End-of-Course Examination Program

South Carolina EOCEP

Biology 1

Sample Items

Introduction

The South Carolina State Department of Education provides districts and schools with tools to assist in delivering focused instruction aligned with the *South Carolina College- and Career-Ready Science Standards 2021*. This document contains a set of ten End-of-Course Examination Program (EOCEP) Biology 1 test items that have been written to align with the standards identified as *EOCEP Biology 1*. These items were reviewed for content, fairness, and sensitivity prior to being field tested and approved for release to the public.

Purpose

This document is intended to be a resource for educators; it is not designed to be a practice test for students. The sample items are examples of college- and career-ready assessment items. The EOCEP assesses content standards in a variety of ways. This document does not include all item types. To see the full functionality of Technology-Enhanced items see Online Tools Training. https://wbte.drcedirect.com/SC/portals/sc

Item Information Format

EOCEP Biology Sample Item (#)	
Standard Alignment	PE Code (2D or 3D) Science and Engineering Practice (SEP) Disciplinary Core Idea (DCI) Crosscutting Concept (CCC)
Standard Description	text from the *South Carolina College- and Career-Ready Science Standards 2021*
Item Type	Selected Response, Multi-select, Drag and Drop, Drop-down, Match Interaction; Short Text Input
Answer Key	correct answer
Depth of Knowledge	cognitive demand
Estimated Difficulty	estimate based on student responses

Links

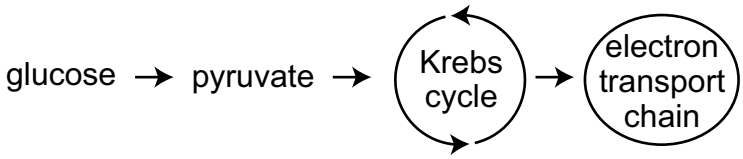
Assessment Quick Links for Teachers
https://ed.sc.gov/tests/assessment-information/quick-links-for-teachers/

South Carolina College- and Career-Ready Science Standards 2021
https://ed.sc.gov/instruction/standards/science/standards/

Norman Webb's Depth-of-Knowledge for the Four Content Areas
https://www.webbalign.org/dok-summary-tables

1. Examine the model.

Cellular Process Essential for Homeostasis



Based on this model, which statement **best** explains how this cellular process provides the energy an organism needs to maintain homeostasis?

A. Glucose molecules are metabolized, resulting in the storage of energy.

B. The bonds in glucose molecules are broken down, resulting in the loss of energy.

C. Glucose molecules are broken down, resulting in the release of energy that is captured in ATP.

D. The bonds of complex molecules are metabolized to form glucose, resulting in the formation of ATP.

EOCEP Biology Sample Item 1	
Standard Alignment	B-LS1-7 (3D) SEP: Developing and Using Models DCI: LS1.C CCC: Energy and Matter
Standard Description	Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules are broken and the bonds in new compounds are formed, resulting in a net transfer of energy.
Item Type	Selected Response
Answer Key	C
Depth of Knowledge	2
Estimated Difficulty	Medium

Go On ☞

2. Complete the table by dragging the **best** example of each cause for biodiversity loss into the table.

Causes for Loss of Biodiversity

Ranking	Cause	Example	Effect on Biodiversity
1	change in land use		30% decrease
2	overuse (overfishing, overhunting, overharvesting)		20% decrease
3	climate change		14% decrease
4	invasive species		11% decrease

Key:

Causes for Loss of Biodiversity

Ranking	Cause	Example	Effect on Biodiversity
1	change in land use	**clear-cutting sections of the Amazon rainforest**	30% decrease
2	overuse (overfishing, overhunting, overharvesting)	**repeatedly planting the same crop on farmland**	20% decrease
3	climate change	**burning fossil fuels**	14% decrease
4	invasive species	**vines growing over trees, buildings, and power lines**	11% decrease

Item information on following page ☞

EOCEP Biology Sample Item 2	
Standard Alignment	B-LS2-7 (2D) SEP: N/A DCI: LS4.D CCC: Stability and Change
Standard Description	Design, evaluate, and refine a solution for reducing the impacts of human activities on biodiversity and ecosystem health.
Item Type	Drag and Drop
Answer Key	Top to Bottom: clear-cutting sections of the Amazon rainforest; repeatedly planting the same crop of farmland; burning fossil fuels; vines growing over trees, buildings, and power lines
Depth of Knowledge	2
Estimated Difficulty	Medium

Go On ☞

3. Use the chart below to answer the question.

Blood Types

Phenotype	Genotype
A	I^Ai or I^AI^A
B	I^Bi or I^BI^B
AB	I^AI^B
O	ii

What are the possible phenotypes of a child with a parent who is heterozygous for type A blood and a parent who is homozygous for type B blood?

A. type A only
B. type AB only
C. type AB or type B
D. type AB or type O

EOCEP Biology Sample Item 3	
Standard Alignment	B-LS3-3 (2D) SEP: Analyzing and Interpreting Data DCI: LS3.B CCC: N/A
Standard Description	Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.
Item Type	Selected Response
Answer Key	C
Depth of Knowledge	2
Estimated Difficulty	Medium

Go On ☞

4. Select a box in each row to indicate whether the molecule is a reactant or product of the process that transforms solar energy into chemical energy.

Cellular Process

	Reactant	Product
water	☐	☐
oxygen	☐	☐
glucose	☐	☐
carbon dioxide	☐	☐

Key:

Cellular Process

	Reactant	Product
water	☑	☐
oxygen	☐	☑
glucose	☐	☑
carbon dioxide	☑	☐

EOCEP Biology Sample Item 4	
Standard Alignment	B-LS1-5 (3D) SEP: Developing and Using Models DCI: LS1.C CCC: Energy and Matter
Standard Description	Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.
Item Type	Match Interaction
Answer Key	See key
Depth of Knowledge	2
Estimated Difficulty	High

Go On ☞

5. Select **two** statements that support the claim that increased genetic diversity within a species increases the chances of the survival of the species.

A. The species would be better able to resist diseases.
B. The species would be better able to mate more frequently.
C. The species would be better able to adapt to changes in climate.
D. The species would be better able to produce large numbers of offspring.
E. The species would be better able to produce individuals with similar genotypes.
F. The species would be better able to produce individuals with similar phenotypes.

EOCEP Biology Sample Item 5	
Standard Alignment	B-LS4-2 (3D) SEP: Constructing Explanations and Designing Solutions DCI: LS4.C CCC: Cause and Effect
Standard Description	Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment.
Item Type	Multi-Select
Answer Key	A, C
Depth of Knowledge	2
Estimated Difficulty	High

Go On ☞

6. In pea plants, round pods (R) are dominant to wrinkled pods (r) and yellow pods (Y) are dominant to green pods (y). The Punnett square below shows the possible gene combinations for a dihybrid cross between two parent plants that are heterozygous (RrYy).

Punnett Square for a Dihybrid Cross

	RY	Ry	rY	ry
RY	RRYY	RRYy	RrYY	RrYy
Ry	RRYy	RRyy	RrYy	Rryy
rY	RrYY	RrYy	rrYY	rrYy
ry	RrYy	Rryy	rrYy	rryy

In each space below, enter the probability of producing the phenotype listed.

round and yellow offspring: [ ] / 16

round and green offspring: [ ] / 16

wrinkled and yellow offspring: [ ] / 16

wrinkled and green offspring: [ ] / 16

Key:

round and yellow offspring: [9] / 16

round and green offspring: [3] / 16

wrinkled and yellow offspring: [3] / 16

wrinkled and green offspring: [1] / 16

Item information on following page ☞

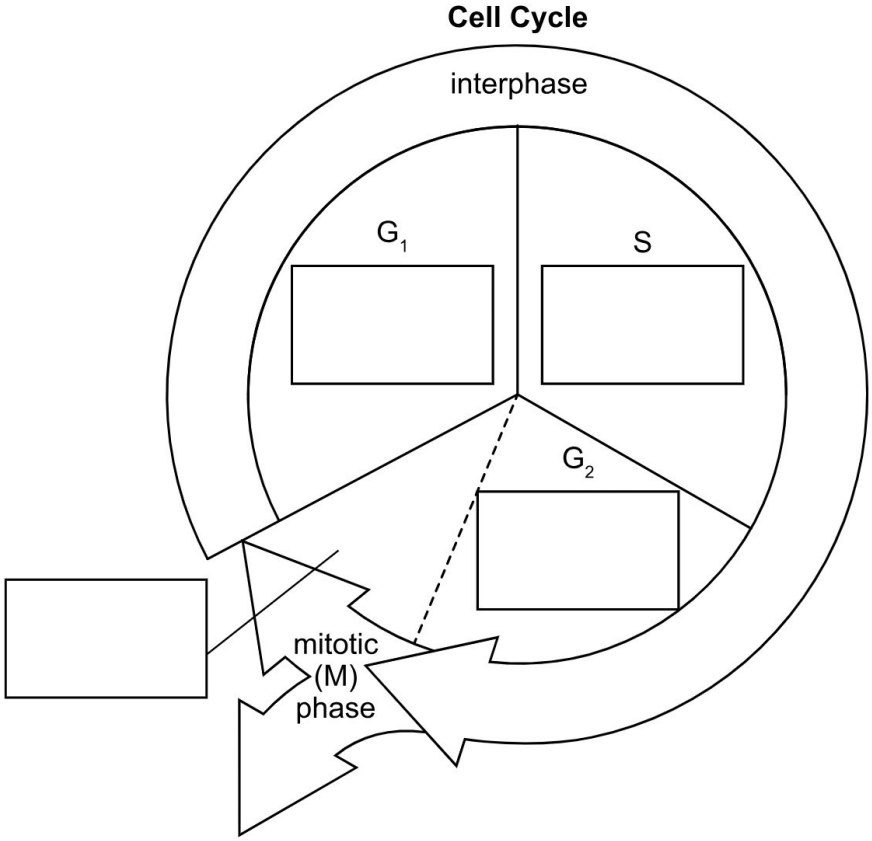
Go On ☞

EOCEP Biology Sample Item 6	
Standard Alignment	B-LS3-3 (3B) SEP: Analyzing and Interpreting Data DCI: LS3.B CCC: Scale, Proportion, and Quantity
Standard Description	Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.
Item Type	Short Text Input
Answer Key	Top to Bottom: 9; 3; 3; 1
Depth of Knowledge	2
Estimated Difficulty	High

Go On ☞

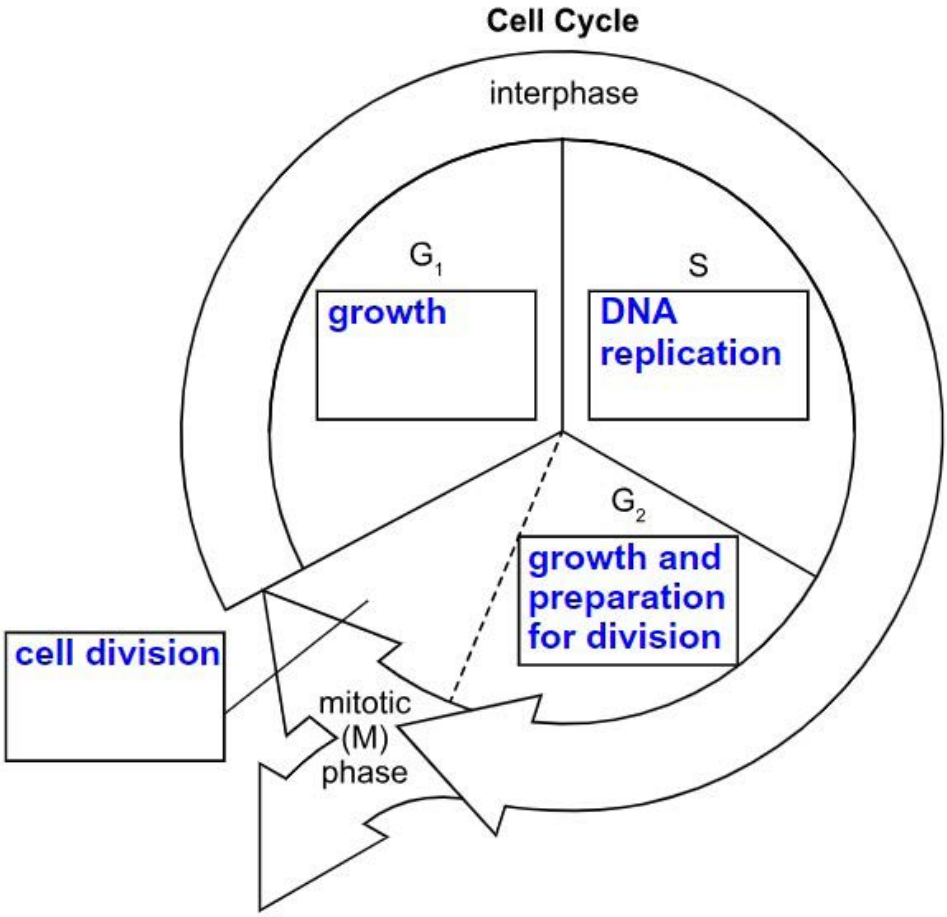
7. A student designed the model shown to explain the cell cycle.

Drag and drop the events into the correct places in the model to describe what occurs during each part of the cell cycle.



Item information on following page ☞

Key:



EOCEP Biology Sample Item 7	
Standard Alignment	B-LS1-4 (3D) SEP: Developing and Using Models DCI: LS1.B CCC: Systems and System Models
Standard Description	Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing, and maintaining, complex organisms.
Item Type	Drag and Drop
Answer Key	See key
Depth of Knowledge	2
Estimated Difficulty	High

Go On ☞

Use the information below to answer the questions.

Environmental DNA

A newly discovered type of DNA was found at a location in Greenland. This DNA has provided evidence for an ancient ecosystem at the location. Scientists call this genetic material environmental DNA, or eDNA. Environmental DNA is collected directly from soil, sediments, and water at excavation sites. The eDNA in Greenland was found in fragments of frozen sediment deep beneath the permafrost. Scientists estimate that the ecosystem existed 2 million years ago.

Observations about eDNA in Greenland

- The eDNA is 1 million years older than any other analyzed DNA.
- DNA pulled from chloroplasts and mitochondria has helped identify over 100 types of plants.
- The eDNA has provided information on multiple organisms.
- The eDNA is not directly linked to a single source of biological material.
- DNA from fossilized mastodon feces has provided evidence of the animal's presence and its diet.
- There is evidence of plentiful food sources that could have supported a mastodon population.
- The ecosystem temperature was 11°C to 19°C warmer than today's temperature.

Technological advances in the study of DNA allowed scientists to sequence small degraded pieces of genetic material. Besides finding evidence of the large number of different plants, scientists also discovered genetic material of animals as diverse as coral, ants, fleas, reindeer, and hares. The fact that evidence of a more temperate ecosystem was found frozen in permafrost suggests a rapid shift in climate conditions.

Go On ☞

8. Poplar and birch trees flourished in the newly discovered ancient environment and played important roles in that ecosystem. A student wants to create a model showing how the trees affected carbon cycling in the ancient ecosystem.

Use the drop-down menus to complete three statements that will support the model.

1. Trees [ ] the amount of carbon dioxide in the atmosphere through [ ].

2. Trees [ ] carbon levels in the geosphere through decomposition.

3. Trees [ ] carbon dioxide levels in the atmosphere and hydrosphere through respiration.

Key:

1. Trees [decreased] the amount of carbon dioxide in the atmosphere through [photosynthesis].

2. Trees [increased] carbon levels in the geosphere through decomposition.

3. Trees [increased] carbon dioxide levels in the atmosphere and hydrosphere through respiration.

Item information on following page ☞

EOCEP Biology Sample Item 8	
Standard Alignment	B-LS2-5 (3D) SEP: Developing and Using Models DCI: LS2.B CCC: Systems and System Models
Standard Description	Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.
Item Type	Drop-Down
Answer Key	1. decreased, photosynthesis; 2. increased; 3. increased
Depth of Knowledge	2
Estimated Difficulty	High

Go On ☞

9. A sample of eDNA from the ancient ecosystem contained genetic material originating from an ancient poplar tree. Scientists identified the corresponding chromosome of modern poplar trees and compared the ancient and modern DNA molecules. The DNA was not identical.

Which statement **most likely** explains why the DNA from modern poplar trees is different from the DNA of ancient poplar trees?

A. Ancient poplar trees reproduced asexually by producing seeds, but modern poplar trees reproduce sexually.

B. Favorable environmental conditions reduced the rate of cellular division, resulting in the production of fewer daughter cells.

C. Mutations made during DNA replication were not corrected before protein synthesis began, causing mutations to accumulate in the poplar genome over time.

D. Independent assortment of chromosomes during meiosis enabled ancient poplar trees to produce identical offspring, but modern poplar trees produce genetically unique offspring.

EOCEP Biology Sample Item 9	
Standard Alignment	B-LS3-2 (2D) SEP: Engaging in Argument from Evidence DCI: LS3.B CCC: N/A
Standard Description	Make and defend a claim based on evidence that inheritable genetic variations may result from (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.
Item Type	Selected Response
Answer Key	C
Depth of Knowledge	2
Estimated Difficulty	High

Go On ☞

10. Scientists sequenced a strand of environmental DNA. They used a codon chart to determine whether the sample included a complete gene. Study the codon chart below.

RNA Codon Chart

Second Position

First Position	U	C	A	G	Third Position
U	UUU, UUC — Phe UUA, UUG — Leu	UCU, UCC, UCA, UCG — Ser	UAU, UAC — Tyr UAA — stop UAG — stop	UGU, UGC — Cys UGA — stop UGG — Trp	**U** **C** **A** **G**
C	CUU, CUC, CUA, CUG — Leu	CCU, CCC, CCA, CCG — Pro	CAU, CAC — His CAA, CAG — Gln	CGU, CGC, CGA, CGG — Arg	**U** **C** **A** **G**
A	AUU, AUC, AUA — Ile AUG — Met start	ACU, ACC, ACA, ACG — Thr	AAU, AAC — Asn AAA, AAG — Lys	AGU, AGC — Ser AGA, AGG — Arg	**U** **C** **A** **G**
G	GUU, GUC, GUA, GUG — Val	GCU, GCC, GCA, GCG — Ala	GAU, GAC — Asp GAA, GAG — Glu	GGU, GGC, GGA, GGG — Gly	**U** **C** **A** **G**

Which statement would **best** identify that the scientists were working with a complete gene?

A. The first codon was UGG; the final codon was AUG.

B. The first codon was AUG; the final codon was UAA, UAG, or UGA.

C. The first codon was UGG; the final codon was UAA, UAG, or UGA.

D. The first codon was AUG; the final codon was AUG.

Item information on following page ☞

EOCEP Biology Sample Item 10	
Standard Alignment	B-LS1-1 (3D) SEP: Constructing Explanations and Designing Solutions DCI: LS3.A CCC: Structure and Function
Standard Description	Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins, which carry out the essential functions of life through systems of specialized cells.
Item Type	Selected Response
Answer Key	B
Depth of Knowledge	1
Estimated Difficulty	Medium

STOP.