

# Released Items

## Biology

### North Carolina End-of-Course Assessment



**Public Schools of North Carolina**

Department of Public Instruction | State Board of Education

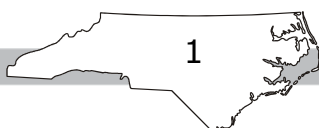
Division of Accountability Services/North Carolina Testing Program



## Sample Questions

- S1 What is the first thing a student should do if an accident happens during a science experiment?
- A report to the teacher
  - B clean the laboratory station
  - C locate the nearest exit
  - D put on safety goggles
- S2 Which device is used to determine the volume of a liquid?
- A anemometer
  - B graduated cylinder
  - C test tube
  - D thermometer

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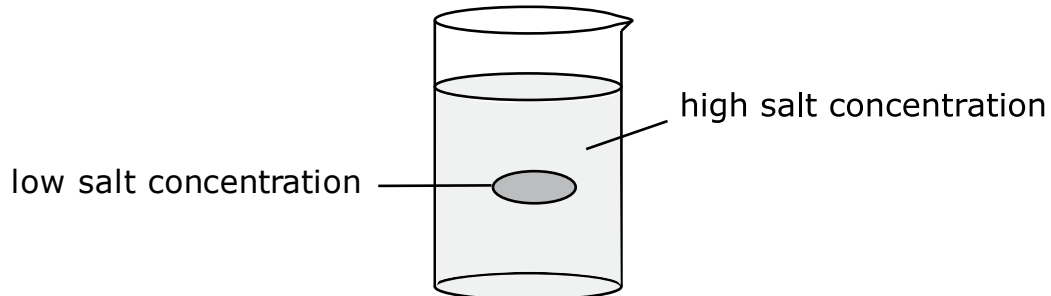
- 1 Which is a primary function of a vacuole in a cell?
- A enzyme production
  - B protein synthesis
  - C storage
  - D reproduction
- 2 What determines the function of a specialized cell?
- A the type of RNA in the cell
  - B the number of ribosomes in the cell
  - C the number of chromosomes in the cell
  - D the active genes in the cell

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- 3 This diagram shows a red blood cell in a beaker that contains a solution with a higher salt concentration than that inside the red blood cell.



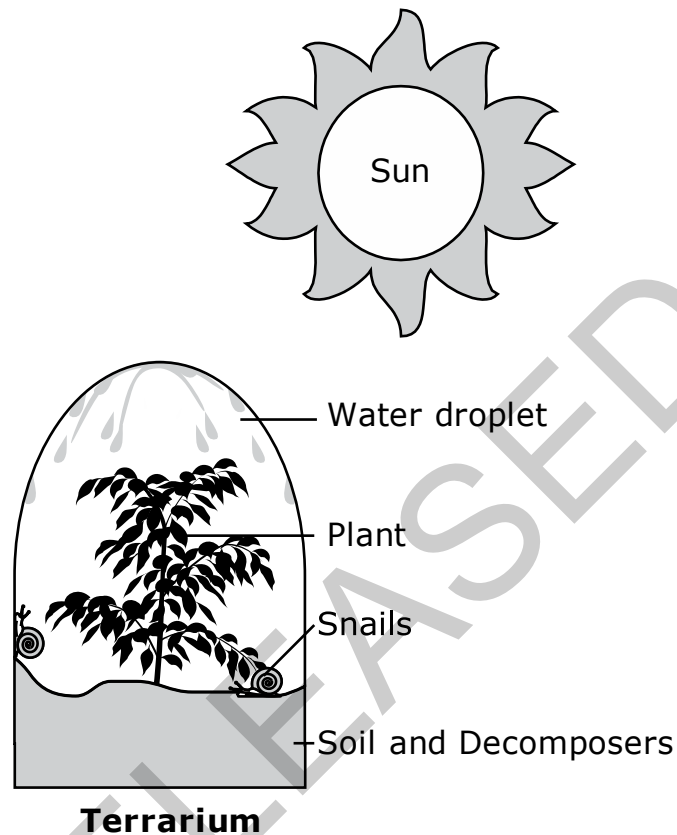
What will happen to the red blood cell in this environment?

- A The size of the red blood cell will remain constant.
- B The red blood cell will swell at first and then shrink.
- C The red blood cell will swell from absorbing salt molecules.
- D The red blood cell will shrink from losing water molecules.
- 4 During which phase of the cell cycle does most cell growth occur?
- A cytokinesis
- B interphase
- C prophase
- D mitosis



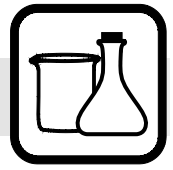


- 5 This diagram represents a closed terrarium exposed to sunlight.



What must happen for the carbon cycle to continue in this terrarium?

- A All organisms must continue to exchange gases.
- B The snails must double their production of carbon dioxide.
- C The plant must produce carbon dioxide at a faster rate.
- D The decomposers must begin to produce oxygen.



- 6 In nature, which type of behavior causes animals to produce aggressive displays and sounds?
- A imprinting
  - B territoriality
  - C conditioning
  - D habituation
- 7 What will **most likely** occur if the population of the world continues to increase at predicted rates?
- A There will be an increase in biodiversity as a result of improvements in technology.
  - B There will be more rapid depletion of natural resources.
  - C The human race will rapidly become extinct.
  - D All human diseases will be eliminated.
- 8 What will **most likely** happen if a nonnative species is introduced into a stable ecosystem?
- A The native species will change their diet, and the ecosystem will remain stable.
  - B The native species will move to another area, and the ecosystem will remain stable.
  - C The native species will have to compete for resources with the nonnative species, and the ecosystem will become unbalanced.
  - D The native species will share their food with the introduced species, and the ecosystem will become unbalanced.



- 9 Why must DNA replication have to occur before a cell can divide by mitosis?
- A to maintain the same number of chromosomes in the daughter cells as in the parent cell
  - B to cause one of the cells produced to have double the number of chromosomes as the parent cell
  - C to allow crossing over to occur in each of the cells produced
  - D to cause all of the cells produced to have half the number of chromosomes as the parent cell

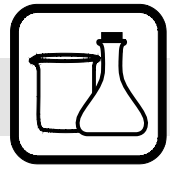
- 10 A section of DNA has these bases:

TAG CAG TAC

Which mRNA sequence is produced from this DNA section?

- A ATC GTC ATG
  - B AUC GUC AUG
  - C AUG CUG AUC
  - D UTC GTC UTG
- 11 Which process can occur in **both** mitosis and meiosis?
- A fertilization
  - B independent assortment
  - C gene mutation
  - D crossing over

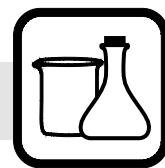




- 12 How do some chemicals increase the risk of a person getting cancer?
- A by causing cell mutations
  - B by causing a deficiency of vitamin D
  - C by causing an increase of toxins in the skin
  - D by causing a decrease in the immune response
- 13 What is the difference between the DNA of a dog and the DNA of a fly?
- A the type of sugar building blocks
  - B the sequence of nucleotides
  - C the strength of hydrogen bonds
  - D the strength of covalent bonds
- 14 Which would be a desirable trait scientists may want to create in a transgenic plant?
- A the ability to resist insects
  - B the ability to grow less fruit
  - C the ability to change color in the winter
  - D the ability to use a lot of water







- 15 Which substance do biochemists often search for in fossils to help better understand the evolutionary relationships of the organism that formed the fossil?
- A ATP
  - B DNA
  - C iron
  - D oxygen
- 16 Scientists believe that the polar bear in Alaska and the brown bear in Russia evolved from a common ancestor. Which would be responsible for this evolutionary change?
- A artificial selection
  - B asexual reproduction
  - C sexual competition
  - D geographic isolation
- 17 What is the basis for the **earliest** classification system of organisms?
- A physical characteristics
  - B differences in habitat
  - C evolutionary relationships
  - D reproductive patterns





- 18 Waxes create a waterproof layer on the outside of some living organisms. To which group of organic molecules do waxes belong?
- A carbohydrates
  - B lipids
  - C nucleic acids
  - D proteins
- 19 Which **best** summarizes the role of DNA in the production of proteins?
- A DNA moves to the cytoplasm to build proteins.
  - B DNA transports amino acids to the ribosomes to make proteins.
  - C DNA contains the instructions used to make proteins.
  - D DNA breaks hydrogen bonds between amino acids.
- 20 A student noticed that the freshwater plant, *Elodea*, produced bubbles when placed in direct light. What could the student **most likely** conclude?
- A Bubbles of carbon dioxide were produced as a result of photosynthesis.
  - B Bubbles of oxygen were produced as a result of photosynthesis.
  - C Bubbles of carbon dioxide were produced as a result of cellular respiration.
  - D Bubbles of oxygen were produced as a result of cellular respiration.

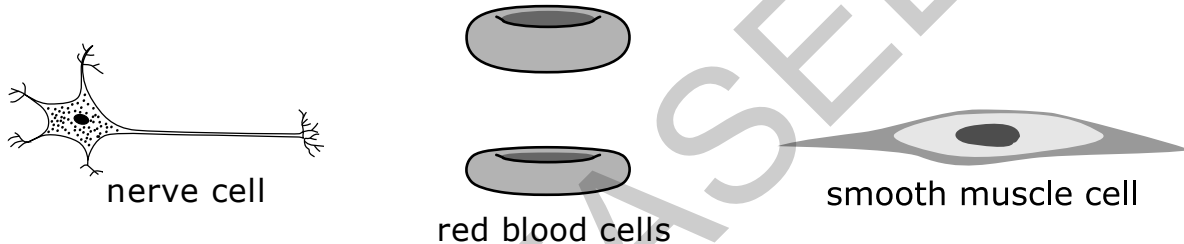




21 Plant cells are able to produce their own food. This process happens in which structure?

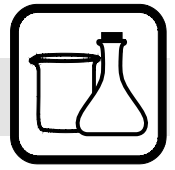
- A cell wall
- B chloroplast
- C mitochondrion
- D vacuole

22 These diagrams show a variety of cells from the same organism.



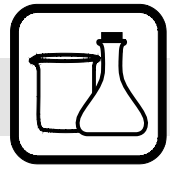
How can cells from the same organism have such different shapes and functions?

- A As each cell differentiates, the DNA changes so that each type of cell has different DNA once it reaches maturity.
- B Mutations in the cells' nuclei lead to new combinations of DNA, resulting in different shapes and functions in the different types of cells.
- C During differentiation, different parts of the DNA in each type of cell are activated, resulting in the different structure and function of the cells.
- D During differentiation, different types of cells produce proteins which destroy the nonactive DNA, leading to cell specialization.



- 23 Which statement **best** explains how sweating during exercise maintains homeostasis?
- A It regulates mineral concentrations in cells.
  - B It regulates body temperature.
  - C It maintains water balance.
  - D It maintains sugar balance in cells.
- 24 The chemical colchicine disrupts cell division. Which cell process would **most likely** stop if colchicine were added to a culture of human liver cells?
- A mitosis
  - B meiosis
  - C crossing over
  - D active transport
- 25 Which statement **best** explains why animals are considered heterotrophic?
- A They are able to produce food through the process of photosynthesis.
  - B They are able to produce food through the process of respiration.
  - C They are able to obtain nutrients by decomposing plant and animal tissue.
  - D They are able to obtain nutrients by consuming other organisms or their products.





- 26 In some ecosystems, wolves have been eliminated due to their threats to humans. How can the reintroduction of wolves benefit the ecosystem?
- A It can eliminate weak animals from a prey population, thereby decreasing competition for natural resources.
  - B It can eliminate the most fit animals among the prey population, which will cause an increase in birthrates of the prey.
  - C It can cause the prey population to migrate to other areas, resulting in more fit prey.
  - D It can cause the prey population to better blend in with their environment.
- 27 What will **most likely** be the result as humans move into new areas, forests are clear cut and housing developments are built?
- A Global temperatures will decrease because trees are removed.
  - B Many organisms will lose their homes because their habitats have been destroyed.
  - C Better sanitation in the area will reduce the amount of pollution.
  - D The rainfall in the area will increase because there will be increased runoff.
- 28 What activity **most** contributes to the depletion of the ozone layer?
- A burning fossil fuels
  - B release of CFCs
  - C deforestation
  - D overuse of fertilizers

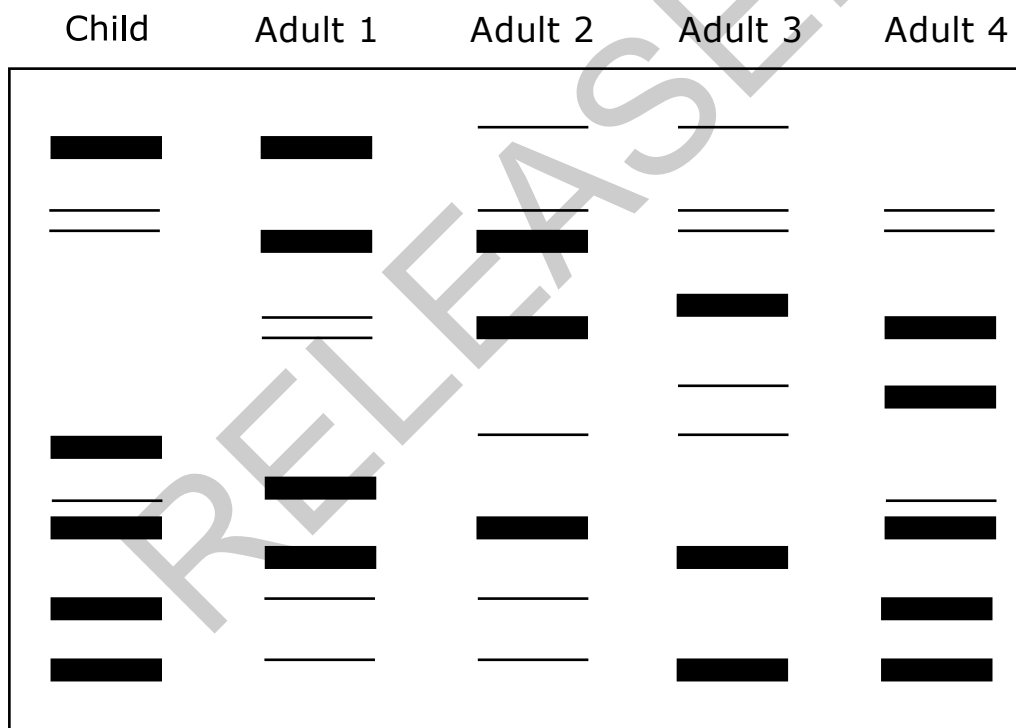


- 29 Which effect could a mutation in mRNA have on the production of proteins?
- A The protein produced will have a different identity.
  - B The protein produced will have a coiled shape.
  - C The protein produced will produce excess nitrogen.
  - D The protein produced will produce excess water.
- 30 What carries the instructions for making amino acids in a protein?
- A the nitrogen base on the tRNA
  - B the hydrogen bonding between nitrogen bases
  - C the sequence of nitrogen bases on the mRNA
  - D the nitrogen base bonding on the DNA molecule
- 31 How are mitosis and meiosis similar?
- A both have two cell divisions
  - B both require DNA replication
  - C both produce gametes
  - D both involve crossing over



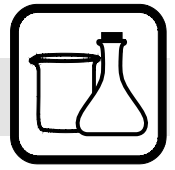
- 32 Genetically identical plants will produce either pink flowers or blue flowers, depending on the type of soil in which they are planted. What is **most likely** the explanation for the differences in flower color?
- A The flower-color gene is codominant.
  - B Mutations alter the flower-color gene.
  - C The flower-color gene is sex-linked.
  - D Environmental factors affect flower color.

- 33 This diagram shows DNA fingerprints for a child and four adults.



Which adult is **most likely** a parent of the child?

- A Adult 1
- B Adult 2
- C Adult 3
- D Adult 4



- 34 Which transgenic organism has been used to clean up oil spills?
- A bacteria
  - B fungus
  - C jellyfish
  - D paramecia
- 35 An antibiotic which was effective 20 years ago against a specific type of bacterial infection no longer works against the same kind of infection today. Which **best** explains why the antibiotic is no longer as effective as it was 20 years ago?
- A Bacteria resistant to the antibiotic have killed off nonresistant bacteria.
  - B Viruses have changed the structure of the bacteria that causes the infection.
  - C Resistant bacteria have survived and reproduced at a greater rate than nonresistant bacteria.
  - D The human body has developed an immunity to the antibiotics.
- 36 An insecticide kills most of the ants on a plant. Over time, it is determined that the insecticide is not as effective for killing ants. Which statement **best** explains this observation?
- A The ants killed initially by the insecticide were genetically the same as the surviving ants.
  - B The ants killed initially by the insecticide had thinner cell membranes than the surviving ants.
  - C The ants that survived were younger than those that died as a result of the insecticide.
  - D The ants killed by the insecticide and the surviving ants were genetically different.





- 37 Multicellular eukaryotic autotrophs belong to which kingdom?
- A Animalia
  - B Fungi
  - C Plantae
  - D Protista
- 38 Salivary amylase is an enzyme in humans that breaks down starches. What substance would humans have difficulty digesting without this enzyme?
- A lipids
  - B nucleic acids
  - C proteins
  - D carbohydrates
- 39 Which **best** explains why the rate of a biochemical reaction decreases at high temperatures?
- A The activation energy increases.
  - B The shape of the enzyme changes.
  - C The enzyme-substrate complex forms.
  - D The bonds between substrates are broken.



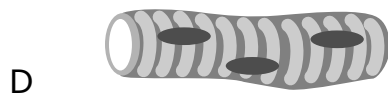
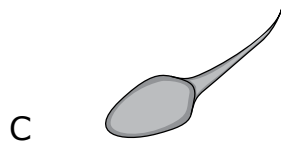
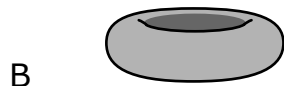
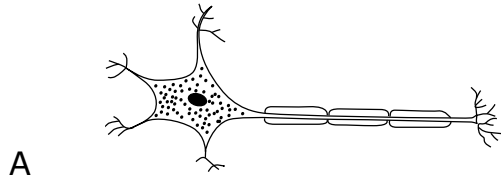
- 40 A contractile vacuole helps protists eliminate excess liquid. This is a “pumping” process which reduces pressure inside the cell and prevents the cell from bursting. What is **most likely** the source of energy for this process?
- A DNA
  - B lipids
  - C ATP
  - D ribosomes
- 41 What do both prokaryotic and eukaryotic cells contain?
- A membrane-bound organelles
  - B linear chromosomes
  - C cytoplasm
  - D a nucleus

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- 42 Which of these cells in the human body is specialized to transport oxygen throughout the body?

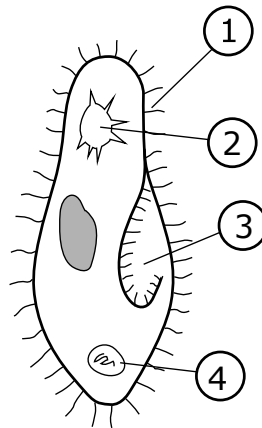


- 43 What would **most likely** be produced when a cell with eight chromosomes undergoes mitosis?

- A two cells with four chromosomes each
- B two cells with eight chromosomes each
- C four cells with four chromosomes each
- D four cells with eight chromosomes each



44 This diagram shows a *Paramecium*, a unicellular protist.



When a chemical is added to the pond water in which the *Paramecium* lives, the *Paramecium* stops moving. Which structure is **most likely** affected?

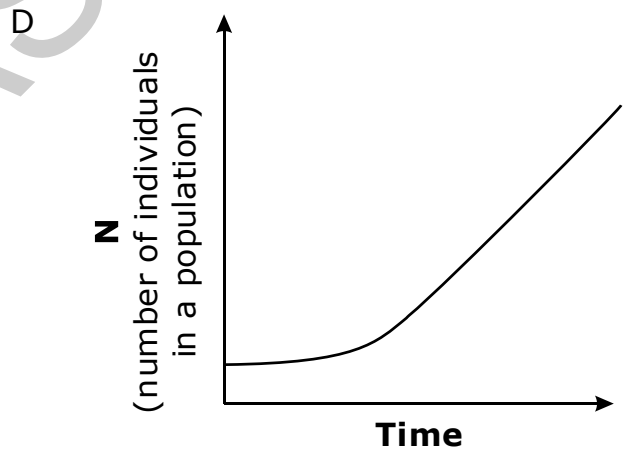
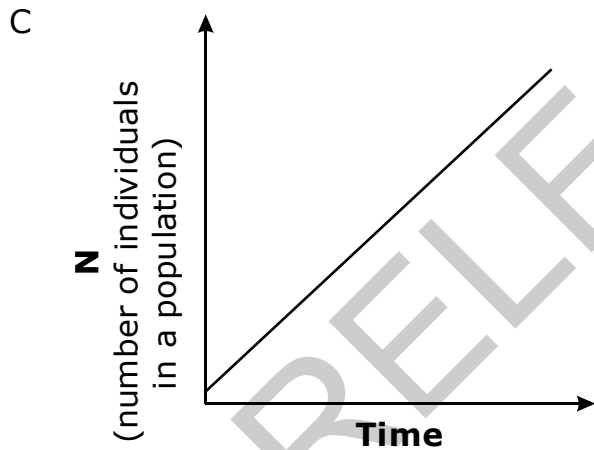
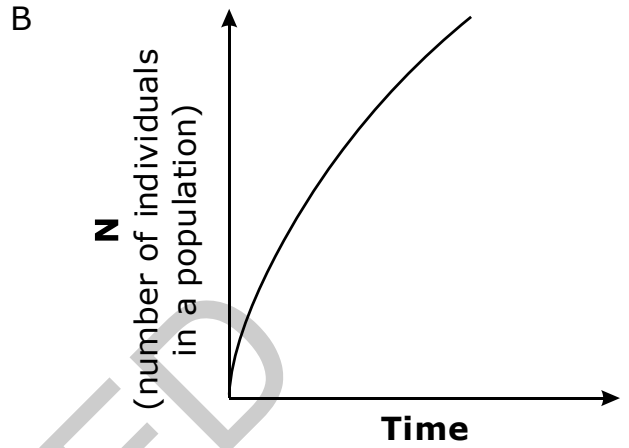
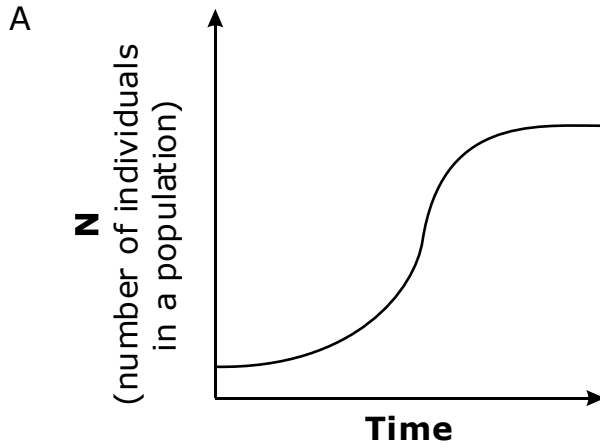
- A (1)
- B (2)
- C (3)
- D (4)

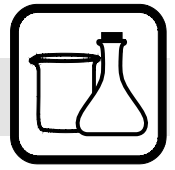
45 Which adaptation do ferns, gymnosperms, and angiosperms have that mosses do not have?

- A chloroplasts
- B flowers
- C stomata
- D vascular tissue



46 Which graph **best** illustrates the growth of a population introduced into an environment with limited resources?





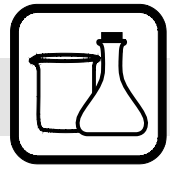
- 47 Which will **most likely** result in a negative growth rate in the human population of a country?
- A The death rate is higher than the birth rate.
  - B The birth rate is higher than the death rate.
  - C The country has improved economic conditions.
  - D The country has made improvements in sanitation.
- 48 Why are many farmers encouraged to plant different types of crops on the same land throughout the year?
- A It prevents insects from destroying crops.
  - B It provides more food to other countries.
  - C It allows for more genetic variation in plants.
  - D It helps to preserve the quality of the soil.
- 49 During translation, what does the tRNA deliver to the ribosomes?
- A amino acids
  - B DNA
  - C mRNA
  - D proteins

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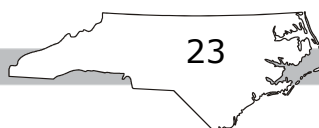




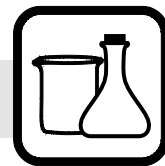
- 50 Which will **most likely** cause an increase in the frequency of genetic mutations in humans?
- A increased exposure to mold spores in the air
  - B increased exposure to the rising levels of atmospheric CO<sub>2</sub>
  - C increased exposure to bacteria in drinking water
  - D increased exposure to X-rays
- 51 Having freckles is dominant over not having freckles. If two individuals heterozygous for freckles have a child, what is the probability the child will have freckles?
- A 0%
  - B 25%
  - C 50%
  - D 75%
- 52 Identical twin girls are separated at birth and cared for by two different families. After twenty years, the twins have different heights and weights. What is **most likely** the cause of these differences?
- A One twin had a genetic condition that prevented her from growing tall.
  - B The DNA of one twin was different from the DNA of the other twin.
  - C Each twin was provided a different diet and physical activities.
  - D The proteins made by one twin were different than the proteins made by the other twin.



- 53 What is the function of a restriction enzyme?
- A to control the movement of proteins into a cell
  - B to regulate blood sugar levels
  - C to produce hormones that regulate digestion
  - D to cut DNA at a specific nucleotide sequence
- 54 Some marine worms and mollusks go through similar larval stages during development. Which can be inferred about their relationship?
- A They share a common ancestor.
  - B They mate with each other.
  - C They compete for a habitat.
  - D They share the same food source.
- 55 Which statement **best** describes natural selection?
- A As the weather changes, organisms that are able to find shelter need less energy to live.
  - B Organisms that eat only plants need less food than organisms that eat animals.
  - C Organisms better adapted to their environment are more likely to reproduce and pass on their traits to their offspring.
  - D Small organisms are more likely to survive than larger organisms.

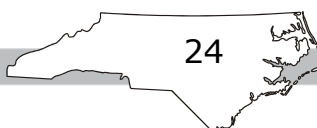






- 56 Some scientists claim recent evidence suggests birds should be reclassified to share more taxonomic groups with dinosaurs. What type of evidence would provide the **best** support for this claim?
- A evidence showing birds shared similar habitats with dinosaurs
  - B evidence showing birds shared similar nutritional requirements as dinosaurs
  - C evidence showing birds shared similar behaviors with dinosaurs
  - D evidence showing birds shared a common genetic history with dinosaurs

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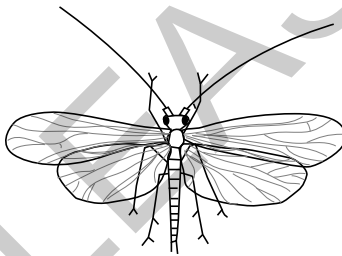




57 This is a dichotomous key for selected arthropods.

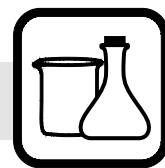
1a	6 legs	go to 2
1b	8 legs	go to 5
2a	wingless	go to 3
2b	has wings	go to 4
3a	3 long tail-like appendages	order <i>Thysanura</i>
3b	no tail-like appendages	order <i>Siphonaptera</i>
4a	1 pair of wings	order <i>Diptera</i>
4b	2 pairs of wings	order <i>Trichoptera</i>
5a	long, segmented abdomen with segmented tail	order <i>Scorpionida</i>
5b	balloon-shaped abdomen with no tail	order <i>Acarina</i>

This diagram shows a caddis fly.



To which order does the caddis fly belong?

- A *Acarina*
- B *Diptera*
- C *Siphonaptera*
- D *Trichoptera*



- 58 Which molecules are joined together to make proteins?
- A fatty acids
  - B nucleic acids
  - C amino acids
  - D acetic acids
- 59 Which word equation **best** represents the process of cellular respiration?
- A carbon dioxide + glucose → oxygen + water
  - B carbon dioxide + water → glucose + oxygen
  - C glucose + oxygen → carbon dioxide + water
  - D oxygen + water → carbon dioxide + glucose
- 60 How does the body of a runner keep up with the demand for energy when cellular oxygen levels are low?
- A through energy production in the mitochondria
  - B through aerobic respiration in the plasma membrane
  - C through ATP produced directly from sunlight
  - D through anaerobic respiration in the cytoplasm

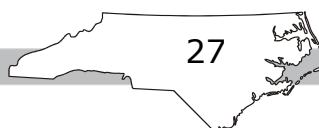


**Directions:**

**This is the end of the Biology test.**

- 1. Look back over your answers for the test questions.**
- 2. Put all of your papers inside your test book and close your test book.**
- 3. Stay quietly in your seat until your teacher tells you that testing is finished.**

RELEASED



**Biology**  
**RELEASED Items**  
**2019–2020**  
**Answer Key**

<b>Item Number</b>	<b>Type</b>	<b>Key</b>	<b>Domain</b>
S1	MC	A	
S2	MC	B	

<b>Item Number</b>	<b>Type</b>	<b>Key</b>	<b>Domain</b>
1	MC	C	Bio.1.1.1
2	MC	D	Bio.1.1.3
3	MC	D	Bio.1.2.1
4	MC	B	Bio.1.2.2
5	MC	A	Bio.2.1.1
6	MC	B	Bio.2.1.3
7	MC	B	Bio.2.2.1
8	MC	C	Bio.2.2.2
9	MC	A	Bio.3.1.1
10	MC	B	Bio.3.1.2
11	MC	C	Bio.3.2.1
12	MC	A	Bio.3.2.3
13	MC	B	Bio.3.3.1
14	MC	A	Bio.3.3.2
15	MC	B	Bio.3.4.1

**BIOLOGY — RELEASED ITEMS**

<b>Item Number</b>	<b>Type</b>	<b>Key</b>	<b>Domain</b>
16	MC	D	Bio.3.4.2
17	MC	A	Bio.3.5.1
18	MC	B	Bio.4.1.1
19	MC	C	Bio.4.1.2
20	MC	B	Bio.4.2.1
21	MC	B	Bio.1.1.1
22	MC	C	Bio.1.1.3
23	MC	B	Bio.1.2.1
24	MC	A	Bio.1.2.2
25	MC	D	Bio.2.1.2
26	MC	A	Bio.2.1.3
27	MC	B	Bio.2.2.1
28	MC	B	Bio.2.2.2
29	MC	A	Bio.3.1.1
30	MC	C	Bio.3.1.2
31	MC	B	Bio.3.2.1
32	MC	D	Bio.3.2.3
33	MC	D	Bio.3.3.1
34	MC	A	Bio.3.3.2
35	MC	C	Bio.3.4.3
36	MC	D	Bio.3.4.3
37	MC	C	Bio.3.5.2
38	MC	D	Bio.4.1.1
39	MC	B	Bio.4.1.3
40	MC	C	Bio.4.2.2

**BIOLOGY — RELEASED ITEMS**

<b>Item Number</b>	<b>Type</b>	<b>Key</b>	<b>Domain</b>
41	MC	C	Bio.1.1.2
42	MC	B	Bio.1.1.3
43	MC	B	Bio.1.2.2
44	MC	A	Bio.1.2.3
45	MC	D	Bio.2.1.2
46	MC	A	Bio.2.1.4
47	MC	A	Bio.2.2.1
48	MC	D	Bio.2.2.2
49	MC	A	Bio.3.1.2
50	MC	D	Bio.3.1.3
51	MC	D	Bio.3.2.2
52	MC	C	Bio.3.2.3
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54	MC	A	Bio.3.4.1
55	MC	C	Bio.3.4.2
56	MC	D	Bio.3.5.1
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