

Computer-Based Released Items

High School Biology MCAS

Spring 2025

The spring 2025 High School Biology test was administered in two formats: a computer-based version and a paper-based version. Most students took the computer-based test. The paper-based test was offered as an accommodation for eligible students who were unable to use a computer. More information can be found on the MCAS Test Administration Resources page at www.doe.mass.edu/mcas/admin.html.

The Department of Elementary and Secondary Education is releasing items from both versions of the test to provide information about the knowledge and skills that students are expected to demonstrate.

- Released items from the **computer-based test** are available online at mcas.onlinehelp.cognia.org/released-items.
- Released items from the **paper-based test** are available in PDF format on the Department's website at www.doe.mass.edu/mcas/release.html.

This document provides information about each released item from the *computer-based test*, including the following: reporting category, standard covered, science practice category, item type, item description, and correct answer (for selected-response items only). Sample responses and scoring guidelines for constructed-response items will be posted at www.doe.mass.edu/mcas/student/.

A Note about Testing Mode

Most of the operational items on the Biology test were the same, regardless of whether a student took the computer-based version or the paper-based version. In places where a technology-enhanced item was used on the computer-based test, an adapted version of the item was created for use on the paper test. These adapted paper items were multiple-choice or multiple-select items that tested the same science content and assessed the same standard as the technology-enhanced item.

High School Biology
Spring 2025 Computer-Based Released Operational Items

CBT Item No.	Reporting Category	Standard	Science Practice Category	Item Type*	Item Description	Correct Answer (SR)**
1	<i>Heredity</i>	HS.LS.3.2	None	SR	Explain how a mutation that causes a condition most likely was introduced into a population.	A
2	<i>Molecules to Organisms</i>	HS.LS.1.2	None	SR	Describe a problem that results when fluid accumulates in alveoli.	D
3	<i>Ecology</i>	HS.LS.2.5	C. Evidence, Reasoning, and Modeling	SR	Use a carbon cycle model to determine which actions store or release carbon.	<i>see page 5</i>
4	<i>Heredity</i>	HS.LS.3.1	None	SR	Describe what happens during fertilization.	B
5	<i>Molecules to Organisms</i>	HS.LS.1.3	None	SR	Describe the function of lysosomes in cells.	C
6	<i>Molecules to Organisms</i>	HS.LS.1.7	B. Mathematics and Data	SR	Describe the importance of oxygen for a marine organism and determine the graph that shows how the amount of carbon dioxide produced by an organism changes as the organism swims underwater.	D;C
7	<i>Heredity</i>	HS.LS.3.4	C. Evidence, Reasoning, and Modeling	SR	Describe how certain conditions are influenced by the interaction of genetics and the environment.	D
8	<i>Molecules to Organisms</i>	HS.LS.1.6	C. Evidence, Reasoning, and Modeling	SR	Identify a type of organic molecule based on the chemical structure of its monomer.	B
9	<i>Molecules to Organisms</i>	HS.LS.1.2	C. Evidence, Reasoning, and Modeling	SR	Determine which organ is directly affected by a specific hormone.	B
10	<i>Heredity</i>	HS.LS.3.1	B. Mathematics and Data	SR	Calculate the approximate mass of DNA in a human gamete.	A
11	<i>Molecules to Organisms</i>	HS.LS.1.1	C. Evidence, Reasoning, and Modeling	SR	Interpret a model to describe the purpose of the cellular process it represents.	<i>see page 5</i>
12	<i>Ecology</i>	HS.LS.2.7	C. Evidence, Reasoning, and Modeling	SR	Explain how an introduced plant most likely affected native plants.	A
13	<i>Ecology</i>	HS.LS.2.1	C. Evidence, Reasoning, and Modeling	SR	Interpret a food web to explain how a change in the population of one organism affected the population of a different organism.	B
14	<i>Evolution</i>	HS.LS.4.5	C. Evidence, Reasoning, and Modeling	SR	Explain a change in the genetic diversity of a population over a specific time period.	C
15	<i>Ecology</i>	HS.LS.2.4	B. Mathematics and Data	SR	Complete an energy pyramid based on a food web and calculate the percentage of energy stored in the trophic level of a specific population.	Part A: <i>see page 5</i> Part B: C
16	<i>Ecology</i>	HS.LS.2.7	C. Evidence, Reasoning, and Modeling	CR	Explain how the reintroduction of a species affected a native species, describe one way an ecosystem benefited from the removal of an invasive species, explain how removing the invasive species affected the native species, and explain how an action humans could take could help the native species.	

CBT Item No.	Reporting Category	Standard	Science Practice Category	Item Type*	Item Description	Correct Answer (SR)**
17	<i>Evolution</i>	HS.LS.4.4	A. Investigations and Questioning	SR	Determine what information about a species of bacteria would help scientists estimate how quickly the bacteria could adapt to an environmental change.	A,E
18	<i>Molecules to Organisms</i>	HS.LS.1.1	C. Evidence, Reasoning, and Modeling	SR	Complete a model to show the molecules and processes involved in protein synthesis.	<i>see page 6</i>
19	<i>Heredity</i>	HS.LS.3.1	None	SR	Interpret given information to determine the cellular process in which crossing over occurs.	B
20	<i>Evolution</i>	HS.LS.4.5	B. Mathematics and Data	CR	Identify environmental factors that could result in differences in plant height, describe evidence from an investigation to show if genetics plays a role in plant height, identify the process that causes adaptations, and describe an investigation to determine if two populations are the same species.	
21	<i>Heredity</i>	HS.LS.3.3	B. Mathematics and Data	CR	Identify genotypes of a phenotype, complete a Punnett square of a given cross, determine the percentage of offspring with the phenotype, and explain why the frequency of alleles for the phenotype would be more or less common in a certain environment.	
22	<i>Molecules to Organisms</i>	HS.LS.1.3	None	SR	Interpret given information to explain how homeostasis helps to regulate body temperature.	D
23	<i>Evolution</i>	HS.LS.4.1	C. Evidence, Reasoning, and Modeling	SR	Analyze a cladogram to determine when a trait was first observed.	<i>see page 6</i>
24	<i>Molecules to Organisms</i>	HS.LS.1.3	C. Evidence, Reasoning, and Modeling	SR	Explain the expected outcome of an investigation involving the passive transport of water molecules across a membrane.	<i>see page 6</i>
25	<i>Heredity</i>	HS.LS.3.3	B. Mathematics and Data	SR	Use a data table to determine the pattern of inheritance for a trait and the fraction of offspring that are expected to inherit a specific phenotype for a given cross.	Part A: <i>see page 6</i> Part B: B
26	<i>Evolution</i>	HS.LS.4.2	C. Evidence, Reasoning, and Modeling	SR	Describe the role of natural selection in favoring a specific trait in an area where the geographic ranges of two similar species overlap.	D
27	<i>Heredity</i>	HS.LS.3.2	C. Evidence, Reasoning, and Modeling	SR	Interpret a model to identify a cellular process and describe an outcome of the process.	<i>see page 6</i>
28	<i>Molecules to Organisms</i>	HS.LS.1.6	C. Evidence, Reasoning, and Modeling	SR	Complete a model to identify the monomers that make up macromolecules involved in protein synthesis.	<i>see page 7</i>
29	<i>Heredity</i>	HS.LS.3.3	B. Mathematics and Data	SR	Determine the probability of an organism to inherit a specific trait.	C
30	<i>Molecules to Organisms</i>	HS.LS.1.5	None	SR	Identify where a tree obtains most of the carbon necessary for growth.	A
31	<i>Evolution</i>	HS.LS.4.5	None	SR	Determine which situation most likely led to speciation as a result of geographic isolation.	A

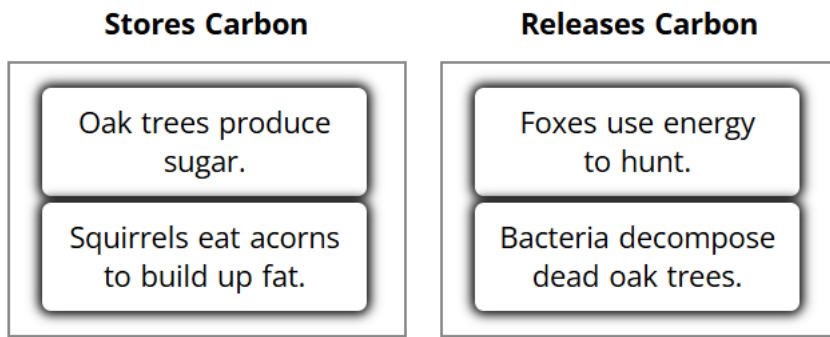
CBT Item No.	Reporting Category	Standard	Science Practice Category	Item Type*	Item Description	Correct Answer (SR)**
32	<i>Heredity</i>	HS.LS.3.4	A. Investigations and Questioning	SR	Describe how a hypothesis about an herbivore affecting gene expression in plants could be supported with a comparison of the plants.	C
33	<i>Molecules to Organisms</i>	HS.LS.1.1	None	SR	Determine where a mutation may occur in a cell and what resulting molecule is changed during transcription.	<i>see page 7</i>
34	<i>Heredity</i>	HS.LS.3.1	C. Evidence, Reasoning, and Modeling	SR	Complete a model to show how a zygote forms.	<i>see page 7</i>
35	<i>Molecules to Organisms</i>	HS.LS.1.4	None	SR	Interpret a data table to determine how a mutation that reduces DNA replication would affect cells with the mutation.	<i>see page 7</i>
36	<i>Molecules to Organisms</i>	HS.LS.1.7	C. Evidence, Reasoning, and Modeling	SR	Complete a model to show how oxygen is used by an organism, identify the cellular process oxygen supports, and identify another reactant needed for that process.	<i>see page 8</i>
37	<i>Molecules to Organisms</i>	HS.LS.1.2	C. Evidence, Reasoning, and Modeling	CR	Describe what would most likely happen to an organism with a mutation that affects the esophagus, describe how an organism's blood would be affected by mutations in the small intestine and liver, and explain the reasoning for each description.	
38	<i>Molecules to Organisms</i>	HS.LS.1.6	None	SR	Determine the evidence needed to determine that a soil sample contains the remains of organisms.	C
39	<i>Evolution</i>	HS.LS.4.1	None	SR	Describe how a diverse group of organisms can produce proteins with almost identical amino acid sequences.	C
40	<i>Molecules to Organisms</i>	HS.LS.1.5	A. Investigations and Questioning	SR	Analyze the setup of an investigation to determine the purpose of the investigation, the process involved, and the products measured.	<i>see page 8</i>
41	<i>Evolution</i>	HS.LS.4.4	B. Mathematics and Data	SR	Use information from a video to determine which graph best represents changes in a population of bacteria over time and explain a difference between bacteria in the population after time has passed.	B;C
42***	<i>Ecology</i>	HS.LS.2.4	C. Evidence, Reasoning, and Modeling	CR	Interpret a food web to determine the trophic level of an organism and explain why a population would be most affected if another population became extinct.	

* Science item types are selected-response (SR) and constructed-response (CR). All selected-response items are worth 1 point unless otherwise noted.

** Answers are provided here for selected-response items only. Pages 5–8 of this document provide correct answers for technology-enhanced (TE) items. Sample responses and scoring guidelines for constructed-response items will be posted at www.doe.mass.edu/mcas/student/default.html.

*** The 2025 Biology test results were reported with item 42 as a two-point item instead of a four-point item. DESE excluded two parts due to irregularities found during scoring. These parts did not count toward any student's score.

Correct Answer for CBT Item #3: Technology-Enhanced Item



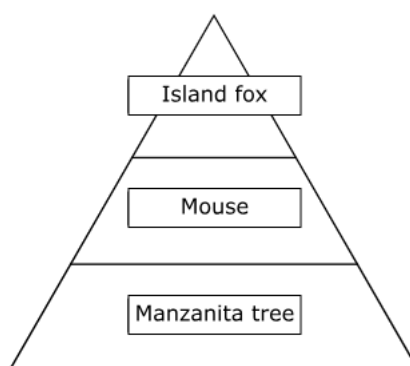
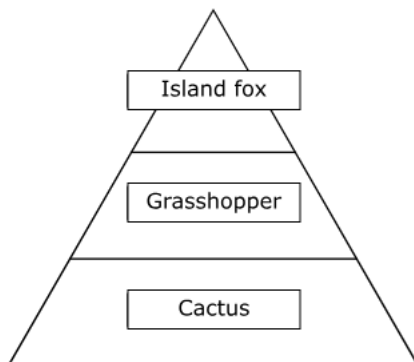
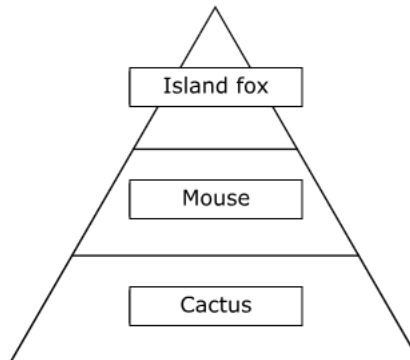
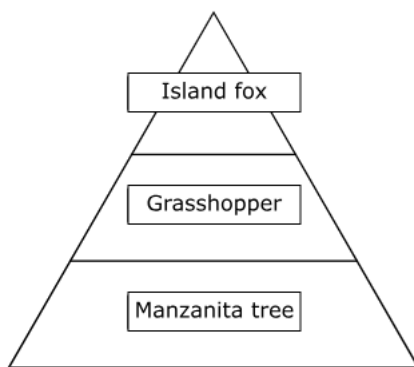
Correct Answer for CBT Item #11: Technology-Enhanced Item

This process is necessary so newly divided cells can

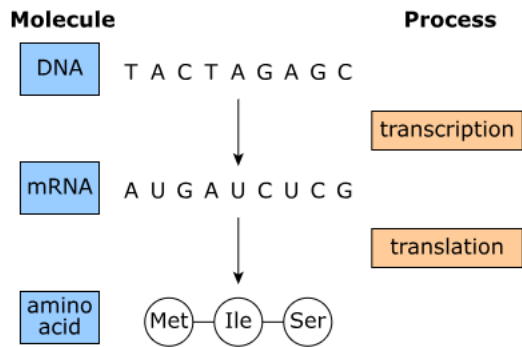
Correct Answers for CBT Item #15: Technology-Enhanced Item

Part A

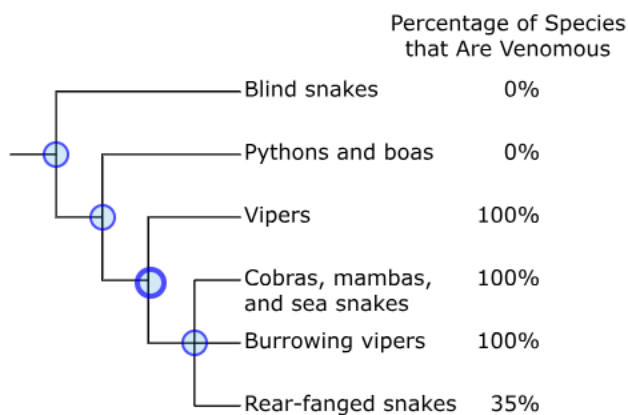
Any one of the following:



Correct Answer for CBT Item #18: Technology-Enhanced Item



Correct Answer for CBT Item #23: Technology-Enhanced Item



Correct Answer for CBT Item #24: Technology-Enhanced Item

Before reaching equilibrium, the volume of water inside the membrane because the number of water molecules that enter the membrane is the number of water molecules that leave the membrane.

Correct Answer for CBT Item #25: Technology-Enhanced Item

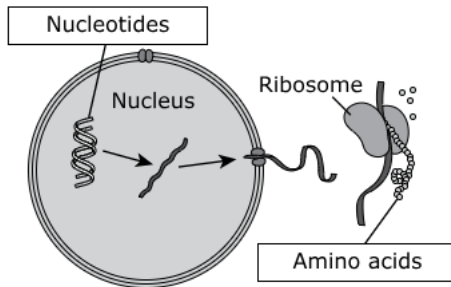
Part A

The pattern of inheritance for eye color in humans is .

Correct Answer for CBT Item #27: Technology-Enhanced Item

The process shown in the model occurs during and is a source of .

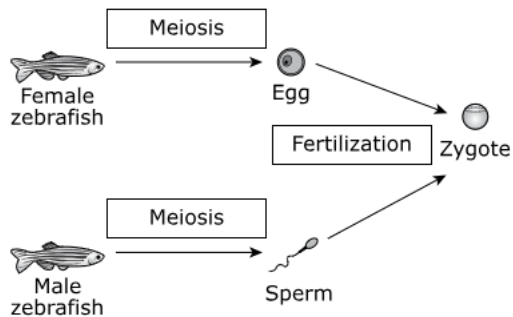
Correct Answer for CBT Item #28: Technology-Enhanced Item



Correct Answer for CBT Item #33: Technology-Enhanced Item

Zebrafish larvae with the mutations have a change in the in the nuclei of their cells. During transcription, the mutation causes a change in the , and this results in a nonfunctioning .

Correct Answer for CBT Item #34: Technology-Enhanced Item

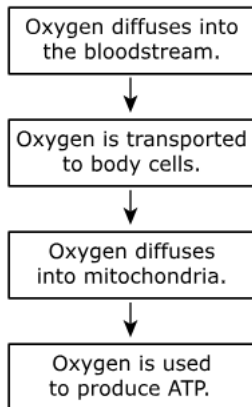


Correct Answer for CBT Item #35: Technology-Enhanced Item

Based on the data in the table above, small intestine cells from zebrafish with mutation W most likely than small intestine cells from zebrafish without mutation W.

Correct Answer for CBT Item #36: Technology-Enhanced Item

Part A



Part B

The model shows that oxygen is needed to support

cellular respiration. ▾

Another reactant that is needed for this process is

glucose. ▾

Correct Answer for CBT Item #40: Technology-Enhanced Item

The investigation was most likely designed to find out

how light intensity ▾ affects the rate of

photosynthesis ▾ by measuring the amount of

oxygen ▾ gas produced.