



SECTION 3

TEST I SAMPLE CONSTRUCTED-RESPONSE ASSIGNMENTS

This section of the Georgia Assessments for the Certification of Educators® (GACE™) Preparation Guide is designed to assist you in responding to the constructed-response assignments on the test. Included in this section are:

- ▶ Constructed-response assignment directions
- ▶ Sample constructed-response assignments
- ▶ Assignment response sheets
- ▶ An example of a strong response to each sample assignment
- ▶ Scoring criteria that will be used in evaluating your response to each assignment

For each sample assignment, you may want to take the following steps to prepare for the test:

- Review the constructed-response assignment directions.
- Print the assignment and the assignment response sheet.
- Use scrap paper to make notes, write an outline, or otherwise prepare your response.
- Use the assignment response sheet to record your response. The assignment response sheet reflects the amount of space available on an actual test.
- After you complete the assignment, review the sample strong response, your response, and the scoring criteria.

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.

CONSTRUCTED-RESPONSE ASSIGNMENT DIRECTIONS

A sample of the directions for the constructed-response assignments is shown in the box below.

CONSTRUCTED-RESPONSE ASSIGNMENT DIRECTIONS

For each constructed-response assignment in this section, you are to prepare a written response of up to one page and record it in the area provided on the appropriate Assignment Response Sheet in your answer document.

Read each assignment carefully before you begin to write. Think about how you will organize what you plan to write. You may use any blank space provided in this test booklet following each assignment to make notes, write an outline, or otherwise prepare your response. *However, each of your final responses must be written on the appropriate Assignment Response Sheet in your answer document.*

Your responses will be evaluated based on the following criteria:

- **Purpose:** The extent to which the response fulfills the purpose of the assignment in relation to relevant GACE framework objectives
- **Application of Content Knowledge and Skills:** The extent to which the response accurately and effectively applies content knowledge and skills in relation to relevant GACE framework objectives
- **Supporting Evidence:** The extent to which the response includes appropriate, specific supporting evidence of content knowledge and skills in relation to relevant GACE framework objectives

Evaluation of each response will be based on the criteria above, not on your writing ability. However, your response must be communicated clearly enough to permit a valid judgment of your knowledge and skills. Your responses should be written for an audience of educators in the field.

Your responses should be your original work, written in your own words, and not copied or paraphrased from some other work. Please write legibly. You may not use any reference materials during the test. Remember to review your work and make any changes you think will improve your responses.

The selected-response section of the answer document containing your name will be removed from your written responses to maintain your anonymity during the scoring process. Do not write your name on any other portion of the answer document, and do not separate any of the sheets from the document.

Please turn the page and begin the constructed-response assignment section of the test.

CONSTRUCTED-RESPONSE ASSIGNMENT ONE

■ Sample Constructed-Response Assignment One

Use the information below to complete the assignment that follows.

A solution is made by mixing 13.8 g of dimethyl ether (C_2H_6O) with 14.8 g of diethyl ether ($C_4H_{10}O$).

- Calculate the mole fraction of dimethyl ether in the solution (show your work); and
- explain why the components of the mixture could be separated using fractional distillation.

■ Strong Response to Sample Constructed-Response Assignment One

To determine the mole fraction of dimethyl ether in the solution, the formula mass of both components of the solution must be determined and the number of moles of each compared. Calculations follow:

$$\text{formula mass} \quad 2(12) + 6(1) + 16 = 46\text{g/mol}$$

$$\text{moles for } \text{C}_2\text{H}_6\text{O} \quad 13.8\text{g} \cdot \frac{1 \text{ mol}}{46\text{g}} = \boxed{0.30 \text{ mol}}$$

$$\text{formula mass} \quad 4(12) + 10(1) + 16 = 74\text{g/mol}$$

$$\text{moles for } \text{C}_4\text{H}_{10}\text{O} \quad 14.8\text{g} \cdot \frac{1 \text{ mol}}{74\text{g}} = \boxed{0.20 \text{ mol}}$$

$$\text{mole fraction of } \text{C}_2\text{H}_6\text{O} = \frac{0.30 \text{ mol}}{(0.30 + 0.20) \text{ mol}} \rightarrow \boxed{0.60}$$

A solution of dimethyl ether and of diethyl ether can be separated by fractional distillation because the two components of the solution have different boiling points. In a closed container, the vapor overlying a solution with two volatile components that are in the same family (in this case, they are both ethers) will contain a greater percent of the more volatile component with the lower formula mass (in this case, the dimethyl ether). In fractional distillation, this difference in volatility (and consequently boiling point) is used to separate the two different components as they move through a fractionating column. When the solution boils, some of the vapor condenses on the glass beads in the fractionating column and drips back into the solution and some of the vapor continues up the column. As the vapor moves up the column, the percentage of the more volatile component increases until essentially pure dimethyl ether rises to the top.

CONSTRUCTED-RESPONSE ASSIGNMENT TWO

■ Sample Constructed-Response Assignment Two

Use the information below to complete the assignment that follows.

A 255 g sample of water at 15.0°C is put into an insulated container. Crushed ice at a temperature of -15.0°C is added to the water.

- Calculate the minimum mass in grams of ice required to lower the temperature of the water to 0°C (show your work); and
- explain why the temperature of the water will remain at 0°C if an additional small amount of ice is added to the water.

■ Strong Response to Sample Constructed-Response Assignment Two

The following calculations are required to determine the minimum mass of ice needed to lower the temperature of the water to 0°C .

$$Q = ms\Delta T$$

Where Q is amount of heat energy

s is specific heat

ΔT is temperature change

First find energy water must lose:

$$Q = 255\text{g} \times \frac{4.18\text{J}}{\text{g}^{\circ}\text{C}} \times 15.0^{\circ}\text{C} = 15,989\text{ J, round off to } 1.60 \times 10^4\text{ J}$$

How much ice is required?

$$m = \frac{Q}{s\Delta T} = \frac{16000}{209\text{ J/g}^{\circ}\text{C} \times 15.0^{\circ}\text{C}} = 5.10 \times 10^2\text{ g}$$

So 510 g of ice are needed to lower the temperature of the water to 0°C .

Since the total mass of water is now 765 g, a great deal of energy must be lost for the water to drop below 0°C . Each molecule of water must lose energy just to change phase from liquid at 0°C to solid at 0°C . The loss of thermal energy as water changes from a liquid to a solid decreases the potential energy of the water rather than decreasing the kinetic energy. The kinetic energy of the water (and therefore its temperature) would not decrease until all of the liquid water has turned to ice. A small amount of ice at -15°C will not absorb enough energy to cause the change in phase and then lower the temperature of the water.

CRITERIA FOR SCORING YOUR RESPONSE

Each response will be evaluated based on the following criteria.

PURPOSE	The extent to which the response fulfills the purpose of the assignment in relation to relevant GACE framework objectives
APPLICATION OF CONTENT KNOWLEDGE AND SKILLS	The extent to which the response accurately and effectively applies content knowledge and skills in relation to relevant GACE framework objectives
SUPPORTING EVIDENCE	The extent to which the response includes appropriate, specific supporting evidence of content knowledge and skills in relation to relevant GACE framework objectives

Each response is rated on a three-point scale. The three score points of the score scale correspond to varying degrees of performance that are related to the above criteria.

Score	Description
3	<p>The "3" response reflects thorough understanding of relevant content knowledge and skills as defined in relevant GACE framework objectives.</p> <ul style="list-style-type: none"> • The response fully achieves the purpose of the assignment. • The response demonstrates an accurate and effective application of relevant content knowledge and skills. • The response provides appropriate, specific supporting evidence of relevant content knowledge and skills.
2	<p>The "2" response reflects general understanding of relevant content knowledge and skills as defined in relevant GACE framework objectives.</p> <ul style="list-style-type: none"> • The response largely achieves the purpose of the assignment. • The response demonstrates a generally accurate, generally effective application of relevant content knowledge and skills. • The response provides some appropriate and general supporting evidence of relevant content knowledge and skills.
1	<p>The "1" response reflects limited or no understanding of relevant content knowledge and skills as defined in relevant GACE framework objectives.</p> <ul style="list-style-type: none"> • The response partially achieves or fails to achieve the purpose of the assignment. • The response demonstrates limited, inaccurate, and/or ineffective application of relevant content knowledge and skills. • The response provides limited or no appropriate, specific supporting evidence of relevant content knowledge and skills.

Please note: A response that is unrelated to the assigned topic, illegible, not primarily in the target language, or lacking a sufficient amount of original work to score will be considered **unscorable**. If there is no response to the assignment, then the response will be considered **blank**.