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Welcome to the GACE Study Companion

Get Ready to Show What You Know

You have gained the knowledge and skills you need for your teaching career. Now you are ready to demonstrate your abilities by taking the Georgia Assessments for the Certification of Educators® (GACE®).

Using the GACE Study Companion is a smart way to prepare for the test so you can do your best on test day. The Study Companion can help you stay on track and make the most efficient use of your study time.

The Study Companion contains practical information and helpful tools including:

- An overview of the assessments
- Descriptions of different types of test questions
- Information about scores and how to understand them
- Test-taking tips and strategies
- Frequently asked questions
- Specific information about the assessment you are taking
- Practice questions and explanations of correct answers
- A study plan template
- Additional resources to help you study

So where should you start?

Begin by reviewing the Study Companion in its entirety, paying particular attention to the content specifications in About the Assessment beginning on page 26. The content specifications detail the knowledge and skills to be measured on the assessment. These specifications are aligned with the:

- Common Core Georgia Performance Standards (CCGPS) — these standards are available on the Georgia Department of Education website at www.doe.k12.ga.us under Curriculum and Instruction
- Content standards for Georgia’s state-approved educator preparation programs — see Educator Preparation Rules in the Rules section on the Georgia Professional Standards Commission (GaPSC) website at www.gapsc.com

To identify the areas you may need to study, go through the standards and note the specific areas that you need to review.
Once you have reviewed the Study Companion and the standards, you can create your own personalized study plan and schedule based on your individual needs and how much time you have before test day. Be sure to also seek other resources to strengthen your content knowledge. See the Preparation Resources section of this Study Companion.

Keep in mind that study habits are individual. There are many different ways to successfully prepare for your test. Some people study better on their own, while others prefer a group setting. You may have more energy early in the day, but another test taker may concentrate better in the evening. Use the Study Companion to develop the approach that works best for you.

Your teaching career begins with preparation. Good luck!
Know What to Expect

These questions and answers will give you an overview of the GACE assessments.

Why do I need to take a GACE assessment?

GACE is the educator certification assessment program for the state of Georgia. The purpose of the GACE assessments is to help the Georgia Professional Standards Commission (GaPSC) ensure that candidates have the knowledge and skills needed to perform the job of an educator in Georgia’s public schools. Professionals serving in most public schools must hold a valid certificate, appropriate to their field of employment.

Which assessments should I take?

Before you register for an assessment, identify which assessment(s) you need to take. Note that some assessments contain more than one test, and that you will be required to pass all of the tests within an assessment to meet the certification requirements. Educator testing requirements for Georgia are available from the GaPSC website at www.gapsc.com under Educator Assessment.

How do I find out what is covered on the assessment I need to take?

Each Study Companion contains the content specifications for the assessment that detail the knowledge and skills to be covered. These specifications are aligned with the Common Core Georgia Performance Standards and the content standards for Georgia’s state-approved educator preparation programs.

What are the Common Core Georgia Performance Standards (CCGPS)?

The CCGPS is a set of core standards for kindergarten through high school in English language arts, mathematics, and grades 6-12 literacy in science, history, social studies, and technical subjects that have been formally adopted by Georgia and 44 other states, including the District of Columbia (D.C.), and two territories, along with the Department of Defense Education Activity. The CCGPS provide a consistent framework to prepare students for success in college and the 21st century workplace.

What are the content standards for Georgia’s state-approved educator preparation programs?

A set of content standards has been adopted by the GaPSC on which state-approved educator preparation program providers prepare their candidates. These standards are adapted from national content standards.

How are the GACE assessments administered?

All GACE assessments are administered via computer at specially equipped test centers throughout Georgia, in neighboring states, and internationally.

Note: After clicking on a link, right click and select "Previous View" to go back to original text.
Where and when are the GACE assessments offered?

Test dates and test center locations are available on the GACE website at www.gace.ets.org. When you register for a test, you can select the test center that is most convenient for you.

How do I get my scores?

Your scores are available through your ETS GACE testing account on the GACE website at www.gace.ets.org on the score reporting date listed in the Registration Bulletin. Your test results are released to you, the GaPSC, and your program provider, if you have one.
Familiarize Yourself with Test Questions

The GACE assessments include several types of test questions, which can be broken into two categories: **objective items** (for which you select or produce an answer that is scored either correct or incorrect) and **constructed response** (for which you write or record a response of your own that is scored by trained raters based on scoring guidelines). You may be familiar with these question formats from taking other standardized tests. If not, familiarize yourself with them so you don’t spend time during the test figuring out how to answer them.

**Understanding Selected-response Questions**

The majority of the questions in the GACE assessments are selected-response questions. The single-question format presents a direct question or an incomplete statement. This type of question may begin with the phrase “Which of the following . . .” Take a look at this example:

Which of the following is a flavor made from beans?

A. Strawberry  
B. Cherry  
C. Vanilla  
D. Mint

**How would you answer this question?**

All of the answer options are flavors. Your job is to decide which of the flavors is the one made from beans.

Try following these steps to select the correct answer.

1) **Limit your answer to one of the options given.** You may know that chocolate and coffee are also flavors made from beans, but they are not listed. Rather than thinking of other possible answers, focus only on the options given (“Which of the following . . .”).

2) **Eliminate incorrect answers.** You may know that strawberry and cherry flavors are made from fruit and that mint flavor is made from a plant. That leaves vanilla as the only possible answer.

3) **Verify your answer.** You can substitute “vanilla” for the phrase “Which of the following” and turn the question into this statement: “Vanilla is a flavor made from beans.” This will help you be sure that your answer is correct. If you’re still uncertain, try substituting the other options to see if they make sense.

You may want to use this technique as you answer selected-response questions on the practice tests.
Try a more challenging example

The vanilla bean question is pretty straightforward, but you’ll find that more challenging questions have a similar structure. For example:

Entries in outlines are generally arranged according to which of the following relationships of ideas?

A. Literal and inferential
B. Concrete and abstract
C. Linear and recursive
D. Main and subordinate

You’ll notice that this example also contains the phrase “which of the following.” This phrase helps you determine that your answer will be a “relationship of ideas” from the options provided. You are supposed to find the option that describes how entries, or ideas, in outlines are related.

Sometimes it helps to put the question in your own words. Here, you could paraphrase the question in this way: “How are outlines usually organized?” Since the ideas in outlines usually appear as main ideas and subordinate ideas, the answer is D.

QUICK TIP ➔ Don’t be intimidated by words you may not understand. It might be easy to be thrown by words like “recursive” or “inferential.” Read carefully to understand the question and look for an answer that fits. An outline is something you are probably familiar with and expect to teach to your students. Remember to slow down, and use what you know.

Watch out for selected-response questions containing “NOT,” “LEAST,” and “EXCEPT”

This type of question asks you to select the option that does not fit. You must be very careful because it is easy to forget that you are selecting the negative. This question type is used in situations in which there are several good solutions or ways to approach something, but also a clearly wrong way.

How to approach questions about graphs, tables, or reading passages

Some questions include introductory information such as a map, table, graph, or reading passage (often called a stimulus) that provides the information the question asks for. In the case of a map or graph, you might want to read the question first, and then look at the map or graph. In the case of a long reading passage, you might want to read the passage first, make notes about places you think are important, and then review your notes and answer the question.

You may also encounter several questions that relate to a single table, graph, or reading passage. There may also be a group of questions that has an initial stimulus that sets the scene and provides information, with a second stimulus at some later point in the questions that provides more information or a subsequent development.

The important thing is to be sure you answer the questions as they refer to the material presented. Be sure to read each question carefully.
How to approach other objective question formats

New formats for presenting information are developed from time to time. Tests may include audio and video stimulus materials such as a movie clip or some kind of animation, instead of a map or reading passage. Other tests may allow you to zoom in on the details in a graphic or picture. Pay attention to the directions on each screen to be sure you understand how the information is being presented for each question or group of questions.

Tests may also include interactive types of questions. These questions take advantage of technology to assess knowledge and skills that go beyond what can be assessed using standard single-selection selected-response questions. If you see a format you are not familiar with, read the directions carefully. The directions always give clear instructions on how you are expected to respond.

The interactive question types may ask you to respond by:

- **Typing in an entry box.** When the answer is a number, you might be asked to enter a numeric answer or, if the test has an on-screen calculator, you might need to transfer the calculated result from the calculator into the entry box. Some questions may have more than one place to enter a response.

- **Clicking check boxes.** You may be asked to click check boxes instead of an oval when more than one option within a set of answers can be selected.

- **Clicking parts of a graphic.** In some questions, you will choose your answer by clicking on location(s) on a graphic such as a map or chart, as opposed to choosing from a list.

- **Clicking on sentences.** In questions with reading passages, you may be asked to choose your answer by clicking on a sentence or sentences within the reading passage.

- **Dragging and dropping answer options into “targets” on the screen.** You may be asked to choose an answer from a list and drag it into the appropriate location in a table, paragraph of text, or graphic.

- **Selecting options from a drop-down menu.** This type of question will ask you to select the appropriate answer or answers by selecting options from a drop-down menu (e.g., to complete a sentence).

Remember that with every question, you will get clear instructions on how to respond. See the GACE Computer-delivered Testing Demonstration on the GACE website to learn how a GACE test works and see examples of some of the types of questions you may encounter.

**QUICK TIP ➔** Don’t make the questions more difficult than they are. Don’t read for “hidden meanings” or “tricks.” There are no “trick questions” on the GACE assessments. They are intended to be serious, straightforward tests of your knowledge.
Understanding Constructed-response Questions

Constructed-response questions require you to demonstrate your knowledge in a subject area by providing in-depth explanations on particular topics. Essay, problem-solving, and oral-response are types of constructed-response questions.

For example, an essay or oral-response question might present you with a topic and ask you to discuss the extent to which you agree or disagree with the opinion stated. You must support your position with specific reasons and examples from your own experience, observations, or reading.

Take a look at a few sample essay topics:

- “Celebrities have a tremendous influence on the young, and for that reason, they have a responsibility to act as role models.”
- “We are constantly bombarded by advertisements — on television and radio, in newspapers and magazines, on highway signs, and the sides of buses. They have become too pervasive. It’s time to put limits on advertising.”
- “Advances in computer technology have made the classroom unnecessary, since students and teachers are able to communicate with each other from computer terminals at home or at work.”

Keep these things in mind when you respond to a constructed-response question

1) **Answer the question accurately.** Analyze what each part of the question is asking you to do. If the question asks you to describe or discuss, you should provide more than just a list.

2) **Answer the question completely.** If a question asks you to do three distinct things in your response, you should cover all three things for the best score. No matter how well you respond, you will not be awarded full credit if you do not answer the question completely.

3) **Answer the question that is asked.** Do not change the question or challenge the basis of the question. You will receive no credit or a low score if you answer another question or if you state, for example, that there is no possible answer.

4) **Give a thorough and detailed response.** You must demonstrate that you have a thorough understanding of the subject matter. However, your response should be straightforward and not filled with unnecessary information.

5) **If your response is written, reread it.** Check that you have written what you thought you wrote. Be sure not to leave sentences unfinished or omit clarifying information.

**QUICK TIP ➔** Scratch paper and pencils will be provided at the test center. You may find that it helps to take notes on this scratch paper about each of the details of the question so that you don’t miss any of them. Then you’ll be sure to have all of the information you need to answer the question.

For more detailed information on constructed-response scoring, see *Understanding Your GACE® Scores* in the Scores section of the GACE website at [www.gace.ets.org](http://www.gace.ets.org).

**Note:** After clicking on a link, right click and select "Previous View" to go back to original text.
GACE Scores

Of course, passing the GACE assessments is important to you, so you need to understand what those scores mean and what the Georgia state standards are.

How do I know if I passed?

All GACE test results, with the exception of the Assessment of Sign Communication – American Sign Language (ASC–ASL), are reported as scaled scores with a scale of 100 to 300. The ASC–ASL is assigned ratings of A to E. Your official score report will indicate how you performed on the test as a whole and whether or not you passed.

**IMPORTANT NOTE:** For assessments composed of more than one test, you must pass all tests for that assessment to meet the certification requirements.

What Your GACE Scores Mean

You received your score report. Now what does it mean? It’s important to interpret your score report correctly and to know what to do if you have questions about your scores.

Visit the Scores section of the GACE website to see a sample score report and to access Understanding Your GACE® Scores, a document that provides additional information on how to read your score report.

Put your scores in perspective

Your score report indicates:

- the date of the test administration
- your scaled score
- pass/not pass determination
- number of scored questions
- number of questions answered correctly
- number of scored questions in each subarea
- number of questions answered correctly in each subarea
- points possible for constructed-response questions (if your test includes a constructed-response section)
- points earned for constructed-response questions
If an assessment consists of more than one test, the following data will be provided if you have ever taken any of the other tests:

- highest score to date on the test (status, scaled score, and date taken)
- passing status based on the highest scaled score for each of the tests

If you have previously taken the same assessment or other assessments, your score report will also list the highest score you earned on each assessment.

**Score scale changes**

ETS updates GACE assessments on a regular basis to ensure they accurately measure the knowledge and skills that are required for certification. Updated assessments cover the same content as the previous assessments. However, scores might be reported on a different scale, so requirements may vary between the new and previous versions. All scores for previous, discontinued assessments are valid and reportable for 50 years.

*Understanding Your GACE® Scores*, found in the Scores section of the GACE website at [www.gace.ets.org](http://www.gace.ets.org), will help you interpret your scores.
Determine Your Strategy for Success

Effective test preparation doesn’t just happen. You’ll want to set clear goals and deadlines for yourself along the way. Otherwise, you may not feel ready and confident on test day.

1) Learn what the assessment covers
You may have heard that there are several different versions of the same test. It’s true. You may take one version of the test and your friend may take a different version. Each test has different questions covering the same subject area, but both versions of the test measure the same skills and content knowledge.

You’ll find specific information on the test you’re taking in the About the Assessment section of each Study Companion, which outlines the content areas that the test measures and what percentage of the test covers each area. Visit the GACE website at www.gace.ets.org for information on other GACE assessments.

2) Assess how well you know the content
Research shows that test takers tend to overestimate their preparedness — this is why some test takers assume they did well and then are surprised to find out they did not pass.

The GACE assessments are demanding enough to require serious review of likely content, and the longer you’ve been away from the content the more preparation you will most likely need. If it has been longer than a few months since you’ve studied your content area, make a concerted effort to prepare.

3) Collect study materials
Gathering and organizing your materials for review are critical steps in preparing for the GACE assessments. Consider the following reference sources as you plan your study:

- Did you take a course in which the content area was covered?
- Do you still have your books or your notes?
- Does your college library have a good introductory college-level textbook in this area?
- Does your local library have a high school-level textbook?

Study Companions are available for all GACE assessments in the Test Prep section of the GACE website at www.gace.ets.org. Each Study Companion provides a combination of test preparation and practice, including sample questions and answers with explanations.

4) Plan and organize your time
You can begin to plan and organize your time while you are still collecting materials. Allow yourself plenty of review time to avoid cramming new material at the end. Here are a few tips:

- Choose a test date far enough in the future to leave you plenty of preparation time. See information on test dates on the GACE website at www.gace.ets.org.
- Work backward from that date to figure out how much time you will need for review.
- Set a realistic schedule — and stick to it.

Note: After clicking on a link, right click and select “Previous View” to go back to original text.
5) Practice explaining the key concepts
Those GACE assessments with constructed-response questions assess your ability to explain material effectively. As a teacher, you’ll need to be able to explain concepts and processes to students in a clear, understandable way. What are the major concepts you will be required to teach? Can you explain them in your own words accurately, completely, and clearly? Practice explaining these concepts to test your ability to effectively explain what you know.

6) Understand how questions will be scored
Scoring information can be found in the Scores section of the GACE website at www.gace.ets.org.

7) Develop a study plan
A study plan provides a roadmap to prepare for the GACE assessments. It can help you understand what skills and knowledge are covered on the test and where to focus your attention. Use the blank study plan template in the back of this Study Companion to organize your efforts.

And most importantly — get started!

Would a Study Group Work for You?

Using this Study Companion as part of a study group
People who have a lot of studying to do sometimes find it helpful to form a study group with others who are working toward the same goal. Study groups give members opportunities to ask questions and get detailed answers. In a group, some members usually have a better understanding of certain topics, while others in the group may be better at other topics. As members take turns explaining concepts to each other, everyone builds self-confidence.

If the group encounters a question that none of the members can answer well, the group can go to a teacher or other expert and get answers efficiently. Because study groups schedule regular meetings, members study in a more disciplined fashion. They also gain emotional support. The group should be large enough so that various people can contribute various kinds of knowledge, but small enough so that it stays focused. Often, three to six members is a good size.

Here are some ways to use this Study Companion as part of a study group:

- **Plan the group’s study program.** Parts of the study plan template can help to structure your group’s study program. By filling out the first five columns and sharing the worksheets, everyone will learn more about your group’s mix of abilities and about the resources, such as textbooks, that members can share with the group. In the sixth column (“Date planned to study this content”), you can create an overall schedule for your group’s study program.

- **Plan individual group sessions.** At the end of each session, the group should decide what specific topics will be covered at the next meeting and who will present each topic. Use the content subareas and objectives in the About the Assessment section to select topics, and then select practice questions.

Note: After clicking on a link, right click and select "Previous View" to go back to original text.
• **Prepare your presentation for the group.** When it’s your turn to present, prepare something that is more than a lecture. Write two or three original questions to pose to the group. Practicing writing actual questions can help you better understand the topics covered on the test as well as the types of questions you will encounter on the test. It will also give other members of the group extra practice at answering questions.

• **Take a practice test together.** The idea of a practice test is to simulate an actual administration of the test, so scheduling a test session with the group will add to the realism and may also help boost everyone’s confidence. Remember, if you take a practice test, allow only the time that will be allotted for that test on your administration day. You can use the questions in this Study Companion for your practice test.

• **Learn from the results of the practice test.** Check each other’s answers. An answer key for the selected-response questions with explanations for the answers is included in this Study Companion. If your test includes constructed-response questions, look at the constructed-response sample questions, which contain sample responses to those types of questions and shows how they were scored. Then try to follow the same guidelines that the test raters use.

  – **Be as critical as you can.** You’re not doing your study partner a favor by letting him or her get away with an answer that does not cover all parts of the question adequately.

  – **Be specific.** Write comments that are as detailed as the comments about the sample responses. Indicate where and how your study partner is doing an inadequate job of answering the question. Writing notes for your study partner may also help.

  – **Be supportive.** Include comments that point out what your study partner got right and that therefore earned them points.

Then plan one or more study sessions based on aspects of the questions on which group members did not perform well. For example, each group member might be responsible for rewriting one paragraph of a response in which someone else did an inadequate job.

Whether you decide to study alone or with a group, remember that the best way to prepare is to have an organized plan. The plan you follow should set goals based on specific topics and skills that you need to learn, and it should commit you to a realistic set of deadlines for meeting these goals. Then you need to discipline yourself to stick with your plan and accomplish your goals on schedule.
Develop Your Study Plan

Developing a study plan helps you prepare for the GACE assessments. A blank study plan worksheet is available in the back of this Study Companion. You can use this worksheet to:

1. **Define Content Areas**: List the most important content areas for your test as defined in About the Assessment beginning on page 26.
2. **Determine Strengths and Weaknesses**: Identify where you have thorough understanding and where you need additional study in each content area.
3. **Identify Resources**: Identify the books, courses, and other resources you plan to use to study for each content area.
4. **Study**: Create and commit to a schedule that provides for regular study periods.

Below is an example of a completed study plan that may help you get started with your own.

<table>
<thead>
<tr>
<th>GACE Test Name:</th>
<th>Reading</th>
</tr>
</thead>
<tbody>
<tr>
<td>GACE Test Code:</td>
<td>117</td>
</tr>
<tr>
<td>I am taking the test on:</td>
<td>October 25, 2014</td>
</tr>
</tbody>
</table>

**Literal Comprehension**

<table>
<thead>
<tr>
<th>Content covered</th>
<th>Description of content</th>
<th>How well do I know the content? (scale 1–5)</th>
<th>What resources do I have/need for studying this content?</th>
<th>Where can I find the resources I need?</th>
<th>Date planned to study this content</th>
<th>Date completed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main Ideas</td>
<td>Identify summaries or paraphrases of main idea or primary purpose of reading section</td>
<td>2</td>
<td>Middle school English text book</td>
<td>College library, middle school teacher</td>
<td>9/15/14</td>
<td>9/15/14</td>
</tr>
<tr>
<td>Supporting Ideas</td>
<td>Identify summaries or paraphrases of supporting ideas and specific details in reading selection</td>
<td>2</td>
<td>Middle school English text book</td>
<td>College library, middle school teacher</td>
<td>9/17/14</td>
<td>9/17/14</td>
</tr>
<tr>
<td>Organization</td>
<td>Identify how reading selection is organized in terms of cause/effect and compare/contrast</td>
<td>3</td>
<td>Middle and high school English text book</td>
<td>College library, middle and high school teachers</td>
<td>9/20/14</td>
<td>9/21/14</td>
</tr>
<tr>
<td>Organization</td>
<td>Identify key transition words/phrases in reading selection and how used</td>
<td>4</td>
<td>Middle and high school English text book</td>
<td>College library, middle and high school teachers</td>
<td>9/25/14</td>
<td>9/26/14</td>
</tr>
<tr>
<td>Vocabulary in Context</td>
<td>Identify meanings of words as used in context of reading selection</td>
<td>3</td>
<td>Middle and high school English text book, dictionary</td>
<td>College library, middle and high school teachers</td>
<td>9/25/14</td>
<td>9/27/14</td>
</tr>
</tbody>
</table>

**Note:** After clicking on a link, right click and select "Previous View" to go back to original text.
## Critical and Inferential Comprehension

<table>
<thead>
<tr>
<th>Content covered</th>
<th>Description of content</th>
<th>How well do I know the content? (scale 1–5)</th>
<th>What resources do I have/need for studying this content?</th>
<th>Where can I find the resources I need?</th>
<th>Date planned to study this content</th>
<th>Date completed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evaluation</td>
<td>Determine whether evidence strengthens, weakens, or is relevant to arguments in reading selection</td>
<td>5</td>
<td>High school text book, college course notes</td>
<td>College library, course notes, high school teacher, college professor</td>
<td>10/1/14</td>
<td>10/1/14</td>
</tr>
<tr>
<td>Evaluation</td>
<td>Determine role that an idea, reference, or piece of information plays in author’s discussion/argument</td>
<td>5</td>
<td>High school text book, college course notes</td>
<td>College library, course notes, high school teacher, college professor</td>
<td>10/1/14</td>
<td>10/1/14</td>
</tr>
<tr>
<td>Evaluation</td>
<td>Determine if information presented is fact or opinion</td>
<td>4</td>
<td>High school text book, college course notes</td>
<td>College library, course notes, high school teacher, college professor</td>
<td>10/1/14</td>
<td>10/1/14</td>
</tr>
<tr>
<td>Evaluation</td>
<td>Identify relationship among ideas presented in reading selection</td>
<td>2</td>
<td>High school text book, college course notes</td>
<td>College library, course notes, high school teacher, college professor</td>
<td>10/1/14</td>
<td>10/1/14</td>
</tr>
<tr>
<td>Inferential Reasoning</td>
<td>Determine logical assumptions on which argument or conclusion is based</td>
<td>3</td>
<td>High school text book, college course notes</td>
<td>College library, middle and high school teachers</td>
<td>10/8/14</td>
<td>10/8/14</td>
</tr>
<tr>
<td>Inferential Reasoning</td>
<td>Determine author’s attitude toward materials discussed in reading selection</td>
<td>2</td>
<td>High school text book, college course notes</td>
<td>College library, middle and high school teachers</td>
<td>10/8/14</td>
<td>10/8/14</td>
</tr>
<tr>
<td>Inferential Reasoning</td>
<td>Determine author’s attitude toward materials discussed in reading selection</td>
<td>1</td>
<td>High school text book, college course notes</td>
<td>College library, middle and high school teachers</td>
<td>10/17/14</td>
<td>10/18/14</td>
</tr>
<tr>
<td>Generalization</td>
<td>Recognize or predict ideas/situations that are extensions of, or similar to, what has been presented in reading selection</td>
<td>2</td>
<td>High school text book, college course notes</td>
<td>College library, middle and high school teachers</td>
<td>10/17/14</td>
<td>10/18/14</td>
</tr>
<tr>
<td>Generalization</td>
<td>Draw conclusions from materials presented in reading selection</td>
<td>3</td>
<td>High school text book, college course notes</td>
<td>College library, middle and high school teachers</td>
<td>10/23/14</td>
<td>10/23/14</td>
</tr>
<tr>
<td>Generalization</td>
<td>Apply ideas presented in a reading selection to other situations</td>
<td>3</td>
<td>High school text book, college course notes</td>
<td>College library, middle and high school teachers</td>
<td>10/23/14</td>
<td>10/23/14</td>
</tr>
</tbody>
</table>

*Note: After clicking on a link, right click and select "Previous View" to go back to original text.*
Review Smart Tips for Success

Learn from the experts. Take advantage of these answers to questions you may have and practical tips to help you navigate the GACE assessment and make the best use of your time.

Should I guess?

Yes. Your score is based on the number of questions you answer correctly, with no penalty or subtraction for an incorrect answer. When you don’t know the answer to a question, try to eliminate any obviously wrong answers and then guess at the correct one. Try to pace yourself so that you have enough time to carefully consider every question.

Can I answer the questions in any order?

Yes. You can go through the questions from beginning to end, as many test takers do, or you can create your own path. Perhaps you will want to answer questions in your strongest area of knowledge first and then move from your strengths to your weaker areas. You can use the “Mark” function to note a question you want to come back to later. There is no right or wrong way; use the approach that works best for you.

Are there trick questions on the test?

No. There are no hidden meanings or trick wording. All of the questions on the test ask about subject matter knowledge in a straightforward manner.

Are there answer patterns on the test?

No. You might have heard this myth: The answers on selected-response tests follow patterns. Another myth is that there will never be more than two questions with the same lettered answer following each other. Neither myth is true. Select the answer you think is correct based on your knowledge of the subject.

Can I write on the scratch paper I am given?

Yes. You can work out problems on the scratch paper provided to you by the test administrator, make notes to yourself, or write anything at all. You may use your scratch paper in any way that is useful to you, but be sure to enter your final answers on the computer. Your scratch paper will be destroyed after you are finished with the assessment.

Smart Tips for Taking the Test

1. **Skip the questions you find extremely difficult.** Rather than trying to answer these on your first pass through the test, leave them blank and mark them. Pay attention to the time as you answer the rest of the questions on the test, and try to finish with 10 or 15 minutes remaining so that you can go back over the questions you left blank. Even if you don’t know the answer the second time you read the questions, see if you can narrow down the possible answers, and then guess.

2. **Keep track of the time.** Keep an eye on the timer located in the upper right-hand corner of the computer screen, and be aware of how much time you have left to complete your test. You will probably have plenty of time to answer all of the questions, but if you find yourself becoming stuck on one question, you might decide to move on and return to that question later.
3. **Read all of the possible answers before selecting one.** Then, reread the question to be sure the answer you have selected really answers the question. Remember, a question that contains a phrase such as “Which of the following does NOT …” is asking for the one answer that is NOT a correct statement or conclusion.

4. **Check your answers.** If you have extra time left over at the end of the test, look over each question and make sure that you have answered it as you intended. Many test takers make careless mistakes that they could have corrected if they had checked their answers.

5. **Don’t worry about your score when you are taking the test.** No one is expected to answer all of the questions correctly. Your score on this test is not analogous to your score on other similar-looking (but in fact very different!) tests. It doesn’t matter on the GACE assessments whether you score very high or barely pass. If you meet the minimum passing scores along with any other requirements for obtaining teaching certification, you will receive a license. In other words, what matters is meeting the minimum passing score.

6. **Use your energy to take the test, not to get angry at it.** Getting angry at the test only increases stress and decreases the likelihood that you will do your best. Highly qualified educators and test development professionals, all with backgrounds in teaching and educational leadership, worked diligently to make the test a fair and valid measure of your knowledge and skills. The best thing to do is concentrate on answering the questions.
Check on Testing Accommodations

What if I have a disability or health-related need?

If you have a disability or health-related need, you may wish to apply for testing accommodations. ETS is committed to serving test takers with disabilities or health-related needs by providing services and accommodations that are reasonable and appropriate given the purpose of the test. Testing accommodations are available for test takers with disabilities or health-related needs who meet ETS requirements. If you are requesting testing accommodations, you must register by mail or fax through ETS Disability Services and have your accommodations approved before you register to test.

The 2013–14 Bulletin Supplement for Test Takers with Disabilities or Health-related Needs for GACE® assessments contains contact information, procedures for requesting testing accommodations, and registration forms. The Supplement should be used in conjunction with the information in the GACE Registration Bulletin. The Supplement and the Registration Bulletin can both be downloaded free of charge from the Testing Accommodations section of the GACE website at www.gace.ets.org.

Disability documentation policy statements and forms are available through the ETS website at www.ets.org/disabilities/documentation. You should also see Tips for Test Takers with Disabilities at www.ets.org/disabilities/tips.

Note: After clicking on a link, right click and select "Previous View" to go back to original text.
Do Your Best on Test Day

You followed your study plan. You are ready for the test. Now it’s time to prepare for test day.

Plan to end your review a day or two before the actual test date so you avoid cramming. Take a dry run to the test center so you’re sure of the route, traffic conditions, and parking. Most of all, you want to eliminate any unexpected factors that could distract you from your ultimate goal — passing the GACE assessment!

On the day of the test, you should:

- be well-rested
- wear comfortable clothes and dress in layers
- eat before you take the test to keep your energy level up
- bring valid and acceptable identification with you that contains your name, signature, and photograph
- be prepared to stand in line to check in or to wait while other test takers check in
- select a seat away from doors, aisles, and other high-traffic areas

You can’t control the testing situation, but you can control yourself. Stay calm. Test administrators are well trained and make every effort to provide uniform testing conditions, but don’t let it bother you if the test doesn’t start exactly on time. You will be given the necessary amount of time once it does start.

You can think of preparing for this test as training for an athletic event. Once you’ve trained, prepared, and rested, give it everything you’ve got.

What items am I restricted from bringing into the test center?

You may not bring personal items into the test center such as:

- cell phones, smartphones (e.g., Android™, BlackBerry®, iPhone®), tablets, PDAs, and other electronic, listening, recording, or photographic devices
- handbags, knapsacks, or briefcases
- food or snacks of any kind
- water bottles or canned or bottled beverages
- study materials, books, or notes
- pens, pencils, and scratch paper (the test administrator will provide pencils and scratch paper)
- tobacco
- weapons of any kind

**NOTE:** All cell phones, smartphones, tablets, PDAs, and other electronic, listening, recording, or photographic devices are strictly prohibited at the test center. If you are found to be in
possession of any of these devices before, during, or after the test administration, your device may be inspected and/or confiscated, and you will be dismissed from the test. Your test scores will be canceled, and you will forfeit your test fees. For more information on what you can bring to the test center, visit the On Test Day section of the GACE website at www.gace.ets.org.

Are You Ready?

Review this list to determine if you’re ready to take your assessment.

- Do you know the Georgia testing requirements for your teaching field?
- Have you followed all of the test registration procedures?
- Do you know the topics that will be covered in each assessment you plan to take?
- Have you reviewed any textbooks, class notes, and course readings that relate to the topics covered?
- Do you know how long the assessment will take and the number of questions it contains?
- Have you considered how you will pace your work?
- Are you familiar with the types of questions that you may encounter during your assessment?
- Are you familiar with the recommended test-taking strategies?
- Have you practiced by working through the practice questions in the Study Companion?
- If constructed-response questions are part of your test, do you understand the scoring criteria for these items?
- If you are repeating a GACE assessment, have you analyzed your previous score report to determine areas where additional study and test preparation could be useful?

If you answered “yes” to the questions above, your preparation has paid off. Now take the GACE assessment, do your best, pass it — and begin your teaching career!
Other Questions You May Have

Here is some supplemental information that can give you a better understanding of the GACE assessments.

What is the purpose of the GACE assessments?

The purpose of the GACE assessments is to assure that candidates have the knowledge and skills needed to perform the job of an educator in Georgia public schools. The GACE assessments are aligned with state and national standards for educator preparation and with state standards for the P–12 student curriculum — the Common Core Georgia Performance Standards (CCGPS) — and the content standards for Georgia's state-approved educator preparation programs. In other words, each GACE assessment was developed by Georgia educators to measure competency on what is taught in Georgia’s P-12 classrooms.

Who developed the GACE assessments?

Each GACE assessment was developed with diverse representation of Georgia educators from across the state, including the participation of committees of Georgia educators, educator preparation faculty, and other content and assessment specialists. This included individuals from school systems, local schools, institutions of higher education (public and private), and other stakeholders.

What do the GACE assessments measure?

Each GACE assessment consists of one or more tests designed to assess a candidate’s knowledge and skills as required by the guidelines for Georgia educator certification.

Do some GACE assessments have more than one test?

Yes. Some GACE assessments do consist of more than one test. You may take each individual test at separate administrations, or for assessments that offer a combined test format, you may take the combined version at one administration. You must pass all tests within an assessment to achieve certification.

What is certification?

Certification in any area — medicine, law, architecture, accounting, cosmetology, or education — is an assurance to the public that the person holding the certification possesses sufficient knowledge and skills to perform important occupational activities safely and effectively. In the case of teacher certification, a certification tells the public that the individual has met predefined competency standards for beginning teaching practice.

Because certification makes such a serious claim about its holder, certification tests are usually quite demanding. In some fields, certification tests have more than one part and last for more than one day. Candidates for certification in all fields plan intensive study as part of their professional preparation. Some join study groups, while others study alone. Preparing to take a certification test is, in all cases, a professional activity. Because it assesses the entire body of knowledge for the field you are entering, preparing for a certification exam takes planning, discipline, and sustained effort.
How are the assessments updated to ensure the content remains current?

GACE assessments are reviewed regularly. During the first phase of review, ETS conducts an analysis of relevant state and association standards and of the current test content. State certification areas and the results of any relevant job analysis are also considered. If these reviews indicate that the test content needs to be updated, a state advisory committee is convened to develop revised test content specifications. New test questions are then produced following the standard test development methodology.

How long will it take to receive my scores?

Unofficial scores for tests that contain only selected-response questions can be viewed at the conclusion of the test. Official scores for these tests are reported approximately four weeks later.

Score reporting dates for all testing windows can be found in the Scores section of the GACE website at [www.gace.ets.org](http://www.gace.ets.org) and in the Registration Bulletin.

Can I access my scores online?

Viewing your scores is easy — simply log in to your ETS GACE testing account on the GACE website at [www.gace.ets.org](http://www.gace.ets.org) and click on your score report.
The GACE Science assessment is designed to measure the professional knowledge of prospective teachers of secondary school Science in the state of Georgia.

This assessment includes two tests. You may take either test individually or the full assessment in a single session. The testing time is the amount of time you will have to answer the questions on the test. Test duration includes time for tutorials and directional screens that may be included in the test.

The questions in this assessment assess both basic knowledge across content areas and the ability to apply principles.

The total number of questions that are scored is typically smaller than the total number of questions on the test. Most tests that contain selected-response questions also include embedded pretest questions, which are not used in calculating your score. By including pretest questions in the assessment, ETS is able to analyze actual test-taker performance on proposed new questions and determine whether they should be included in future versions of the test.

Note: After clicking on a link, right click and select "Previous View" to go back to original text.
Content Specifications

Each test in this assessment is organized into content subareas. Each subarea is further defined by a set of objectives and their knowledge statements.

- The objectives broadly define what an entry-level educator in this field in Georgia public schools should know and be able to do.
- The knowledge statements describe in greater detail the knowledge and skills eligible for testing.
- Some tests also include content material at the evidence level. This content serves as descriptors of what each knowledge statement encompasses.

The following is a breakdown of the subareas and objectives for the tests in this assessment.

Note: After clicking on a link, right click and select "Previous View" to go back to original text.
**Test I Subareas**

<table>
<thead>
<tr>
<th>Subarea</th>
<th>Approx. Percentage of Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Scientific Inquiry, Processes, Technology, and Society</td>
<td>30%</td>
</tr>
<tr>
<td>II. Physical Science</td>
<td>70%</td>
</tr>
</tbody>
</table>

**Test I Objectives**

**Subarea I: Scientific Inquiry, Processes, Technology, and Society**

*Objective 1: Understands the nature of scientific inquiry and processes, including the collection and analysis of data*

The beginning Science teacher:

A. Understands methods of scientific inquiry and design
   - Identifying problems based on observations
   - Forming and testing hypotheses
   - Development of theories, models, and laws
   - Experimental design, including independent and dependent variables, controls, and sources of error
   - Process skills including observing, comparing, inferring, categorizing, generalizing, and concluding

B. Understands the history and nature of scientific knowledge
   - Subject to change
   - Consistent with evidence
   - Based on reproducible evidence
   - Unifying concepts and processes, such as systems, models, constancy and change, equilibrium, form and function
   - Peer review

C. Understands the major historical developments of science
   - Accepted principles and models develop over time
   - Major developments in science, such as atomic theory and plate tectonics
   - Contributions of major historical figures such as Darwin and Newton

*Note: After clicking on a link, right click and select "Previous View" to go back to original text.*
D. Understands the processes involved in scientific data collection and manipulation
   - Common units of measurement (metric and English), including unit conversion and prefixes such as milli- and kilo-
   - Laboratory notebook practices
   - Scientific notation and significant figures in collected data
   - Organization, presentation, and communication of data, using appropriate tools
   - Basic data and error analysis, including determining mean, accuracy, precision, and sources of error

E. Understands how to interpret and draw conclusions from data presented in tables, graphs, maps, and charts
   - Trends in data
   - Relationships between variables
   - Predictions based on data
   - Drawing valid conclusions based on data

F. Understands the procedures for correct preparation, storage, use, and disposal of laboratory materials
   - Appropriate and safe use of materials, such as chemicals and lab specimens
   - Safe disposal of materials
   - Appropriate storage
   - Preparations for classroom or field use of materials, such as preparing solutions and staining slides

G. Understands how to use standard equipment in the laboratory and the field
   - Appropriate and safe use of equipment such as Bunsen burner, glassware, and microscopes
   - Appropriate storage of equipment such as pH probes and dissection equipment
   - Maintenance and calibration of equipment such as microscopes and balances
   - Preparation for classroom or field use, such as prelaboratory setup, classroom demonstrations, and field research

H. Understands safety and emergency procedures in the laboratory
   - Location and use of standard safety equipment such as eyewash stations and showers
   - Laboratory safety rules for students
   - Appropriate apparel and conduct in the laboratory
   - Emergency procedures for events such as fires, chemical spills, and injuries
Objective 2: Understands the relationship of science and technology to society and the environment

The beginning Science teacher:

A. Understands that science and technology impact the environment and society
   • Acid rain
   • Air and water pollution
   • Greenhouse gases
   • Ozone layer depletion
   • Waste disposal and recycling
   • Green chemistry
   • Irrigation
   • Reservoirs and levees
   • Depletion of aquifers
   • Loss of biodiversity

B. Understands major issues associated with energy production and the management of natural resources
   • Renewable and nonrenewable energy resources
   • Conservation, recycling, and sustainability
   • Pros and cons of power generation based on various sources, such as fossil and nuclear fuel, hydropower, wind power, solar power, and geothermal power
   • Issues associated with the use and extraction of Earth’s resources (e.g., mining, land reclamation, and deforestation)

C. Understands applications of science and technology in daily life
   • Chemical properties of household products
   • Communication (e.g., wireless devices, GPS, satellites)
   • Science principles applied in commonly used consumer products such as batteries, lasers, polarized sunglasses, and fiber optic cables
   • Water purification
   • Common agricultural practices, such as the use of insecticides, herbicides, and genetically modified crops
   • DNA evidence in criminal investigations

Note: After clicking on a link, right click and select "Previous View" to go back to original text.
D. Understands the impact of science on public health issues
   • Nutrition, disease, and medicine
   • Biotechnology, such as genetic engineering
   • Medical technologies, such as medical imaging, X rays, and radiation therapy

Subarea II: Physical Science

Objective 1: Understands the organization of matter, the atomic model, and relationships involving energy and matter

The beginning Science teacher:

A. Understands the organization of matter
   • Elements, compounds, and mixtures
   • Molecules, atoms, ions, and subatomic particles
   • Basic properties of solids, liquids, and gases

B. Understands the basic structure of the atom
   • Atomic models
   • Atomic structure, including nucleus, electrons, protons, and neutrons
   • Atomic number, atomic mass, and isotopes
   • Electron arrangements
   • Radioactive decay processes and half-life
   • Fission and fusion

C. Understands basic concepts and relationships involving energy and matter
   • Conservation of energy
   • Conservation of matter in chemical systems
   • Kinetic and potential energy
   • Conversions between different forms of energy, such as thermal, chemical, electrical, and mechanical
   • Chemical and physical properties/changes
   • Temperature scales, such as Celsius, Fahrenheit, and Kelvin
   • Conduction, convection, and radiation

Note: After clicking on a link, right click and select “Previous View” to go back to original text.
D. Understands the states of matter and factors that affect phase changes
   • Basic assumptions of the kinetic theory of matter, such as the particles are in constant motion and the average speed of gas particles is related to temperature
   • Ideal gas laws
   • Phase transitions and the energy changes involved, such as heat of vaporization and heat of sublimation

E. Understands applications of energy and matter relationships
   • Matter cycling (carbon, nitrogen, water)
   • Energy flow in ecosystems
   • Convection currents in the atmosphere, ocean, and mantle
   • Conservation of mass in the rock cycle
   • Chemical and physical changes in rocks
   • Impact of solar radiation on Earth and life
   • Energy transformations in living systems, such as photosynthesis and cellular respiration

Objective 2: Understands chemistry, including periodic table, compounds, formulas, bonding, reactions, and solutions

The beginning Science teacher:

A. Understands how to name simple compounds and write their chemical formulas
   • Interpreting chemical formulas
   • Naming compounds based on formula
   • Writing formulas based on name
   • Structural formulas, such as electron dot and Lewis structures

B. Understands types of chemical interactions
   • Covalent bonding
   • Ionic bonding
   • Metallic bonding
   • Intermolecular forces such as hydrogen bonding

C. Understands the mole concept and its applications
   • Avogadro’s number
   • Molar mass
   • Percent composition
D. Understands the organization of the periodic table and can use it to predict trends in physical and chemical properties
   • Elements arranged in groups and periods
   • Atomic number, atomic mass, and isotopic abundance
   • Symbols of the elements
   • Trends in physical properties based on position of elements on the periodic table
   • Trends in chemical reactivity based on position of elements on the periodic table

E. Understands basic concepts involved in chemical reactions
   • Balancing equations of simple chemical reactions
   • Simple stoichiometric calculations based on balanced equations
   • Endothermic and exothermic reactions
   • Factors that affect reaction rates, such as concentration, temperature, pressure, catalysts/enzymes, and activation energy
   • Factors that affect reaction equilibrium, including Le Chatelier’s principle
   • Types of reactions, such as combustion, single or double replacement, decomposition, synthesis, and oxidation/reduction

F. Understands simple acid-base chemistry
   • Properties of acids and bases
   • pH scale
   • Neutralization
   • Acid-base indicators, such as phenolphthalein, pH paper, and litmus paper

G. Understands different types of solutions
   • Dilute and concentrated
   • Saturated, unsaturated, and supersaturated
   • Solvent and solute
   • Concentration terms such as molarity
   • Preparation of solutions of varying concentrations

Note: After clicking on a link, right click and select "Previous View" to go back to original text.
H. Understands factors affecting the solubility of solids, liquids, and gases and the dissolving process
   • Effect of temperature, pressure, particle size, and agitation on the rate of dissolving
   • Effect of temperature and pressure on solubility, including solubility curves
   • Polar versus nonpolar solvents and solutes
   • Dissociation of ionic compounds such as salts in water (e.g., ionization, electrolytes)
   • Precipitation
   • Freezing point depression
   • Osmotic pressure

Objective 3: Understands physics, including mechanics, electricity and magnetism, and wave properties

The beginning Science teacher:

A. Understands how to describe motion in one and two dimensions
   • Speed and velocity
   • Acceleration
   • Displacement
   • Linear momentum
   • Vector and scalar quantities

B. Understands Newton’s three laws of motion
   • First law: inertia
   • Second law: $F = ma$
   • Third law: action-reaction forces

C. Understands the concepts of mass, weight, and gravity
   • Distinction between mass and weight
   • Gravitational attraction
   • Acceleration due to gravity

Note: After clicking on a link, right click and select "Previous View" to go back to original text.
D. Understands how to analyze motion and forces
   • Friction
   • Collisions and conservation of linear momentum
   • Circular motion
   • Center of mass
   • Conservation of energy
   • Work, energy, and power
   • Projectile motion
   • Inclined planes
   • Periodic motion, including pendulums, oscillating springs, planetary orbits, and satellites
   • Basic fluid mechanics, including buoyancy, density, and pressure

E. Understands simple machines
   • Mechanical advantage
   • Types of simple machines, such as the wedge, screw, and lever
   • Concept of torque

F. Understands the electrical nature of common materials
   • Electric charges
   • Electrostatic force (attraction and repulsion, Coulomb’s law)
   • Conductivity, conductors, and insulators

G. Understands basic electrical concepts
   • Direct current (DC) and alternating current (AC)
   • Current, resistance, voltage, and power
   • Ohm’s law (V = IR)
   • Basic series and parallel circuits
   • Voltage sources, such as batteries and generators

H. Understands the basic properties of magnetic fields and forces
   • Magnetic materials
   • Magnetic forces and fields, including magnetic poles, attractive and repulsive forces
   • Electromagnets

Note: After clicking on a link, right click and select "Previous View" to go back to original text.
I. Understands the electromagnetic spectrum
   • Nature of light, including wave properties and photons
   • Visible spectrum and color
   • Electromagnetic spectrum, such as visible, ultraviolet, infrared, microwave, and gamma

J. Understands the basic characteristics and types of waves
   • Transverse and longitudinal
   • Frequency, amplitude, wavelength, speed, and energy

K. Understands basic wave phenomena
   • Reflection, refraction, diffraction, and dispersion
   • Absorption and transmission
   • Interference, scattering, and polarization
   • Total internal reflection
   • Doppler effect

L. Understands basic optics
   • Mirrors
   • Lenses and their applications, such as the human eye, microscope, and telescope
   • Prisms

M. Understands the basic characteristics and phenomena of sound
   • Pitch/frequency and loudness/intensity
   • Sound wave production, air vibrations, and resonance
   • Application of the Doppler effect to sound
Test II Subareas

<table>
<thead>
<tr>
<th>Subarea</th>
<th>Approx. Percentage of Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Life Science</td>
<td>60%</td>
</tr>
<tr>
<td>II. Earth and Space Science</td>
<td>40%</td>
</tr>
</tbody>
</table>

Test II Objectives

**Subarea I: Life Science**

Objective 1: Understands the structure of cells and basic cellular processes, including genetics

The beginning Science teacher:

A. Understands the basic structure and function of cells and their organelles
   • Structure and function of cell membranes
   • Structure and function of animal and plant cell organelles
   • Levels of organization and scale (molecules, cells, tissues, organs, organ systems)
   • Major features of common animal cell types
   • Prokaryotes and eukaryotes

B. Understands key aspects of cell reproduction and division
   • Cell cycle
   • Mitosis
   • Meiosis
   • Cytokinesis

C. Understands the basic biochemistry of life
   • Cellular respiration (aerobic and anaerobic)
   • Photosynthesis
   • Structure and function of biological molecules, such as DNA, carbohydrates, proteins, lipids, and enzymes

*Note: After clicking on a link, right click and select "Previous View" to go back to original text.*
D. Understands basic genetics
   • Structure and function of DNA and RNA
   • Chromosomes, genes, and alleles
   • Dominant and recessive traits
   • Mendelian inheritance, including genotype, phenotype, use of Punnett squares, and pedigrees
   • Mutations, chromosomal abnormalities, and common genetic disorders

Objective 2: Understands mechanisms of evolution, characteristics of organisms, and principles of ecology

The beginning Science teacher:

A. Understands the theory and key mechanisms of evolution
   • Mechanisms of evolution
   • Isolation mechanisms and speciation
   • Supporting evidence, including the fossil record, comparative genetics, and homologous structures

B. Understands the elements of the hierarchical classification scheme
   • Classification schemes
   • Characteristics of bacteria, animals, plants, fungi, and protists
   • Characteristics of viruses

C. Understands the major structures of plants and their functions
   • Characteristics of vascular and nonvascular plants
   • Structure and function of roots, leaves, and stems
   • Asexual and sexual reproduction
   • Uptake and transport of nutrients and water
   • Tropisms: responses to stimuli

Note: After clicking on a link, right click and select "Previous View" to go back to original text.
D. Understands the basic anatomy and physiology of animals, including the human body
  • Response to stimuli and homeostasis
  • Systems that exchange with the environment, including respiratory, excretory, and digestive systems
  • Internal transport and exchange, including the circulatory system
  • Control systems, such as the nervous system and the endocrine system
  • Movement and support systems, including the skeletal and muscular systems
  • Reproduction and development
  • Immune system

E. Understands population dynamics
  • Growth curves and carrying capacity
  • Behavior, such as territoriality
  • Intraspecific relationships, such as mating systems, social systems, and competition

F. Understands community ecology
  • Niche
  • Species diversity
  • Interspecific relationships, such as predator-prey and parasitism

G. Understands ecosystems
  • Biomes
  • Stability and disturbances, such as glaciation, climate change, and succession
  • Energy flow, such as trophic levels and food webs
  • Biogeochemical cycles, including water, nitrogen, and carbon cycles and biotic/abiotic interaction

Subarea II: Earth and Space Science

Objective 1: Understands geology, including Earth's structure, rocks, minerals, plate tectonics, and historical geology

The beginning Science teacher:

A. Understands the types and basic characteristics of rocks and minerals and their formation processes
  • The rock cycle
  • Characteristics of sedimentary, igneous, and metamorphic rocks and their formation processes
  • Characteristics of minerals and their formation processes

Note: After clicking on a link, right click and select "Previous View" to go back to original text.
B. Understands the processes involved in erosion, weathering, and sedimentation of Earth’s surface materials
   - Erosion and sedimentation
   - Chemical and physical weathering
   - Characteristics of soil
   - Porosity and permeability
C. Understands Earth’s basic structure and internal processes
   - Earth’s layers, such as the crust, mantle, and core
   - Shape and size of Earth
   - Geographical features
   - Earth’s magnetic field
D. Understands plate tectonic theory
   - Folding and faulting
   - Processes at plate boundaries, such as seafloor spreading
   - Basic characteristics of various types of volcanoes
   - Basic characteristics of earthquakes, including seismic waves and triangulation
E. Understands historical geology
   - Principle of uniformitarianism
   - Basic principles of relative age dating, including superposition, stratigraphic correlation, and fossil succession
   - Absolute (radiometric) dating
   - Geologic time scale (era and periods)
   - Fossil record as evidence of the origin and development of life, including fossilization methods, mass extinctions, ice ages, and meteor impacts

Objective 2: Understands the hydrosphere and atmosphere, including water cycle, bodies of water, weather, and climate

The beginning Science teacher:

A. Understands the water cycle
   - Evaporation and condensation
   - Precipitation
   - Runoff and infiltration
   - Transpiration
   - Properties of water that affect Earth systems such as density, changes on freezing, high heat capacity, and solvent properties

Note: After clicking on a link, right click and select "Previous View" to go back to original text.
B. Understands the characteristics and processes of Earth’s oceans and other bodies of water
   • Distribution and location of Earth’s water
   • Seawater composition
   • Coastline topography and topography of ocean floor
   • Tides, waves, and currents
   • Estuaries, barrier islands, islands, reefs, and atolls
   • Polar ice, icebergs, and glaciers
   • Lakes, ponds, and wetlands
   • Streams, rivers, and river deltas
   • Groundwater, water table, wells, aquifers, geysers, and springs

C. Understands the basic structure and composition of Earth’s atmosphere
   • Layers
   • Composition of atmosphere
   • Atmospheric pressure and temperature

D. Understands basic concepts of weather development
   • Relative humidity
   • Dew point
   • Wind
   • Cloud types and formation
   • Types of precipitation
   • Air masses, fronts, storms, and severe weather, such as hurricanes and tornadoes
   • Development and movement of weather patterns

E. Understands the major factors that affect climate and seasons
   • Effects of latitude, geographical location, and elevation
   • Effects of atmospheric circulation, such as trade winds and jet streams
   • Effects of ocean circulation
   • Characteristics and locations of climate zones, such as the Tropics and the Arctic
   • Effect of the tilt of Earth’s axis on seasons
   • Effects of natural phenomena, such as volcanic eruptions and solar radiation variations
   • El Niño, La Niña, and monsoons

Note: After clicking on a link, right click and select "Previous View" to go back to original text.
Objective 3: Understands astronomy, including solar system, stars, and other features of the universe

The beginning Science teacher:

A. Understands the major features of the solar system
   • Structure of the solar system
   • Effects of motion and gravity
   • Characteristics of the Sun, Moon, and planets
   • Characteristics of asteroids, meteoroids, comets, and dwarf/minor planets
   • Theories of the origin of the solar system

B. Understands the interactions of the Earth-Moon-Sun system
   • Effect on seasons
   • Effect on tides
   • Earth’s rotation and orbital revolution around the Sun
   • Phases of the Moon
   • Solar and lunar eclipses
   • Time zones
   • Effect of solar wind on Earth

C. Understands major features of the universe
   • Galaxies
   • Characteristics of stars and their life cycles
   • Dark matter
   • Theories of the origin of the universe
   • Technology and measurement techniques used to investigate the universe, such as telescopes, spectroscopes, and probes
Approaches to Answering Selected-response Questions

The purpose of this section is to describe selected-response question formats that you will typically see on the GACE assessments and to suggest possible ways to approach thinking about and answering them. These approaches are intended to supplement and complement familiar test-taking strategies with which you may already be comfortable and that work for you. Fundamentally, the most important component in ensuring your success is familiarity with the content that is covered on the assessment. This content has been carefully selected to align with the knowledge required to begin a career as a teacher in the state of Georgia.

The questions on this assessment are designed to assess your knowledge of the content described in the subareas and objectives in each test. In most cases, you are expected to demonstrate more than just your ability to recall factual information. You may be asked to think critically about the information, to analyze it, to compare it with other knowledge you have, or to make a judgment about it.

The questions on this assessment are all selected-response questions. When you are ready to respond, you must choose one of the answer options listed. You may also encounter some questions that use alternate response types; e.g., questions that require you to select multiple options, enter a numeric answer into a text box, or drag-and-drop options. Be sure to read the directions carefully to ensure that you know what is required for each test question. Leave no questions unanswered. Questions for which you mark no answer are counted as incorrect. Your score will be determined by the number of questions for which you select the correct answer.

This test has a Periodic Table of the Elements and Table of Information built into the testing software. These reference documents can be accessed by selecting the “Help” function. The test clock does not stop when the “Help” function is being used.
Question Formats
You may see the following types of questions on the test:

- Single Questions
- Clustered Questions

On the following pages, you will find descriptions of these commonly used question formats, along with suggested approaches for responding to each type.

Single Questions

The single-question format presents a direct question or an incomplete statement. It can also include a reading passage, a graphic, a table, or a combination of these features. The answer options appear below the question.

The following question is an example of the single-question format.

Example

Which of the following is the most important consideration for students and teachers with regard to students’ use of the Internet as a research tool?

A. The name of a website does not always give a clear indication of the contents of the site.
B. The rapid expansion of the Internet makes it difficult to obtain the very latest information on a given topic.
C. Different search engines use different formulas for matching websites to search strings.
D. Much of the information on the Internet has not been reviewed and verified by experts in relevant fields.

Suggested Approach

Read the question carefully and critically. Think about what the question is asking and the situation it is describing. Eliminate any obviously wrong answers, select the correct answer choice, and mark your answer.

The question in the example above addresses students’ use of the Internet as a research tool. Since there are few controls over what information may be posted on the Internet and by whom, information obtained through this medium cannot be assumed to be accurate. Therefore, students who are using the Internet as a research tool must be made aware of the importance of consulting sources that have been reviewed by experts to verify the accuracy of any information obtained. Therefore, option D is the single best answer.
With regard to the other responses, it is true that the name of a website may not accurately represent the information it presents (option A), and it is also true that search engines use different formulas for matching websites to search strings (option C). While these issues may affect the ease of locating information, they are not relevant to the more critical issue of accuracy. With regard to option B, the question of whether students have located the very latest information, which may or may not be substantiated, is less important than whether they have consulted a variety of up-to-date, accurate resources in a variety of media.

**Clustered Questions**

Clustered questions are made up of a stimulus and two or more questions relating to the stimulus. The stimulus material may be a reading passage, a sample of student work, a description of a student and/or program, a graphic, a table, or any other information needed to answer the questions that follow.

You can use several different approaches to respond to clustered questions. Some commonly used strategies are listed below.

**Strategy 1**  
Skim the stimulus material to understand its purpose, its arrangement, and/or its content. Then read the questions and refer again to the stimulus material to obtain the specific information you need to answer the questions.

**Strategy 2**  
Read the questions before considering the stimulus material. The theory behind this strategy is that the content of the questions will help you identify the purpose of the stimulus material and locate the information you need to answer the questions.

**Strategy 3**  
Use a combination of both strategies. Apply the “read the stimulus first” strategy with shorter, more familiar stimuli and the “read the questions first” strategy with longer, more complex, or less familiar stimuli. You can experiment with the sample questions in this Study Companion and then use the strategy with which you are most comfortable when you take the actual test.

Regardless of which strategy you choose, you should read the stimulus carefully and critically. You may want to note its important points to help you answer the questions.

As you consider questions set in educational contexts, try to enter into the identified teacher’s frame of mind and use that teacher’s point of view to answer the questions that accompany the stimulus. Be sure to consider the questions only in terms of the information provided in the stimulus — not in terms of your own experiences or individuals you may have known.

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**Note:** After clicking on a link, right click and select "Previous View" to go back to original text.
Example
First read the stimulus (a description of a class activity planned by a teacher).

Use the information below to answer the questions that follow.

A science teacher and a computer teacher work with the same group of eighth graders. The teachers will be addressing some related content with these students, so they agree to create an interdisciplinary unit with coordinated instruction between the two classes.

Now you are prepared to address the first of the two questions associated with this stimulus.

1. The teachers begin planning the interdisciplinary unit by deciding on student learning goals that both teachers will emphasize in their classrooms. Before beginning the unit, the teachers should answer which of the following questions to ensure the unit is as effective and well coordinated as possible?

   A. How should the topic coverage be sequenced and paced during the unit?
   B. How much time should be devoted to individual, small-group, and whole-class instruction during the unit?
   C. What methods should be communicated with parents about learning expectations?
   D. What presentation methods and teaching styles should be used during the unit?

Suggested Approach
Read the question carefully and critically. Think about the question that is being asked. Eliminate any obviously wrong answers, select the correct answer choice, and mark your answer.

This question tests understanding of effective collaborative practices. The teachers have agreed on their learning goals for students. Now they need to agree on the sequence and pace of instruction (option A) so that students will be able to build on previously presented content as new content is taught. Students will be much more likely to understand the topic of any given lesson if they are able to fit the new information into a framework of existing knowledge. Therefore, option A is the single best answer.

None of the other responses addresses ways to coordinate instruction effectively. Once the teachers have agreed on student learning goals and on the sequence and pace of topic coverage, students will be able to benefit from instruction whether or not the teachers coordinate their grouping practices (option B) or employ similar presentation methods and teaching styles (option D). With regard to option C, communicating learning expectations with parents is irrelevant to how well the two teachers are coordinated.
Now you are ready to answer the second question.

2. The teachers wish to ensure that their unit will proceed smoothly. They can most likely achieve this goal by using which of the following strategies?

   A. Create a plan before the unit begins specifying the learning activities that will occur in each teacher’s classroom each day
   B. Make arrangements to meet on a regular basis to discuss how the unit is progressing and to address any issues that may arise
   C. Identify before the unit begins any teacher tasks that will need to be performed during the unit and assign each task to a teacher
   D. Make arrangements to collaboratively create all lesson plans that will be used in both classrooms throughout the unit

**Suggested Approach**

Again, carefully consider the information presented in the stimulus, and then read the second question, which focuses on the principles of effective collaboration in an interdisciplinary teaching situation. Ongoing communication is essential so that the teachers can share information about and identify ways to address such issues as unanticipated directions students’ interests have taken, concepts students are having trouble with, and so forth. Establishing a regular meeting schedule to discuss progress and make necessary adjustments (option B) is an effective means of ensuring that such communication will occur. Therefore, **option B is the single best answer.**

None of the other strategies listed would facilitate the ongoing exchange of information necessary to address issues that arise as the unit proceeds. Because teachers are unlikely to accurately predict the specific issues that will arise during a unit, brainstorming teacher responses prior to beginning the unit (option A) would most likely be an inefficient use of planning time. Jointly creating all lesson plans in advance (option D) would not allow the flexibility necessary to adapt activities and lessons to changing circumstances and would also require a large and unnecessary investment of the teachers’ time. While identifying and assigning specific teacher roles ahead of time (option C) might increase efficiency, it would not enhance the teachers’ ability to address student learning issues effectively as they arise.
Practice Questions

This section presents some sample questions for you to review as part of your preparation for the assessment. You will probably find it helpful to simulate actual testing conditions. A correct answer and a rationale for each sample test question can be found in the section following the sample questions.

Keep in mind that the test you take at an actual administration will have different questions, although the proportion of questions in each subarea will be approximately the same. You should not expect the percentage of questions you answer correctly in these practice questions to be exactly the same as when you take the test at an actual administration, since numerous factors affect a person’s performance in any given testing situation.

The sample questions are included to illustrate some of the formats and types of questions you will see on the test; however, your performance on the sample questions should not be viewed as a predictor of your performance on the actual test.
Directions: Each of the questions or incomplete statements below is followed by four suggested answers or completions. Select the one that is best in each case.

1. In an experiment to determine if a new gasoline additive will decrease the amount of pollutants generated by automobile engines, 1 g of the additive is added to each liter of regular gasoline, and the amount of pollutants that are produced by the car engine is measured. Which of the following additional steps is most appropriate for determining the effectiveness of the additive?
   A. Run the experiment again under identical conditions
   B. Add 2 g of additive to each liter of gasoline, and measure the amount of pollutants produced by the same engine
   C. Add 1 g of additive to each liter of premium gasoline, and measure the amount of pollutants produced by the same engine
   D. Use the regular gasoline without the additive in the same engine, and measure the amount of pollutants produced

Answer and Rationale

2. Four students measured the width of a desk every day for three days. Their measurements in centimeters are shown in the chart below.

<table>
<thead>
<tr>
<th>Student</th>
<th>Day 1</th>
<th>Day 2</th>
<th>Day 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>90.40</td>
<td>92.40</td>
<td>94.40</td>
</tr>
<tr>
<td>2</td>
<td>91.3</td>
<td>91.5</td>
<td>91.4</td>
</tr>
<tr>
<td>3</td>
<td>92.2</td>
<td>92.1</td>
<td>92.2</td>
</tr>
<tr>
<td>4</td>
<td>90.5</td>
<td>91.4</td>
<td>92.3</td>
</tr>
</tbody>
</table>

   If the actual width of the desk is 91.4 cm, which of the following statements is true?

   A. Student 1’s measurements are most precise.
   B. Student 2’s measurements are most accurate and most precise.
   C. Student 3’s measurements are most accurate.
   D. Student 4’s measurements are most precise.

Answer and Rationale
3. Which of the following poses the greatest safety risk while being heated in a school laboratory?

A. A mixture of iron and copper
B. Mercury(II) oxide
C. Sodium chloride
D. Calcium carbonate

Answer and Rationale

4. Which of the following is most likely to cause a rise in the average temperature of Earth’s atmosphere in the future?

A. Atomic warfare
B. CO₂ from fossil fuels
C. Dust clouds from volcanoes
D. Depletion of Earth’s ozone layer

Answer and Rationale

5. A neutral atom of \( ^{197}_{79}\text{Au} \) has which of the following?

A. 197 neutrons
B. 79 neutrons
C. 118 protons
D. 79 electrons

Answer and Rationale
6. When a 20 g piece of iron with a temperature of 300°C is immersed in a pot containing 500 g of boiling water at 100°C, what will happen to the temperature of the water and of the iron?

A. The water temperature will increase, and the temperature of the iron will not change.
B. The water temperature will increase, and the temperature of the iron will decrease.
C. The water temperature will remain the same, and the temperature of the iron will decrease.
D. The temperature of both the water and the iron will remain the same.

Answer and Rationale

7. Which of the following is the formula of tin(IV) chloride?

A. Ti₄Cl
B. TiCl₄
C. Sn₄Cl
D. SnCl₄

Answer and Rationale

8. Which of the following is true of the elements in order from top to bottom of the first column of the periodic table?

A. They increase in electronegativity.
B. They decrease in atomic mass.
C. They increase in ionization.
D. They increase in atomic radius.

Answer and Rationale

Note: After clicking on a link, right click and select "Previous View" to go back to original text.
9. When the equation given below is balanced using the smallest whole-number coefficients possible, the coefficient for CO₂ is

\[ C_4H_{10}(g) + O_2(g) \rightarrow CO_2(g) + H_2O(g) \]

A. 1  
B. 5  
C. 8  
D. 13

Answer and Rationale

10. A solution contains 20 g of dissolved alum in 100 mL of water at 30°C.

On the basis of the solubility data above, this solution is

A. polyunsaturated.  
B. unsaturated.  
C. saturated.  
D. supersaturated.

Answer and Rationale
11. In a tug-of-war, one teams pulls in one direction with a force of 800 newtons (N), and the other team pulls in the opposite direction with a force of 600 N. The magnitude of the resultant force is

   A. 1,400 N  
   B. 800 N  
   C. 600 N  
   D. 200 N

**Answer and Rationale**

12. A circuit consists of two identical resistors connected in parallel to a 12 V battery. The current drawn from the battery is 2.4 A. What is the resistance of each resistor?

   A. 0.50 Ω  
   B. 2.5 Ω  
   C. 5.0 Ω  
   D. 10 Ω

**Answer and Rationale**
13. In the condition known as nearsightedness, the image of a distant object focuses in front of the retina of the eye, as shown in the diagram below.

Which of the following lenses could be used to correct nearsightedness?

A.  
B.  
C.  
D.  

Answer and Rationale
14. Which of the following best describes the difference between fungal cells and animal cells?

A. Fungal cells have mitochondria, while animal cells do not.
B. Fungal cells are diploid, while animal cells are haploid.
C. Fungal cells have a cell wall, while animal cells do not.
D. Fungal cells are heterotrophic, while animal cells are autotrophic.

Answer and Rationale

15. At which stage of meiosis do homologous chromosomes segregate during the formation of gametes?

A. Anaphase I
B. Metaphase II
C. Telophase II
D. Prophase I

Answer and Rationale

16. In guinea pigs, black or chocolate fur color is determined by a pair of gene alleles, B for dominant black and b for recessive chocolate. According to Mendelian principles of inheritance, if a male guinea pig heterozygous for black fur (Bb) is mated to a female that is also heterozygous black, the percent of offspring that are expected to have chocolate fur is

A. 0%
B. 25%
C. 50%
D. 75%

Answer and Rationale

Note: After clicking on a link, right click and select "Previous View" to go back to original text.
17. Scientists believe that a worldwide catastrophic event occurred during the late Cretaceous period and that the event likely caused which of the following?

   A. The movement of aquatic animals onto land
   B. The sudden demise of the dinosaurs
   C. The emergence of *Homo sapiens* on the grasslands of Africa
   D. The first appearance of mammals

**Answer and Rationale**

18. Which of the following is matched with its correct function?

   A. Ovule .. production of pollen
   B. Vascular cambium .. formation of apical meristem
   C. Xylem .. transport of sugars
   D. Guard cell .. regulation of transpiration rate

**Answer and Rationale**

19. In an organism with a complete digestive tract, which of the following processes predominates at the anterior end of the tract?

   A. Hydrolysis of proteins
   B. Mechanical digestion
   C. Absorption of nutrients
   D. Absorption of H₂O

**Answer and Rationale**
20. If each of the following meals provides the same number of calories, which meal requires the most land for its production?

A. Red beans and rice  
B. Steak and a baked potato  
C. Corn tortilla and refried beans  
D. Lentil soup and brown bread

**Answer and Rationale**

21. Which of the following statements is correct about a trophic structure in which a leaf-eating grasshopper is eaten by a frog, which in turn is eaten by a snake?

A. The frog is an herbivore.  
B. The snake is a secondary consumer.  
C. The grasshopper is a primary consumer.  
D. The snakes outnumber the grasshoppers in the community.

**Answer and Rationale**

22. The accumulation of stress along the boundaries of lithospheric plates leads to which of the following?

A. Earthquakes  
B. Magnetic reversals  
C. Hurricanes  
D. Increased deposition of deep-sea sediments

**Answer and Rationale**

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**Note:** After clicking on a link, right click and select "Previous View" to go back to original text.
23. Of the following, the best method to use to determine Earth’s age is to study the

A. rate of increase in saline content of the oceans.
B. ratio of uranium or thorium content to lead content in granite rock.
C. percentage of radioactive carbon-14 in organic remains.
D. rate of sedimentation characteristic of alluvial deposits.

**Answer and Rationale**

24. When cool air flows from a high mountain region to a region of lower elevation, the air will

A. increase in moisture content.
B. condense, forming large amounts of dew.
C. undergo adiabatic warming.
D. undergo adiabatic cooling.

**Answer and Rationale**

25. The surface currents of Earth’s oceans are most likely created by which of the following?

A. Density variations of the seawater
B. Heat that escapes from Earth’s mantle layer
C. The prevailing winds of Earth’s atmosphere
D. The oxygen content of Earth’s atmosphere

**Answer and Rationale**

26. The phases of the Moon are mainly determined by the

A. distance of the Moon from the Sun.
B. rotation of Earth on its axis.
C. angle of the Moon's orbit relative to that of Earth’s orbit.
D. position of Earth and the Moon relative to the Sun.

**Answer and Rationale**
## Answer Key and Rationales

<table>
<thead>
<tr>
<th>Question Number</th>
<th>Correct Answer</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>D</td>
<td><strong>Option D is correct.</strong> The only way to determine whether the gasoline additive reduces pollution is to compare the amount of pollutants generated in the presence of the additive to the amount generated in its absence.</td>
</tr>
<tr>
<td>2</td>
<td>B</td>
<td><strong>Option B is correct.</strong> The average of the three measurements made by Student 2 is 91.4, which is the same as the actual width and hence is accurate. Also, the deviation from the actual width for each measurement is 0.1, 0.1, 0.0, respectively, with an average deviation of 0.0667, indicating that Student 2’s measurements are the most precise. Student 4’s measurements also average to 91.4, but they have a larger average deviation from the actual width, indicating less precision.</td>
</tr>
<tr>
<td>3</td>
<td>B</td>
<td><strong>Option B is correct.</strong> Mercury(II) oxide breaks down on heating into metallic mercury and oxygen. Mercury vapor that is given off is highly toxic when inhaled or absorbed through the skin, and exposure to mercury in a school should be greatly limited if not eliminated altogether.</td>
</tr>
<tr>
<td>Question Number</td>
<td>Correct Answer</td>
<td>Rationale</td>
</tr>
<tr>
<td>-----------------</td>
<td>---------------</td>
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</tr>
<tr>
<td>4</td>
<td>B</td>
<td><strong>Option B is correct.</strong> Increased carbon dioxide (greenhouse gas) in the atmosphere can contribute to a rise in atmospheric temperature. Atomic warfare would more likely result in a nuclear winter. Dust clouds from volcanoes would probably cause cooling due to high atmospheric dust absorbing the Sun’s rays so they cannot reach the ground. The depletion of the ozone layer allows more ultraviolet radiation to reach Earth’s surface, but in itself should not cause warming.</td>
</tr>
<tr>
<td>5</td>
<td>D</td>
<td><strong>Option D is correct.</strong> The atomic number of the atom is 79, as indicated by the subscript, and is equal to the number of protons. In a neutral atom, the number of protons equals the number of electrons. Hence, the number of electrons is 79. The superscript, 197, is the mass number and is equal to the number of protons plus the number of neutrons.</td>
</tr>
<tr>
<td>6</td>
<td>C</td>
<td><strong>Option C is correct.</strong> Heat from the iron, which is at 300ºC, will be transferred to the water, which is at a lower temperature, 100ºC. However, the water will continue boiling and its temperature will remain constant as long as there is still liquid water present. The heat that was absorbed from the iron will be used in the process of converting liquid water to water vapor. (The amount of liquid water is much larger than the amount of iron and hence will not all vaporize as a result of absorbing heat from the iron.) The iron will cool to 100ºC, at which point it will be in thermal equilibrium with the water.</td>
</tr>
<tr>
<td>Question Number</td>
<td>Correct Answer</td>
<td>Rationale</td>
</tr>
<tr>
<td>-----------------</td>
<td>---------------</td>
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</tr>
<tr>
<td>7</td>
<td>D</td>
<td><strong>Option D is correct.</strong> The chemical symbol for tin is Sn. Tin(IV) indicates that tin is in the +4 oxidation state (Sn⁴⁺). Since the chlorine in the compound is in a –1 oxidation state (Cl⁻), the correct formula is SnCl₄.</td>
</tr>
<tr>
<td>8</td>
<td>D</td>
<td><strong>Option D is correct.</strong> Down a column in the periodic table, the succeeding elements have increasingly larger atomic radii.</td>
</tr>
<tr>
<td>9</td>
<td>C</td>
<td><strong>Option C is correct.</strong> The balanced equation is 2 C₄H₁₀(g) + 13 O₂(g) → 8 CO₂(g) + 10 H₂O(g). Hence, the coefficient for CO₂ is 8.</td>
</tr>
<tr>
<td>10</td>
<td>D</td>
<td><strong>Option D is correct.</strong> Based on the graph, a saturated solution of alum at 30°C contains a little more than 15 g of dissolved alum in 100 mL of water. A solution that contains 20 g of dissolved alum in 100 mL of water at 30°C is supersaturated.</td>
</tr>
<tr>
<td>11</td>
<td>D</td>
<td><strong>Option D is correct.</strong> The magnitude of the net force is equal to 800 N - 600 N = 200 N, since the two forces are pulling in opposite directions.</td>
</tr>
</tbody>
</table>

**Note:** After clicking on a link, right click and select "Previous View" to go back to original text.
<table>
<thead>
<tr>
<th>Question Number</th>
<th>Correct Answer</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>D</td>
<td><strong>Option D is correct.</strong> A circuit consisting of two identical resistors of resistance $R$ connected in parallel to a battery is equivalent to a circuit consisting of a single resistor of resistance $R_{eq}$ connected to the battery, where $1/R_{eq} = 1/R + 1/R = 2/R$, or $R_{eq} = R/2$. According to Ohm's law, the voltage $V = IR$, which in this case gives $12 V = (2.4 A)R_{eq} = (2.4 A)R/2$. When the equation is solved for $R$, one obtains $R = 10 , \Omega$.</td>
</tr>
<tr>
<td>13</td>
<td>B</td>
<td><strong>Option B is correct.</strong> The proper corrective lens to use for nearsightedness is a lens placed between the object and the eye that will cause the parallel rays from the distant object to diverge slightly away from the optical axis before reaching the eye. The lens diverges the rays to such an extent that when the diverging rays are refocused by the eye, an image is produced directly on the retina. Of the lenses represented in the options, the lens in option B is the only diverging lens.</td>
</tr>
<tr>
<td>14</td>
<td>C</td>
<td><strong>Option C is correct.</strong> One of the major structural differences between fungal cells and animal cells is the presence of cell walls only in fungi. Cells of both types of organisms have mitochondria and are diploid and heterotrophic.</td>
</tr>
</tbody>
</table>

*Note: After clicking on a link, right click and select "Previous View" to go back to original text.*
<table>
<thead>
<tr>
<th>Question Number</th>
<th>Correct Answer</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>A</td>
<td><strong>Option A is correct.</strong> During prophase I of meiosis, the chromosomes of each homologous pair undergo synapsis, which allows crossing-over to occur. The synapsed homologous pairs align on the equatorial plate during metaphase I and then separate/segregate during anaphase I.</td>
</tr>
<tr>
<td>16</td>
<td>B</td>
<td><strong>Option B is correct.</strong> Each of the guinea pigs has two alleles of the gene determining black or chocolate fur color. Because the guinea pigs are heterozygous for this gene, each has a dominant B allele and a recessive b allele. Only one allele is present in a haploid gamete, so it is expected that one half of the sperm produced by the male will contain a b allele and one half of the eggs produced by the female will contain a b allele. Progeny may have the genotypes BB, Bb, or bb. Because b is recessive, the progeny must receive two copies of b (bb) to have chocolate-colored fur. The chance that this will happen is $1/2 \times 1/2 = 1/4$ or 25%.</td>
</tr>
<tr>
<td>17</td>
<td>B</td>
<td><strong>Option B is correct</strong> The sudden disappearance of 90 percent of the dinosaur species occurred about 60 million years ago. Recently discovered chemical evidence points to a catastrophic event, such as a large impact, occurring at that time.</td>
</tr>
</tbody>
</table>

**Note:** After clicking on a link, right click and select "Previous View" to go back to original text.
<table>
<thead>
<tr>
<th>Question Number</th>
<th>Correct Answer</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>18</td>
<td>D</td>
<td><strong>Option D is correct.</strong> Stomata open and close due to the changing shape of the guard cells that flank them. Transpiration refers to the evaporative loss of water through the stomata of the leaves and other aerial parts of a plant.</td>
</tr>
<tr>
<td>19</td>
<td>B</td>
<td><strong>Option B is correct.</strong> Mechanical digestion increases the surface area of food particles, so chemical digestion is facilitated in later sections of the tract.</td>
</tr>
<tr>
<td>20</td>
<td>B</td>
<td><strong>Option B is correct.</strong> Energy is lost as matter is transferred from one trophic level to another. Plants are primary producers, while steaks are derived from herbivores that eat plants. It takes more land to produce the energy in steak than it does to produce the same amount of energy in food from plants.</td>
</tr>
<tr>
<td>21</td>
<td>C</td>
<td><strong>Option C is correct.</strong> The grasshopper is the herbivore and thus the primary consumer. In the trophic structure described, the frog is a secondary consumer and the snake is a tertiary consumer.</td>
</tr>
<tr>
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<tr>
<td>22</td>
<td>A</td>
<td><strong>Option A is correct.</strong> Earthquakes are the abrupt release of energy that occurs when a rock under stress fractures and displacement occurs.</td>
</tr>
<tr>
<td>23</td>
<td>B</td>
<td><strong>Option B is correct.</strong> The decay of certain isotopes of uranium and thorium occurs at a fixed rate. Each of these elements has a half-life long enough (4.5 and 14 billion years for Th\textsuperscript{232} and U\textsuperscript{238}, respectively) to permit a reasonable estimation of the age of Earth.</td>
</tr>
<tr>
<td>24</td>
<td>C</td>
<td><strong>Option C is correct.</strong> When cool air flows from a high mountain region to a region of lower elevation, the air undergoes adiabatic warming. Adiabatic warming occurs as the pressure of the air increases as it descends.</td>
</tr>
<tr>
<td>25</td>
<td>C</td>
<td><strong>Option C is correct.</strong> The winds of Earth’s atmosphere are the primary force that creates the surface currents of the oceans.</td>
</tr>
<tr>
<td>26</td>
<td>D</td>
<td><strong>Option D is correct.</strong> The Moon does not emit its own light but reflects light received from the Sun. It is the position of Earth and Moon relative to the Sun that determines the phase of the Moon. The half of the Moon that faces the Sun is always lighted, and the phases that are seen from Earth are determined by how much of the lighted half is visible.</td>
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<table>
<thead>
<tr>
<th>Content covered</th>
<th>Description of content</th>
<th>How well do I know the content? (scale 1–5)</th>
<th>What resources do I have/need for studying this content?</th>
<th>Where can I find the resources I need?</th>
<th>Date planned to study this content</th>
<th>Date completed</th>
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Preparation Resources

The resources listed below may help you prepare for the GACE assessment in this field. These preparation resources have been identified by content experts in the field to provide up-to-date information that relates to the field in general. You may wish to use current issues or editions to obtain information on specific topics for study and review.

Journals

American Biology Teacher, National Association of Biology Teachers
American Scientist, Sigma XI, the Scientific Research Society
ChemMatters, American Chemical Society
Geology Today, Geologist’s Association
Natural History, American Museum of Natural History
Sky and Telescope, Sky Publishing
The Earth Scientist, National Earth Science Teacher’s Association
The Physics Teacher, American Association of Physics Teachers
The Science Teacher, National Science Teachers Association

Other Resources


Note: After clicking on a link, right click and select "Previous View" to go back to original text.
Brooks/Cole.

**Online Resources**
American Association for the Advancement of Science—www.aaas.org
American Association of Physics Teachers—www.aapt.org
American Astronomical Society—www.aas.org
American Chemical Society—www.acs.org
American Institute of Biological Sciences—www.aibs.org
American Physical Society—www.aps.org
National Association of Biology Teachers—www.nabt.org
National Association of Geoscience Teachers—www.nagt.org
National Science Teachers Association—www.nsta.org
The Geological Society of America—www.geosociety.org

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