



SECTION 2

TEST I SAMPLE QUESTIONS

This section of the Georgia Assessments for the Certification of Educators® (GACE™) Preparation Guide provides sample selected-response questions with an annotated answer key for you to review as part of your preparation for the test. The sample selected-response questions are designed to illustrate the nature of the test questions. Work through the questions carefully before referring to the annotated answer key, which follows the sample selected-response questions. The answer key provides the correct response to each question, describes why each correct response is the best answer, and lists the objective within the test framework to which each question is linked.

Please note that a periodic table and a set of constants and formulas are provided for this test. Please refer to these materials as needed in responding to the sample test questions and assignments. These materials are located in the Assessment Reference Materials section at the end of this preparation guide.

A scientific calculator may be used for this test as needed in responding to the sample test questions and assignments. Please refer to the current GACE registration bulletin for information about the use of calculators at the test administration.

QUESTIONS

1. The speed at which the earth travels around the sun varies slightly due to the:
 - A. elliptical shape of the earth's orbit.
 - B. tilt of the earth's axis.
 - C. rotational velocity of the earth.
 - D. internal structure of the earth.

2. Which of the following mechanisms provides the thermal energy needed to sustain hurricane development?
 - A. advection of warm air masses toward the center of low pressure
 - B. evaporation of water vapor from the tops of storm clouds
 - C. convection of warm air at the center of cyclonic rotation
 - D. condensation of water vapor as moist air rises into the atmosphere

3. Which of the following best explains why average summer temperatures are higher and average winter temperatures are lower for a city located in the center of the North American continent than for a city located at the same latitude on the East Coast of the United States?
 - A. Albedo is constant year-round for water but varies greatly between winter and summer for land.
 - B. Higher water vapor content in the air helps insulate the coast from extensive heat loss and gain.
 - C. Winds blow primarily north–south over the center of the continent but east–west over the Atlantic Ocean.
 - D. Ocean waters moderate coastal temperatures by gaining and losing heat more slowly than land.

4. A geologist examining a piece of sandstone from an unknown location is interested in determining the conditions under which the sandstone was deposited. Which of the following characteristics of the sandstone would be most helpful in identifying the conditions under which the sediments were initially deposited?
- A. the density and hardness of the grains in the sample
 - B. the age of the sample
 - C. the size and shape of the grains in the sample
 - D. the purity of the sample
5. Coastal regions of the southeastern United States have become increasingly prone to population explosions of dinoflagellates, known as red tides. Toxic substances produced by these organisms can cause massive fish kills and poison other marine life. Which of the following has been implicated in the increased prevalence of red tides?
- A. overfishing of a variety of near-shore predator species
 - B. erosion of coastal beaches resulting from development
 - C. pollution of coastal waters by nutrient-rich runoff
 - D. dredging of coastal waterways for shipping
6. Which of the following is a characteristic of viruses that distinguishes them from cellular organisms?
- A. the inability to move
 - B. the inability to reproduce outside the living cells of a host
 - C. the absence of a nucleus
 - D. the absence of nucleic acids in the genome
7. An increase in lactic acid in the human body during strenuous physical activity is the direct result of the production of:
- A. ATP molecules during aerobic respiration.
 - B. pyruvic acid during anaerobic fermentation.
 - C. acetaldehyde from pyruvate during aerobic respiration.
 - D. ethanol from pyruvate during anaerobic fermentation.

Section 2: Test I Sample Questions

8. The two strands of the DNA double helix are held together by hydrogen bonds that are broken during replication. The hydrogen bonds that link the two chains of the DNA molecule exist between:
- A. deoxyribose sugars.
 - B. phosphate groups.
 - C. ribose sugars.
 - D. nitrogen bases.
9. Which of the following processes leads to a net increase in the energy in an ecosystem?
- A. respiration
 - B. decomposition
 - C. photosynthesis
 - D. predation
10. Rising sea levels during the early Holocene led to the formation of islands that had previously been linked to the mainland. Over time, isolation from the mainland would likely have which of the following effects on populations of large plants and animals on the newly created islands?
- A. reduced genetic diversity within most species on the island
 - B. reduced number of different species on the island
 - C. increased mutation rates in individuals within each species on the island
 - D. increased competition among the different species on the island

ANNOTATED ANSWER KEY

For question	The correct response is	Reason	Test Objective
1	A	The elliptical shape of the earth's orbit causes predictable changes in the speed at which the earth orbits the sun. Kepler's second law states that the orbital speed of a planet varies so that an imaginary line connecting the sun to the planet will sweep over equal areas in an equal amount of time. Therefore, as the earth moves along its elliptical orbit, its speed increases as it nears the sun and decreases as it moves away from the sun.	0001
2	D	Most of the thermal energy required to sustain hurricane development comes from the condensation of water vapor. As water vapor that evaporates from the ocean surface rises up in bands surrounding the eye of the hurricane, it condenses, releasing large amounts of latent heat. This latent heat of condensation is believed to provide most of the energy required to sustain a hurricane.	0002
3	D	Average temperatures in coastal regions tend to be cooler in the summer and warmer in the winter than temperatures in the continental interior primarily because of the moderating effect of large bodies of water. This moderating effect is due to the high heat capacity of water compared to earth materials, such as rock and soil.	0003
4	C	The size and shape of sand grains within a sample of sandstone can provide a geologist with information about the conditions under which the sediment was initially deposited. All other factors being equal, grain size indicates the velocity of the water that the sediment settled out of. As a grain of sand is moved about prior to being incorporated into a sedimentary deposit, it will become less angular, smoother, and ultimately rounder. The smoothness or roundness of a grain of sand is a measure of how long it moved around prior to being buried in a sedimentary deposit.	0004
5	C	The rapid growth of populations of dinoflagellates, a phenomenon known as a red tide, has increased over the last quarter century in some heavily populated coastal regions. Although red tides are natural phenomena, there are indications that the increase in the frequency and extent of red tides has been partly caused by the runoff of nitrogen and phosphorous into coastal waters from agricultural sources and sewage treatment plants.	0005
6	B	Viruses are extremely small infectious agents that cannot reproduce outside the living cells of the host organisms they infect. This dependency distinguishes them from cellular organisms.	0006

Section 2: Test I Sample Questions

For question	The correct response is	Reason	Test Objective
7	B	During the early stages of strenuous physical exercise, human muscle cells break down sugar for ATP production faster than oxygen can be supplied from the blood. Under these anaerobic conditions, muscle cells use lactic acid fermentation to make ATP. This involves reducing pyruvic acid to form lactic acid, a waste product.	0007
8	D	Hydrogen bonds between different nitrogen bases on the two opposing strands of the DNA double helix hold the two strands together. The chemical structure of these nitrogen bases dictates that they can only pair with the one partner base that has the right chemical side group. This specificity of bonding partnerships between different nitrogen bases is an important component of the coding of genetic information.	0008
9	C	The producers in an ecosystem are plants. It is through the process of photosynthesis that plants trap solar energy and make it available for other types of organisms in an ecosystem.	0009
10	A	A small group of individuals of a particular species that is isolated from a larger population can contain only a fraction of the gene pool of the original population. With large organisms, it can be assumed that relatively small numbers of individuals would end up isolated on a particular island. Over time, the small size of the island population would also lead to the random loss of alleles due to inbreeding. As a consequence of both of these factors, the genetic diversity of the island population would likely be significantly less than that of the original mainland population from which it was descended.	0010