic Plant Cells**

Condition	Cell Membrane	Vacuole	Chloroplasts
Slide 1: Leaf in tap water	Just inside cell wall	Large, fills most of cell	Near edges of cell, around vacuole
Slide 2: Leaf in 10% salt solution	Pulled away from cell wall	Invisible	Clumped in center of cell

Which statement is the BEST explanation for these findings?

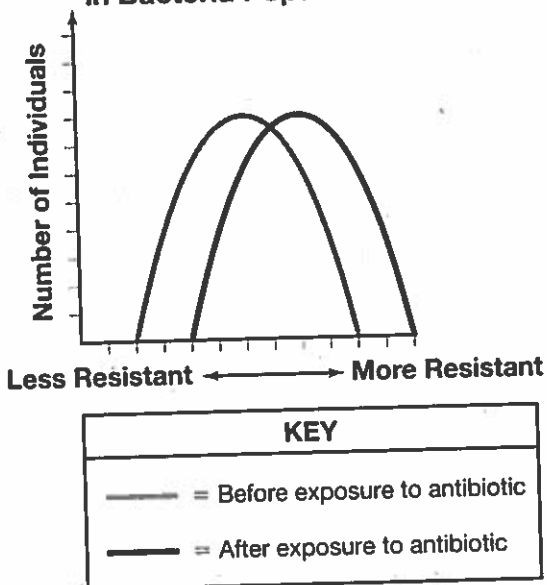
- (a) The 10% salt solution was hypertonic; the tap water was isotonic.
- (b) The 10% salt solution was hypotonic; the tap water was hypertonic.
- (c) The 10% salt solution was isotonic; the tap water was hypertonic.
- (d) The 10% salt solution was isotonic; the tap water was hypotonic.

31. A student gathered evidence to support the argument that viruses should be classified as living, rather than nonliving. Which evidence would BEST support this student's argument?

- (a) Viruses have DNA and RNA.
- (b) Viruses need a host cell to replicate.
- (c) Viruses rely on a host cell for energy.
- (d) Viruses can cause diseases in living organisms.

32. A scientist does an experiment with bacteria and antibiotics. She uses genetic technology to insert a gene for antibiotic resistance into a small percentage of individuals in a population of bacteria. Then she exposes the population to an antibiotic. She lets the surviving bacteria return to the original population size. The graph shows how the population changed after the population recovered from exposure to the antibiotic.

Distribution of Antibiotic Resistance in Bacteria Populations



Which statement BEST explains the results of this experiment?

- (a) The antibiotic was not effective against the bacteria.
- (b) Only the bacteria that had the gene for resistance survived the antibiotic.
- (c) The antibiotic gave resistance to most of the bacteria by the end of the experiment.
- (d) The bacteria that received the gene were more likely to reproduce than those that did not.

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33. In a stable meadow ecosystem, the size of a plant population has increased sharply due to a seasonal increase in rainfall. What is the BEST prediction of how the plant population will continue to change?
- (a) Supplies of another resource will limit the growth of the plant population, causing it to stabilize.
  - (b) The size of the plant population will continue to increase indefinitely.
  - (c) The plant population will remain at its current size indefinitely.
  - (d) After the increase, the plants will use up the resources they need, and the population will die out.

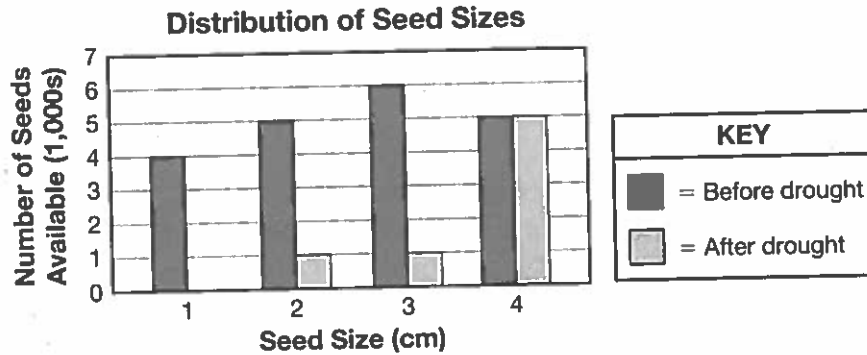
34. A scientist did an experiment with fruit flies. He divided a single population of fruit flies into two groups. He fed one group with food that was mostly starch and the other group with food that was mostly sugar. After many generations, he put the two groups back together. He then chose 30 females fed with each type of food from the mixed population to see which male flies they chose as mates. The scientist found that:

- 22 females that fed on starch chose males that fed on starch.
- 8 females that fed on starch chose males that fed on sugar.
- 21 females that fed on sugar chose males that fed on sugar.
- 9 females that fed on sugar chose males that fed on starch.

Which statement describes the BEST way to interpret this data?

- (a) Sorting members of a population into groups may help explain natural selection.
- (b) Mixing two groups into a single population may help explain nonrandom mating.
- (c) Giving individuals in a population different kinds of food may help explain evolution.
- (d) Separating a single species into two environments may help explain how new species are formed.

35. The shape of a bird's beak is a structural adaptation that allows it to eat specific types of food. Scientists studied the population of a bird species on an island. Within the population, the birds' beak size ranges from small to large, with most individuals having medium-size beaks. The bird population survives by eating the seeds from several species of trees. The seeds are various sizes. A drought kills all but one species of tree on the island. The graph below shows the change in distribution of seed sizes on the island.

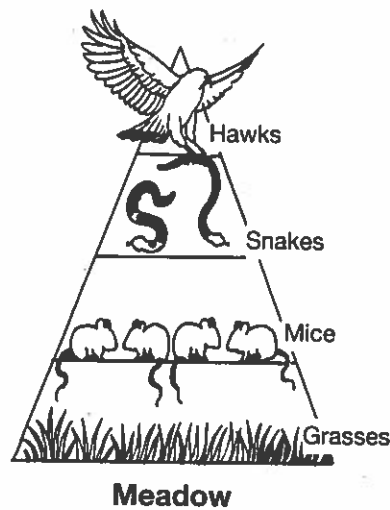


Which statement BEST predicts how this environmental change will affect the ability of the birds to survive?

- (a) All individuals in the bird population will survive; the population will not be affected.
- (b) The birds with large beaks will survive, but most of the other birds will not get the resources they need to survive.
- (c) None of the birds in the population will survive because the total supply of seeds has decreased.
- (d) Most of the birds with small and medium beaks will survive, but the birds with large beaks will not get the resources they need to survive.

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36. A student wanted to make a model to demonstrate the role of the cell membrane in maintaining homeostasis in the cell. Which property would be MOST important when showing the function of the cell membrane in maintaining homeostasis?
- (a) rigidity
  - (b) smoothness
  - (c) solubility in water
  - (d) selective permeability
37. The diagram models available energy in a meadow ecosystem.



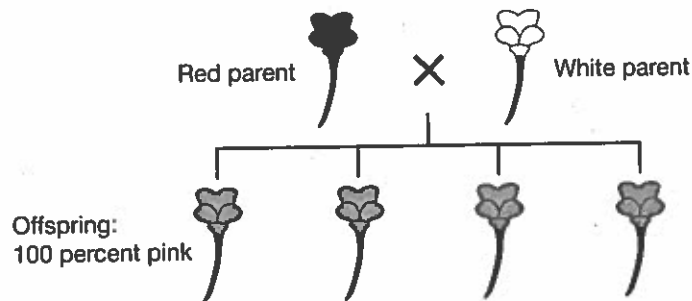
In a square kilometer of the meadow ecosystem, mice consume 125,000 kcal of grasses per year. About how much energy is available to hawks per square kilometer per year?

- (a) 125 kcal
- (b) 1250 kcal
- (c) 12,500 kcal
- (d) 125,000 kcal

38. If the gene for a protein suffers a base-pair substitution, which will be the MOST LIKELY result when the gene is expressed?

- (a) A frame shift will occur, and different proteins will be produced.
- (b) The protein produced may be nonfunctioning or shortened.
- (c) The protein's function will not be affected in any significant way.
- (d) The mRNA strand produced during transcription will be longer.

39. A student investigated the inheritance of flower color in snapdragons. The diagram represents the results the student observed after carrying out a cross between a red snapdragon and a white snapdragon.



Based on the information in the diagram, which BEST predicts the phenotypes that could result from a cross between two pink snapdragons?

- (a) pink snapdragons only
- (b) pink snapdragons and white snapdragons only
- (c) pink snapdragons, red snapdragons, and white snapdragons
- (d) red snapdragons only

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40. A student carried out an investigation to answer this question:

*Does a low-oxygen environment change the rate of photosynthesis?*

What is the MOST probable explanation that the student will develop after completing his investigation?

- (a) Oxygen is a reactant of photosynthesis, so low oxygen levels decrease the rate of photosynthesis.
- (b) Oxygen is not required for photosynthesis to occur, so the rate of photosynthesis is unaffected by low oxygen levels.
- (c) Oxygen supplies the energy that is stored in food molecules, so photosynthesis stops in conditions where oxygen is not plentiful.
- (d) The oxygen in the environment limits the rate of photosynthesis, so photosynthesis proceeds faster as oxygen levels decrease.

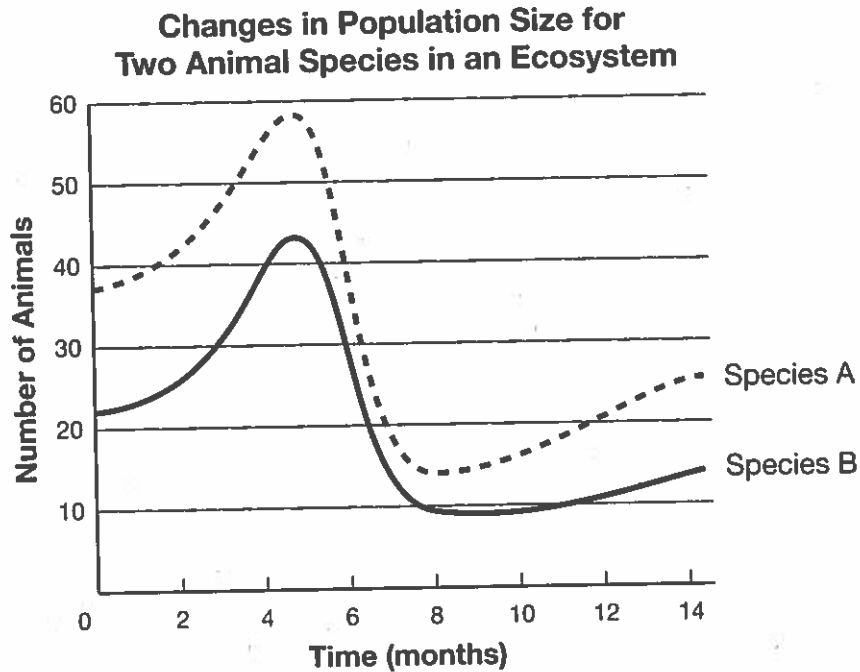
41. A student prepares to develop a model to show how populations can change over time. She thinks of a pair of birds. The male and female are both heterozygous for a certain trait ( $Tt$ ). She uses two coins to create her starting population. She decides that heads will represent the dominant ( $T$ ) allele, and tails will represent the recessive ( $t$ ) allele. She flips the two coins five times to complete her model. Her data are in the table.

Offspring	Genotype
1	$TT$
2	$tt$
3	$Tt$
4	$TT$
5	$Tt$

The student plans to use the genotypes as the gene pool for the next generation. Which step should the student do next to BEST model genetic drift in this population?

- (a) increase the size of the gene pool
- (b) introduce new genes into the gene pool
- (c) randomly remove individuals from the gene pool
- (d) increase the number of different alleles in the gene pool

42. Scientists gathered data about two populations of animals that are found in the same ecosystem.



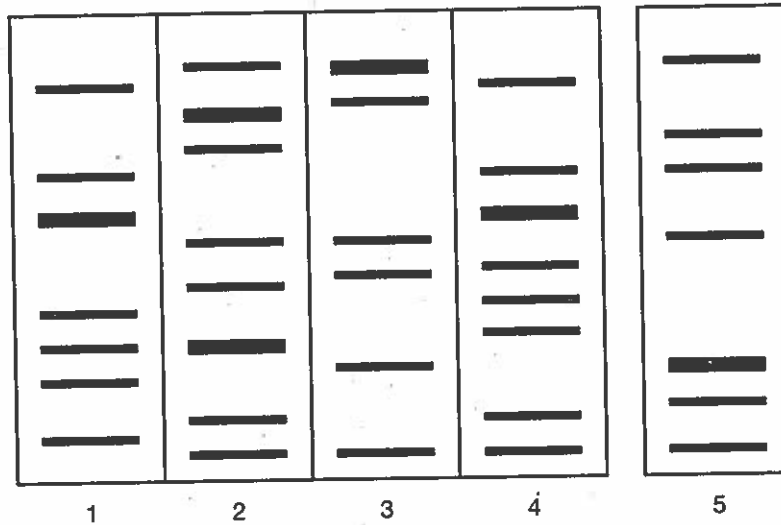
Which explanation is BEST supported by the data?

- (a) The two populations have similar sets of limiting factors.
- (b) Species A is a keystone species in this ecosystem.
- (c) The resource availability in this ecosystem is consistent year-round.
- (d) Species B has a higher carrying capacity in this ecosystem than Species A.

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43. The emerald sea slug feeds on a species of green algae. The sea slug keeps and uses some chloroplasts from the algae it consumes and is therefore one of very few animals that can perform photosynthesis. Scientists have discovered that the sea slug also has genes from the algae. These algal genes code for proteins that maintain and repair the chloroplasts, keeping them functioning for up to nine months. Which statement BEST explains how the slug's ability to photosynthesize is evidence of evolution?
- (a) Emerald sea slugs show that animals can evolve into plants.
  - (b) Emerald sea slugs and green algae have a close common ancestor.
  - (c) Emerald sea slugs have acquired algal genes that they pass on to their offspring.
  - (d) Emerald sea slugs are not born with chloroplasts but must obtain them by eating algae.
44. A population of bacteria reproduces by binary fission and lives in an aquatic environment. A small change in the pH of the water completely eliminates the population of bacteria in that environment. This information could be used as evidence to support which TWO claims?
- (a) The slow rate of asexual reproduction compared to sexual reproduction is a disadvantage when conditions change.
  - (b) The lack of genetic variability of the offspring produced by asexual reproduction can be a disadvantage when environmental conditions change.
  - (c) The change in pH meant that none of the bacteria could find mates and reproduce.
  - (d) The small number of offspring produced by asexual reproduction meant that not enough bacteria were present to respond to the change in pH.
  - (e) The large number of offspring produced by asexual reproduction can make a population more vulnerable to changes in the environment.
  - (f) Changing the environment can be an effective method of reducing populations of unwanted organisms that reproduce asexually.

45. A laboratory technician obtains DNA samples from four individuals to determine their genetic relationship to a fifth person. Using gel electrophoresis, DNA fingerprints are developed for all five people. The diagram below represents the fingerprints.

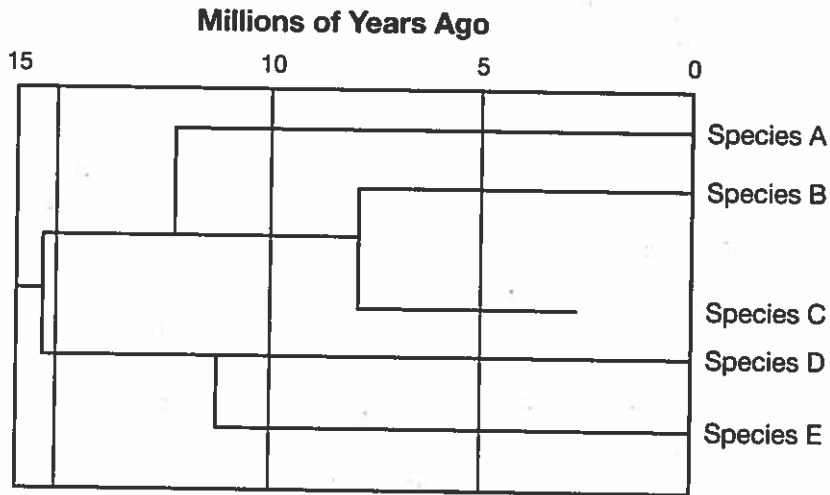


Which claim is supported by the information shown in the DNA fingerprints?

- (a) Individuals 1 and 3 are most closely related to Individual 5.
- (b) Individuals 1, 3, and 4 are most closely related to Individual 5.
- (c) Individual 2 is most closely related to Individual 5.
- (d) Individual 4 is most closely related to Individual 5.

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46. The diagram shows a phylogenetic tree of five species.



**Part A**

Which living species are most closely related?

- (a) species A and B
- (b) species B and C
- (c) species C and D
- (d) species D and E

**Part B**

The evidence used to construct this phylogenetic tree came from the fields of paleontology, embryology, and anatomy. A biochemist analyzed hemoglobin from four species. The table compares the amino acid differences in hemoglobin between species A and the other organisms.

**Comparisons of Hemoglobin of Four Species**

Species	Amino Acid Differences
A	0
B	4
D	6
E	2

How do these data conflict with the information shown in the phylogenetic tree?

- (a) The data suggest that species A is not related to the other species.
- (b) The data suggest that species A and E are most closely related.
- (c) The data suggest that species A and E are not related to each other.
- (d) The data suggest that species A and B are most distantly related.

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47. Proteins are formed in the cytoplasm of cells using genetic instructions from DNA, which is located in the cell nucleus. Which is the BEST explanation of how the genetic information gets from the nucleus to the site of protein synthesis?
- (a) DNA divides during mitosis. One strand travels outside the nucleus to bind with RNA in the cytoplasm and form a protein.
  - (b) DNA is copied to make mRNA. The mRNA leaves the nucleus and goes to the ribosomes in the cytoplasm, where the information is used to guide protein synthesis.
  - (c) Genetic information travels from DNA in the nucleus along a strand of mRNA that is connected to ribosomes in the cytoplasm where proteins are made.
  - (d) The genetic code is transferred to ribosomes on tRNA molecules, which then pass through the nuclear membrane and into the cytoplasm.
48. The Punnett square shows a cross between two pea plants that are heterozygous for pod color.

	G	g
G	GG Green	Gg Green
g	Gg Green	gg Yellow

- Which statement BEST describes and explains these results?
- (a) The phenotypic and genotypic ratios are the same.
  - (b) Only one of the offspring shows the dominant trait.
  - (c) Two different genotypes produce the same phenotype.
  - (d) Other alleles must affect the color of pea pods.

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49. As the human population grows, humans use more resources, such as water. Human activities also cause pollutants to enter water systems. Which statement describes a likely result if these trends continue?

- (a) Clean water will be a limiting factor for the human population but not for populations of other organisms.
- (b) Clean water will be a limiting factor for the human population and for most populations of other organisms.
- (c) The water cycle removes all pollutants, so clean water will not be a limiting factor for the human population or others.
- (d) Humans and other organisms will become adapted to using polluted water, so clean water will not be a limiting factor for populations.

50. This table shows information about the classification of four organisms.

	Wolf	Horse	Lion	Dog
<b>Kingdom</b>	Animalia	Animalia	Animalia	Animalia
<b>Phylum</b>	Chordata	Chordata	Chordata	Chordata
<b>Class</b>	Mammalia	Mammalia	Mammalia	Mammalia
<b>Order</b>	Carnivora	Carnivora	Carnivora	Carnivora
<b>Family</b>	Canidae	Equidae	Felidae	Canidae
<b>Genus</b>	Canis	Equus	Panthera	Canis
<b>Species</b>	lupus	caballus	leo	familiaris

Which argument is BEST supported by the information in the table?

- (a) Wolves and dogs have the greatest similarity in structure and function.
- (b) All four organisms are similar in that they have cells with chloroplasts.
- (c) These organisms all belong to the same family and order.
- (d) Horses and lions share no similarities with the other organisms in the table.

51. A student constructed this Punnett square to solve a problem involving a cross between two heterozygous individuals.

	<i>W</i>	<i>w</i>	
<i>W</i>	<i>WW</i>	<i>Ww</i>	<i>W</i> = white <i>w</i> = black
<i>w</i>	<i>Ww</i>	<i>ww</i>	

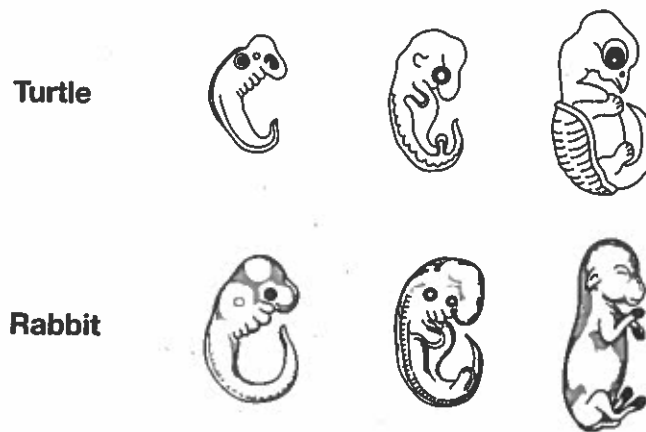
How did the student use the law of segregation as she defined this problem?

- (a) As she completed the Punnett square, she showed alleles for different traits being inherited separately.
  - (b) As she prepared the Punnett square, she showed the two alleles in each parent being inherited separately.
  - (c) She used the Punnett square to determine which allele is expressed in the possible offspring.
  - (d) She used the Punnett square to calculate the probability of each potential combination of alleles.
52. Firewood is sometimes sold at roadside stands in areas where camping is popular. People can buy the bundles of firewood and transport them to their campgrounds. Students design a scanner that could detect the presence of insects in the bundles of firewood. The scanner would alert buyers that firewood with insects, eggs, or larvae present should be used only at campsites near the site of purchase. The solution these students have designed would be MOST useful to prevent which problem?
- (a) deforestation near campsites
  - (b) the introduction of nonnative species
  - (c) overconsumption of firewood by campers
  - (d) release of greenhouse gases as the firewood is burned

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53. The diagram shows the embryos of a reptile and a mammal.



**Part A**

Which claim is BEST supported by evidence in the picture?

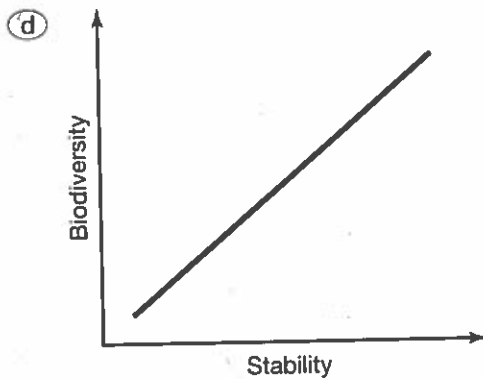
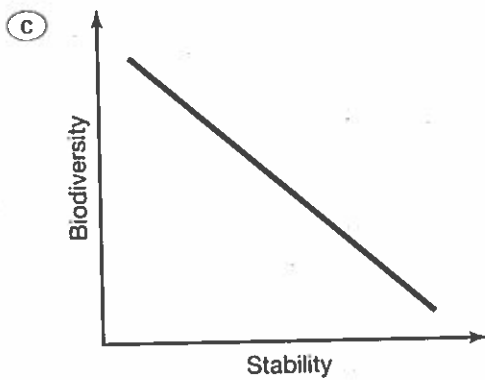
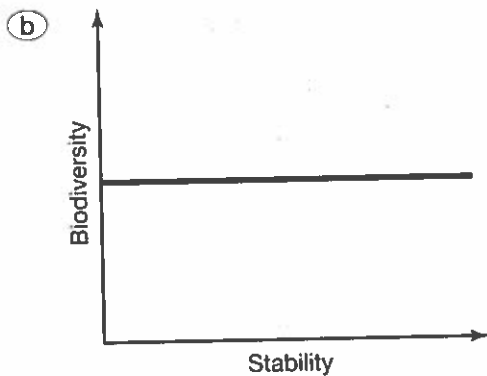
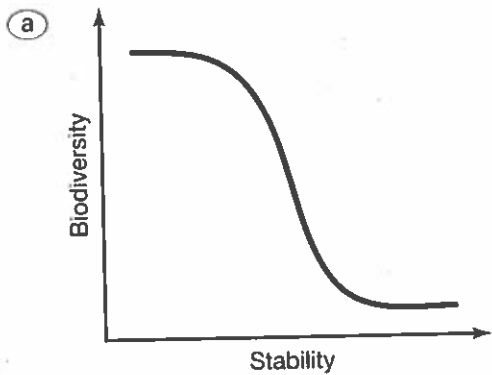
- (a) Mammals evolved directly from reptiles.
- (b) Mammals share many analogous structures with reptiles.
- (c) Reptiles and mammals descended from a shared ancestor.
- (d) Reptiles and mammals develop differently from one another.

**Part B**

A group of scientists studies a protein that is present in both rabbits and turtles. What piece of evidence from this study would BEST support the claim you chose in Part A?

- (a) little similarity in the DNA of the two animals
- (b) few differences in the amino acid sequences in the two animals
- (c) a greater amount of the protein in the rabbit than in the turtle
- (d) a higher number of mutated genes in the turtle than in the rabbit

54. Which graph best summarizes the relationship between the biodiversity of an ecosystem and its stability?



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55. A student makes individual models of mitosis, of meiosis, and of binary fission. In which of the student's models should the genetic material in the daughter cells be shown as identical to the genetic material in the parent cell?
- (a) in the models of binary fission and of mitosis
  - (b) in the models of meiosis and of mitosis
  - (c) in the binary fission model only
  - (d) in the meiosis model only

56. A student made this model of a protein.



Which TWO statements describe how the model could be labeled?

- (a) Each shape could be labeled *amino acid*, and the links between the shapes could be labeled *peptide bonds*.
- (b) The entire structure could be labeled *polysaccharide*, and each shape could be labeled *monosaccharide*.
- (c) Each shape could be labeled *nucleotide*, and the entire structure could be labeled *nucleic acid*.
- (d) The entire structure could be labeled *polymer*, and each shape could be labeled *monomer*.
- (e) The individual shapes could be labeled *steroids* and *phospholipids*, and the links between the shapes could be labeled *peptide bonds*.
- (f) Each shape could be labeled *DNA*, and the entire structure could be labeled *RNA*.

# Notes

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