GACE® Study Companion
Middle Grades Mathematics Assessment

For the most up-to-date information, visit the ETS GACE website at gace.ets.org.
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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](http://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](http://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.

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

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**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.
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.
• **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.

**GACE Test Name:** Reading  
**GACE Test Code:** 117  
**I am taking the test on:** October 25, 2014

<table>
<thead>
<tr>
<th>Literal Comprehension</th>
<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>
<td></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>
<td></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>
<td></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>
<td></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>
<td></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 textbook, 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 textbook, 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 textbook, 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 textbook, 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</td>
<td>Determine logical assumptions on which argument or conclusion is based</td>
<td>3</td>
<td>High school textbook, 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>Reasoning</td>
<td>Identify author’s attitude toward materials discussed in reading selection</td>
<td>2</td>
<td>High school textbook, 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>Reasoning</td>
<td>Determine author’s attitude toward materials discussed in reading selection</td>
<td>1</td>
<td>High school textbook, 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 textbook, 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 textbook, 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 textbook, 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.

**Note:** After clicking on a link, right click and select "Previous View" to go back to original text.
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.
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 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 and click on your score report.
About the Assessment

<table>
<thead>
<tr>
<th>Assessment Name</th>
<th>Middle Grades Mathematics</th>
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<td>Grade Level</td>
<td>4–8</td>
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<tr>
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</tr>
<tr>
<td>Test Format</td>
<td>Computer delivered</td>
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The GACE Middle Grades Mathematics assessment is designed to measure the professional knowledge of prospective teachers of middle school Mathematics in the state of Georgia.

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.
Content Specifications

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 this assessment.
Test Subareas

<table>
<thead>
<tr>
<th>Subarea</th>
<th>Approx. Percentage of Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Arithmetic and Algebra</td>
<td>65%</td>
</tr>
<tr>
<td>II. Geometry and Data</td>
<td>35%</td>
</tr>
</tbody>
</table>

Test Objectives

Subarea I: Arithmetic and Algebra

Objective 1: Understands and applies knowledge of numbers and operations

The beginning Middle Grades Mathematics teacher:

A. Understands operations and properties of the real number system
   - Solves problems using addition, subtraction, multiplication, and division of real numbers
   - Describes the effect that an operation has on a given number; e.g., adding a negative, dividing by a fraction
   - Applies the order of operations
   - Identifies or applies properties of operations on a number system; e.g., commutative, associative, distributive, identity
   - Compares, classifies, and orders real numbers
   - Performs operations involving exponents, including negative exponents
   - Simplifies and approximates radicals
   - Uses scientific notation to represent and compare numbers

B. Understands the relationships among fractions, decimals, and percents
   - Finds equivalent fractions
   - Converts among fractions, decimals, and percents
   - Represents fractions, decimals, and percents with various models

C. Understands how to use ratios and proportional relationships to solve problems
   - Uses ratio language and notation to describe a relationship between two quantities
   - Recognizes and represents proportional relationships between two quantities
   - Uses proportional relationships to solve problems; e.g., rates, scale factors
   - Solves percent problems; e.g., discounts, taxes, tips, simple interest rates

Note: After clicking on a link, right click and select "Previous View" to go back to original text.
D. Understands how to use basic concepts of number theory (e.g., divisibility, prime factorization, multiples) to solve problems
   • Applies characteristics of prime and composite numbers
   • Applies characteristics of odd or even numbers
   • Solves problems involving factors, multiples, and divisibility
E. Knows how to use estimation strategies to determine the reasonableness of results
   • Recognizes the reasonableness of results within the context of a given problem
   • Tests the reasonableness of results using estimation
   • Recognizes appropriate uses of estimation and rounding
   • Estimates absolute and relative error in numerical answers to problems

Objective 2: Understands and applies knowledge of algebra and its processes

The beginning Middle Grades Mathematics teacher:

A. Understands how to evaluate and manipulate algebraic expressions, equations, and formulas
   • Performs arithmetic operations on polynomials
   • Manipulates and performs arithmetic operations on rational expressions
   • Evaluates, manipulates, and compares algebraic expressions involving radicals and exponents, including negative exponents
   • Uses variables to construct and solve equations in real-world contexts
   • Translates verbal relationships into algebraic equations or expressions
B. Understands how to recognize and represent linear relationships algebraically
   • Determines the equation of a line
   • Recognizes and uses the basic forms of linear equations
   • Converts among various forms of linear equations; e.g., slope-intercept, point-slope, standard
C. Understands how to solve equations and inequalities
   • Solves one-variable linear equations and inequalities
   • Solves one-variable nonlinear equations and inequalities; e.g., absolute value, quadratic
   • Represents solutions to inequalities on the number line
   • Represents and solves systems of linear equations and inequalities with two variables

Note: After clicking on a link, right click and select "Previous View" to go back to original text.
D. Understands how to recognize and represent simple sequences or patterns; e.g., arithmetic, geometric

- Evaluates, extends, or algebraically represents rules involving number patterns
- Describes or extends patterns involving shapes or figures
- Forms rules based on given patterns
- Identifies patterns based on given rules

**Objective 3: Understands and applies knowledge of functions and their graphs**

The beginning Middle Grades Mathematics teacher:

A. Understands how to identify, define, and evaluate functions

- Determines whether a relation is a function
- Evaluates functions for given values; i.e., algebraically, graphically, tabular
- Recognizes that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers

B. Knows how to determine and interpret the domain and the range of functions represented numerically, graphically, or algebraically

- Determines the domain and range of a given table of values
- Determines the domain and range from a given graph of a function
- Determines the domain and range of a given function that is represented algebraically
- Interprets domain and range in real-world settings

C. Understands basic characteristics of linear functions; e.g., slope, intercepts

- Determines the slope of a given linear function
- Interprets slope as a constant rate of change
- Determines the x- and y-intercepts of a given linear function
- Interprets the x- and y-intercepts of a given linear function

D. Understands the relationships among functions, tables, and graphs

- Determines an equation to best represent a given linear graph
- Sketches a graph, given an equation of a linear function
- Sketches graphs showing key features, given a verbal description of the relationship
- Writes a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function
- Compares properties of two functions, each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions)

**Note:** After clicking on a link, right click and select "Previous View" to go back to original text.
E. Knows how to analyze and represent functions that model given information
   • Develops a model (e.g., graph, equation, table) of a given set of conditions
   • Evaluates whether a particular mathematical model (e.g., graph, equation, table) can be used to describe a given set of conditions
   • Interprets a particular mathematical model; e.g., graph, equation, table

Subarea II: Geometry and Data

Objective 1: Understands and applies knowledge of geometry and measurement

The beginning Middle Grades Mathematics teacher:

A. Understands how to solve problems involving perimeter and area of plane figures
   • Calculates and interprets perimeter and area of plane figures that can be composed of triangles and quadrilaterals
   • Calculates changes in perimeter and area as the dimensions of plane figures change

B. Knows how to solve problems involving surface area and volume of solids
   • Calculates and interprets surface area and volume of solids; e.g., prisms, pyramids, cylinders, spheres
   • Calculates changes in surface area and volume as the dimensions of a solid change
   • Uses two-dimensional representations of three-dimensional objects to visualize and solve problems

C. Understands the concepts of similarity and congruence
   • Determines whether two figures are similar or congruent
   • Uses similarity and congruence to solve problems with two-dimensional and three-dimensional figures
   • Uses congruence and similarity criteria for triangles to prove relationships in geometric figures

D. Knows the properties of lines (e.g., parallel, perpendicular, intersecting) and angles
   • Solves problems involving parallel, perpendicular, intersecting, and skew lines
   • Applies angle relationships (e.g., supplementary, vertical, alternate interior) to solve problems

E. Understands properties of triangles
   • Solves problems involving sides (e.g., Pythagorean theorem) and angles
   • Recognizes characteristics of special triangles; e.g., isosceles, right, 30-60-90
   • Solves problems that involve medians, midpoints, and altitudes

Note: After clicking on a link, right click and select "Previous View" to go back to original text.
F. Knows properties of quadrilaterals (e.g., rectangle, rhombus, trapezoid) and other polygons
   • Identifies geometric properties of various quadrilaterals and the relationships among them; e.g., parallelogram, trapezoid
   • Identifies relationships among quadrilaterals
   • Solves problems involving sides, angles, or diagonals of polygons
   • Identifies the lines of symmetry in a polygon

G. Understands properties of circles
   • Solves problems involving circumference and area of a circle
   • Solves problems involving diameter and radius of a circle
   • Solves basic problems involving central angles, arcs, chords, and sectors

H. Knows how to interpret geometric relationships in the \( xy \)-plane; e.g., transformations, distance, midpoint
   • Identifies the characteristics of ordered pairs located in quadrants and on the axes of the coordinate plane
   • Uses coordinate geometry to represent and identify the properties of geometric shapes; e.g., Pythagorean theorem, area of a rectangle
   • Determines the distance between two points
   • Determines the midpoint of the segment joining two points
   • Interprets and solves problems involving transformations; i.e., translations, reflections, rotations, dilations
   • Proves the slope criteria for parallel and perpendicular lines and uses them to solve geometric problems
   • Uses coordinates to compute perimeters of polygons and areas of triangles and rectangles

I. Understands systems of measurement; e.g., metric, customary
   • Solves measurement and estimation problems involving time, length, volume, and mass in standard measurement systems
   • Converts units within the United States customary system or the metric system
   • Converts units between the United States customary and metric systems
   • Uses appropriate units of measurement in a given context

J. Knows how geometric constructions are made
   • Identifies formal geometric constructions made with a variety of tools and methods; e.g., copying a segment, bisecting an angle, constructing parallel and perpendicular lines

Note: After clicking on a link, right click and select "Previous View" to go back to original text.
Objective 2: Understands and applies knowledge of probability, statistics, and discrete mathematics

The beginning Middle Grades Mathematics teacher:

A. Understands how to interpret, analyze, and represent data presented in a variety of displays
   - Analyzes and interprets various displays of data; e.g., box plots, histograms, scatterplots, stem-and-leaf plots, two-way tables
   - Draws conclusions based on data; e.g., misleading representation of data, line of best fit, interpolation, association
   - Chooses appropriate graphs based on data; e.g., represents data accurately, chooses correct types of graphs

B. Understands concepts associated with measures of central tendency and dispersion (spread)
   - Solves for the mean and weighted average of given sets of data
   - Determines and interprets mean, median, and mode in a variety of problems
   - Determines and interprets common features of sets of data; e.g., range and outliers
   - Chooses appropriate measures of central tendency to represent given sets of data and justify the measures used
   - Identifies correct statements regarding a given numerical data set
   - Uses data to draw comparative inferences about two populations
   - Distinguishes between random and biased sampling

C. Understands statistical processes and how to evaluate them
   - Understands statistics as a process for making inferences about population parameters based on a random sample from that population
   - Decides if a specified model is consistent with results from a given data-generating process; e.g., using simulation

D. Understands how to make inferences and justify conclusions from sample surveys, experiments, and observational studies
   - Recognizes the purposes of and differences among sample surveys, experiments, and observational studies, and explains how randomization relates to each
   - Uses data from a sample survey to estimate a population mean or proportion
   - Develops a margin of error through the use of simulation models for random sampling
   - Uses data from a randomized experiment to compare two treatments
   - Uses simulations to decide if differences between parameters are significant
   - Evaluates reports based on data

Note: After clicking on a link, right click and select "Previous View" to go back to original text.
E. Knows how to develop, use, and evaluate probability models
   • Uses counting techniques (e.g., the counting principle, permutations, combinations) to answer questions involving a finite sample space
   • Solves probability problems involving independent and dependent events
   • Finds the conditional probability of A given B, and interprets the answer in terms of the model

F. Is familiar with how to use visual representations to model and solve problems

G. Uses and interprets simple diagrams (e.g., Venn diagrams, flowcharts) to solve problems

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

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

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**Note:** After clicking on a link, right click and select "Previous View" to go back to original text.
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. Which of the following defines $y$ as a function of $x$?

   A. $x - y^2 = 4$
   B. $x^2 + y^2 = 4$
   C. $y = x^2 + 2$
   D. $y < x + 1$

Answer and Rationale

2. The original price of a certain car was 25 percent greater than its cost to the dealer. The actual selling price was 25 percent less than the original price. If $c$ is the cost of the car and $p$ is the selling price, which of the following represents $p$ in terms of $c$?

   A. $p = 1.00c$
   B. $p = 1.25c$
   C. $p = 0.25(0.75c)$
   D. $p = 0.75(1.25c)$

Answer and Rationale

Note: After clicking on a link, right click and select "Previous View" to go back to original text.
3. Which of the following is true about the data in the table below?

<table>
<thead>
<tr>
<th>$x$</th>
<th>$y$</th>
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<tbody>
<tr>
<td>−4</td>
<td>−2</td>
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<tr>
<td>−3</td>
<td>−2/3</td>
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<td>−2</td>
<td>−1</td>
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<tr>
<td>−1</td>
<td>−1/2</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

A. As $x$ decreases, $y$ increases.
B. As $x$ increases, $y$ does not change.
C. As $x$ increases, $y$ decreases.
D. As $x$ increases, $y$ increases.

**Answer and Rationale**

4. The average number of passengers who use a certain airport each year is 350 thousand. A newspaper mistakenly reported the number as 350 million. The number reported in the newspaper was how many times the actual number?

A. 10
B. 100
C. 1,000
D. 10,000

**Answer and Rationale**

*Note: After clicking on a link, right click and select "Previous View" to go back to original text.*
5. Which of the following figures results if right triangle $ABC$, shown in the $xy$-plane below, is flipped (reflected) across the $y$-axis to form triangle $A'B'C'$, and then turned (rotated) clockwise about point $C''$ by 90 degrees?

![Diagram of triangle ABC and its transformations]

A. 

B. 

C. 

D. 

Answer and Rationale

Note: After clicking on a link, right click and select "Previous View" to go back to original text.
6. The large rectangular block shown below was made by stacking smaller blocks, all of which are the same size.

![Image of a large rectangular block with dimensions 12 cm by 9 cm by 8 cm]

What are the dimensions, in centimeters, of each of the smaller blocks?

A. $3 \times 2 \times 3$
B. $3 \times 3 \times 3$
C. $3 \times 4 \times 3$
D. $4 \times 4 \times 3$

**Answer and Rationale**

7. In the figure below, line $\ell$ and line $p$ are parallel and $y = 3x$.

![Image of parallel lines with an angle $x$ and an angle $y$]

What is the value of $x$?

A. 30
B. 45
C. 60
D. 75

**Answer and Rationale**
8. A square is inscribed in each of the circles below. The radius of circle $A$ is 1, and the radius of circle $B$ is 2.

What is the ratio of the area of the square inscribed in circle $A$ to the area of the square inscribed in circle $B$?

A. $1:\sqrt{2}$
B. $1:2$
C. $1:2\sqrt{2}$
D. $1:4$

Answer and Rationale
9. A taxi ride costs $2.50 for the first \( \frac{1}{4} \) mile or fraction thereof plus $0.50 for each additional \( \frac{1}{4} \) mile or fraction thereof. Which of the following graphs represents the total cost of a ride as a function of distance traveled?

A. 

B. 

C. 

D. 

Answer and Rationale

10. In a class of 29 students, 20 students have dogs and 15 students have cats. How many of the students have both a dog and a cat?

A. None of the students necessarily have both.
B. Exactly 5 students have both.
C. Exactly 6 students have both.
D. At least 6 students and at most 15 students have both.

Answer and Rationale

Note: After clicking on a link, right click and select "Previous View" to go back to original text.
11. The graph below shows the distribution of the contents, by weight, of a county’s trash.

![Pie chart showing trash distribution]

If approximately 60 tons of the trash consists of paper, approximately how many tons of the trash consist of plastics?

A. 24
B. 20
C. 15
D. 12

**Answer and Rationale**

12. In order to estimate the population of snails in a certain woodland, a biologist captured and marked 84 snails that were then released back into the woodland. Fifteen days later the biologist captured 90 snails from the woodland, 12 of which bore the markings of the previously captured snails.

If all of the marked snails were still active in the woodland when the second group of snails was captured, what should the biologist estimate the snail population to be, based on the probabilities suggested by this experiment?

A. 630
B. 1,010
C. 1,040
D. 1,080

**Answer and Rationale**
13. If a student takes a test consisting of 20 true-false questions and randomly guesses at all of
the answers, what is the probability that all 20 guesses will be correct?

A. 0  
B. \( \left( \frac{1}{2} \right)^{20} \)  
C. \( \frac{1}{2^{20}} \)  
D. \( \frac{1}{2} \)

Answer and Rationale

14. In an ordered set of numbers, the median is the middle number if there is a middle number;
otherwise, the median is the average of the two middle numbers.

88, 86, 98, 92, 90, 86

If Robin had the test scores given above, what was her median score?

A. 89  
B. 90  
C. 92  
D. 95

Answer and Rationale

15. If there are exactly five times as many children as adults at a show, which of the following
CANNOT be the number of people at the show?

A. 102  
B. 80  
C. 36  
D. 30

Answer and Rationale
<table>
<thead>
<tr>
<th>Question Number</th>
<th>Correct Answer</th>
<th>Rationale</th>
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<tbody>
<tr>
<td>1</td>
<td>C</td>
<td><strong>Option C is correct.</strong> This question asks you to identify a function by applying your understanding of functions to different mathematical statements. In questions such as this that ask “which of the following,” you should consider only the answer choices given. There may be other correct answers to the question, as in this case, but you are not asked to consider those. To answer this question, you should recall that if ( y ) is a function of ( x ), then each value of ( x ) (in the domain of the function) results in only one value of ( y ). In options A and B, most values of ( x ) have two different corresponding values of ( y ). You can see this by solving the equations in options A and B for ( y ). In option A, ( y = \pm \sqrt{4 - x} ) or ( y = -\sqrt{4 - x} ). Similarly, in option B, ( y = \pm \sqrt{4 - x^2} ). So neither option A nor B defines ( y ) as a function of ( x ). In option D, for each value of ( x ) there is more than one value of ( y ) that satisfies the inequality. So option D does not define ( y ) as a function of ( x ). However, in option C, for each value of ( x ) there is only one value of ( y ) that corresponds to that value of ( x ). Thus, the correct answer is option C.</td>
</tr>
<tr>
<td>2</td>
<td>D</td>
<td><strong>Option D is correct.</strong> This question asks you to apply your knowledge of percent increase or decrease to determine a selling price based on the cost of a car to the dealer, ( c ). Since the original price of the car was 25 percent greater than the cost to the dealer, the original price was ( c + 0.25c = 1.25c ). Since the selling price was 25 percent less than this amount, only 75 percent of this amount will be paid, so the selling price of the car was ((1.25c)(0.75) ). Thus, the correct answer is option D.</td>
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**Note:** After clicking on a link, right click and select "Previous View" to go back to original text.
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<tbody>
<tr>
<td>3</td>
<td>D</td>
<td><strong>Option D is correct.</strong> As ( x ) moves from (-4) to (0) (i.e., from left to right on the number line), its value increases. Similarly, the value of ( y ) increases from (-2) to (0). Thus, it can be seen that as ( x ) increases, ( y ) increases.</td>
</tr>
<tr>
<td>4</td>
<td>C</td>
<td><strong>Option C is correct.</strong> The number of passengers who use the airport each year, 350 thousand, can be written as 350,000; 350 million can be written as 350,000,000. ( 350,000,000 \div 350,000 = 1,000 ), so the correct answer is option C.</td>
</tr>
<tr>
<td>5</td>
<td>A</td>
<td><strong>Option A is correct.</strong> When triangle ( ABC ) is reflected across the ( y )-axis, the figure formed is located in quadrant I and is the mirror image of the given figure. Rotating the triangle 90 degrees clockwise about vertex ( C' ) yields option A.</td>
</tr>
<tr>
<td>6</td>
<td>D</td>
<td><strong>Option D is correct.</strong> The length of the large block, 12 centimeters, is 3 times the length of a small block, so each small block is ( 12 \div 3 = 4 ) centimeters long. Similarly, the width of a small block is ( 8 \div 2 = 4 ) centimeters, and the height of a small block is ( 9 \div 3 = 3 ) centimeters.</td>
</tr>
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</table>

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<tbody>
<tr>
<td>7</td>
<td>B</td>
<td><strong>Option B is correct.</strong> This question asks you to apply your understanding of angles in a plane and, in particular, properties of angles associated with parallel and transversal lines. You should be able to show, using pairs of alternate interior angles and corresponding angles, that the angle with measure $x$ degrees and the angle with measure $y$ degrees are supplementary angles. Recall that the sum of the measures of supplementary angles is $180^\circ$. That is, $x + y = 180$. It is given that $y = 3x$. Substituting for $y$, you get $4x = 180$. Hence, $x = 45$. Therefore, the correct answer is option B.</td>
</tr>
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</table>

| 8               | D             | **Option D is correct.** This question asks you to apply your knowledge of circles, squares, and proportional reasoning to find the ratio of the areas of two squares. There are many ways to approach this problem. One approach is to use the information given and many things that you know about circles, squares, and triangles and do lots of computation. Another is to use your knowledge of what happens to area when you scale up corresponding linear dimensions in a figure. If you like to compute, here is what you might do. First consider circle $A$. The radius of circle $A$ is 1, and the diameter is 2. This diameter is also the diagonal of the inscribed square and the hypotenuse of a right triangle with side $a$. By the Pythagorean theorem, $a^2 + a^2 = 2^2$; $2a^2 = 2 \times 2$, $a^2 = 2$, and thus $a$, the length of a side of square $A$, is $\sqrt{2}$. So the area of square $A$ is $(\sqrt{2})^2 = 2$. Likewise, the area of square $B$ is $(2\sqrt{2})^2 = 8$. Thus, the ratio of the area of square $A$ to the area of square $B$ is 2:8, which is 1:4. |

**Note:** After clicking on a link, right click and select "Previous View" to go back to original text.
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<tbody>
<tr>
<td>9</td>
<td>A</td>
<td><strong>Option A is correct.</strong> This question asks you to apply your knowledge of graphing data in a coordinate plane to a situation involving graduated rate. You should notice that each of the choices given is the graph of a step function. You will need to identify the graph that includes the correct cost for the first step and the correct interval between steps. Since the cost for the first ( \frac{1}{4} ) mile or less is $2.50, the cost for the first step (the value on the vertical axis) should be 2.5 over the horizontal interval from 0 to ( \frac{1}{4} ) mile, with a solid dot at ( \frac{1}{4} ) mile. (There should be no cost at a distance of 0 miles, since there is no charge if there is no ride.) In each of the subsequent horizontal intervals of ( \frac{1}{4} ) mile, the cost value on the vertical axis should show an increment of $0.50, with a solid dot at the right endpoint of each interval. Only option A illustrates this correctly. Option C has the correct cost values for each step but does not represent the endpoints of each interval correctly. The correct answer choice, therefore, is option A.</td>
</tr>
</tbody>
</table>

| 10              | D             | **Option D is correct.** Since the 29 students have a total of 35 dogs and cats, at least 6 must have both a dog and a cat. If there are exactly 6 students with both a dog and a cat, then 14 students have only a dog and 9 students have only a cat. On the other hand, all 15 cat owners could also have a dog; then 5 students have only a dog and 9 students have neither a dog nor a cat. |

*Note: After clicking on a link, right click and select "Previous View" to go back to original text.*
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</table>
| 11              | D             | **Option D is correct.** The circle graph shows the distribution of the trash contents *in percents*; the question asks for the *weight* of the plastics contents in tons. From the graph we see that plastics account for 8% of the total weight of the trash. The problem states that 60 tons of the trash consists of paper; the graph shows that this amount equals 40% of the total, so 

\[ 60 = 0.4 \times \text{(total weight)} \]

and the total weight is \[ \frac{60}{0.4} = 150 \text{ tons.} \]

The weight of plastics equals 8% of 150 tons, or \((0.08)(150) = 12\) tons.

There is another, slightly faster, way to solve this problem. Use the fact that the ratio of plastics to paper in the trash is the same, whether the two amounts are given as percents or in tons. This gives the proportion

\[ \frac{\text{tons of plastics}}{\text{tons of paper}} = \frac{8\%}{40\%} = \frac{1}{5} \]

or

\[ \frac{\text{tons of plastics}}{60} = \frac{1}{5} \]

\[ \text{tons of plastics} = \frac{60}{5} = 12. \]

**Back to Question**
<table>
<thead>
<tr>
<th>Question Number</th>
<th>Correct Answer</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>A</td>
<td><strong>Option A is correct.</strong> Given the conditions of the experiment, it is reasonable to assume that the 90 snails captured by the biologist, 15 days after the markings were made, represent a random sample of the snail population. Thus, about ( \frac{12}{90} ) or ( \frac{2}{15} ) of the population had been marked. Thus, the original 84 snails marked represented approximately ( \frac{2}{15} ) of the entire population, and the biologist should estimate the snail population to be ( 84 \times \frac{15}{2} ), or 630.</td>
</tr>
</tbody>
</table>

Back to Question

| 13              | B             | **Option B is correct.** The probability that the student guesses any one answer correctly is \( \frac{1}{2} \), and since the student is randomly guessing, the guesses are independent events. Thus, the probability of guessing all 20 answers correctly is \( \left( \frac{1}{2} \right)^{20} \). |

Back to Question

**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>
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<tbody>
<tr>
<td>14</td>
<td>A</td>
<td><strong>Option A is correct.</strong> The problem gives a set of test scores and the definition of the median. The first part of the definition tells you to order the scores — that is, to arrange them in order from smallest to largest. Here are the numbers ordered from smallest to largest: 86, 86, 88, 90, 92, 98. Because there are an even number of scores (6), there are two middle numbers in the set, 88 and 90, and the average of the two middle numbers is ( \frac{88 + 90}{2} = \frac{178}{2} = 89 ). Thus, the median of Robin’s scores is 89. (Notice that the median of a set of numbers need not be one of the numbers in the set.)</td>
</tr>
<tr>
<td>15</td>
<td>B</td>
<td><strong>Option B is correct.</strong> If ( a ) represents the number of adults, then ( 5a ) represents the number of children and ( 6a ) represents the total number of people at the show. Since ( 6a ) represents a whole number that is a multiple of 6, there cannot be 80 people at the show, because 80 is not a multiple of 6.</td>
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</tbody>
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**Note:** After clicking on a link, right click and select "Previous View" to go back to original text.
## Study Plan Sheet

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

*Mathematics Teacher*, National Council of Teachers of Mathematics

*Mathematics Teaching in the Middle School*, National Council of Teachers of Mathematics

*Middle Ground*, National Middle School Association

*Middle School Journal*, National Middle School Association

Other Resources


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


**Online Resources**

Georgia Department of Education — www.doe.k12.ga.us

National Council of Teachers of Mathematics — www.nctm.org

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