Released Form

Published September 2024

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

In compliance with federal law, the NC Department of Public Instruction administers all state-operated educational programs, employment activities, and admissions without discrimination because of race, religion, national or ethnic origin, color, age, military service, disability, or gender, except where exemption is appropriate and allowed by law.

Inquiries or complaints regarding discrimination issues should be directed to:
Thomas Tomberlin, Senior Director, Office of Educator Preparation and Teacher Licensure, NCDPI
6301 Mail Service Center, Raleigh, NC 27699-6301 / Phone: (984) 236-2114/ Fax: (984) 236-2099

Visit us on the Web: www.dpi.nc.gov

1 How is a DNA molecule arranged?

A double-stranded with alternating deoxyribose and phosphate groups on the sides with adenine, guanine, cytosine, and thymine in the middle

B double-stranded with alternating deoxyribose and phosphate groups on the sides with adenine, guanine, cytosine, and uracil in the middle

C double-stranded with alternating ribose and phosphate groups on the sides with adenine, guanine, cytosine, and thymine in the middle

D double-stranded with alternating ribose and phosphate groups on the sides with adenine, guanine, cytosine, and uracil in the middle

2 A group of students completed two experiments. Their notes are below:

Experiment 1:

- Hydrogen peroxide was poured on a slice of raw potato.
- The peroxide bubbled vigorously.
- The peroxide was broken down into water and oxygen.

Experiment 2:

- A slice of raw potato was heated and then hydrogen peroxide was poured on it.
- There was no visible reaction.

Which statement explains the results of these experiments?

A Heating the potato had no effect on the potato enzymes.

B Heating the potato caused the hydrogen peroxide to evaporate, so the reaction did not occur.

C Heating the potato caused the potato enzymes to release the water and oxygen from the hydrogen peroxide.

D Heating the potato caused a shape change in the potato enzymes, so they could no longer function properly.

3 Hummingbirds thrive in warm, moist climates, and their primary source of food is nectar from flowering plants. A three-year drought is expected in an ecosystem. How will this ***most likely*** affect the hummingbird population in that ecosystem?

A The hummingbirds will increase their reproductive rate in order to ensure enough individuals survive.

B The hummingbirds will decrease their reproductive rate in order to decrease genetic diversity within the population.

C The hummingbirds will immediately adapt to eat new food sources, increasing the overall survival rate of the population.

D The hummingbirds will struggle to find food, and only those that can adapt to new food sources will survive.

4 This chart shows characteristics of four different cells observed under a microscope.

Cell	Cell Wall	Chloroplast	Mitochondria	Ribosome
1			✓	✓
2	✓	✓	✓	✓
3	✓			✓
4	✓		✓	✓

Which is ***most likely*** a prokaryotic cell?

A Cell 1

B Cell 2

C Cell 3

D Cell 4

5 What is the significance of three consecutive nucleotides in DNA?

A They code for one amino acid.

B They code for three amino acids.

C They code for one complete protein.

D They code for three complete proteins.

6 A cell experiences an error during the cell cycle, causing it to go through cytokinesis before mitosis. Which statement ***best*** describes the new cells?

A The new cells will be double the size of the original cell.

B The new cells will have twice as much DNA as the original cell.

C The new cells will have no DNA or organelles but will continue progressing through the cell cycle.

D The new cells will have an incorrect amount of DNA and organelles, and will likely experience cell death.

7 Among birds, some skin cells grow feathers when they mature, while other skin cells grow scales at maturity. Which statement ***best*** explains this difference?

A Skin cells exposed to colder environments grow feathers, while skin cells exposed to wet environments grow scales.

B While all cells have the same DNA, specialized cells express certain traits that produce feathers or scales.

C Skin cells that have feathers are diploid, while skin cells that make scales are haploid.

D Some skin cells have different DNA to build structures like feathers and scales.

8 The table below describes several different types of energy transfer processes.

Energy Transfer in Organisms

Transfer	Starting Energy Type	Ending Energy Type
1	solar	chemical
2	chemical	heat
3	chemical	ATP
4	solar	ATP

Which transfer represents photosynthesis?

A 1

B 2

C 3

D 4

9 Which substance must be present to release energy from glucose?

A hydrogen

B oxygen

C lactic acid

D carbon dioxide

10 Which is an example of the cycling of carbon?

A Animals use the carbon in carbon dioxide for cellular respiration.

B Graphene is formed by causing carbon atoms to align in a particular way.

C Carbon dioxide is trapped in the atmosphere and contributes to the greenhouse effect.

D A plant uses the carbon in carbon dioxide for photosynthesis and is eaten by an animal.

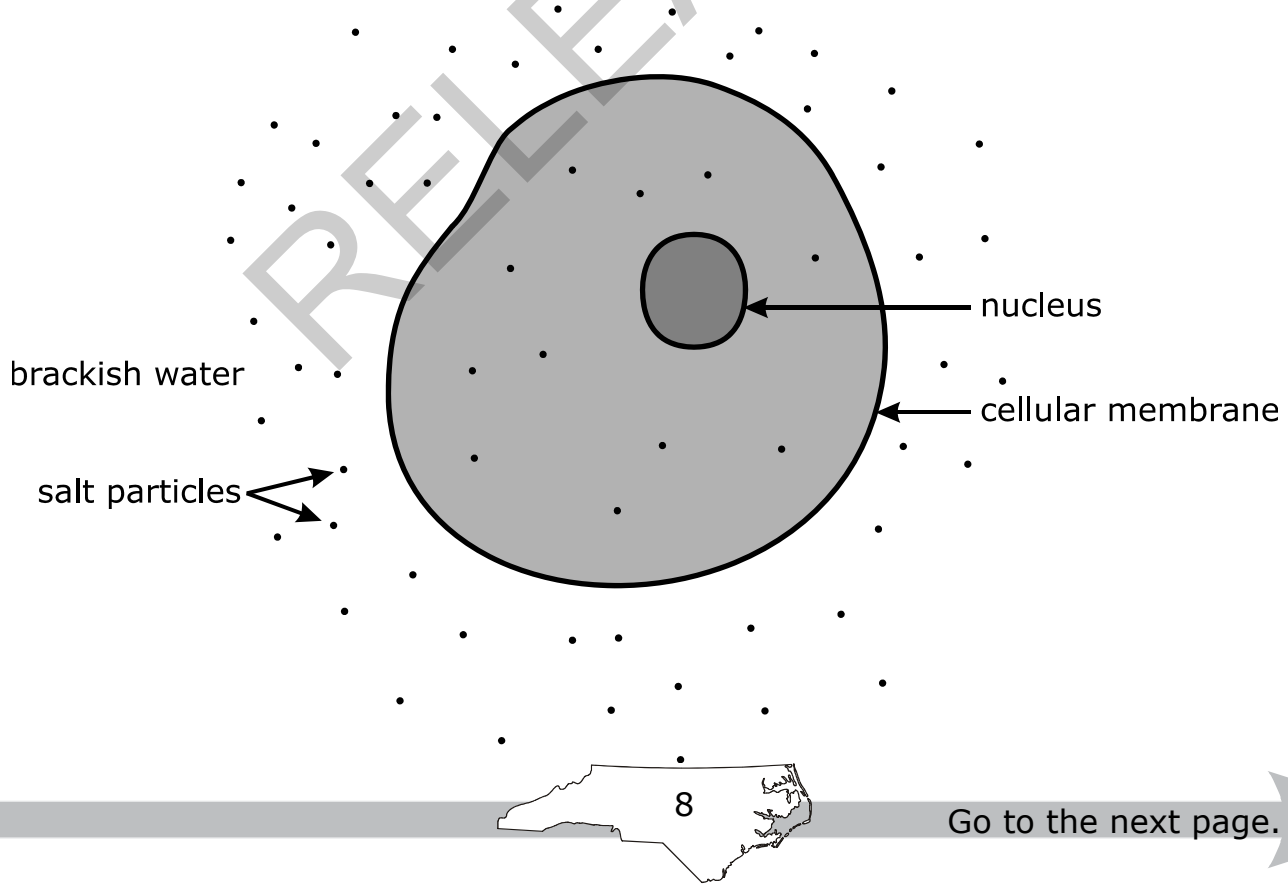
Questions 11–15 are part of an item set. Use the following information to answer the questions.

The Brackish Life

Finger mullets are small fish that play a critical role in North Carolina's estuary ecosystems. Estuaries are ecosystems of change, and life is not always easy for finger mullets there.

An estuary is a brackish water environment. Salinity changes in response to tidal changes. At high tide, the estuary is filled with more ocean water, and the salinity increases. The salinity decreases at low tide, when the ocean waters recede and fresh water from the mouth of the river is allowed in. Organisms that live in this environment are specially adapted for constantly changing salinity levels. When the salinity of the water changes, the cells of the organisms that live there must adjust by either taking in water or releasing it. The diagram below, Figure 1, represents a cell from the gill tissue of a finger mullet in a high-salinity environment.

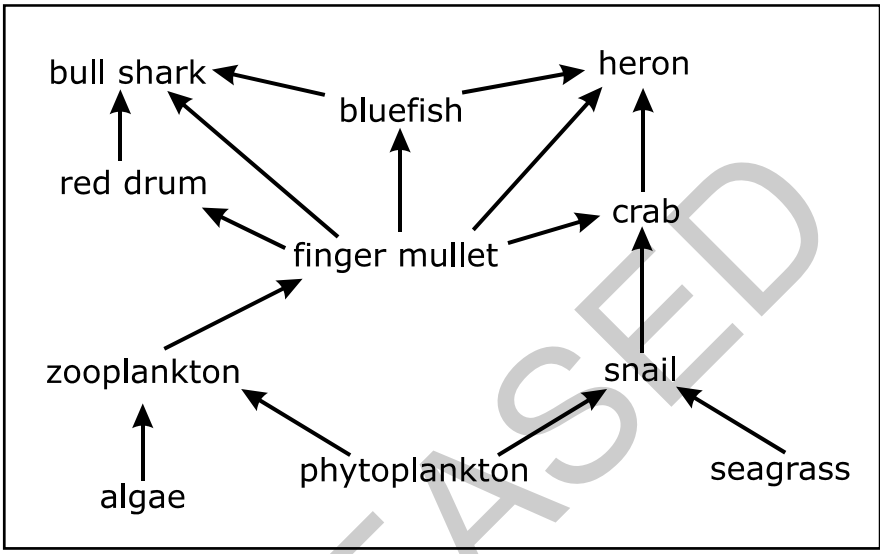
Figure 1: Diagram of a Gill Tissue Cell



Go to the next page.

Along with salt and other nutrients, the tides also sweep organisms into and out of the estuaries. Small invertebrates and fish are carried with the currents, and predators often enter estuary areas as they follow the food. This food web represents some of the complicated relationships among estuary organisms, with the finger mullet at its center.

Figure 2: Estuary Food Web



11 How does the cellular membrane of the finger mullet's cell contribute to homeostasis within the cell?

A It serves as a solid membrane, allowing no materials to pass into and out of the cell.

B It serves as an impermeable membrane, allowing only water to move into and out of the cell.

C It serves as a selectively permeable membrane, allowing water and other materials to move into and out of the cell as needed.

D It serves as a permeable membrane, allowing any material to easily pass into and out of the cell, whether needed or not.

Go to the next page.

12 This is a copy of an online technology enhanced item.

Place (click and drag) the phrases to correctly complete the statement, so that it explains how the cellular membrane shown in Figure 1 helps support the finger mullet in a high-salinity environment. Fill in all of the cells.

	1		2	
The cell membrane		by allowing water		

1	2
maintains homeostasis	to enter the cell.
disrupts homeostasis	to exit the cell.

13 A researcher hypothesizes that water will move out of the cell more quickly when the concentration of salt in the water outside the cell is greater. Which experiment would ***best*** test this hypothesis?

A A researcher places three cells of the same type in varying concentrations of salt water. Then the researcher measures the size of each cell every minute during a 5-minute period of time.

B A researcher places three cells of the same type in the same concentration of salt water. Then the researcher measures the size of each cell every minute during a 5-minute period of time.

C A researcher places cells from three different fish in varying concentrations of salt water. Then the researcher measures the size of each cell at the end of a 5-minute period of time.

D A researcher places cells from three different fish in the same concentration of salt water. Then the researcher measures the size of each cell at the end of a 5-minute period of time.

14 Based on the food web (Figure 2), what effect will a decrease in the algae population have on the finger mullet population in the estuary?

A The finger mullet population will increase because the zooplankton population will decrease.

B The finger mullet population will decrease because the zooplankton population will increase.

C The finger mullet population will decrease because the zooplankton population will decrease.

D The finger mullet population will stay the same because algae is not a direct food source for the mullets.

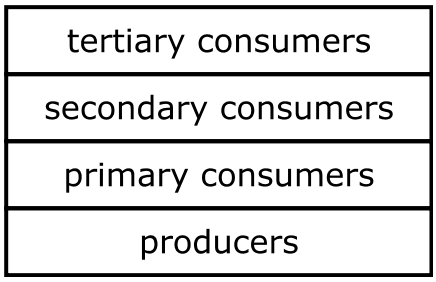
15 This is a copy of an online technology enhanced item.

Based on the food web (Figure 2), which statements are true? Select (click) **three** true statements.

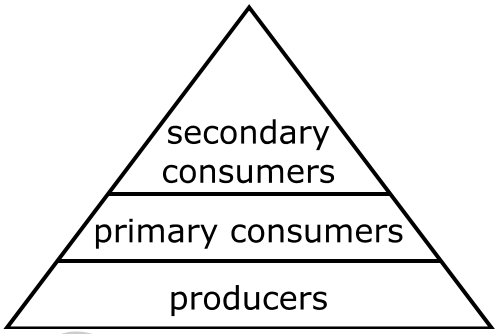
- ☐ The red drum only receives energy by consuming finger mullets.
- ☐ The seagrass obtains its energy from the phytoplankton and algae.
- ☐ The phytoplankton produce oxygen and glucose the heron needs to survive.
- ☐ The phytoplankton produce carbon dioxide and glucose the algae need to survive.
- ☐ The bull shark and heron populations have the most energy available because they are at the top of the food chain.
- ☐ The phytoplankton population has the most energy available because it is at the bottom of the food chain.

16 Which model represents energy transfer within a food web in a stable ecosystem?

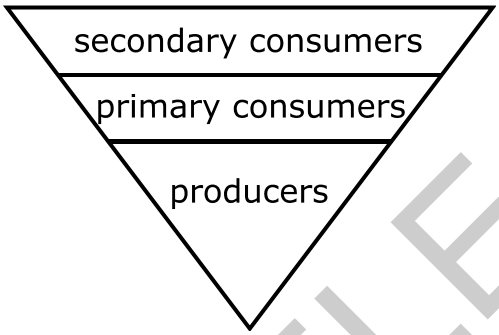
A



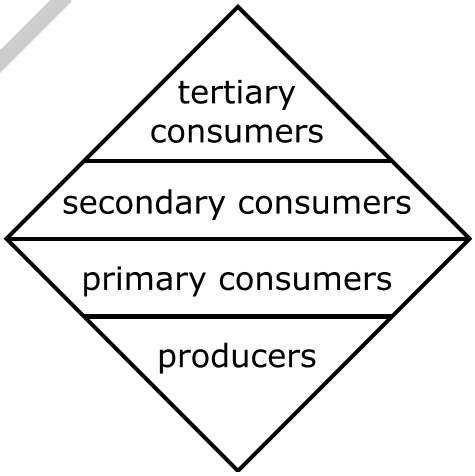
B



C



D



17 What would ***most likely*** occur if a new insect species were introduced into North Carolina's ecosystems?

A The new insect species would maintain the stability of the area.

B The new insect species would have less reproductive success.

C The new insect species would be eaten by natural predators.

D The new insect species would increase competition for food resources.

18 Which human action could ***best*** reduce global climate change?

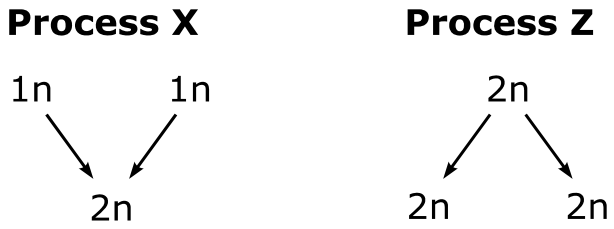
A increasing the ozone layer

B converting to carbon-free energy

C monitoring smog levels in urban areas

D protecting fresh water against pollution

19 These diagrams illustrate two reproductive processes.



Which statement ***best*** explains the processes?

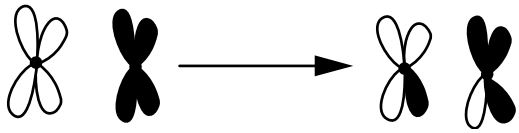
A Process X results in cells that have more genetic variation than those produced through Process Z.

B Process X results in cells that have less genetic variation than those produced through Process Z.

C Process X results in 1 cell that has the exact same DNA as the parent cells, and Process Z results in 2 cells that have the exact same DNA as the parent cell.

D Process X results in 1 cell that has the exact same DNA as the parent cells, while Process Z results in 2 cells that have different DNA from the parent cell.

20 This diagram shows homologous chromosomes.



Which choice ***best*** describes the source of genetic variation?

A crossing over

B gene mutation

C nondisjunction

D independent assortment

21 A student crosses two plants.

- Plant 1 has red petals (RR).
- Plant 2 has white petals (WW).
- All of the offspring plants have pink petals (RW).

Which type of inheritance do these plants exhibit?

A polygenic

B codominant

C incompletely dominant

D autosomal recessive

22 Nicolette conducted a study of neck length in giraffes. Neck length for the giraffes ranged from 5.9 feet to 7.9 feet. What can ***most likely*** be inferred from the study?

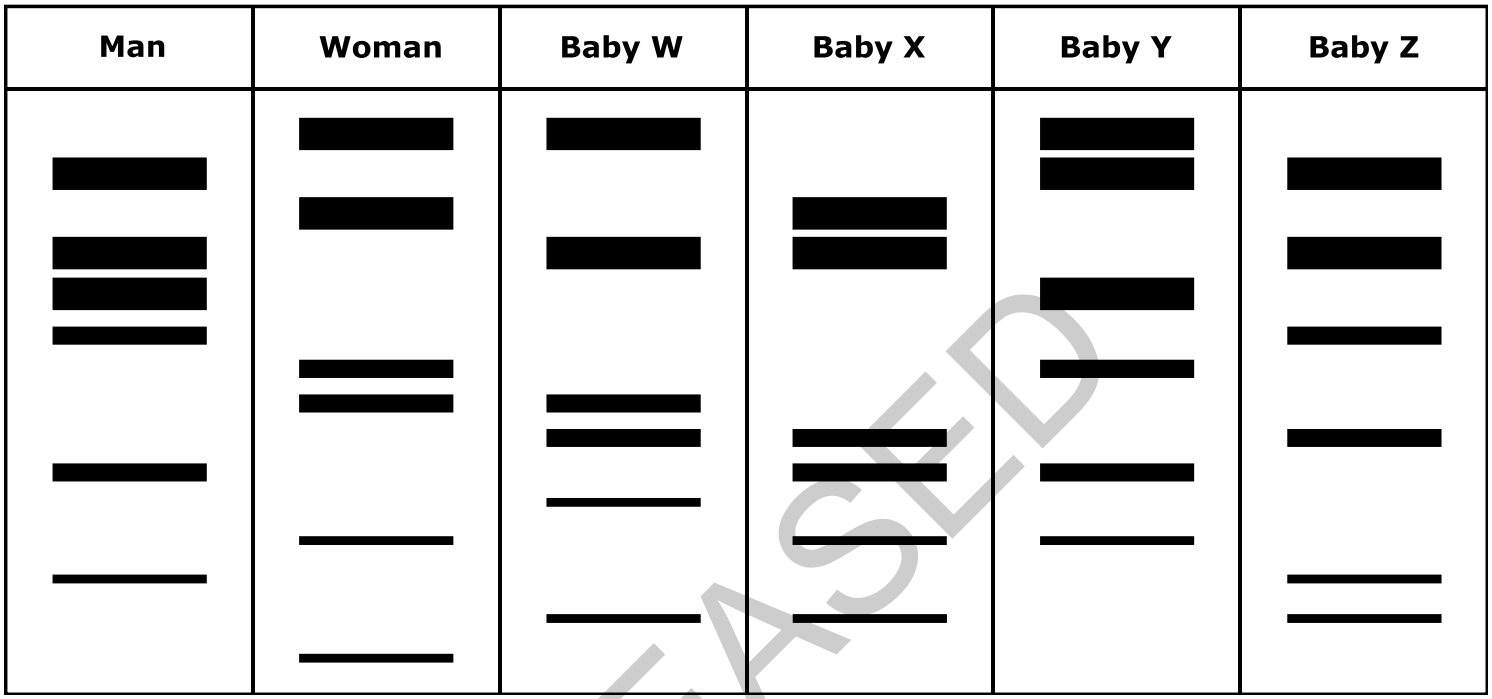
A Neck length is a sex-linked trait.

B The trait for neck length is controlled by multiple genes.

C Neck length is a codominant trait.

D The trait for neck length is controlled by dominant alleles.

23 This diagram represents the DNA fingerprint for a man, a woman, and four different babies, one of which is the man and woman's baby.



Based on the DNA fingerprints, which is ***most likely*** the man and woman's baby?

A Baby W

B Baby X

C Baby Y

D Baby Z

24 A farmer reads this information:

- A bacterium has a gene that allows it to create pesticide.
- The gene has been transferred into a corn plant, allowing the corn plant to produce pesticide.

Why might a farmer choose to plant genetically engineered corn?

A to spread mutations from the corn to other crops

B to reduce chemical use during the growing season

C to allow the fields to be used for more than one season

D to decrease the amount of land needed to grow the corn crop

25 A patient takes medication to treat strep throat caused by the bacteria *Streptococcus pyogenes*. Which statement ***best*** describes the reproductive success of the bacteria after the patient has taken the medication for a period of time?

A The bacteria may develop resistance to the medication and continue to reproduce.

B The patient will require a vaccination to prevent the bacteria from reproducing.

C The patient's immune system will produce antibodies that prevent the bacteria's reproduction.

D The medication may serve as an energy source and cause rapid reproduction of the bacteria.

26 Which information provides the ***most reliable*** evidence of common ancestry for four species of mammals?

A embryological forms

B nucleotide sequences

C anatomical structures

D homologous structures

27 This is a copy of an online technology enhanced item.

A marine biology program has monitored a population of sharks in the southern Atlantic Ocean for over 100 years. The population has been very successful over this period of time. The biologists hypothesize that natural selection has been acting on the population, increasing its ability to thrive. Select (click) the ***three*** observations that ***best*** support the hypothesis.

- ☐ The sharks have been able to adapt to changes in their environment.
- ☐ The sharks have been unable to adapt to changes in their environment.
- ☐ Individuals are very similar to one another as a result of genetic continuity.
- ☐ Individuals differ from one another as a result of genetic diversity.
- ☐ The average number of births has been less than the average number of deaths in the population.
- ☐ The average number of births has been greater than the average number of deaths in the population.

28 A population of rabbits lives in a forest. Some of the rabbits have a mutation that results in extra-powerful hind legs. What will ***most likely*** happen to the population of rabbits if a population of wolves is introduced to the forest?

A The number of rabbits with normal legs will increase over time because their DNA is not mutated.

B The number of rabbits with powerful legs will increase over time because they can better escape the wolves.

C The total number of rabbits will decrease over time because all rabbits have an equal chance of getting eaten.

D The total number of rabbits will decrease over time because most rabbits will have induced mutations that reduce their survival rate.

29 An enzyme has an optimal temperature of 25°C. During an experiment, which action would ***most likely*** increase the rate of the reaction?

A decreasing the light intensity

B increasing the temperature above 25°C

C decreasing the amount of substrate available

D increasing the temperature from 15°C to 25°C

30 This is a copy of an online technology enhanced item.

Stem

This is a dichotomous key used to identify coniferous tree species.

Step 1	a. more than 5 needles in each cluster b. 2–5 needles in each cluster	*Larix laricina* Go to 2.
Step 2	a. 5 needles in each cluster b. 2 needles in each cluster	*Pinus strobus* Go to 3.
Step 3	a. long needles clustered in pairs b. short needles clustered in pairs	*Pinus resinosa* *Pinus banksiana*

These diagrams show four different species of coniferous tree.

Species 1

Species 2

Species 3

Species 4

Using the dichotomous key and the tree images, place (click and drag) the characteristics of each species in the correct box. Then, place (click and drag) the scientific names that identify each species. Fill in all of the cells.

Species	Characteristic	Scientific Name
1		*Larix laricina*
2	five needles in each cluster	
3		
4		*Pinus banksiana*

short needles clustered in pairs	long needles clustered in pairs	more than 5 needles in each cluster
Pinus resinosa	***Pinus strobus***	

31 A nuclear membrane with pores surrounds a cell's nucleus. How would a nucleus that lacks pores affect its function in the cell?

A Messenger RNA would not be able to leave the nucleus to provide the code to make proteins.

B Messenger RNA would not be able to leave the nucleus to make carbohydrates.

C DNA would not be able to leave the nucleus to be used to make proteins.

D DNA would not be able to replicate or leave the nucleus.

32 Which action takes place on a ribosome, resulting in synthesis of a protein?

A creation of mRNA from one strand of the DNA double helix

B transformation of single-stranded mRNA into double-stranded tRNA

C breakdown of polypeptide chain into amino acids and nitrogenous bases

D attachment of the mRNA to tRNA molecules which are coupled to specific amino acids

33 The plants in an ecosystem complete both photosynthesis and cellular respiration. How do the two processes differ from one another in terms of energy?

A Photosynthesis stores solar energy in the chemical bonds of carbohydrates, while cellular respiration releases energy from the chemical bonds in carbohydrates to produce ATP molecules.

B Photosynthesis releases energy from the chemical bonds in carbohydrates to produce ATP molecules, while cellular respiration stores solar energy in the chemical bonds of carbohydrates.

C Photosynthesis stores solar energy in ATP molecules for cellular use, while cellular respiration produces ATP by breaking inorganic chemical bonds.

D Photosynthesis stores solar energy in high-energy chemical bonds of inorganic compounds, while cellular respiration releases solar energy to heat cellular structures.

34 A biologist analyzed a sample of pond water and recorded the different organisms in the sample. This table shows the number of each organism in the pond sample.

Organisms	Number
phytoplankton	50,000–70,000
frogs	50
insect larvae	800–900
trout	3

Why does the sample contain more phytoplankton than trout?

A A trout requires less energy than a phytoplankton organism.

B Phytoplankton receive energy from the other organisms.

C Insect larvae obtain energy directly from the sun and transfer energy to the other organisms.

D Phytoplankton obtain energy directly from the sun and transfer energy to the other organisms.

35 How would a longer snow season ***most likely*** affect the populations of red and white foxes living in the same forest ecosystem?

A Red foxes would have a greater advantage, so their population size would increase, while the white fox population size would decrease.

B White foxes would have a greater advantage, so their population size would increase, while the red fox population size would decrease.

C White foxes would have a lesser advantage, so their population size would increase, while the red fox population size would remain the same.

D Red foxes would have a lesser advantage, so their population size would increase, while the white fox population size would remain the same.

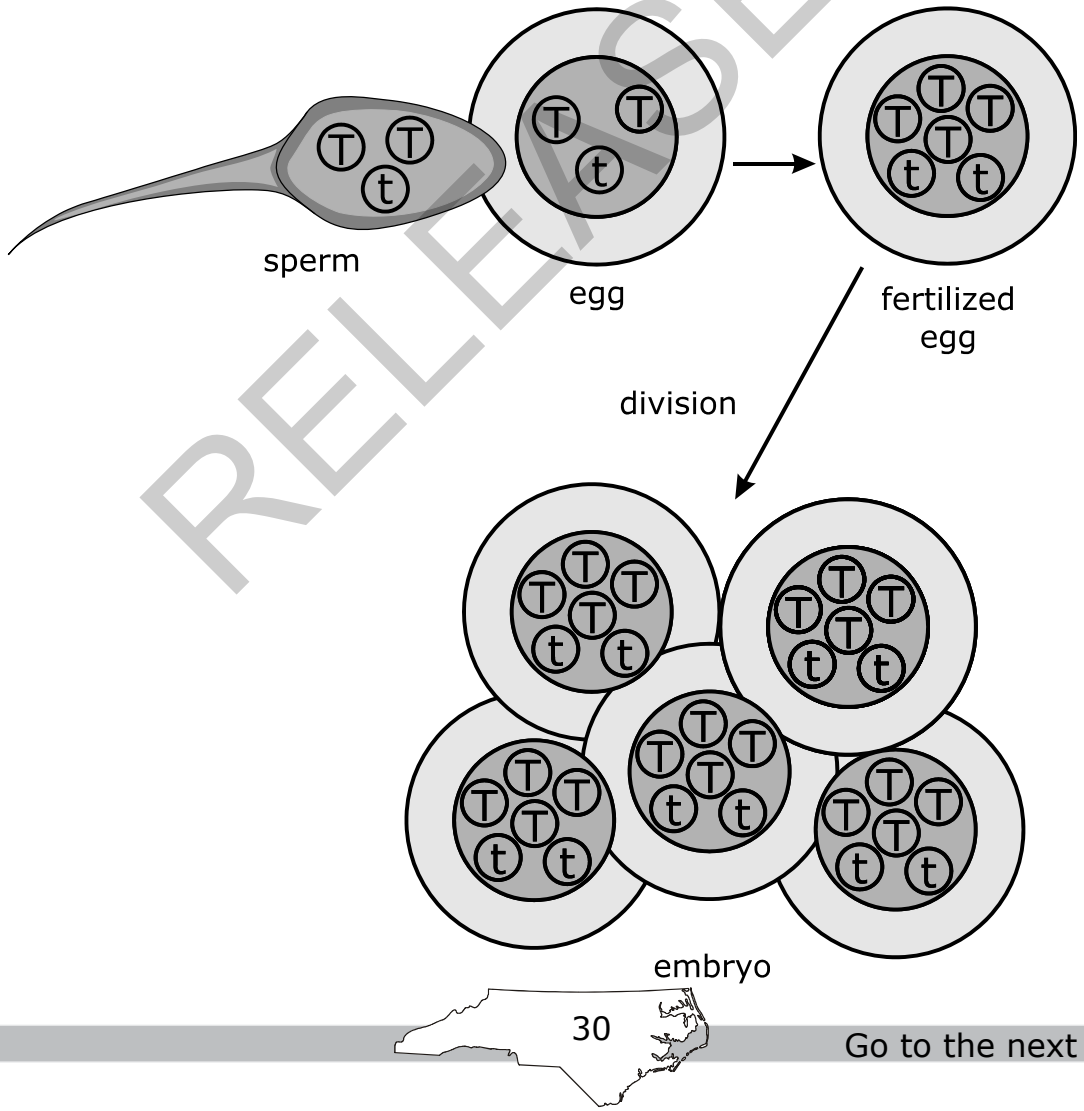
Questions 36–40 are part of an item set. Use the following information to answer the questions.

Do You Play Basketball?

"Wow! You are tall. Do you play basketball?" Judd gets asked this question at least once a day. At 6'7" he is very tall. Judd's dad is tall (6'3"), and Judd's mom is above average height for women (5'9"). How can it be that Judd is taller than both of his parents?

Human height is controlled by at least three genes, each with two alleles: dominant (T) and recessive (t), where T is expressed as tall height. The diagram below (Figure 1) shows how Judd's parents' genes for height might have resulted in Judd's genotype for height.

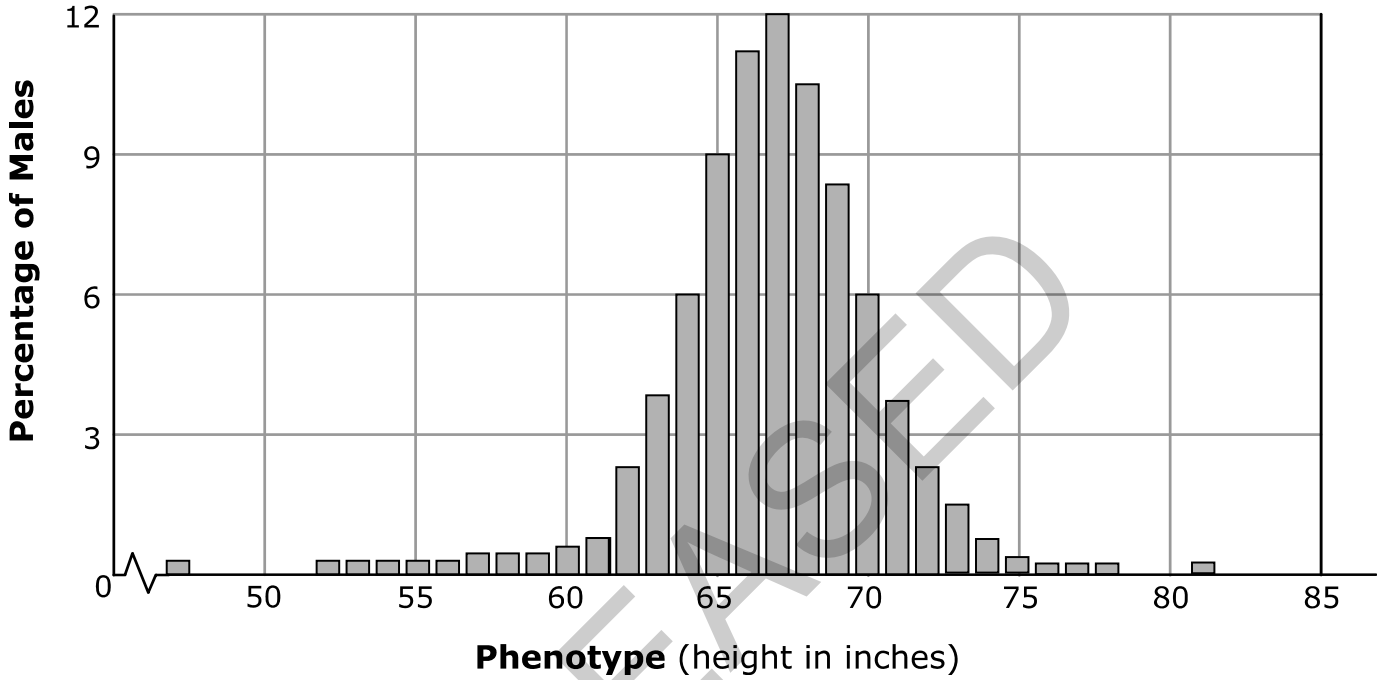
Figure 1: Combination of Genes through Fertilization



Go to the next page.

Multiple genotypes for human height are possible, so there are many possible variations in phenotypes. The range of phenotypes for human height in males is shown in Figure 2.

Figure 2: Range of Phenotypes for Human Height in Males



Go to the next page.

36 This is a copy of an online technology enhanced item.

Select (click and drag) the choices that best complete the statement. Fill in all of the cells.

The cells of the embryo are [1] because of [2]

1	2
diploid	fertilization.
haploid	genetic recombination.
	meiotic division.

37 Judd has a 20-year-old sister. Her height is 5’4”. Which statement ***best*** explains why his sister is shorter than him and their parents?

A She received no genes for height from her mother.

B She received no genes for height from either parent.

C The embryo that became Judd’s sister had a higher percentage of recessive alleles than the embryo that became Judd.

D The embryo that became Judd’s sister had a higher percentage of dominant alleles than the embryo that became Judd.

38 Which statement ***best*** describes the trait for height, based on Figure 2?

A Height is a sex-linked trait.

B Height is a polygenic trait.

C Height has no genotypic expression.

D Height follows a simple Mendelian inheritance pattern.

39 Some of the phenotypes for male height are identified by two distinct ranges.

- Range 1: 50-55 inches
- Range 2: 75-80 inches

Which choice ***best*** describes how these height ranges are represented in Figure 2?

A Both Range 1 and Range 2 represent rare phenotypes for male height.

B Both Range 1 and Range 2 represent common phenotypes for male height.

C Range 1 represents a rare phenotype, while Range 2 represents a common phenotype for male height.

D Range 1 represents a common phenotype, while Range 2 represents a rare phenotype for male height.

Go to the next page.

40 Judd visits an exhibit at a local museum. A display there describes a recent research study where people from several distinct neighborhoods in a large U.S. city were surveyed for height. The display features the data table below.

Neighborhood	Number of People Surveyed	Average Height	Demographics*
1	136	5’10”	high socioeconomic status, positive health
2	188	5’6”	low socioeconomic status, negative health
3	176	5’7”	low socioeconomic status, moderate health

*Evaluation of socioeconomic status includes income, social standing, education level, and occupation. Evaluation of health includes factors such as frequency of illness, nutritional status, and access to health care.

What can ***most likely*** be inferred from the research data?

A The trait for height results from mutational changes in a person’s DNA sequence.

B The trait for height can be influenced by the environment in which a person lives.

C The trait for height results from genetic diversity in the neighborhood’s gene pool.

D The trait for height is influenced by the heights of other people living in the environment.

41 The bacterium *Yersinia pestis* is responsible for causing bubonic plague in the 1300s. Survivors of plague showed an increased frequency of a mutation for a cell receptor protein which prevented infection from the bacterium.

Which statement ***best*** explains the genetic change in Europe's population after the bubonic plague outbreak?

A The number of people with the mutation increased because of the use of a vaccine.

B The number of people with the mutation increased because there was an immediate increase in variation among the population.

C The number of people with the mutation increased because the mutated receptor protein was selected for during the outbreak.

D The number of people with the mutation increased because the mutated receptor protein was selected against during the outbreak.

42 Modern dairy cows are different from their ancestors. They produce larger volumes of milk with higher protein and fat content. Which statement ***best*** explains this?

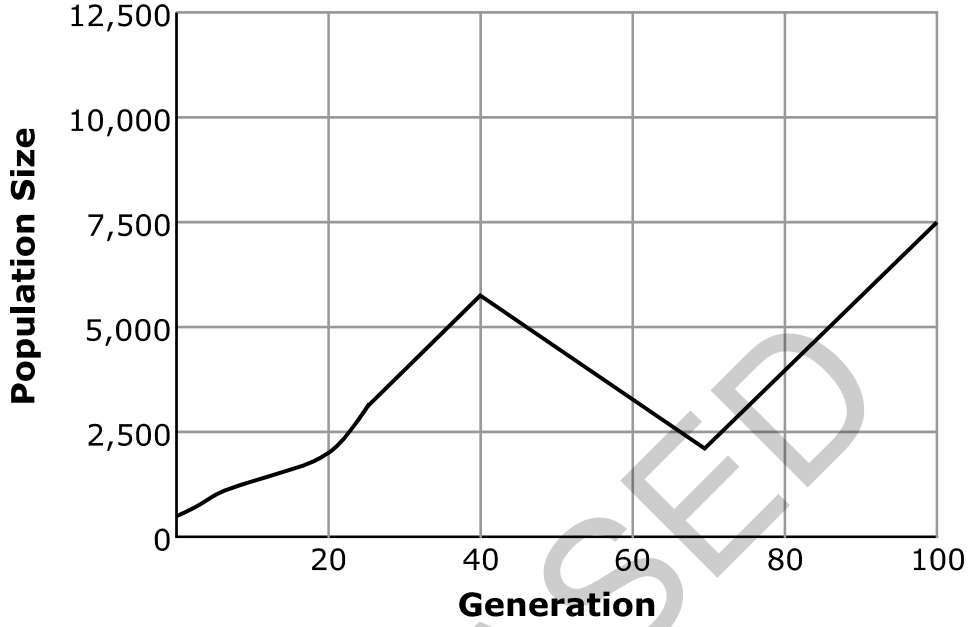
A Dairy cows within the species have interbred, resulting in low genetic diversity among offspring.

B Dairy cows within the species have interbred, resulting in high genetic diversity among offspring.

C Humans have used artificial selection to encourage transmission of traits associated with high-quality milk production from parent cows to offspring.

D Humans have used natural selection to encourage transmission of traits associated with high-quality milk production from parent cows to offspring.

43 The graph below represents the size of a bacteria population.



A scientist introduces an antibiotic to the population at Generation 40. Which statement ***best*** explains the population increase after Generation 70?

A Some bacteria adapted by developing resistance to the antibiotic, allowing them to survive and reproduce.

B All bacteria adapted by developing resistance to the antibiotic, preventing them from surviving and reproducing.

C The antibiotic prevented mutations in the DNA of some bacteria, allowing them to survive and reproduce.

D The antibiotic caused a mutation in the DNA of all bacteria, preventing them from surviving and reproducing.

44 How could a scientist ***best*** determine whether a fungus is a new species?

A by comparing the physical appearance of the fungus to a known fungal species

B by comparing the epidermal cells of the fungus to a known fungal species

C by comparing the feeding habits of the fungus to a known fungal species

D by comparing the DNA sequence of the fungus to a known fungal species

45 How might mutations contribute to natural selection?

A They occur after a natural disaster has changed a population's environment.

B They result when organisms observe traits of other successful populations.

C They occur in somatic cells and can be passed to offspring.

D They add variations to the gene pool of a population.

46 An animal was cloned in a lab, producing five genetically identical offspring. The offspring were then sent to five different zoos. After five years, scientists collected data on these animals and found a variation in their heights. What is the ***most likely*** explanation for the data?

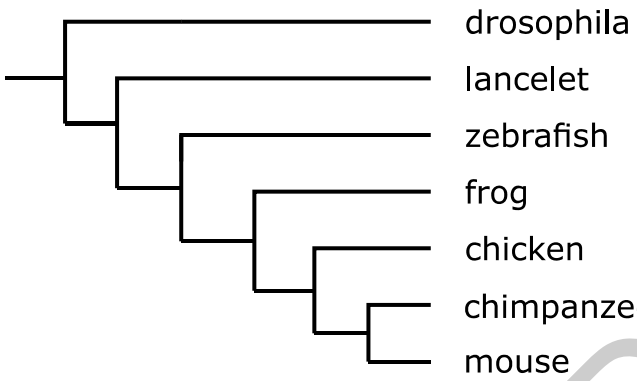
A Each clone experienced mutations with no effect on its genes.

B Each clone experienced a different environment with no effect on its genes.

C Each clone experienced the same mutations, which influenced the expression of its genes.

D Each clone experienced a different environment, which influenced the expression of its genes.

47 This is a phylogenetic tree.



Based on the phylogenetic tree, which two organisms share the ***most recent*** common ancestor?

A drosophila and lancelet

B frog and chicken

C chicken and mouse

D chimpanzee and frog

48 Which statement ***best*** explains the relationship between glucose, cellular respiration, and photosynthesis?

A Photosynthesis uses the glucose produced by cellular respiration to make energy.

B Photosynthesis and cellular respiration are both used to produce glucose and energy.

C Photosynthesis produces the glucose used in cellular respiration to make energy.

D Photosynthesis and cellular respiration both consume glucose to produce energy.

49 Kudzu was brought into the southeastern United States in the late 1800s and was encouraged for use in controlling erosion. However, in 1972 the USDA declared kudzu to be a weed. Which statement ***best*** explains this change in thought?

A Kudzu grew faster than native species and reduced biodiversity in the area in which it lived.

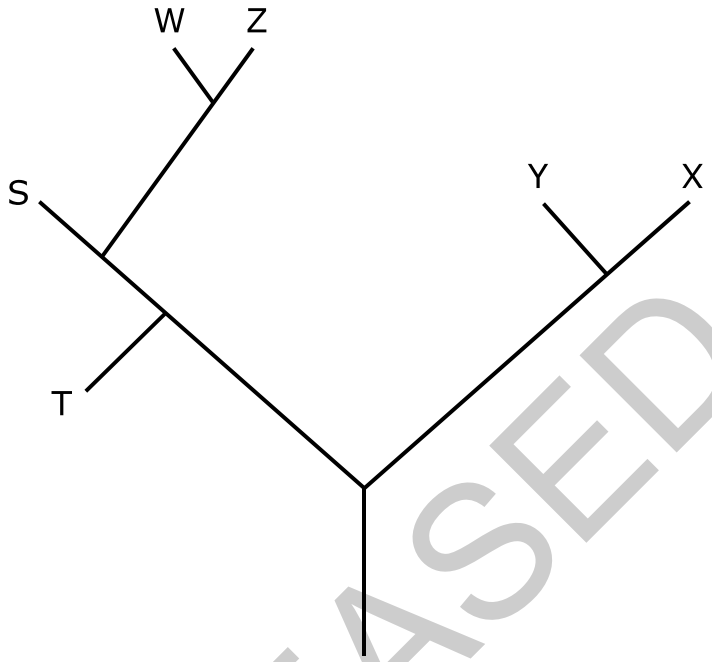
B Kudzu formed a mutualistic relationship with native plants and increased biodiversity in the area in which it thrived.

C Kudzu emitted an odd odor and people disliked how it looked on their property.

D Kudzu brought diseases from Japan that infected native plants.

Go to the next page.

50 Fossils were discovered by scientists for each of the organisms in this phylogenetic tree.



Which organism is most likely the ***oldest***?

A organism S

B organism T

C organism W

D organism Y

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.**

STOP

Biology
Released Form
2024
Answer Key

Table 1

Question Number	Question Type[1]	Key	Objective
1	MC	A	LS.Bio.1.1
2	MC	D	LS.Bio.1.2
3	MC	D	LS.Bio.10.1
4	MC	C	LS.Bio.1.4
5	MC	A	LS.Bio.1.5
6	MC	D	LS.Bio.2.1
7	MC	B	LS.Bio.2.2
8	MC	A	LS.Bio.3.2
9	MC	B	LS.Bio.3.3
10	MC	D	LS.Bio.4.1
11	MC	C	LS.Bio.1.3
12	TD	See Table 2	LS.Bio.3.1
13	MC	A	LS.Bio.3.1
14	MC	C	LS.Bio.4.2
15	MS	See Table 2	LS.Bio.4.2
16	MC	B	LS.Bio.4.2
17	MC	D	LS.Bio.5.1

Go to the next page.

Question Number	Question Type[1]	Key	Objective
18	MC	B	LS.Bio.5.2
19	MC	A	LS.Bio.6.1
20	MC	A	LS.Bio.6.2
21	MC	C	LS.Bio.7.1
22	MC	B	LS.Bio.7.2
23	MC	C	LS.Bio.8.1
24	MC	B	LS.Bio.8.2
25	MC	A	LS.Bio.9.1
26	MC	B	LS.Bio.9.2
27	MS	See Table 2	LS.Bio.9.3
28	MC	B	LS.Bio.9.4
29	MC	D	LS.Bio.1.2
30	DD	See Table 2	LS.Bio.10.2
31	MC	A	LS.Bio.1.3
32	MC	D	LS.Bio.1.5
33	MC	A	LS.Bio.4.1
34	MC	D	LS.Bio.4.2
35	MC	B	LS.Bio.5.1
36	TD	See Table 2	LS.Bio.6.1
37	MC	C	LS.Bio.6.2
38	MC	B	LS.Bio.7.2
39	MC	A	LS.Bio.7.2

Go to the next page.

Question Number	Question Type[1]	Key	Objective
40	MC	B	LS.Bio.7.3
41	MC	C	LS.Bio.9.4
42	MC	C	LS.Bio.8.2
43	MC	A	LS.Bio.9.1
44	MC	D	LS.Bio.9.2
45	MC	D	LS.Bio.9.3
46	MC	D	LS.Bio.7.3
47	MC	C	LS.Bio.10.2
48	MC	C	LS.Bio.4.1
49	MC	A	LS.Bio.5.1
50	MC	B	LS.Bio.10.2

[1]Question Type:
MC = multiple choice
DD = drag and drop
MS = multiselect
TD = targeted drop

Go to the next page.

Table 2

Question	Technology Enhanced Item Solution
12	maintains homeostasis; to exit the cell.
15	The red drum only receives energy by consuming finger mullets. The phytoplankton produce oxygen and glucose the heron needs to survive. The phytoplankton population has the most energy available because it is at the bottom of the food chain.
27	The sharks have been able to adapt to changes in their environment. Individuals differ from one another as a result of genetic diversity. The average number of births has been greater than the average number of deaths in the population.
30	1 more than 5 needles in each cluster 2 *Pinus strobus* 3 long needles clustered in pairs; *Pinus resinosa* 4 short needles clustered in pairs
36	diploid; fertilization.