



CRCT



Study



Guide



Reading
English/Language Arts
Mathematics
Science
Social Studies



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Using the CRCT Study Guide

This Study Guide focuses on the knowledge and skills that are tested on the Georgia Criterion-Referenced Competency Tests (CRCT). It is designed for teachers to use with their students and for parents to use with their children. Go to **www.gadoe.org/** to find further information about and support for the CRCT.



Use the following section of this guide, *About the CRCT*, for an overview of the CRCT and for test-taking strategies to review with your students.

- The content tested on the CRCT is based on the Georgia Performance Standards, which describe what all students should know, understand, and be able to do.



The chapters of this guide are organized by subject. In each chapter you can explore the skills needed to succeed in a specific, tested domain (grouping of similar content standards). The subject chapters include a snapshot of each domain, instructional **Activities** that address covered skills, and a **Practice Quiz** with annotated **Solutions** to help assess student progress.

Overview of the CRCT

What is the CRCT?

The CRCT is a series of state-mandated achievement tests for students in Grades 1 through 8. In Grades 3 through 8, the subject areas of reading, English/language arts, mathematics, science, and social studies are covered.

What does the CRCT measure?

The CRCT measures how well students have acquired the knowledge and skills outlined by the state curriculum for their grade level. A new statewide curriculum, known as the Georgia Performance Standards (GPS), sets academic standards and expectations for all students in Georgia's public schools. The CRCT corresponds to the new standards.

The tests accomplish the following:

- Ensure that students are learning
- Provide data to teachers, schools, and school districts so they can make better instructional decisions
- Measure accountability, including Adequate Yearly Progress (AYP) as measured by the federal No Child Left Behind Act

CRCT results measure the academic achievement of students, classes, schools, school systems, and the state. This information can be used to identify individual student strengths and weaknesses or, more generally, to measure the quality of education throughout Georgia.

How are CRCT questions scored?

The CRCT currently uses only selected-response (multiple-choice) questions. There are four choices for each question, labeled A, B, C, and D.

Students are not compared to each other. Each is measured on his or her achievement in meeting the standards. Scores are reported according to three performance levels: Does Not Meet the Standard, Meets the Standard, and Exceeds the Standard. For more information, go to the website www.gadoe.org/ci_testing.aspx?PageReq=CI_TESTING_CRCT and click the link for "2008 CRCT Interpretive Guide."

Since the spring of 2006, performance on the reading portion of the CRCT has been linked to the Lexile scale. Visit **www.gadoe.org/lexile.aspx** for more information on this national reading measure.

Preparing for the CRCT

Test-Taking Strategies

Weeks Before the Test

The following are study skills and test-taking tips to share with students:

Keep on top of material as you learn it in school. Don't leave everything until the last minute!

Ask questions in class when you don't understand something.

Set academic goals for the upcoming weeks and months (short and long term).

Choose a quiet place to work that is free of distractions.

Find out as much as you can about the test.

Build in time to review what you learned in your last study session.

Divide assignments into smaller pieces. It's easier to remember information this way.

Take breaks! Studying for a long time non-stop is not productive.

Consider reviewing materials with others after you've studied on your own. This helps reinforce what you already know and reminds you of things you've forgotten.

Actively take notes while you read. This forces you to think about what you are reading.

Try sample test questions for practice.

At the end of each study session, evaluate what you have accomplished.

**Day Before
the Test**

Get a good night's rest.

If you are feeling nervous, talk to a teacher or parent.

Remember that this test is only one measure of your knowledge.

Eat a good breakfast before the test; it will give you energy to stay alert.

**During
the Test**

Remind students of the following strategies to use during the test:

Relax by taking slow, deep breaths.

Make sure you understand the directions. If you are not sure, ask the teacher for clarification.

Read each question carefully.

When you use scratch paper, make sure that you copy the problem correctly from the test onto your paper.

You can underline and make marks on your test to help you while you work, but the only answers that will be scored are those in the correct place on your answer sheet.

Try to come up with your own answer before seeing the choices. This will help in choosing the best answer choice available.

Eliminate answer choices that you know cannot be right.

Leave a question blank if you are unsure of the answer, then return to it at the end.

Manage your time. Don't let the pace of others make you nervous. However, don't spend too much time on one question.

Be sure to answer all of the questions.

Review your answers when you have finished the test.

Try to stay calm during the test. Remember, this is a chance for you to show what you know.

Related Links

Below are links to important resources that contain information related to the CRCT.

Georgia Performance Standards:
www.georgiastandards.org/

CRCT Content Descriptions:
www.gadoe.org/ci_testing.aspx?PageReq=CI_TESTING_CRCT

GPS Frameworks:
www.georgiastandards.org/

Lexile Framework for Reading:
www.gadoe.org/lexile.aspx

Best practices in education indicate that teachers should first model new skills for students. Next, teachers should provide opportunities for guided practice. Only then should teachers expect students to successfully complete an activity independently.

The activities in this guide are no exception. They are designed to be used by teachers and parents to help students with the skills on the Georgia CRCT.

Since different students have different strengths and needs, the activities in this study guide can be scaffolded for students who need more support, extended to challenge advanced students, or presented as is (with appropriate modeling) for grade-level students.

Reading



Chapter 1

Reading

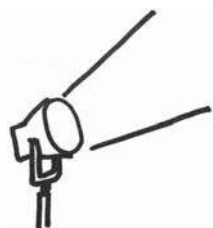
By Grade 8, students have developed the analytical reading skills to read, understand, and analyze both literary and informational texts. Additionally, these students successfully read and understand many different types of texts across subjects. Students should be able to determine what unfamiliar words mean based on how they are used. Students should also grasp how authors use language differently depending on their purpose and the literary genre.

The Reading activities focus on some of the concepts that are assessed on the Grade 8 CRCT Reading domains. These domains are as follows:

- 1 Reading Skills and Vocabulary Acquisition**
- 2 Literary Comprehension**
- 3 Information and Media Literacy**



Activities



① Reading Skills and Vocabulary Acquisition

Georgia Performance Standards ELA8R2, ELA8RC3, and ELA8RC4

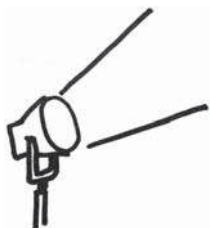
By Grade 8, students have developed sophisticated vocabularies as well as the skills to figure out word meanings in context. Students should be able to determine meanings, use alternate word choices, and recognize etymologies of words.

The following activities develop skills in this domain:

- To help students develop vocabulary skills, students should play the *Synonym and Word-Part Match* game. For this activity, create pairs of synonyms and a list of word-parts with matching definitions. (Synonyms, word-parts, and word-part definitions are available online and in many grammar books.) Then, write each synonym or definition on a card, and give each student one card. At the beginning of the game, tell students to find their matching cards. For some groups, students should take turns reading their cards aloud. For other groups (or as a variation on the original game), students should find their matches without speaking. Sample word pairs include the following: *hesitant* and *indecisive*; *ponder* and *contemplate*; *courageous* and *valiant*; *auto-* and *self*; *re-* and *again*; *intra-* and *within*; *noun* and *person, place, thing, or idea*.
- To develop vocabulary skills, students should have *Literary Word Banks*. In these “banks,” students “deposit” unfamiliar words as they are reading, in the first of three columns. In the second column, each student guesses what the word means based on its context. In the third column, the student writes down the dictionary definition he or she has looked up. On another page of the “bank,” students write down sentences using their new words. Students could also draw illustrations of these new vocabulary words and display them for others.
- To promote students’ engagement with new vocabulary words, students should do personalized vocabulary assignments with these words. Students may use their friends’ names as part of the exercises. Demonstrating that they understand the meanings of the vocabulary words, students must respond to personalized questions or statements such as, *Issue a decree to Sasha* or *Describe Chris being churlish to Elizabeth* or *Describe a time you were scapegoated by your brother*.



Activities



2 Literary Comprehension

Georgia Performance Standard ELA8R1

Grade 8 students read and understand many different types of literary and informational texts. They need to be familiar with the features of different genres. They must also be able to identify themes in literary works. Therefore, they must understand the difference between topics and themes. Students must also be able to evaluate and draw conclusions about plots, conflicts, and resolutions. Similarly, they should be able to analyze and evaluate literary devices, including figurative language, imagery, and sound devices (e.g., alliteration, onomatopoeia, rhyme, and meter). Finally, students should be able to detect how an author's language usage creates tone and mood.

The following activities develop skills in this domain:

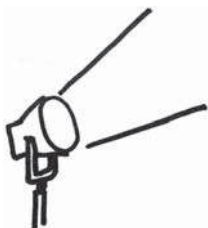
- To help students understand the concept of climax in a narrative and make inferences or draw conclusions about characters, students should examine characters' reactions after the climax in a story has occurred. Students should imagine they are newspaper reporters assigned to interview the participating characters and script several interviews with the characters. The interviewer should elicit responses from the characters that reveal both a deep understanding of the characters' traits and motivations and also an awareness of the plot events that have occurred. The interviewer's questions should reveal certain conclusions he or she has made about the characters being interviewed. Students should write their mock interviews in the style of a play.
- To supplement students' reading of poetry and to help them understand metaphor as a literary device, students should examine several metaphors such as *my love is a rose* and *her hair is golden silk*. Students should explain why the speaker would call his love a flower and describe hair as golden silk. Students should discuss what qualities the speaker's love has that would warrant these comparisons. Students should practice writing with their own metaphors. After reading a poem, such as Langston Hughes's "Mother to Son," in which the speaker compares his life to a staircase, students should choose something to which they can compare their lives. They then should make lists of the shared aspects of both. For example, for the statement *my life is a roller coaster* students could write the following: both have ups and downs, both can be scary, both have slow times and fast times. Students should take these statements and create short poems. To enhance students' appreciation of the visual power of metaphors, students should illustrate their metaphors.
- To help enhance students' knowledge of sensory details and authors' abilities to create tone and mood, students should close their eyes and listen to a descriptive, sensory-rich excerpt of literature. After the passage has been read aloud, students should identify the tone of the passage and the elements that contributed to it. To encourage students to pay attention to



sensory details, students should taste differently flavored hard candies and describe them together. They should smell a series of spices and describe what they are reminded of. Then, they should feel and describe several objects of varying textures. Next, students should write their own sensory detailed pieces in which they describe objects using all five senses.



Activities



3 Information and Media Literacy

Georgia Performance Standards ELA8R1, ELA8RC2, and ELA8LSV2

As students encounter various types of media as well as workplace and consumer materials, they need strong skills to identify common text features (e.g., paragraphs, topic sentences, concluding sentences, footnotes), organizational patterns (e.g., cause and effect, comparison and contrast), main ideas, and evidence to support them. Students also need to be able to recognize the author's purpose and understand the ways authors develop their arguments. Additionally, students need to apply what they read as they follow directions for computers and other devices. Since many of these texts contain diagrams and images, students must also have the skills to analyze common graphic features and understand their relationships with the texts.

The following activities develop skills in this domain:

- To help students develop the skills necessary to understand and use manuals and brochures, students should analyze a manual for a product they use. First, students should choose a technological product they use such as an MP3 player, telephone, digital alarm clock, personal computer, or bread machine. Next, students should identify the process that is to be programmed and use the manual to follow the directions to complete the process. After they have completed this activity, they should reflect on the areas of instruction that were the most unclear and describe how they would recommend revising them. Finally, students should select one unclear part and revise it. For example, if a diagram is inadequate, they could draw a new diagram. If a chart is unclear, students should redesign it. If a paragraph is confusing, they should rewrite it.
- To help students examine a piece of text that has a strong point of view and understand how the author structures his or her argument, students should analyze and organize sentences in a persuasive paragraph. Magazine articles can be effective and readily available sources for such paragraphs. For this activity, a persuasive paragraph is divided into sentences, each written on a blank index card. Several sentences that are not relevant and do not support the thesis of the paragraph should be included as distracters. Students should arrange the index cards to create a cogent and logical argument. First, students must determine the author's position. Next, they should choose the sentences that support the author's argument and put them in an effective sequence. Students must also recognize and remove the distracter sentences, making sure they can explain why the sentences do not belong. Finally, students should present their paragraph arrangements and describe the development of the author's perspective and argument.



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- To enhance students' inferential skills and to relate prior knowledge from one subject area or text to another subject area or text, students should compare and contrast themes from several sources. Students should examine two different sources and analyze the ways in which these sources address the same theme(s). For example, students could compare and contrast the themes of prejudice and discrimination as they arise in texts such as Dr. Martin Luther King's *I Have a Dream* speech, Elizabeth George Speare's novel, *The Witch of Blackbird Pond*, or some poems by Langston Hughes. First, students should brainstorm a list of the themes or ideas in each of these pieces. Next, they should examine their lists and see the common thread(s) among them. Then, students should list the ways in which the theme is addressed similarly and the ways it is addressed differently in these sources. Finally, students should write essays comparing and contrasting the themes in the texts.



Practice Quiz



Genre: Informational Text

Read the passage below and answer the questions that follow.

Victory Athletics Warranty

Thank you for purchasing a Victory Athletics product. We make high quality rowing machines and treadmills. Our machines are built to last! Please read the terms and conditions of our warranty.

AT PURCHASE

Every piece of equipment comes with a warranty card. Please mail to us the completed card and a copy of your receipt **WITHIN FIFTEEN DAYS OF PURCHASE**. Then, we will issue you a personal customer number.

TERMS

Victory Athletics offers a limited warranty plan covering parts and labor for five years.

IF YOU HAVE A PROBLEM

The fastest way to report a problem is to visit our website (victoryathletics.com). Then, click "Request for Repair." Enter your customer number and select an image that matches your machine. Finally, select the problem's location and describe the problem in your own words.

You may also report a problem by calling us at (888) 555-0241. Give your customer number to the representative and describe the problem. Our office is open Monday through Friday, 9:00 A.M. to 5:00 P.M., Central Standard Time.

REPAIRING YOUR EQUIPMENT

For simple problems, Victory Athletics may send you a replacement part. Check our website or call a service representative for further assistance.

We resolve electrical problems at our authorized repair centers. These centers are located in many major cities. Our website and service representatives can help you find a nearby repair center.

Victory Athletics will replace broken items with new or used parts. This process takes six to eight days. If necessary, we may replace an entire machine.



EXCLUSIONS

The limited warranty does not cover machines damaged by:

- incorrect setup or installation
- poor maintenance
- incorrect use (or abuse), including being hit, kicked, or dropped
- acts of nature, such as fire, flooding, earthquakes, etc.

- 1 **What is the quickest way to report a problem with a Victory Athletics product?**
 - A visit the website
 - B return the part by mail
 - C call the customer care office
 - D visit the nearest repair center

- 2 **Under which heading would a user look to determine if a repair is covered under the warranty?**
 - A AT PURCHASE
 - B IF YOU HAVE A PROBLEM
 - C REPAIRING YOUR EQUIPMENT
 - D EXCLUSIONS

- 3 **Which of these BEST describes the purpose of the bold headings in the passage?**
 - A to organize information into sections
 - B to inform buyers about new products
 - C to help store owners make needed repairs
 - D to highlight the key words in the warranty

- 4 **Which group of people would have the MOST trouble getting an electrical problem repaired?**
 - A people who want used parts
 - B people who live far from a city
 - C people who get their mail at the post office
 - D people who have a slow Internet connection

- 5 **With which of these would the author of the passage MOST LIKELY agree?**
 - A Victory Athletics' products will not break.
 - B Victory Athletics treats their employees well.
 - C Victory Athletics will not fix problems quickly.
 - D Victory Athletics' warranty covers parts and labor.



- 6 **What is the MOST LIKELY reason that the words *WITHIN FIFTEEN DAYS OF PURCHASE* are printed in capital letters?**
- A to impress customers
 - B to emphasize the statement
 - C to provide general warranty information
 - D to space the letters correctly on the page
- 7 **How does a customer get a customer number?**
- A shop at an affiliated store
 - B talk to a service representative
 - C go to an authorized repair shop
 - D mail in a store receipt and warranty card
- 8 **What will customers see on the company's website AFTER they enter their customer numbers?**
- A a copy of their warranty card
 - B number to call for electrical repairs
 - C link to a service representative
 - D an image of the equipment they purchased

- 9 **What is the meaning of the word *exclusions* based on the information below?**

EXCLUSIONS

This warranty does not cover machines damaged by:

- incorrect setup or installation
- poor maintenance
- incorrect use (or abuse), including being hit, kicked, or dropped
- acts of nature, such as fire, flooding, earthquakes, etc.

- A exceptions
 - B corrections
 - C inspections
 - D explanations
- 10 **Which word BEST replaces the word *authorized* as it is used in the sentence?**

Mechanical and electrical troubles are resolved at authorized repair shops.

- A nearby
- B capable
- C official
- D following



Solutions

Number	Correct Answer	Explanation
1	A	<p><i>Uses information from a variety of consumer, workplace, and public documents (e.g., job applications) to explain a situation or decision and solve a problem. (ELA8R1e)</i></p> <p>The correct answer is Choice (A) visit the website. The first line of the warranty states, “The fastest way to report a problem is to visit our website.” Choice (B) is not listed as a possible option. Choice (C) is listed as an option, but it is not described as the fastest way to report a problem. Choice (D) is incorrect because a visit to a repair center is stated as a place where Victory Athletics will “resolve electrical problems” rather than as a fast way to report a problem.</p>
2	D	<p><i>Analyzes and evaluates common textual features (e.g., paragraphs, topic sentences, concluding sentences, introduction, conclusion, footnotes, index, bibliography). (ELA8R1a)</i></p> <p>The correct answer is Choice (D) EXCLUSIONS. The EXCLUSIONS section states what the warranty does not cover. The customer can then deduce what is covered. Choices (A), (B), and (C) do not explain whether a repair is covered under the warranty</p>
3	A	<p><i>Applies, analyzes, and evaluates common organizational structures (e.g., graphic organizers, logical order, cause and effect relationships, comparison and contrast). (ELA8R1b)</i></p> <p>The correct answer is Choice (A) to organize information into sections. The bold headings help consumers quickly find information they need within specific sections of the text. Choices (B), (C), and (D) are incorrect as they are not accurate in this passage.</p>



Number	Correct Answer	Explanation
4	B	<p><i>Uses information from a variety of consumer, workplace, and public documents (e.g., job applications) to explain a situation or decision and solve a problem. (ELA8R1e)</i></p> <p>The correct answer is Choice (B) people who live far from a city. Since the repair centers are located in “many major cities,” people who live far from a city would have the most difficulty accessing a center. Choices (A) and (C) are incorrect as neither of these situations would interfere with taking advantage of the warranty. Choice (D) is incorrect because although a slow Internet connection could take more time to get an electrical problem repaired, a person who lives far from a city would have the MOST trouble.</p>
5	D	<p><i>Recognizes and traces the development of an author’s argument, point of view, or perspective in text. (ELA8R1c)</i></p> <p>The correct answer is Choice (D) Victory Athletics’ warranty covers parts and labor. This is the guarantee to the customer. Choices (A), (B), and (C) are incorrect as they are not mentioned in the warranty.</p>
6	B	<p><i>Recognizes and uses the features of disciplinary texts (e.g., charts, graphs, photos, maps, highlighted vocabulary. (ELA8RC2f)</i></p> <p>The correct answer is Choice (B) to emphasize the statement. When authors want to emphasize something, they often use visual cues to do so. In this instance, the use of all capital letters emphasizes the importance of completing certain tasks within the specified period of time. Choice (A) is incorrect because Victory Athletics would not try to <i>impress customers</i> with a fifteen-day limitation on completing and mailing in warranty cards and copies of receipts. Choice (C) is incorrect because the capitalized text does not provide <i>general warranty information</i>; it merely calls readers’ attention to the words. Choice (D) is incorrect because capitalization does not <i>space letters correctly on the page</i>.</p>



Number	Correct Answer	Explanation
7	D	<p><i>Uses information from a variety of consumer, workplace, and public documents (e.g., job applications) to explain a situation or decision and solve a problem. (ELA8R1e)</i></p> <p>The correct answer is Choice (D) mail in a store receipt and warranty card. The first section of the warranty states that customers should fill in the warranty card and send it in with a copy of the purchase receipt within 15 days of purchase. Choices (A), (B), and (C) are incorrect as they are not stated as ways to obtain a customer number.</p>
8	D	<p><i>Applies, analyzes, and evaluates common organizational structures (e.g., graphic organizers, logical order, cause and effect relationships, comparison and contrast). (ELA8R1b)</i></p> <p>The correct answer is Choice (D) An image of the equipment they purchased. The first paragraph in the section IF YOU HAVE A PROBLEM states that after entering a customer number, a purchaser should “select an image that matches your machine.” Choices (A), (B), and (C) are incorrect because they contradict the text of the warranty.</p>
9	A	<p><i>Determines the meaning of unfamiliar words in content and context specific to reading and writing. (ELA8R2b)</i></p> <p>The correct answer is Choice (A) exceptions. The warranty states there are <i>exclusions</i>, or <i>exceptions</i>, to what it will cover, such as damages caused by “incorrect setup or installation.” Choices (B), (C), and (D) are incorrect because their meanings are illogical in this context.</p>



Number	Correct Answer	Explanation
10	C	<p><i>Determines pronunciations, meanings, alternate word choices, parts of speech, or etymologies of words. (ELA8R2a)</i></p> <p>The correct answer is Choice (C) official. By including the phrase <i>authorized repair shops</i>, Victory Athletics is requiring repair shops to have <i>official</i> approval in order to make repairs covered by the warranty. Choices (A) <i>nearby</i>, (B) <i>capable</i>, and (D) <i>following</i> are incorrect because their meanings are neither synonymous with, nor related to, the word <i>authorized</i>.</p>



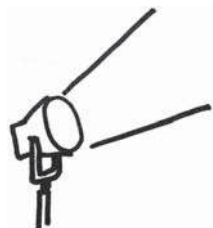
English/Language Arts

By the end of Grade 8, students have a strong understanding of the standard rules of capitalization, punctuation, pronoun use, and correct spelling. Additionally, students know the basic parts of sentences and can use this information to identify and use different types of sentences. Students should correct problematic sentences, including those that are run-ons or fragments and those with usage errors, such as incorrect pronoun forms. When researching, Grade 8 students use primary and secondary sources appropriately. Grade 8 students should be able to select effective organizational structures for their writing and ensure coherence by using transitional words and phrases. They should bring closure to their compositions with strong conclusions.

The English/Language Arts activities focus on some of the concepts that are assessed on the Grade 8 CRCT English/Language Arts domains. These domains are as follows:

- 1 Grammar/Sentence Construction**
- 2 Research/Writing Process**

Activities



1 Grammar/Sentence Construction

Georgia Performance Standard ELA8C1

Within the Grammar/Sentence Construction domain, students should be able to determine correct pronoun usage (specifically by gender and case) and parts of speech. They should also be able to analyze various sentence types (simple, compound, complex, and compound-complex). Students should evaluate sentences for agreement between subjects and verbs as well as between pronouns and their antecedents. In addition, they should produce final drafts that demonstrate competence in punctuating a variety of sentence types, applying rules of capitalization, eliminating fragments and run-ons, and applying correct use of commas and semicolons in all types of sentences (compound, complex, and compound-complex). For clarity, students should avoid misplaced modifiers, and correct other writing issues, such as nonstandard English and double negatives.

The following activities develop skills in this domain:

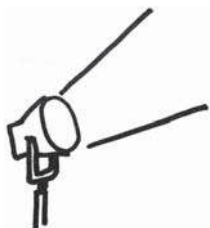
- For practice using correct pronoun forms, students will work individually or in small groups to evaluate pronoun use in the sentences below. Students need to find the five sentences that have pronoun errors. Beneath each sentence with an error, students should write the corrected version.
 - Our class took a bus trip to the Etowah Mounds historic site, which is located northwest of Atlanta, Georgia.
 - The bus driver assigned the first seat to my friend and I.
 - We learned that Etowah was the home of Mississippian Indians over 500 years ago.
 - When we arrived, we saw six large mounds of earth and a museum building.
 - “Who’s ready to explore?” asked the teacher, and everyone raised their hand.
 - In the museum, we saw objects that had been excavated from the mounds.
 - The people decorated themselves with copper ornaments, shells, feathers, and tattoos.
 - When we went outside, we visited a very large mound, what was once the platform for a chief’s home.
 - We learned that some of the ancients there were buried with tools that they believed would be useful in the afterlife.
 - Whomever would have guessed that six mounds of earth could be so very interesting?

For further practice, students can create sentences that have pronoun errors and challenge others around them to find the error. If the person answering does not give the correct answer, the challenger needs to supply that answer and explain why it is correct.



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- To gain competence and confidence using different sentence patterns and appropriate punctuation, students should practice combining sentences. The challenge is to combine the following twelve simple sentences into just five compound or compound-complex sentences. At least one of the combined sentences should demonstrate the correct use of the semicolon. The others should demonstrate the correct use of commas and conjunctions.
 - Ben’s mom had to work late.
 - She asked him to get supper ready.
 - He found a package of cornbread mix in the cupboard.
 - In the cupboard, he found fresh hotdog buns.
 - In the refrigerator, he found some hotdogs.
 - In the refrigerator, he found fresh vegetables.
 - He cooked the hotdogs in the oven.
 - He followed the package directions to make cornbread.
 - He washed the vegetables.
 - He cut up the vegetables.
 - He cooked the vegetables in a pan.
 - Mom came home to a delicious supper.
 - To gain an understanding of how dangling modifiers or misplaced modifiers can interfere with communication, students should analyze the sentences below. In pairs, the students should read the sentences to each other and imagine the weird situations that result from the errors. After students have read all six sentences, they should briefly review the concept that a modifier must be placed carefully so that it clearly applies to the word or phrase that it modifies. In most cases, a modifier should be placed next to whatever it modifies. Finally, partners should work together to rewrite the sentences, rewording them to correct any dangling or misplaced modifiers.
 - Running through the woods, a slippery stone tripped me
 - Old and dilapidated, the baby was sleeping in a playpen.
 - The robbery victim was found tied to a chair by police.
 - While watching the parade, a large helium balloon hit a lamppost.
 - Famous for potholes and broken pavement, I ride my bike down the alley.
 - Fierce, beautiful, and wild, Mr. Johnson took many photos of the lions.

Activities



2 Research/Writing Process

Georgia Performance Standards ELA8W1, ELA8W2, and ELA8W4

For the writing process, students should apply appropriate organizational structure as they write paragraphs or longer compositions. They will use appropriate transitions between paragraphs, passages, and ideas, and they will develop appropriate closing sentences to give their compositions closure. They will develop their compositions with supporting evidence and details. They will be able to eliminate extraneous information from their writing, to reorganize sentences to improve clarity, to maintain a consistent point of view, and to identify and revise errors. Finally, students should be able to locate and evaluate a variety of primary and secondary sources to use in their research.

The following activities develop skills in this domain:

- To gain a clear understanding of what is meant by the term primary source, students should become familiar with the website for the U.S. National Archives: **www.archives.gov/about**. They can begin their search by following the Home Page prompts to the pages on the site that allow them to download the United States Charters of Freedom: *The Declaration of Independence*, *The Constitution*, and the *Bill of Rights*. After examining these documents, which are examples of primary sources, students should write a definition of the term *primary source*. They should move to the page of FAQs (Frequently Asked Questions), which presents questions that other researchers have asked. Students should list some examples of other primary sources they have found, either on the Internet or in the community. They should also explain why they consider each to be a primary, rather than a secondary, source. Finally, students should create some sample research questions to be investigated with primary sources. They should list one question from history, one from science, and one from current events.
- For practice evaluating secondary sources, students should select a research topic with which they are already familiar. For instance, a student who likes stargazing might investigate different types of telescopes. Taking the role of researcher, students should search for articles online using any search engine and print out the list of web articles available. Students need to skim as many of those articles as time allows, checking to see which ones are primary sources. From the articles that are secondary sources, students should select three that seem to provide useful information on the chosen topic. Students should examine those articles carefully to answer the following questions:
 - Did an authority (expert in the field) write the article?
 - Is the article intended to give information or is it meant to sell something?
 - Does the article give evidence to support the claims that it makes?
 - For what audience is the article intended?
 - Does the author give documentation to show where the information came from?



- For help in writing effective closing statements, students should consider the possible strategies listed below. They should examine textbooks, newspapers, and leisure reading to find an example of each of the strategies in use. Then, each student should write the beginning and middle of a paragraph, leaving a blank space for the conclusion. Finally, the students should exchange papers and use one of the following ideas to add a strong conclusion to the incomplete paragraph.
 - A restatement of the main idea
 - A quotation from an authority
 - A question that leads readers to think further about the main point
 - A prediction based on the main idea
 - A brief story that illustrates the main idea
 - A warning based on the main idea
- To see how an inconsistency in the writer's point of view can interfere with communication, students should read aloud the sentences below. Then they should rewrite each sentence to make the point of view consistent.
 - No matter how hard I try, you can never please everybody.
 - In my science class, we learned how to calculate your body mass index.
 - In summer, he likes swimming, but they can't swim here all winter.
 - Many people believe this place is haunted, but you can't believe everything.

Teachers can also provide paragraphs and other longer texts for students to evaluate and revise.



Practice Quiz



1 **Which change should be made in the sentence?**

Lakisha gave their speech before it was due.

- A change *gave* to *give*
- B change *their* to *her*
- C change *speech* to *speeches*
- D change *due* to *do*

2 **What kind of sentence is this?**

If you are coming to the party, please bring a healthy snack.

- A compound-complex
- B compound
- C complex
- D simple

3 **Which sentence is written correctly?**

- A Hosea told me the score of the game.
- B Hosea he told me the score of the game.
- C Hosea hisself told me the score of the game.
- D Hosea he himself told me the score of the game.

4 **Where does the semicolon belong in the sentence?**

The marching band will perform at Friday's game however, they have not practiced at all this week.

- A after *band*
- B after *perform*
- C after *game*
- D after *practiced*

5 **Which sentence uses the underlined word correctly?**

- A The dog happily wagged its tail as the girl approached.
- B Its never too late to share your ideas with the committee.
- C Its likely to rain today, so you better take your umbrella.
- D I am struggling with this math problem because its very difficult.



6 **Which word in the sentence should be capitalized?**

I memorized "The Road not Taken," a poem by Robert Frost, for my literature class.

- A not
- B poem
- C literature
- D class

7 **Which organizational method is used in the paragraph?**

In early colonial days, women made quilts to keep their families warm. These quilts were hand-sewn and usually made from scraps of old clothing or bedding. Though some quilts today are made by hand, most are mass-produced and are sewn with machines. Homemade quilts may contain old pieces of fabric, but most modern quilts are made from new fabric.

- A cause and effect
- B chronological order
- C question and answer
- D compare and contrast

8 **Which is the BEST supporting detail for the topic sentence?**

Good, well-prepared soil is one of the most important ingredients for a healthy garden.

- A Before planting any seeds, the soil needs to be warm and all rocks need to be removed.
- B If your clothes get dirty while working in the soil, be sure to wash them right away.
- C Some plants are more popular in southern regions than in northern regions.
- D Planting a garden can be a fun way for families to spend time together.

9 **Which topic would be the MOST appropriate for a short report?**

- A The History of the Olympics
- B Judging the Olympic Sports
- C My Favorite Olympic Athlete
- D Olympic Athletes Through the Ages



10 **Which idea is repeated in the paragraph?**

For many years, Switzerland has been known all over the world for its cuckoo clocks, which are made out of wood. These timepieces are hand-carved from aged linden wood. Today these Swiss clocks come in all shapes and sizes.

- A The Swiss people make clocks out of wood.
- B The Swiss people carve their clocks by hand.
- C The Swiss people are famous for their clocks.
- D The Swiss people produce a variety of clocks.

Solutions

Number	Correct Answer	Explanation
1	B	<p><i>Declines pronouns by gender and case, and demonstrates correct usage in sentences. (ELA8C1a)</i></p> <p>The correct answer is Choice (B) change <i>their</i> to <i>her</i>. The error here is one of pronoun case. <i>Lakisha</i> is the subject, and she is giving the speech; therefore, <i>their</i> should be <i>her</i> (to agree with <i>Lakisha</i>). Choice (A) is incorrect because it introduces both tense-agreement and subject-verb agreement errors. Choice (C) is incorrect because it introduces a number-agreement error. The word <i>it</i> refers to the singular noun <i>speech</i>; it cannot refer to the plural noun <i>speeches</i>. Choice (D) is incorrect because the word <i>do</i> is the wrong part of speech.</p>
2	C	<p><i>Analyzes and uses simple, compound, complex, and compound-complex sentences correctly, punctuates properly, and avoids fragments and run-ons. (ELA8C1b)</i></p> <p>The correct answer is Choice (C) complex. The first part of the sentence (<i>If you are coming to the party</i>) is a dependent clause; it begins with a subordinating conjunction and cannot stand alone. The second part of the sentence (<i>please bring a healthy snack</i>) is an independent clause; it does form a complete thought. Together, these two clauses create a complex sentence. Choice (A) is incorrect because the sentence does not have two independent clauses plus a dependent clause. Choice (B) is incorrect because the sentence does not have two independent clauses. Choice (D) is incorrect because the sentence does not have just a single independent clause.</p>
3	A	<p><i>Revises sentences by correcting errors in usage. (ELA8C1d)</i></p> <p>The correct answer is Choice (A) Hosea told me the score of the game. This sentence has no errors. Choice (B) is incorrect because it includes the unnecessary pronoun <i>he</i>. Choice (C) is incorrect because it uses the nonstandard pronoun form <i>hissself</i>. Choice (D) is incorrect because in addition to the unnecessary pronoun in Choice (B), this answer includes the extra reflexive pronoun <i>himself</i>.</p>

Number	Correct Answer	Explanation
4	C	<p><i>Demonstrates appropriate comma and semicolon usage (compound, complex, and compound-complex sentences, split dialogue, and for clarity). (ELA8C1e)</i></p> <p>The correct answer is Choice (C) after game. One way to combine two independent clauses is to use a semicolon and a transitional adverb. “However” is the transitional adverb; therefore, the semicolon should come after “game” and before “however”. Choice (A) is incorrect because <i>The marching band</i> is not an independent clause. Choice (B) is incorrect because the words “at Friday’s game” belong to the first independent clause. Choice (D) is incorrect because the words that follow <i>practiced</i> do not constitute an independent clause.</p>
5	A	<p><i>Revises sentences by correcting errors in usage. (ELA8C1d)</i></p> <p>The correct answer is Choice (A) The dog happily wagged its tail as the girl approached. Here, the word <i>its</i> is a possessive pronoun referring to the word <i>dog</i>. Choices (B), (C), and (D) are incorrect because they include the word <i>its</i> but need the contraction <i>it’s</i> (meaning <i>it is</i>).</p>
6	A	<p><i>Produces final drafts/presentations that demonstrate accurate spelling and the correct use of punctuation and capitalization. (ELA8C1g)</i></p> <p>The correct answer is Choice (A) not. All words in a title (with the exception of small articles, prepositions, and conjunctions) are capitalized. In this context, Choices (B), (C), and (D) are not proper nouns, and there are no other reasons to capitalize them.</p>



Number	Correct Answer	Explanation
7	D	<p><i>Uses traditional structures for conveying information (e.g., chronological order, cause and effect, similarity and difference, and posing and answering a question). (ELA8W1c)</i></p> <p>The correct answer is Choice (D) compare and contrast. Throughout the paragraph, the author makes comparisons and contrasts between quilts from colonial days and those made today. Choice (A) is incorrect because no causal relationship is given. Choice (B) is incorrect because the details do not progress in chronological order (sequentially, from the past to the present). Choice (C) is incorrect because no question is posed.</p>
8	A	<p><i>Develops the topic with supporting details. (ELA8W2d)</i></p> <p>The correct answer is Choice (A) Before planting any seeds, the soil needs to be warm and all rocks need to be removed. The topic sentence focuses on the importance of soil for a garden. Choice (A) is the only answer that supports the topic sentence. It provides information about preparing the soil. Choice (B) is incorrect; while it mentions soil, the sentence focuses on clothing and does not relate to preparing soil for planting. Choice (C) is also incorrect; it focuses on the differences in popularity between plants in the southern and northern regions. Finally, Choice (D) is incorrect because it focuses on how families may enjoy spending time together while gardening.</p>
9	C	<p><i>Uses a variety of primary and secondary sources and distinguishes the nature and value of each. (ELA8W2f)</i></p> <p>The correct answer is Choice (C) My Favorite Olympic Athlete. Here students must judge different topics and select one that would be manageable in a “short report.” Choices (A), (B), and (D) are all large topics, which would be impossible to cover thoroughly in a “short report.”</p>

Number	Correct Answer	Explanation
10	A	<p><i>Excludes extraneous and inappropriate information. (ELA8W2g)</i></p> <p>The correct answer is Choice (A) The Swiss people made clocks out of wood. In order to make writing precise and concise, students must avoid unnecessary repetition. The passage mentions twice that Swiss cuckoo clocks are made of wood. Choices (B), (C), and (D) are incorrect choices because they do not repeat ideas already mentioned in the passage.</p>

Mathematics



Chapter 3

Mathematics

By the end of Grade 8, students will understand various numerical representations, including square roots, exponents, and scientific notation. Students will use and apply geometric properties of plane figures, including congruence and the Pythagorean Theorem. Symbolic algebra will be used to represent situations and solve problems that involve linear relationships, linear equations, and systems of linear equations or inequalities. Students will be able to use equations, tables, and graphs to analyze and interpret linear functions. Students will work with and understand set theory and simple counting techniques and use those to determine the theoretical probability of simple events. Students will begin to make inferences from statistical data, particularly data that can be modeled by linear functions.

The Mathematics activities are focused on some of the concepts that are assessed on the Grade 8 CRCT Mathematics domains. These domains are as follows:

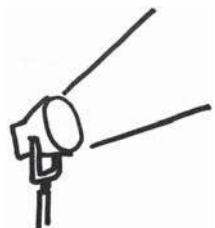
- 1 Number and Operations**
- 2 Geometry**
- 3 Algebra**
- 4 Data Analysis and Probability**

The *Mathematical Process Skills* are integrated throughout the domains. These are skills used to acquire and apply content knowledge.

Mathematical Process Skills refer to students' dexterity in applying concepts and skills in the context of authentic problems and in understanding concepts rather than merely following a sequence of procedures. Process skills are used to acquire and apply content knowledge. Process skills include solving problems that arise in mathematics and other contexts; reasoning and evaluating mathematical arguments; communicating mathematically; making connections among mathematical ideas and to other content areas; and representing mathematical ideas in multiple ways.



Activities



① Number and Operations

Georgia Performance Standard M8N1

Within the Number and Operations domain, students learn the different representations of numbers including square roots, exponents, and scientific notation. Students learn the square roots of perfect squares and use the perfect squares to estimate the square roots of other numbers. Students will see square roots in different ways, including as the length of a side of a square with a given area, and as points and lengths on a number line. They will learn that the square root of 0 is 0 and that every positive number has two square roots that are opposite in sign. Students will recognize and use the radical symbol to denote the positive square root of a positive number, as well as simplify, add, subtract, multiply, and divide expressions containing square roots. Students will distinguish between rational and irrational numbers. Students will use the laws of exponents to simplify expressions containing integer exponents. They will express numbers in scientific notation and use them in problem situations. Lastly, students will use appropriate technologies to solve problems involving square roots, exponents, and scientific notation.

The following activities develop skills in this domain:

- To practice finding square roots and using radicals, students will set up and solve simple radical equations involving the side lengths of squares in this problem. In *The Perfect Square Gardens*, there are currently four gardens that are perfectly square. Garden A has an area of 81 square yards; Garden B has an area of 121 square yards; Garden C has an area of 225 square yards; and Garden D has an area of 324 square yards. The head gardener is going to make four new square gardens and he wants:
 - The side length of Garden E to be twice the side length of Garden C
 - The side length of Garden F to be the sum of the side lengths of Gardens A and B
 - The side length of Garden G to be the difference of the side lengths of Gardens A and D
 - The ratio of the side lengths of Garden H to Garden B to have the same ratio as the side lengths of Garden D to Garden A

Use $\sqrt{81}$, $\sqrt{121}$, $\sqrt{225}$, and $\sqrt{324}$ to set up and solve equations and proportions to find the side lengths of the four new perfectly square gardens. After finishing the problem, students should describe in their own words the relationship between the radical sign, the square root of a number, and the side length of a square with a given area.



- To develop fluency with the laws of exponents, students will build exponential expressions that are equivalent to a given exponential expression. Each student will write a different simple exponential expression, such as a^6 , on three index cards. For their unique expression, the students should make five additional index cards according to these rules:
 - The first index card should have an expression that reduces to the original exponential expression using the addition law of exponents. For example, for a^6 students might write $a^2 \times a^4$, $a^3 \times a^3$, or $a^5 \times a$.
 - The second index card should have an expression that reduces to the original exponential expression using the multiplicative law of exponents. For example, for a^6 students might write $(a^3)^2$ or $(a^2)^3$.
 - The third index card will have an expression that reduces to the original exponential expression using the division law of exponents. For example, for a^6 students might write $\frac{a^{12}}{a^6}$ or $\frac{a^{10}}{a^4}$.
 - The fourth index card will have an expression that reduces to the original exponential expression using the addition and division law of exponents. For example, for a^6 students might write $\frac{a^4 a^5}{a^3}$ or $\frac{a^2 a^6}{a^2}$.
 - The fifth index card will have an expression that reduces to the original exponential expression using the multiplication and division law of exponents. For example, for a^6 students might write $\frac{(a^3)^3}{a^3}$.

Students then shuffle the cards, exchange them, find and match all the equivalent expressions, and label the index card with the law or laws that were used to reduce the expression on it.

- To apply converting to, and using numbers in, scientific notation, students will make a model of the universe and calculate the time it would take to travel to the different locations at the speed of light. On a large sheet of paper or poster board students should draw the sun, the eight planets, Alpha Centauri, Sirius, Deneb, and the Galactic Center. Students should label their distances from Earth in scientific notation and should not be concerned with making the drawing to scale.



Location	Distance from Earth in standard form (km)	Distance from Earth in scientific notation (km)	Column 3/speed of light = number of seconds	Column 4/seconds per year = years to reach location
Sun	149,570,000			
Mercury	91,620,000			
Venus	41,460,000			
Mars	78,270,000			
Jupiter	628,570,000			
Saturn	1,277,430,000			
Uranus	2,720,730,000			
Neptune	4,350,330,000			
Alpha Centauri	40,396,400,000,000			
Sirius	81,738,800,000,000			
Deneb	13,263,600,000,000,000			
Galactic Center	262,151,000,000,000,000			

Students will then:

- 1 Divide the distances by the speed of light (3.0×10^6 km/s).
 - 2 Divide the quotient from (1) by the number of seconds in a year (3.1556926×10^7 s) to determine the time it would take in years to reach Earth by traveling at the speed of light. This information should also be included on their drawings.
- Students will review definitions and follow the steps of a flow chart to help them distinguish between rational and irrational numbers. Irrational numbers will include the estimated value of a non-perfect square. Prepare a deck of 3 × 5-inch cards ahead of time. On each card write either a rational or an irrational number:
 - Rational numbers can include fractions, terminating decimals, square roots of perfect squares (showing the perfect square inside a radical with an equal sign indicating the root), repeating decimals, and integers.
 - Irrational numbers can include square roots of non-perfect squares (showing the non-perfect square inside a radical with an equal sign indicating the root), non-terminating decimals, and non-repeating decimals.

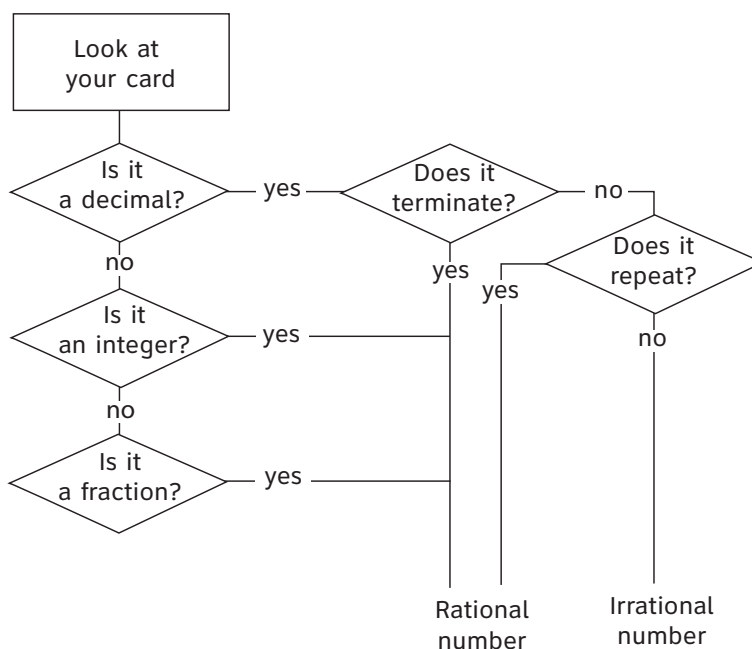
To begin the lesson, post the following definitions:

- **Rational number:** A number that can be expressed as a ratio of two integers. In other words, a rational number can be written as a fraction, a repeating decimal, a terminating decimal, or a whole number.
- **Irrational number:** A number that cannot be expressed as a ratio of two integers. In other words, an irrational number can be written as a decimal that does not repeat or terminate.

Next, use the board or chart paper to show examples of rational and irrational numbers:

- For a rational number, show that the fraction $1/1000$ can also be expressed as .001.
- For an irrational number, write the symbol π and ask students for what value the symbol is given. Elicit that π is usually written as the rounded off decimal of 3.14. Demonstrate that π is an irrational number because it can be written as 3.1415926535897932384626433832795... Explain that the value of π goes on forever, without repeating or terminating.

Then, display the following flow chart. Explain that students will determine whether various numbers are rational or irrational numbers using the chart. They will begin at the rectangle and follow the various pathways depending upon how they answer questions about each rational or irrational number. Demonstrate using $1/1000$ and 3.1415926535897932384626433832795....

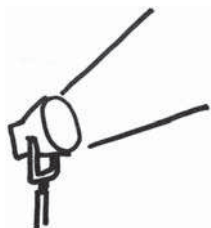




Next, distribute one prepared index card to each student. Students will use the flow chart to determine if his or her card displays a rational or irrational number. They may achieve this process in one of the following ways:

- Post the flow chart on the board or chart paper. One student at a time will tell the class how he or she moves through the flowchart for his or her number.
- Distribute a copy of the flow chart to each student. Students will trace the correct path for the numbers on their cards.
- Reproduce the flow chart with masking tape on the floor. Students will walk through the flow chart.

Activities



2 Geometry

Georgia Performance Standards M8G1 and M8G2

The Geometry domain addresses students' understanding of and ability to apply the properties of parallel and perpendicular lines as well as the meaning of congruence. Students will investigate characteristics of parallel and perpendicular lines both algebraically and geometrically and apply properties of angle pairs formed by parallel lines cut by a transversal. Students will understand the properties of the ratio of segments of parallel lines cut by one or more transversals. Students will know the meaning of congruence and understand that all corresponding angles are congruent and all corresponding sides are congruent. Students will understand and use the Pythagorean Theorem and other properties of right triangles. They will recognize and interpret the Pythagorean Theorem as a statement about areas of squares or sides of a right triangle.

The following activities develop skills in this domain:

- To experience the outcome when parallel lines are cut by a transversal, students will make and put together puzzles formed by parallel lines and transversals. Students place masking tape on paper to make two parallel lines, one transversal, and a second set of parallel lines that cross the first set. Students then separate the angles by cutting the piece of paper along the masking tape edge. Students will measure and label one angle formed by the single transversal and one angle formed by the parallel line crossings. They then switch pieces, put the puzzle back together, and label all the angles. After they finish, students should be able to explain the following:
 - Why they needed only one angle measurement from each set of line crossings
 - Why they couldn't have found the measures of all the angles if they had been given only one angle from a single transversal intersection
 - The rules they used to find the missing angle measures
- Students will strengthen their ability to use congruence by labeling corresponding angles and sides of congruent figures in different positions. First, students should cut out different triangles, quadrilaterals, and polygons from a piece of paper. On separate pieces of paper for each shape, students should choose a position for tracing the figure. Then, based on that position, students should do the following:
 - Trace the figure translated right two inches.
 - Trace the figure reflected horizontally and vertically.
 - Trace the figure rotated 90° and 270° .
 - Measure and label the angles and side lengths of the original figure.

Students then exchange tracings and use different colored markers to show congruent sides and angles. They will label the angle measures and side lengths and briefly describe how they used the properties of congruence to find the measurements.

- Students will apply the Pythagorean Theorem to construct lines with lengths that are irrational numbers. The square root of any positive integer that is not a perfect square is an irrational number. Students should first draw four right triangles with the following leg lengths:
 - 1 inch and 1 inch
 - 1 inch and 2 inches
 - 2 inches and 3 inches
 - 4 inches and 4 inches

Students will then find the lengths of the hypotenuses, leaving them in radical form. Students should then answer the following questions:

- 1** Which lines have lengths that are irrational?
 - 2** How did you find the lengths?
 - 3** Could you have measured these lengths accurately using a standard ruler?
 - 4** How were you able to use the Pythagorean Theorem to create and measure the lengths accurately?
- To make a connection between the algebraic equation and geometric meaning of the Pythagorean Theorem, students will find the square of the hypotenuse of a right triangle using the squares of its legs. Students will cut out one-inch squares from two 8.5 x 11 pieces of paper.
 - 1** First, students should draw a right triangle with leg lengths 3 inches and 4 inches. They will then use the one-inch square papers to build a 3 x 3 square and a 4 x 4 square along the respective legs. They then will use those one-inch square papers to build a square along the hypotenuse and write what happened in their own words.
 - 2** Second, students should draw an acute triangle that has side lengths 3 inches and 4 inches. Students should predict and verify whether the third side length will be less than or greater than 5 inches. They then will build 3 x 3 and 4 x 4 squares along the 3- and 4-inch sides using inch squares. Students will then try to build a square along the third side and write what happens.
 - 3** Finally, students should draw an obtuse triangle with side lengths 3 inches and 4 inches. They should predict and verify whether the third side length will be less than or greater than 10 inches. They then build the 3 x 3 and 4 x 4 squares on the 3- and 4-inch sides with the 1-inch paper squares. Students will then try to build a square of 1-inch paper squares along the third side and write what happens.



- 4** Students then repeat steps 1–3 using leg lengths and side lengths of 6 inches and 8 inches, and 5 inches and 12 inches.

After finishing the activity, students will answer these questions:

- 1** What does the Pythagorean Theorem say about the areas of the squares formed on the legs and hypotenuse of a right triangle?
- 2** Was the third side of the acute triangle shorter or longer than the hypotenuse of the right triangle? How did this affect the relationship between the area of the squares formed on the 3- and 4-inch sides and the area of the square formed on the third side?
- 3** Was the third side of the obtuse triangle shorter or longer than the hypotenuse of the right triangle? How did this affect the relationship between the area of the squares formed on the 3- and 4-inch sides and the area of the square formed on the third side?
- 4** Why didn't the Pythagorean Theorem work for the acute and obtuse triangles?



Activities



3 Algebra

Georgia Performance Standards M8A1, M8A2, M8A3, M8A4, and M8A5

The Algebra domain addresses students' ability to use algebra to represent, analyze, and solve problems. Students will learn to represent a given situation using algebraic expressions or equations in one variable as well as how to simplify and evaluate them. Students will solve different forms of algebraic equations in one variable, including those with absolute values, and interpret solutions in context. Students will solve equations involving several variables for one variable in terms of the others. Students will understand and graph inequalities in one variable. They will represent a given situation using an inequality in one variable, use the properties of inequality to solve, graph solutions on a number line, and interpret solutions in problem contexts. Students will understand relations and linear functions. They will recognize a relation as a correspondence between varying quantities and recognize a function as a correspondence between inputs and outputs, where the output for each input must be unique. They will distinguish between relations that are functions and those that are not and recognize functions in a variety of representations and contexts. Students will use tables to describe sequences recursively and with a formula in closed form. They will understand and recognize arithmetic sequences as linear functions with whole number input values and interpret the constant difference in an arithmetic sequence as the slope of the associated linear function. Students will identify relations and functions as linear or nonlinear and translate among verbal, tabular, graphic, and algebraic representations of them. Students will graph and analyze graphs of linear equations and inequalities, including interpreting slope as a rate of change; determining the meaning of the slope and y-intercept in a given situation; graphing equations of the form $y = mx + b$ and $ax + by = c$; graphing the solution set of a linear inequality; and identifying whether the solution set is an open or a closed half-plane. Given a graph, students will determine the equation of a line, numerical information that defines the line, or a context involving a linear relationship. They will solve problems involving linear relationships, including systems of linear equations and inequalities. Given a problem in context, students will be able to write a system of linear equations or inequalities to represent it, solve these systems graphically or algebraically (using technology as appropriate), and interpret the solutions in context.

The following activities develop skills in this domain:

- Most 8th graders are likely to be familiar with percentage discounts given at department store sales. Students will relate this real-world topic to writing, evaluating, and solving equations using one variable.

McMurphy's Third-Annual Sidewalk Sale

Item	Percentage Discount	Sale Price	Original Price
Sandals	15%	\$38.25	
T-shirts — plain	30%		
T-shirts — printed	10%		
Year-end Denim Collection — 5 pairs of jeans	25%		

Using the information in this chart from a store's sidewalk sale, students will be able to complete the following questions. Recording their answers in the chart when applicable will aid them in solving later questions.

- 1 Using equations with one variable, describe two ways that the original price for the sandals can be determined.
- 2 During the store's sale, a pair of sandals before taxes cost \$38.25. Write an equation that represents this. Then solve to determine the original price.
- 3 A person decides to buy a pair of sandals and a Denim Collection. If she had purchased them before the sale, she would have paid \$189.00 before taxes. Using the answer from question two, write equations that allow you to solve for the sale price and the original price of the Denim Collection. Then determine the total price she would have paid for the two items during the sale.
- 4 The original price for printed T-shirts is \$5.00 more than the original price for plain T-shirts. A student wants to buy two of each type of T-shirt at the sale price. Write an equation that represents this using only one variable.
- 5 During the sale, the final price for the items in question four comes to approximately \$58.00. What are the original prices and sale prices of each type of T-shirt?

Teachers will provide students with one or both of the following real-world scaffolding applications as a culmination of the activity:

- Show students quick ways to figure out sale prices in their minds.
For example, at a 25% off sale, divide the original price by 4 to find out how much you'll be saving.
- Have students practice figuring out how much to tip at restaurants using both algebraic equations and mental math (for example, 15%, 18%, and 20% tips).
- Extending sequences and writing equations to represent them may be used as students make fictional train schedules for the Atlanta-Athens commuter rail. Students will make the schedule for the Atlanta-bound trains by assuming the following information:
 - 1 The first train leaves at 6:30 A.M.
 - 2 A train leaves every 42 minutes.
 - 3 For trains that leave before 9:00 A.M., there are exactly 13 minutes between each stop.
 - 4 For trains that leave after 9:00 A.M., there are exactly 16 minutes between stops.

Atlanta-bound

Athens	6:30
Bogart	
Winder	
Cedars Road	
Lawrenceville	
Reagan Pkway	
Lilburn	
Tucker	
Emory	
Atlantic Station	
Atlanta	

Students will then write out and number the terms of the following:

- The sequence that gives the times trains leave Athens
- The sequence that gives the times of station stops for the 3rd train to leave Athens
- The sequence that gives the times of station stops for the 7th train to leave Athens



Students will make equations that represent the time it takes to get to a stop on the Atlanta-bound and the Athens-bound trains. Equations will be of the form $T = bS$, where S is the stop number, b is the time between each stop, and T is time. They then use the equation to find the time it takes to get from Athens to Cedars Road, Athens to Tucker, and Athens to Atlanta. Students also verify their equations using the schedules they've created.

- To determine the difference between solution sets of systems with open inequalities and those with closed inequalities, students will test the points that lie on the boundary. On two separate coordinate planes students will draw the solution sets to the following:

$y \leq x + 5$	$y \leq x + 5$	$y < x + 5$	$y < x + 5$
$y \geq 10 - 4x$	$y > 10 - 4x$	$y \geq 10 - 4x$	$y > 10 - 4x$

Students will test the points (1, 7), (2, 6), (3, 7), (2, 7), and (3, -2) for each system. Then they will answer the following questions:

- 1 What is the only difference between the systems of inequalities?
- 2 Which points satisfy all four systems? How can you see this on the graphs?
- 3 Which of the points satisfy none of the systems? How can you see this on the graphs?
- 4 For the other points, which systems do they satisfy? How is this issue related to the system having closed or open inequalities?
- 5 In general, if a point lies on the boundary line of the solution set of a system of inequalities, when will it be part of the solution set? When will it not?

Students will graph and label equations of the form $y = mx + b$ to learn about the slopes of parallel and perpendicular lines. To study parallel lines, students will graph and label the pairs of lines given below on separate graphs. After graphing the equations, students will describe in their own words what lines with the same slope look like geometrically.

1 slope = 4, y-int = 1	3 slope = -2, y-int = -3	5 slope = 1, y-int = 0
2 slope = 4, y-int = 3	4 slope = -2, y-int = 1	6 slope = 1, y-int = -2

To study perpendicular lines, students will graph and label the pairs of lines given below on separate graphs. After graphing the equations, students will describe in their own words what lines with the same slope look like geometrically.

7 slope = 2, y-int = 2	9 slope = 3, y-int = 4	11 slope = 1, y-int = 0
8 slope = -1/2, y-int = 3	10 slope = -1/3, y-int = 2	12 slope = -1, y-int = 0

- Students will work with data about the Georgia state bird, the brown thrasher, to recognize relations and functions, distinguish between relations and functions, and to show how the same function can be represented in a variety of ways. First, review the definitions of *relations* and *functions* with the class. Post the following definitions on the board or chart paper:

- Relation: A set of ordered pairs, showing a correspondence between two groups.
- Function: A relation in which each x value has one, and only one, y value.

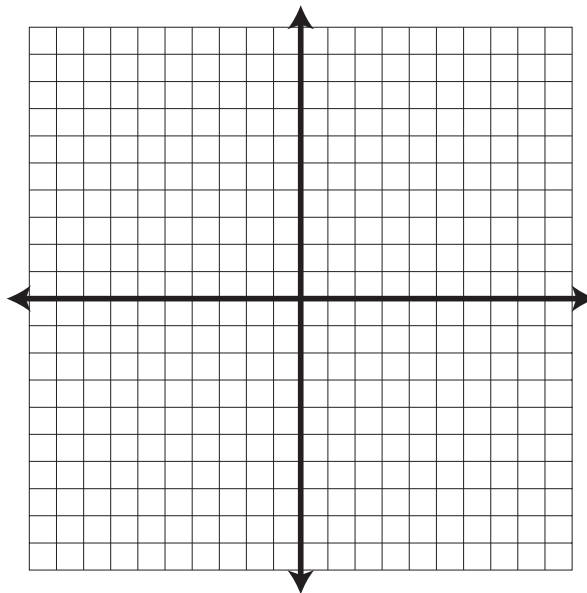
Next, explain to students that they will work with data about the brown thrasher's nest-building heights and the number of eggs the brown thrasher lays in the nest.

Distribute copies of the following table or post on the board or chart paper:

Height of the nest from the ground in inches (x)	Number of eggs in the nest (y)
6	2
8	1
10	5
2	3
5	5
3	4
4	6
6	4
9	4
7	2

Then, ask the class whether the information provided in the table represents a relation that is a function or is not a function. Elicit the correct answer: the table represents a relation that is not a function. Students will notice that for the x value of 6, there are two possible y values, 2 and 4.

- Tell students to use the **Vertical Line Test** as an additional way to prove whether or not a group of ordered pairs represents a relation that is a function. Explain that a relation is not a function if a vertical line can be drawn through two or more points because, for some value of x , there are at least two values for y . Have students test this proof:
 - Provide each student with a grid similar to the one that follows.



- Students will plot the 10 ordered pairs from the nest/egg table.
- Students will then examine the plot to see whether a vertical line can be drawn to connect any two or more plotted points.
- Students will find that the ordered pairs (6, 2) and (6, 4) can be connected by a vertical line, proving that the relation is *not* a function.

Distribute or post the following table and inform the class that the table shows data regarding a brown thrasher population. Explain that the table shows the population of one group of brown thrashers, which began with 500 birds and declined at a constant rate over five years due to the loss of habitat.

Year (<i>x</i>)	Population (<i>y</i>)
0	500
1	450
2	405
3	365
4	328
5	295

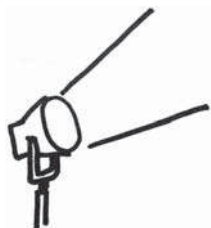


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- Once again, ask the class whether the information provided on the table represents a relation that *is* or *is not* a function. Elicit the correct answer: the table represents a relation that *is* a function. For each x value, there is one, and only one, y value.

Distribute another grid. Students will use the Vertical Line Test to prove that the population data *does* represent a function. Students will not be able to draw a vertical line to connect two or more plotted points.

Conclude the activity with a discussion of how functions can be represented in a variety of ways. Explain that the two columns of data represent the function in a **tabular representation**. Have students connect the plotted ordered pair points from their second grid and explain that the downward sloping line is a **graphical representation** of the function.

Activities



④ Data Analysis and Probability

Georgia Performance Standards M8D1, M8D2, M8D3, and M8D4

The Data Analysis and Probability domain addresses students' ability to apply basic concepts of set theory. Students will demonstrate relationships among sets through the use of Venn diagrams; determine subsets, complements, intersection, and union of sets; and use set notation to denote elements of a set. Students will determine the number of outcomes related to a given event using tree diagrams or with the addition and multiplication principles of counting. Students will use the basic laws of probability to find the probabilities of simple and compound independent events. Students will learn to organize, interpret, and make inferences from statistical data. They will gather data that can be modeled with a linear function and use it to estimate and determine a line of best fit on a scatterplot.

The following activities develop skills in this domain:

- To practice working with and using set notation, students will divide 24 of Shakespeare's plays into different groups. Students will find the subsets listed below, and then find various unions and intersections as listed.

The Comedy of Errors: Comedy, 1590

King Lear: Tragedy, 1605

Julius Caesar: Tragedy, 1599

Much Ado about Nothing: Comedy, 1598

All's Well that Ends Well: Comedy, 1602

Two Gentlemen of Verona: Comedy, 1594

As You Like It: Comedy, 1599

Measure for Measure: Comedy, 1604

Midsummer Night's Dream: Comedy, 1595

Winter's Tale: Comedy, 1610

The Tempest: Comedy, 1611

Antony and Cleopatra: Tragedy, 1606

Othello: Tragedy, 1604

Macbeth: Tragedy, 1605

Taming of the Shrew: Comedy, 1593

Romeo and Juliet: Tragedy, 1594

Coriolanus: Tragedy, 1607

Love's Labour's Lost: Comedy, 1594

Hamlet: Tragedy, 1600

Merchant of Venice: Comedy, 1596

Twelfth Night: Comedy, 1599

Timon of Athens: Tragedy, 1607

Troilus and Cressida: Tragedy, 1601

Titus Andronicus: Tragedy, 1593

List the names of the plays that fall into each of the following subsets:

A = the subset of Shakespeare's plays that are comedies

B = the complement of A (the plays that are not in set A; tragedies, not comedies)

C = the subset of Shakespeare's plays that were written before 1600

D = the complement of C (the plays that are not in set C; plays not written before 1600)

E = $A \cup C$ (the plays that are in sets A **or** C; the plays that are comedies **or** the plays written before 1600)

F = $A \cap C$ (the plays that are in sets A **and** C; the plays that are comedies **and** the plays written before 1600)

H = $B \cup D$ (the plays that are in sets B **or** D; the plays that are not comedies **or** the plays that were not written before 1600)



$I = B \cap D$ (the plays that are in sets **B and D**; the plays that are not comedies **and** the plays that were not written before 1600)

$J = C \cap D$ (the plays that are in sets **C and D**; the plays that were written before 1600 **and** the plays that were not written before 1600)

Students should explain:

- 1 How they determined the plays that fall in sets B , D , and E through J
 - 2 The difference between the union and the intersection of sets
 - 3 Whether they think the union of two sets always has more elements (is bigger) than the intersection
 - 4 Why it makes sense that J does not have any plays in it
- Students will develop the connection between tree diagrams and the multiplication principle by building trees and filling in blanks.

You are ordering a breakfast combo and have two choices to make:

- You get a bagel with either butter or cream cheese.
- You get either juice or tea.

Make a tree diagram to show the different breakfast combinations you can choose and then fill in the blanks to finish the following sentence:

There were _____ drink options for each of _____ bagel options, which gave a total of _____ options.

You order juice and have two choices to make:

- You can have orange, apple, or tomato juice.
- You can have small, medium, or large.

Make a tree diagram to show the different choices you can make for size and kind of juice. Then fill in the blanks to finish the following sentence:

There were _____ juice options and _____ size options, which gave a total of _____ options.

At lunch you order a sandwich and have three choices to make:

- You can have either ham or turkey.
- You can have either cheddar cheese or Swiss cheese.
- You can have either mustard or mayonnaise.



Make a tree diagram to show the different combinations you can choose. Then fill in the blanks to finish the following sentence:

There were ____ meat options, ____ cheese options, and ____ condiment options, which gave a total of ____ options.

At dinner you order the daily special and have three choices to make:

- You can have corn, steamed spinach, or carrots.
- You can have French fries, mashed potatoes, or a baked potato.
- You can have chicken, steak, or ham.

Make a tree diagram to show the different dinner combinations you have to choose from and then fill in the blanks to finish the following sentence:

There were ____ vegetable options, ____ potato options, and ____ meat options, which gave a total of ____ options.

Students should then explain in their own words how to find the total number of combinations available without making a tree diagram. They should also explain how the multiplication rule is related to tree diagrams.

- Calculating probabilities of independent events may be used in predicting different kinds of weather for tomorrow based on this forecast:

We have a 60% chance of sunshine, a 20% chance of clouds, and a 20% chance of rain. The temperature should be in the low 80s, with a 10% chance of being between 75 and 80 degrees, an 80% chance of being between 80 and 85 degrees, and a 10% chance of being between 85 and 90 degrees.

Students will assume that the temperature probabilities and the probabilities of sun/cloud/rain are independent and use them to find the probability that tomorrow's weather will be:

- 1** 77 degrees and sunny
- 2** 87 degrees and rainy
- 3** 81 degrees and cloudy

Finally, students choose three weather conditions (a combination of temperature and sun, cloud, rain) that they think will have different probabilities of occurring than those above. Students should use the individual probabilities to explain why they think the compound probability will be different. Then they should find the actual probability.

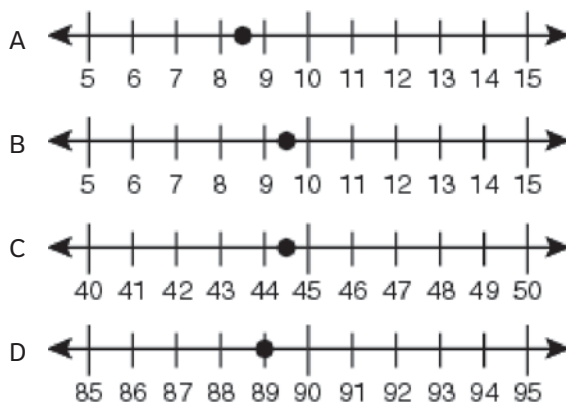


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- Students will practice making inferences from statistics by gathering price data for cereals, making a scatter plot, and creating a line of best fit to model it. Students will go to the grocery store and record the prices and weights of 15 different cereals. Students will then plot the values with the weights on the x-axis and the prices on the y-axis. Students will draw a line of best fit and explain in their own words what they think is the relationship between the amount of cereal purchased and the purchase price.

Practice Quiz



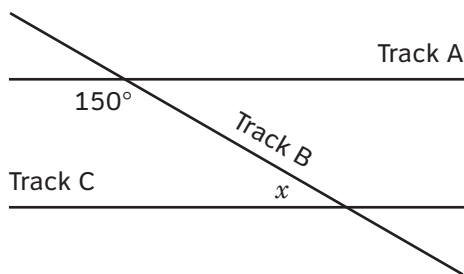
- 1 Which number line shows the value that is closest to $\sqrt{89}$?



- 2 What is the value of $(3^6)(3^{-2})(3)$?

A 9
 B 27
 C 81
 D 243

- 3 At a train station, Track A is parallel to Track C. Track B intersects Track A and Track C. Track A and Track B intersect at an angle of 150° as shown.



What is the measure of the angle, x , formed by the intersection of Track B and Track C?

A 30°
 B 50°
 C 150°
 D 180°



- 4 **Tammy is 2 years older than twice the age of her brother. The sum of their ages is 17. If x represents the age of her brother, which equation represents this situation?**

A $2x + 2 = 17$
 B $2(x + 2) = 17$
 C $x + 2(x + 2) = 17$
 D $x + (2x + 2) = 17$

- 5 **Eva transports tents across a lake using a boat that can hold a maximum of 1,000 pounds. Eva weighs 100 pounds, and each tent weighs 50 pounds. The inequality below can be used to find the number of tents, t , the boat can hold with Eva onboard.**

$$50t + 100 \leq 1,000$$

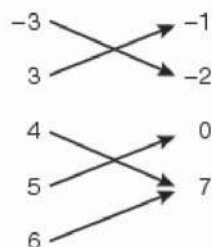
What is the maximum number of tents the boat can hold with Eva onboard?

A 17
 B 18
 C 19
 D 22

- 6 **Which relation does NOT represent a function?**

A $\{(3, 2), (-3, 2), (2, 3)\}$

B **Input Output**



C $x = -2$

D

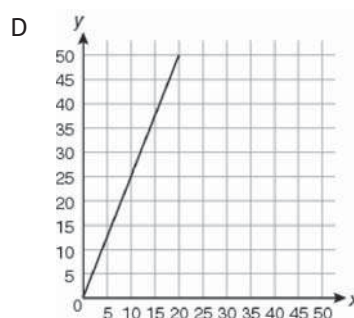
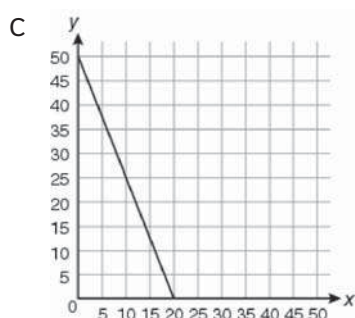
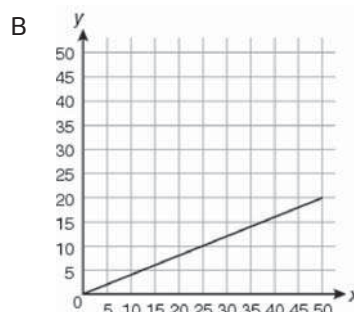
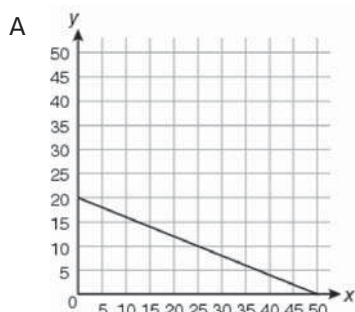
x	y
3	4
5	7
7	10
9	13



- 7 Look at the equation.

$$2x + 5y = 100$$

Which graph represents this equation?



- 8 John gets price quotes from two different lawn-mowing services for the cost of mowing the field next to his house. Company A charges \$8 plus an additional \$5 per hour. Company B charges \$2 plus an additional \$6 per hour. The total price quote for each company is the same amount. How many hours do the companies estimate it will take to mow the field?
- A 6
B 10
C 21
D 38
- 9 If $T = \{\text{the factors of 30}\}$ and $F = \{\text{the factors of 40}\}$, then what is $T \cap F$?
- A $\{1, 2, 5, 10\}$
B $\{1, 2, 3, 5, 6, 10, 15, 30\}$
C $\{1, 2, 4, 5, 8, 10, 20, 40\}$
D $\{1, 2, 3, 4, 5, 6, 8, 10, 15, 20, 30, 40\}$



-
- 10 **A bakery sells chocolate, vanilla, and strawberry cakes. All of the cakes are filled with either fruit or cream AND topped with either glaze or powdered sugar. How many different types of cakes does the bakery sell?**
- A 7
 - B 9
 - C 12
 - D 24

Solutions

Number	Correct Answer	Explanation
1	B	<p><i>Recognize square roots as points and as lengths on a number line. (M8N1c)</i></p> <p>The correct answer is Choice (B). Because 89 is between 81 and 100, its square root will be between $\sqrt{81} = 9$ and $\sqrt{100} = 10$. Choice (A) is incorrect because it is between 8 and 9, possibly a calculation error. Choice (C) is incorrect and is half of 89. Choice (D) is incorrect and is 89 itself.</p>
2	D	<p><i>Simplify expressions containing integer exponents. (M8N1i)</i></p> <p>The correct answer is Choice (D) 243. When multiplying powers with the same base, the exponents 6, -2, and 1 are added to give an exponent of 5: $3^5 = 243$. Choice (A) is incorrect and may result from dividing 6 by 2 and then subtracting the unlabeled exponent of 1 to get $3^2 = 9$. Choice (B) is incorrect and may result from dividing 6 by 2 and then ignoring the unlabeled exponent of 1 on top of 3 to get $3^3 = 27$. Choice (C) is incorrect and may result from mistakenly dividing 6 by 2 and then adding 1 to get $3^4 = 81$.</p>
3	A	<p><i>Apply properties of angle pairs formed by parallel lines cut by a transversal. (M8G1b)</i></p> <p>The correct answer is Choice (A) 30°. Angle x is congruent to either of the acute angles formed by the intersection of Track A and Track B. When one of the acute angles is added to the 150° angle, the result is a line forming a straight angle of 180°. Subtracting 150° from 180° gives an acute angle measuring 30°. Angle x is congruent to these acute angles and has the same angle measure, 30°. Choice (B) is incorrect and may result from a calculation error when solving $x + 150 = 180$. Choice (C) is incorrect and may result from thinking that angles inside the parallel lines on the same side of the transversal should be equal. Choice (D) is incorrect because 180° represents the sum of 150° and 30°.</p>



Number	Correct Answer	Explanation
4	D	<p><i>Represent a given situation using algebraic expressions or equations in one variable. (M8A1a)</i></p> <p>The correct answer is Choice (D) $x + (2x + 2) = 17$. If x is the age of Tammy's brother, then Tammy is twice her brother's age ($2x$) plus two years, or $(2x + 2)$. The sum of their ages is 17, which is represented as $x + (2x + 2) = 17$. Choice (A) is incorrect because $2x + 2$ represents only Tammy's age rather than the sum of Tammy's age and her brother's age. Choices (B) and (C) are incorrect because $2(x + 2)$ suggests a misapplication of the distributive property (placing 2 outside the parentheses) when attempting to represent Tammy's age as "2 years older than twice the age of her brother." Choice (B) also fails to represent the sum of their ages.</p>
5	B	<p><i>Use the properties of inequality to solve inequalities. (M8A2b)</i></p> <p>The correct answer is Choice (B) 18. By subtracting 100 from both sides of the inequality it becomes $50t \leq 900$, which reduces to $t \leq 18$. Choice (A) is incorrect and results from subtracting the constant and the coefficient of t from both sides of the equation before dividing by 50 or by misreading the inequality symbol as <i>less than</i> rather than <i>less than or equal to</i>. Choice (C) is incorrect and results from mistakenly subtracting the coefficient of t, 50. Choice (D) is incorrect and results from mistakenly adding 100 to both sides of the inequality before dividing by 50.</p>
6	C	<p><i>Recognize functions in a variety of representations and a variety of contexts. (M8A3d)</i></p> <p>The correct answer is Choice (C) $x = -2$. $x = -2$ is a vertical line, which means there is more than one y value that corresponds to the x value of -2. Choice (A) is incorrect and could represent a function because we don't see any repeated values in the input positions of the coordinate pairs. Choice (B) is incorrect. It represents a function because every input has only one arrow coming from it and, therefore, has only one output. Choice (D) is incorrect and represents a function because we don't see different y outputs for a repeated x input.</p>



Number	Correct Answer	Explanation
7	A	<p><i>Graph equations of the form $Ax + By = C$. (M8A4d)</i></p> <p>The correct answer is Choice (A). The y-intercept of the equation is 20 and the x-intercept is 50. The only graph with a line with those intercepts is the graph in Choice (A). Choice (B) is incorrect and results from using the x- and y-intercepts as the x and y values of a point on the line. Choice (C) is incorrect and results from making the x-intercept 20 and the y-intercept 50. Choice (D) is incorrect and results from using the x-intercept as the y value and the y-intercept as the x value of a point on the line.</p>
8	A	<p><i>Solve systems of equations graphically and algebraically, using technology as appropriate. (M8A5b)</i></p> <p>The correct answer is Choice (A) 6. If h = hours, the expression for the price quote from Company A is $8 + 5h$, and the expression for the price quote from Company B is $2 + 6h$. Because the two price quotes are equal, the two expressions should be written as an equality, $8 + 5h = 2 + 6h$, by simplifying the equation (by subtracting $5h$ from both sides and subtracting 2 from both sides) to isolate the variable, the result is $h = 6$. Choice (B) is incorrect and may result from incorrectly adding 2 to both sides instead of subtracting. Choice (C) is incorrect and results from simply adding all the given numbers: $8 + 5 + 2 + 6 = 21$. Choice (D) is incorrect and results from finding the dollar amount of the price quotes from either company.</p>
9	D	<p><i>Determine subsets, complements, intersection, and union of sets. (M8D1b)</i></p> <p>The correct answer is Choice (A) {1, 2, 5, 10}. The intersection of two sets includes all the elements the sets have in common, which in this case is the common factors of 30 and 40. Choice (C) is incorrect and represents the elements of set F. Choice (B) is incorrect and represents the elements of set T. Choice (D) is incorrect and is the union of T and F.</p>



Number	Correct Answer	Explanation
10	C	<i>Apply the addition and multiplication principles of counting. (M8D2b)</i> The correct answer is Choice (C) 12 . Multiplication can be used to find the total number of combinations. Since there are three cake options, two filling options, and two topping options, the total number of combinations is $3 \times 2 \times 2 = 12$. Choice (A) is incorrect and results from adding the number of options together instead of multiplying them. Choices (B) and (D) are incorrect and may result from calculation error.



Chapter 4

Science

Students in Grade 8 work conceptually on the laws of physical science: conservation of matter and energy, motion, and forces. They use their observations to explain the difference between physical and chemical changes, to investigate relationships between force, mass, and the motion of objects, and to explore the wave nature of sound and electromagnetic radiation. Students at this grade level identify gravity, electricity, and magnetism as major forces acting in nature.

The Science activities focus on some of the concepts that are assessed on the Grade 8 CRCT Science domains. These domains are as follows:

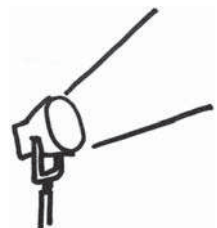
- 1 Structure of Matter**
- 2 Force and Motion**
- 3 Energy and Its Transformations**

The *Characteristics of Science* skills are integrated throughout the domains. These skills are corequisites for understanding the content of each Science domain.

Characteristics of Science refer to understanding the process skills used in the learning and practice of science. These skills include testing a hypothesis, record keeping, using correct safety procedures, using appropriate tools and instruments, applying math and technology, analyzing data, interpreting results, and communicating scientific information. *Characteristics of Science* also refer to understanding how science knowledge grows and changes and the processes that drive those changes. Grade 8 students should be able to replicate investigations and compare results to find similarities and differences. At this grade level, the students should understand the importance of working safely.



Activities



① Structure of Matter

Georgia Performance Standard S8P1

Within the Structure of Matter domain, students are expected to identify and demonstrate the Law of Conservation of Matter, use the Periodic Table of Elements, and distinguish between physical and chemical properties. Students are expected to recognize physical and chemical changes and understand the difference between atoms and molecules. Students should identify the signs of a chemical reaction and be able to differentiate between density and mass, and pure substances and mixtures.

The following activities develop skills in this domain:

- To help students differentiate between physical and chemical properties, students will complete a number of experiments. Observations and data should be recorded in a chart like the example below:

Trial	Initial Observations	Final Observations	Type of Reaction	Result of the Experiment
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Experiment 1: Cut an apple and expose it to air for ten minutes.

Experiment 2: Mix $\frac{1}{2}$ cup of vinegar and a teaspoon of baking soda.

Experiment 3: Mix food coloring with a cup of water.

Experiment 4: Mix food coloring with a cup of water and add thirty drops of bleach to the solution.

Experiment 5: Put hydrogen peroxide (H_2O_2) on a cut apple.

Experiment 6: Mix salt and water together.

Students should be able to label each experiment as resulting in a physical or chemical change. They should also understand that color changes and the dissolving of a solute are not clear indicators of a chemical change.

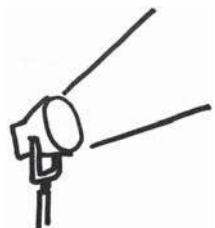
- To help students recognize the similarities and differences in elements, students will follow in the footsteps of Dmitri Mendeleev and create their own periodic table. Students will begin by using household items like fruits, vegetables, clothes, shoes, cleaning materials, and books to create a household periodic table. Students should create a way to arrange the items in groups and then as a whole with their classmates. After a class discussion on the methods used to create the household periodic table, students will consider the elements iron, aluminum, copper, neon, carbon, oxygen, gold, silver, fluorine, sodium, chlorine, calcium, nitrogen, and cobalt. On separate index cards, students should list each element, a description of its physical

and chemical properties, and the element's atomic number, all of which can be found on a periodic table. Students will then arrange the elements in a basic periodic table. Students should be methodical and group elements based on similarities and differences to create their own periodic table. After completion, students will compare their table to the standardized version and answer the following questions:

- Are there any major differences between the two charts?
 - What characteristics did you use to create your table, and what characteristics did Mendeleev use to create the early standardized table?
 - Which characteristics seem the most important in grouping the elements? Why?
- To explore the concept of Conservation of Matter, students will perform an experiment, paying close attention to mass before and after the experiment. Students will need a reliable scale, one balloon, water, a 2-liter soda bottle, and four antacid tablets. Students should separately measure the mass of the balloon, the 2-liter bottle $\frac{3}{4}$ full of water, and the four antacid tablets. Before performing the experiments, students should weigh the entire apparatus and record the data, and then students should predict the mass of the apparatus after the reaction. During the experiment, students should pay close attention to making clear and accurate records of the experiment. Students should then drop the antacid tablets into the bottle of water, quickly place the balloon over the top of the bottle, and hold it in place with tape. When the reaction has ended, students should immediately weigh the entire apparatus. After conducting the experiment, students will answer the questions below based on their observations:
- What type of reaction occurred? What observations support your answer?
 - What types of products were made (color, phase, etc.)?
 - Did the mass change? What law does this result support?
 - If there was a change, what can account for this change?
 - Would the results be the same in an open system (i.e., repeating the experiment without the balloon)?



Activities



② Force and Motion

Georgia Performance Standards S8P3 and S8P5

Within the Force and Motion domain, students are expected to investigate the relationship between force, mass, and motion. Terms like velocity and acceleration, gravity, inertia, and friction gain new meaning. The effect of simple machines upon work is examined. Forces acting in nature, gravity, electricity, and magnetism are explored.

The following activities develop skills in this domain:

- To show how graphs can help students determine the relationship between velocity and acceleration, students will create graphs for the following scenarios. For each scenario, students should graph the scenarios with velocity (m/s) on the y-axis and time (s) on the x-axis. All movement is in a straight line.
 - You move a distance of five meters to the kitchen at a velocity of 3 m/s, pause for three seconds to retrieve a soda, and then walk back to the couch at a velocity of 1 m/s.
 - A bus driver drives 2 kilometers at a velocity of 30 km/hr to the first bus stop, pauses for four minutes to pick up passengers, and then drives 4 miles to the next stop at 40 km/hr.
 - A group runs 500 meters at a velocity of 8 km/hr and then stops for 3 minutes while getting their bikes ready. The group then bikes 6 km at a velocity of 14 km/hr to the finish line.

For each graph, students should circle any acceleration and box any deceleration during these activities. Students should then create their own scenarios and make their own graphs.

- To help students understand gravity, students will weigh themselves as if they were on other planets or celestial bodies. Students will complete the following chart by multiplying the students' mass by gravity, which will give the weight for each row. Students should use their weight on Earth as a baseline for mass, because scales on Earth convert weight to mass by using the average value of gravity on Earth which is 1.

Location	Mass	Average Acceleration of Gravity	Weight
Earth		1	
Earth's Moon		0.17	
Venus		0.91	
Mars		0.38	
Mercury		0.38	
Jupiter		2.54	
Saturn		1.08	
Uranus		0.91	
Neptune		1.19	
Pluto		0.06	
Sun		27.9	

After completion, students should answer the following questions:

- How does gravity affect weight?
- On which planets will you weigh the most and the least?
- On which planet is gravity the strongest? Why?
- To show how series and parallel circuits are created and work, students will use two D batteries, pieces of copper wire, two flashlight bulbs that work, and one flashlight bulb that does not work. Students will complete the following three tasks using only the starting materials. After each task students should draw a diagram of each and label the circuit as series or parallel. In a series circuit, current moves in a loop without splitting, while in a parallel circuit the current splits when it reaches a point in which two or more wires connect.

Task 1: Using one battery, pieces of wire, and a working light bulb, make the light bulb light up.

Task 2: Using two batteries, pieces of wire, and a working light bulb, make the bulb shine brighter than in the first task.

Task 3: Using two batteries, pieces of wire, and a working light bulb, make the bulb shine with the same brightness as in the first task.

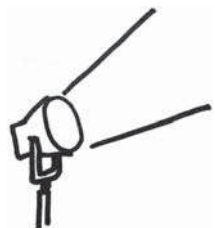
Task 4: Using two batteries, pieces of wire, and two working light bulbs, make both the bulbs light up.

Task 5: Repeat the third task with one light bulb that does not work. What happens to the circuit?

After completion of the activity, students will create posters that include information on both circuit types. This information should include the circuit type, a diagram, and a brief description of how current runs through a circuit.



Activities



3 Energy and Its Transformations

Georgia Performance Standards S8P2 and S8P4

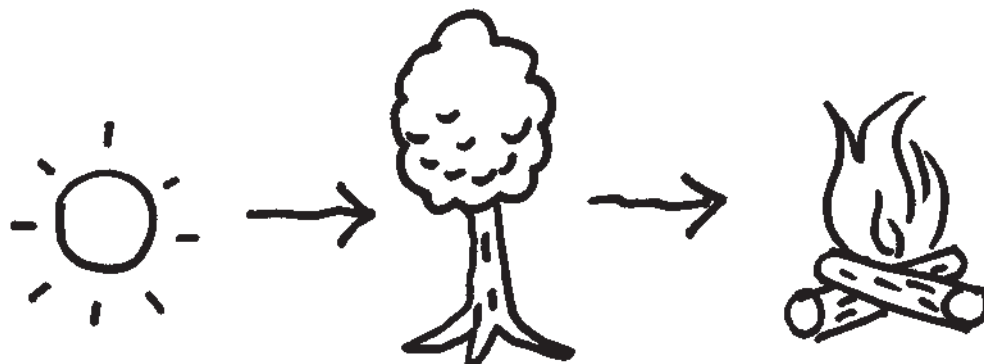
By the end of Grade 8, students should be able to identify the kinds of energy involved in common scenarios, explain energy transformations in terms of the Law of Conservation of Energy, trace different forms of energy through a given system, and distinguish between kinetic and potential energy. Heat flow is understood in terms of conduction, convection, and radiation. Mechanical and electromagnetic waves are defined and properties of light and sound energy are explored.

The following activities develop skills in this domain:

- To help students understand the different types of energy, students will label the following scenarios with the correct type of energy.
 - Riding a bike
 - A light bulb
 - A gas fire
 - Computer speakers
 - A rosebush
 - A diver standing still at the edge of a diving board
 - A stretched spring

After completion of the list, students should pick two scenarios from the list above to compare and contrast. Students should create a Venn diagram with two circles, one circle labeled with the first scenario and the other circle labeled with the second scenario. Students will fill in the corresponding circles with information about each type of energy. The space shared by both circles (the intersection) should include information common to both scenarios. After completion of the Venn diagram, students should create posters with illustrations that sum up the differences and similarities between the two types of energy.

- To help students understand energy transformation in terms of the Law of Conservation of Energy, students will create energy chains for basic transformations. An energy chain is an illustrated step-by-step accounting of energy transformation for a process, like a cartoon strip. An example of an energy chain is the burning of biomass, such as wood:



Heat and light energy from the Sun is transferred to trees during photosynthesis and stored as chemical energy. The chemical energy is released during burning of the wood, and it is transformed into heat and light energy.

Students will create energy chains for the following scenarios:

- Fossil fuels
 - Biomass in the form of dung
 - Wind power
 - Wave power
 - Solar power
- To help students visualize the electromagnetic spectrum, students should conduct research and create poster board replicas of the electromagnetic spectrum. Students should use white poster board, the Internet or a textbook, and markers to create the spectrum. During their research, students may also use the chart below to record data about the parts of the electromagnetic spectrum.

Types of Radiation	Frequency Range	Wavelength Range	Sources of the Waves	Energy Levels of Radiation	Application of Waves
Radio					
Microwaves					
Infrared					
Visible					
Ultraviolet					
X-ray					

After completion of the chart, students should combine research to create the electromagnetic spectrum. They should make sure that the chart is aligned to both the frequency and wavelength ranges of the types of



radiation, as well as the application of the types of waves. Students should answer the following questions after completion of the entire activity:

- In what part of the spectrum can you see colors?
- What type of radiation gives humans a suntan?
- Which types of electromagnetic radiation have the highest and lowest energy?
- What types of radiation are used to diagnose human health problems?
- What is the relationship between wavelength and frequency?



Practice Quiz



- 1 **A student lights a candle and the wax begins to melt.**

Which statement describes the movement of the particles as the solid candle melts to a liquid?

- A The particles move faster and farther apart.
- B The particles move slower and farther apart.
- C The particles move faster and closer together.
- D The particles move slower and closer together.

- 2 **A student adds 5 grams of vinegar to 7 grams of baking soda in a sealed container. Then he watches the chemical reaction that occurs.**

Which of these predicts the mass of the materials in the container after the reaction is complete?

- A 0 grams
- B 2 grams
- C 12 grams
- D 35 grams

- 3 **A student is riding a roller coaster. The roller coaster moves up a hill slowly and then starts to move faster as it goes toward the bottom of the hill.**

Where on the hill will the student have the MOST kinetic energy?

- A halfway up the hill
- B at the top of the hill
- C halfway down the hill
- D at the bottom of the hill

- 4 **A teacher demonstrates a chemical reaction for the class.**

Which of these would NOT show evidence that a chemical reaction has occurred?

- A change in color
- B change in shape
- C formation of a gas
- D formation of a precipitate

- 5 **Which of these sets of objects will have the GREATEST gravitational attraction between them??**

- A two 1-kilogram objects 1 meter apart
- B two 1000-kilogram objects 1 meter apart
- C two 1-kilogram objects 1000 meters apart
- D two 1000-kilogram objects 1000 meters apart



- 6 **Which of these statements is NOT true about both mechanical and electromagnetic waves?**
- A Both types of waves carry energy.
 - B Both types of waves need a medium to travel.
 - C Both types of waves can have a variety of frequencies.
 - D Both types of waves can be described by their wavelengths.
- 7 **Which of these describes an object with the LARGEST acceleration?**
- A an object with a small change in velocity over a small change in time
 - B an object with a small change in velocity over a large change in time
 - C an object with a large change in velocity over a small change in time
 - D an object with a large change in velocity over a large change in time
- 8 **Ms. Lee heats a pot of water on her stove. Water heated at the bottom of the pot flows to the top of the pot. The colder water at the top sinks. As the water moves, heat flows from the hotter water to the colder water.**
- Which of these terms describes this method of heat transfer?**
- A conduction
 - B convection
 - C emission
 - D radiation
- 9 **A student has an aquarium filled with water. Light shines through the window and into the aquarium.**
- Which of these describes how the light wave will MOST LIKELY change as it moves from air into water?**
- A The light wave will be absorbed.
 - B The light wave will be diffracted.
 - C The light wave will be reflected.
 - D The light wave will be refracted.
- 10 **A student is investigating a substance to determine what it is made of. He studies the physical and chemical properties of the substance.**
- Which of these properties of the substance is a chemical property?**
- A the melting point of the substance
 - B how easily the substance bends
 - C how well the substance burns
 - D the density of the substance

Solutions

Number	Correct Answer	Explanation
1	A	<p><i>Describe the movement of particles in solids, liquids, gases, and plasma states. (S8P1c)</i></p> <p>The correct answer is Choice (A) The particles move faster and farther apart. As the candle melts, particles gain in kinetic energy, move faster, and collide more frequently, which moves particles away from each other. Choice (B) is incorrect because it states that the particles move slower. Choice (C) is incorrect because it states that the particles move closer together. Choice (D) is incorrect because it is the opposite of the correct answer.</p>
2	C	<p><i>Identify and demonstrate the Law of Conservation of Matter. (S8P1g)</i></p> <p>The correct answer is Choice (C) 12 grams. The sum of the mass of the vinegar and baking soda (12 grams) will not change after the reaction is complete because there is no loss or gain of mass in a closed chemical reaction, in accordance with the Law of Conservation of Matter. Choices (A) and (B) are incorrect because mass decreases, and Choice (D) is incorrect because mass increases.</p>
3	D	<p><i>Explain the relationship between potential and kinetic energy. (S8P2b)</i></p> <p>The correct answer is Choice (D) at the bottom of the hill. The kinetic energy of the cars will be the greatest at the bottom of the hill, when the cars have used up their potential energy and reached their greatest speed. Choices (A) and (C) are incorrect because the roller coaster cars will not have the greatest amount of kinetic energy or the greatest amount of potential energy at the halfway point. Choice (B) is incorrect because the roller coaster cars have the most potential energy at the top of the hill.</p>



Number	Correct Answer	Explanation
4	B	<p><i>Distinguish between changes in matter as physical (i.e., physical change) or chemical (development of a gas, formation of precipitate, and change in color). (S8P1e)</i></p> <p>The correct answer is Choice (B) change in shape. Change in shape is a physical change, so it does not alter chemical composition. Choices (A), (C), and (D) are incorrect because they are all examples of chemical change.</p>
5	B	<p><i>Recognize that every object exerts gravitational force on every other object, and that the force exerted depends on how much mass the objects have and how far apart they are. (S8P5a)</i></p> <p>The correct answer is Choice (B) two 1000-kilogram objects 1 meter apart. Gravitational attraction increases directly with the increase in mass and decreases with the increase in distance. Choice (A) is incorrect because the objects have less mass at the same distance. Choice (C) is incorrect because the objects have less mass at the greater distance, so this is the choice with the least gravitational attraction. Choice (D) is incorrect because the distance is greater.</p>
6	B	<p><i>Identify the characteristics of electromagnetic and mechanical waves. (S8P4a)</i></p> <p>The correct answer is Choice (B) Both types of waves need a medium to travel. Mechanical waves require a material medium to transfer energy, but electromagnetic waves travel through space and do not require a medium. Choices (A), (C), and (D) are incorrect because both types of waves carry energy, have a variety of frequencies, and can be described by their wavelengths.</p>

Number	Correct Answer	Explanation
7	C	<p><i>Determine the relationship between velocity and acceleration. (S8P3a)</i></p> <p>The correct answer is Choice (C) an object with a large change in velocity over a small change in time. Acceleration is dependent on how quickly there is a change in velocity [$a = (v - v_0)/t$]. A large change in velocity over a small period of time will have the highest acceleration. Choices (A), (B), and (D) are incorrect because they represent slower rates of acceleration.</p>
8	B	<p><i>Describe how heat can be transferred through matter by the collisions of atoms (conduction) or through space (radiation). In a liquid or gas, currents will facilitate the transfer of heat (convection). (S8P2d)</i></p> <p>The correct answer is Choice (B) convection. When part of a fluid expands due to heating, its density is reduced relative to the rest of the water in the pot, so the heated water rises. Heat is transferred between the heated water and the cool water through this movement. Choices (A), (C), and (D) are incorrect because they refer to different methods of energy transfer.</p>
9	D	<p><i>Describe how the behavior of light waves is manipulated, causing reflection, refraction, diffraction, and absorption. (S8P4b)</i></p> <p>The correct answer is Choice (D) The light wave will be refracted. Since water is denser than air, light waves slow down as they enter water, causing light waves to bend or refract. Choices (A), (B), and (C) are incorrect because they represent how light waves interact with different media.</p>
10	C	<p><i>Distinguish between physical and chemical properties of matter as physical (i.e. density, melting point, boiling point) or chemical (i.e., reactivity, combustibility). (S8P1d)</i></p> <p>The correct answer is Choice (C) how well the substance burns. Combustion is a chemical property because it indicates a chemical change that a substance can undergo. Choices (A), (B), and (D) are incorrect because they represent physical properties.</p>



Social Studies

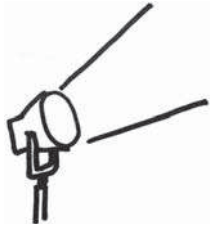
In Grade 8, students study Georgia history, geography, government, and economics. While the four state domains are interwoven, ample opportunity is also provided for in-depth study of Georgia history and the government of Georgia. While U.S. historical events are included to help students understand the impact of those events on Georgia and to help students understand Georgia's role in the history of the United States, the focus is on Georgia.

The Social Studies activities focus on some of the topics assessed on the Grade 8 CRCT Social Studies domains. These domains are as follows:

- 1 History**
- 2 Geography**
- 3 Government/Civics**
- 4 Economics**



Activities



1 History

Georgia Performance Standards SS8H1, SS8H2, SS8H3, SS8H4, SS8H5, SS8H6, SS8H7, SS8H8, SS8H9, SS8H10, SS8H11, and SS8H12

In order for students to fully appreciate Georgia's place in modern U.S. history, it is necessary for them to gain an understanding of Georgia's role in and contributions to American history. The main focus of this domain is the history of the state of Georgia. Although students will examine past culture and heritage, it is important that they demonstrate an ability to analyze and evaluate the impact of historical figures and events and how they shape and define contemporary economic, political, and social conditions in Georgia. While the History domain traces people and events from the development of Native American cultures to modern times, the primary emphasis is on the period from the Civil War to the present.

The following activities develop skills in this domain:

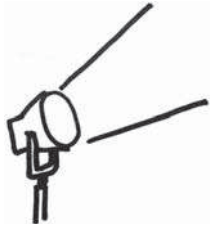
- To better understand the colonial period of Georgia's history, students should organize an illustrated and annotated timeline. Students will use a large sheet of poster board to organize the elements chronologically, providing an illustration to highlight each element included in the timeline. Students will divide the timeline into four sections and label them *European Exploration*, *The Founding of Georgia*, *The Trustee Period*, and *Georgia as a Royal Colony*. For each time period, two events which help to define Georgia's development should be chosen. Students should attach a short paragraph describing the impact of those events on the specific time period. Finally, students should write a paragraph in which they analyze the events depicted on the timeline and explain their consequences on the overall development of Georgia during this time period.
- To ensure they understand the important developments in Georgia between 1789 and 1840, students should use a series of graphic organizers to illustrate the significance of key developments and practices in Georgia during this time period.
 - Graphic Organizer #1. Compare and contrast the effect on Georgia of the establishment, growth, and development of the Baptist and Methodist churches.
 - Graphic Organizer #2. Compare and contrast the method and results of the headright system and the land lotteries in the growth of Georgia.
 - Graphic Organizer #3. Compare and contrast similarities and differences between the effects of the cotton gin and railroads on the growth of Georgia separately, and then analyze the two developments when considered together.



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- Graphic Organizer #4. Identify key individuals and events that led to the removal of the Creeks and Cherokees from Georgia. Analyze the importance of each individual or event included in your organizer.
 - To better understand the key political, social, and economic changes that occurred in Georgia between the years of 1877 and 1918, students should create a series of informational flyers or foldables. Each flyer or foldable will have three parts. Part 1 will define a particular issue and identify key people related to that issue. Part 2 will describe how the issue affected Georgia and the nation at the time, as well as the role played by the people identified in Part 1. Part 3 will analyze the long-term impact on Georgia and the world. Students will choose four topics from among the following: the Bourbon Triumvirate, the International Cotton Expositions, the Populist movement, the 1906 Atlanta riot, the Leo Frank Case, the county unit system, disenfranchisement, racial violence, Jim Crow laws, and *Plessy v. Ferguson*. Once students have completed all four flyers or foldables, students will choose one of the issues and write a two-page essay that evaluates and explains the issue's immediate impact as well as the lasting influence on Georgia.
 - Students will better understand important events in Georgia that occurred after World War I by writing investigative newspaper articles dealing with the four issues listed below from this era. Students should take on the role of a period journalist, using the Internet or library resources to research the topics. Keeping in mind the audience of newspaper readers of the period, students should write articles that address the elements of each issue that would have been most important to their audience. After writing the four articles, the student will then write a short essay analyzing the effect the four topics had on Georgia separately as well as collectively.
 - The effect of the boll weevil and the drought on Georgia agriculture.
 - Economic factors that helped lead to the Great Depression.
 - The impact of the political career of Eugene Talmadge.
 - New Deal programs (e.g., Civilian Conservation Corps, Agricultural Adjustment Act, rural electrification, Social Security) and their effects on Georgia.



Activities



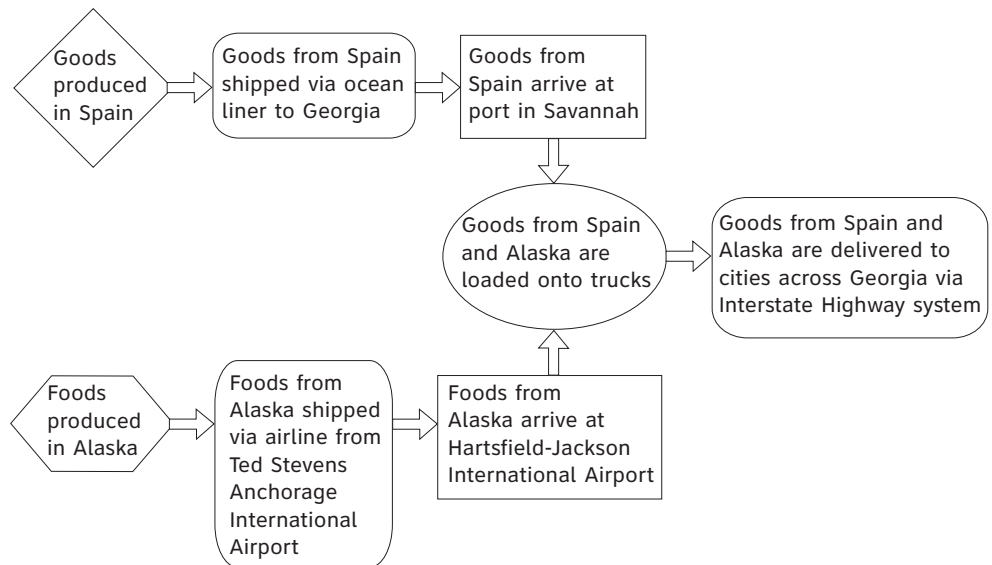
2 Geography

Georgia Performance Standards SS8G1 and SS8G2

The focus of the Grade 8 Geography domain is to examine the influence of location and physical features as they relate to economic growth and development in the state of Georgia. By the end of Grade 8, students should be able to demonstrate knowledge and understanding of Georgia's location relative to the nation, continent, and Western Hemisphere. They should also be able to demonstrate knowledge and understanding of important physical features of Georgia, including climate, and the effect these features have on transportation, trade, and jobs.

The following activities develop skills in this domain:

- To help students understand the physical features and location of Georgia, students will create a map of the state and investigate its five geographic regions. Students will draw the map on poster board and call attention to the different areas covered by each of the five regions with highlighters or colored pencils. In each region, students will identify distinctive geographical features that distinguish it from the other regions. Students will attach information to the map indicating how each region extends beyond the borders of Georgia. They should describe the impact of each region on the development of the state and surrounding areas. The students should include important agricultural and industrial features whose origins can be traced to the physical features of the region. Cities whose establishment can be credited to the physical characteristics of the region should also be identified on the map. Finally, students should choose one region and present their findings using the map as a visual resource.
- To help students explain how transportation systems interact to contribute to Georgia's economy, students will develop a flow chart. Students should highlight the connections among the state's four major transportation systems: Interstate Highway System, Hartsfield-Jackson International Airport, Georgia's deepwater ports, and the railroads. They will track the route of a product created in a state other than Georgia, as well as the route of a product created outside the United States (see sample flow chart below). To help reinforce the importance of these transportation systems to Georgia's economy, students will then add additional shapes to the flow chart at appropriate points to identify and describe jobs created as a response to the growing needs of the four transportation systems.



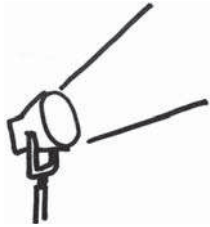
- To help students understand the impact of climate on Georgia’s development, students will write a speech to persuade a target audience that Georgia has favorable climate conditions for tourism and business. The speech should define the appropriate target audience—either tourists or business owners—and address one of the following question sets in detail. Students should also create a visual display to which they will refer while presenting the speech in front of the class, highlighting the locations of major industrial areas, farming regions, or major tourist attractions.
- What climate conditions make Georgia a suitable location for crop and livestock production, and what effects have these conditions had on the state’s economic and social development? Briefly trace the history of crop and livestock production in Georgia with an emphasis on how the climate of Georgia affected the choices early producers made about what to produce and how the climate affects production choices today as well.
- How does the climate of Georgia affect tourism in the state and what is the impact of tourism on the state’s economy? The focus of the speech should be on the impact of climate-related tourism on the state and how this impact has made Georgia a more desirable location to visit. The growth of small business and the economic impact on the state and local communities should be discussed in the speech.
- What impact does the climate of Georgia have on the state’s ability to attract and keep businesses of all sizes? The focus of the speech should be on the advantages that climate offers Georgia when it comes to attracting companies to the state. Discuss not only the initial advantages but the overall advantages of locating to and remaining in Georgia.



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- What impact has climate had on the development of Georgia's primary industries (raising crops and livestock, forestry, mining, and fishing) and the subsequent growth of manufacturing and service industries in the state? The focus of this speech should be on the interdependence and interrelationships between the primary, manufacturing, and service industries, and the role of Georgia's climate in the growth and development of each.



Activities



③ Government/Civics

Georgia Performance Standards SS8CG1, SS8CG2, SS8CG3, SS8CG4, SS8CG5, and SS8CG6

The focus of the Grade 8 Government/Civics domain is the process of government in the state of Georgia and the political role of citizens under its constitution. For citizens to participate in the political process and fulfill their civic responsibilities, it is important that they acquire knowledge and understanding of the political and legal structures and institutions that govern their state. By the end of Grade 8, students should be able to demonstrate knowledge and understanding of their civic rights and responsibility to participate in the political process (voting, joining political parties, running for public office, etc.). They must also be able to demonstrate knowledge and understanding of the legislative, executive, and judicial structures and processes of state government, the role of local government, and the justice system as it relates to juvenile offenders.

The following activities develop skills in this domain:

- After learning how Georgia’s constitution provides for political participation by its citizens, students will create an album reflecting this process at work. Students will be divided into three groups. The first group will focus on current events, the second group will concentrate on the revolutionary era, and the third group will focus on the civil rights movement of the 1950s and 1960s. Each group should collect newspaper articles, magazine articles, or photographs that demonstrate five different ways citizens of Georgia participate in the political process, such as voting, peaceful protests, participating in political parties, campaigning, running for public office, etc. Students in each group will write a short essay describing the activity in each source example, explaining the rights at play, and defending the importance of this type of political participation. After reading the essays to the class, students will then compare and contrast the examples of political participation throughout history and analyze the impact of this participation on the development of Georgia.
- To help the students analyze the role of the legislative branch in Georgia’s state government, students will research the process a bill follows to become a law and form a mock General Assembly to carry out the process. First, students should study the organization and role of the state legislature. Next, students should create a flow chart to illustrate the steps a bill must take to become a law. At each step in the process, students should include in the flow chart events that could halt the bill’s progress, as well as what is required to keep the bill moving forward. As students work, ask guiding questions such as, *What are the qualifications and duties of the members of the General Assembly?* and *Who leads the General Assembly and how does the committee system work?* After students have completed their research,



they should create a bill for consideration in the legislature. Using the flow chart they created earlier, the students should then describe the steps their bill would take, including specific committees it would have to pass through. Students will then plan and execute a mock General Assembly to carry out the process a bill would follow through the legislative branch in Georgia's state government in order to become a law.

- Students will analyze the distinct functions and purposes of the three basic forms of municipal government in Georgia by using a chart to compare and contrast their characteristics. Students will create a chart following the sample below. The columns distinguish the three municipal government forms, and the rows direct student research into the specific roles and characteristics within each type of government. Students should use the results of their research to fill in each box on the chart. They will then split into three groups for a debate. Each group will select one of the three municipal governments and argue the advantages of this form of government, analyzing why their chosen government is best suited to serve the needs of a city of a particular size.

	Strong Mayor-Council	Weak Mayor-Council	Council-Manager
Role of Mayor			
Role of City Council			
Special features of this government			
Strength(s) of this government			
Weakness(es) of this government			

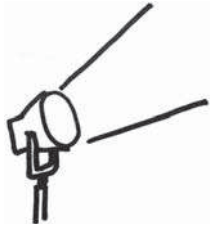
- To help students understand the juvenile justice system, students will perform a skit **under careful guidance** from a teacher or parent, demonstrating how the legal process works in the case of juvenile offenders. Students will choose an act that would have them tried either as a delinquent juvenile or as an unruly juvenile or status offender. Students will then be paired up with a classmate or a family member. In this activity, a teacher or parent will play the role of the police officer or authority figure, while the students assume the role of the juvenile offenders. The process should reflect all steps from the time juvenile is taken into custody through the adjudication and disposition of the case. The skit should address one of the following important issues:



- Delinquent behaviors vs. unruly behaviors and possible consequences of each
- Rights of juveniles when taken into custody
- Steps in the juvenile justice process



Activities



4 Economics

Georgia Performance Standards SS8E1, SS8E2, SS8E3, SS8E4, and SS8E5

The Grade 8 Economics domain focuses on the various factors that have influenced and shaped Georgia's economic growth and development. While the focus is on the modern time period, consideration will be given to past developments. After tracing previous economic trends and developments, connections and links to the modern era can be better understood. By the end of Grade 8, students should be able to demonstrate knowledge and understanding of the importance of both domestic and international trade to Georgia's economic growth and development. Students should also know and understand the role of the entrepreneur through the investment of resources, and the risks associated with these investments, to generate economic growth and productivity. Finally, students will be expected to know and understand revenue sources available to both state and local governments to finance various public services (for example, sales taxes, federal grants, personal income taxes, and property taxes).

The following activities develop skills in this domain:

- Students will better understand personal money management by tracking projected income, spending, and savings over a one-month period. First, students will choose a familiar profession they are interested in, such as a teacher, accountant, radiologist, welder, researcher, or programmer. Then students should do research to determine the average salary for this profession in their area using Internet resources or reference books. Based on the salary, students should calculate a projected monthly income before and after taxes. Provide scenarios for each student so they can estimate their monthly expenses. For instance, some students will have new cars, others older cars; some will live in small apartments, some will live in larger (more expensive) homes; some will live alone, others may have (a) roommate(s) to share expenses; some students will live within a few miles of their jobs, others will have to travel long distances (30 miles or more). Once each scenario has been assigned, students will do research using the Internet and newspapers to determine their monthly expenses. Students should project savings and expenditures based on this research and use a spreadsheet or chart to track the following items.
 - Other income
 - Rent or mortgage payments
 - Property taxes and insurance
 - Utilities (electric, gas/heating oil, telephone, cell phone, cable TV, Internet service, etc.)
 - Health insurance (medical, dental, vision) and medications
 - Auto payments, fuel, maintenance, parking/tolls, and insurance
 - Public transportation



-
- Groceries and eating out
 - Student loans
 - Child care
 - Entertainment

Students should answer the following questions as a follow-up to their money management experiment.

- Looking at your money management record, how much money will you have that can be saved at the end of each month?
 - Does your projected income allow you to live the way you want? If not, what changes might you have to make?
 - Can you think of ways to save money for something you really want to buy?
 - Did you identify expenses you did not expect? How might you be able to handle such expenses?
- To help students understand how the four transportation systems (the Interstate Highway System, Hartsfield-Jackson International Airport, Georgia's deepwater ports, and the railroads) contribute to Georgia's role in trade, split students up into four groups and assign each group of students one system of transportation. Students will research how the system they were assigned affects trade in the state. Students should conduct this research using grade-appropriate materials and websites (.edu, .gov, or .org).

They should be able to answer the following questions:

- What type of trade is conducted using this system of transportation?
- How does this transportation system affect Georgia's role in trade within the United States and within the world?
- How has this transportation system helped to promote free trade?

Using their findings, each student group will produce a poster or advertisement describing the benefits of their transportation system on trade in Georgia and will present their findings to the class. Conclude the activity with a discussion about how Georgia's role in trade has changed over time.

- To help students understand the importance of entrepreneurship to Georgia's economic growth and development, students will interview local entrepreneurs who have founded both large and small businesses. Students' questions should focus on gaining insight into the decision-making process necessary for starting a business, as well as risks, costs, and contributions made by new businesses in local and surrounding communities. After interviewing the entrepreneurs and researching the economic impact of the various businesses on their communities, students should analyze the information and report back to their classmates. Students should include a description of how both large and small businesses each impact the community.



Students should ask questions during the interview including, but not limited to, the following:

- What was the main reason you decided to start your own business?
- What need in the community did your business meet?
- How is your business affected by the community in which it is located?
How might it be different if it were in a different community?
- Can you explain the process of getting a business started, including permits, buying property, and hiring employees?
- What difficulties did you encounter during this process?
- How did the community respond to your business?
- What, if any, changes have you made to adapt to the changing demands of the community?
- How do you compete with other businesses, especially larger ones, that provide the same service?
- What costs, financial or otherwise, were involved?
- What risks did you have to take, and what rewards have you reaped?
- How does your business contribute to the community's economic growth?

Finally, students should create a business plan for a fictional business of their choosing. Students should use a chart to analyze the costs of starting a new business, list possible risks they would face as entrepreneurs, and explain how their business would affect the surrounding community.

- To help students understand the types of goods and services produced and traded by Georgians during different historical time periods, students will work together in small groups researching the Internet (.edu, .gov, or .org websites), encyclopedias, textbooks, and other grade-level appropriate materials on this topic. Each group will be assigned one time period and will need to complete all columns of the applicable row of this chart.



What goods and services were produced in Georgia?	Why were these particular goods and services produced at this time?	Who did Georgians trade these goods and services with?	What kinds of things did Georgians need to import during this time period?	Why did Georgians need to import these particular things?
Colonial Era, 1733–1775				
Revolution and Early Republic, 1775–1800				
Antebellum Era, 1800–1860				
Civil War and Reconstruction, 1861–1877				
Late Nineteenth Century, 1877–1900				
Progressive Era to World War II, 1900–1945				
Civil Rights and Sunbelt Georgia, 1945–1990				

After the groups complete their research, students will write a group report about each particular time period using all of the information they gathered in the chart. Then the groups will present their reports to the rest of the class. As the reports are given, the other students will complete their individual charts for each time period. When completed, these charts will help them review the economic history for all time periods in the state of Georgia. As a follow-up activity, students will spend time in pairs quizzing each other on the information contained in the charts.



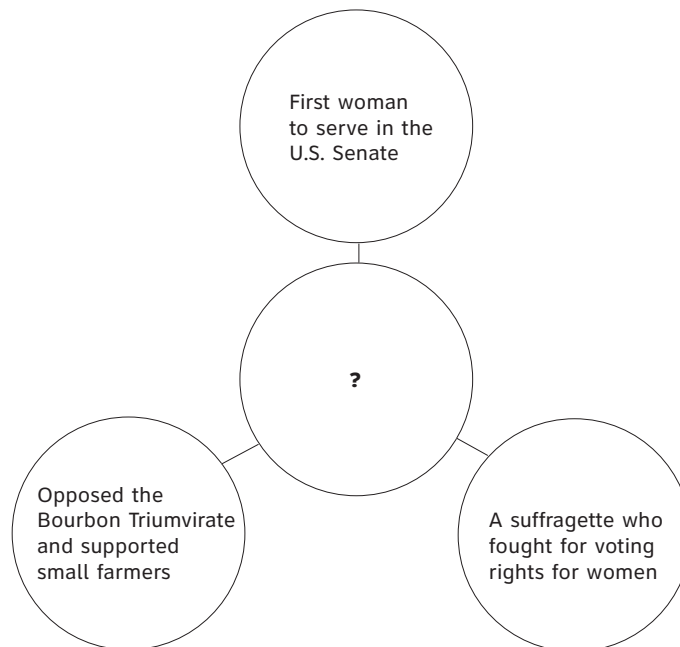
Practice Quiz



- 1 **Which condition in England inspired James Oglethorpe to plan a colony in Georgia?**
 - A The government was too strict in England.
 - B There was a large number of debtors in England.
 - C There was very little available farmland in England.
 - D The black plague was claiming many lives in England.

- 2 **What was the purpose of the land lotteries?**
 - A to provide land for the Native Americans to settle
 - B to set aside acreage for national parks and wildlife
 - C to allow wealthy families to purchase large tracts of land
 - D to encourage a large number of families to settle the Georgia frontier

- 3 **Which name goes in the center circle of this graphic organizer?**

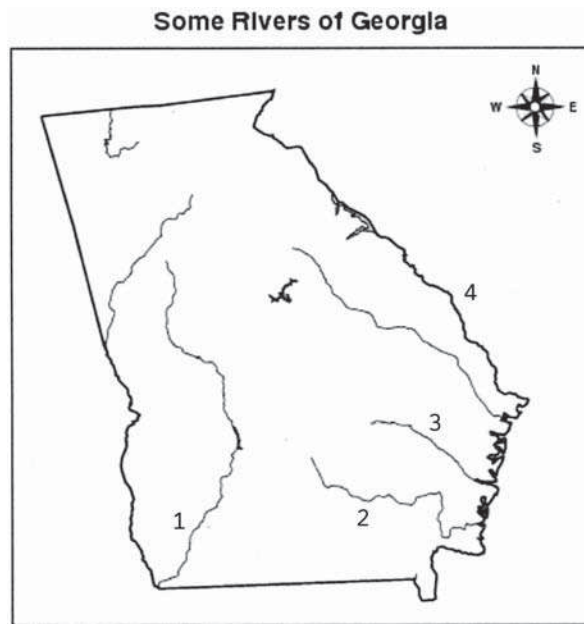


- A Nancy Hart
- B Mary Musgrove
- C Lugenia Burns Hope
- D Rebecca Latimer Felton



- 4 **Which of these factors played a major role in Georgia's farming crisis during the 1920s?**
- A cold weather
 - B the cotton gin
 - C the gray locust
 - D the boll weevil

- 5 **Which number marks the location of the Savannah River?**



- A 1
 - B 2
 - C 3
 - D 4
- 6 **How did Georgia's Fall Line encourage industrial growth in the 1800s?**
- A Its forests provided trees for the timber industry.
 - B Its rapid rivers provided water power for industrial plants.
 - C Its deep-sea ports made it easy for industries to ship goods.
 - D Its high mountains and scenic beauty promoted the tourism industry.
- 7 **In the Georgia General Assembly, who presides over the Senate?**
- A Governor
 - B Majority Whip
 - C Minority Leader
 - D Lieutenant Governor



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- 8 **Which of these occurs after a bill is approved by both houses of the Georgia General Assembly?**
- A The president of the United States reviews the bill.
 - B The governor either signs the bill into law or vetoes it.
 - C The judicial branch sends the bill to the Supreme Court.
 - D The citizens of the state vote on the bill in the next primary.
- 9 **Which of these is a function of a special-purpose government in Georgia?**
- A conducting trials
 - B appointing a mayor
 - C enforcing state laws
 - D operating an airport
- 10 **A student is organizing his finances. He has drawn a chart with four columns labeled *income*, *spending*, *credit*, and *saving*. Which of these belongs in the *credit* column?**
- A interest earned
 - B loan from a bank
 - C wages from a job
 - D purchase of stocks



Solutions

Number	Correct Answer	Explanation
1	B	<p><i>Explain the importance of James Oglethorpe, the Charter of 1732, reasons for settlement (charity, economics, and defense), Tomochichi, Mary Musgrove, and the city of Savannah. (SS8H2a)</i></p> <p>The correct answer is Choice (B) There was a large number of debtors in England. The primary purpose behind the settlement of Georgia was James Oglethorpe's interest in establishing a colony for English debtors. Choices (A), (C), and (D) are incorrect because they all list reasons unrelated to the settlement of Georgia, though they do list reasons for the settlement of other areas in the United States.</p>
2	D	<p><i>Evaluate the impact of land policies pursued by Georgia; include the headright system, land lotteries, and the Yazoo land fraud. (SS8H5b)</i></p> <p>The correct answer is Choice (D) to encourage a large number of families to settle the Georgia frontier. Throughout the late 17th and early 18th centuries, the state of Georgia sponsored several land lotteries to make its western lands more economically viable. These lotteries helped facilitate the removal of eastern tribes from the interior and southeast, thereby extending state jurisdiction over these lands. This was done to meet the demand for arable land and to promote economic growth. Choice (A) is incorrect because land was actually taken away from Native Americans. Choice (B) is incorrect because the land was used for people to settle, not for creating parks. Choice (C) is incorrect because the land was utilized by common citizens of Georgia as well as the wealthy.</p>



Number	Correct Answer	Explanation
3	D	<p><i>Evaluate the impact the Bourbon Triumvirate, Henry Grady, International Cotton Exposition, Tom Watson and the Populists, Rebecca Latimer Felton, the 1906 Atlanta Riot, the Leo Frank Case, and the county unit system had on Georgia during this period. (SSH8H7a)</i></p> <p>The correct answer is Choice (D) Rebecca Latimer Felton. She was the first woman to serve in the U.S. Senate. Her greatest impact was her influence in promoting women's right to vote. Choices (A), (B), and (C) are incorrect because they were a woman in the militia, an interpreter for James Oglethorpe, and an African-American social reformer, respectively.</p>
4	D	<p><i>Describe the impact of the boll weevil and drought on Georgia. (SS8H8a)</i></p> <p>The correct answer is Choice (D) the boll weevil. It is a well-documented fact that boll weevil infestation devastated cotton production throughout the South during the 1920s. Choices (A), (B), and (C) did not play major roles in the farming crisis in Georgia during the 1920s.</p>
5	D	<p><i>Locate and evaluate the importance of key physical features on the development of Georgia; include the Fall Line, Okefenokee Swamp, Appalachian Mountains, Chattahoochee and Savannah Rivers, and Barrier Islands. (SS8G1c)</i></p> <p>The correct answer Choice is (D) 4. The Savannah River makes up the majority of the boundary between Georgia and South Carolina. Choices (A), (B), and (C) are incorrect because they label the Flint, Satilla, and the Altamaha Rivers, respectively.</p>



Number	Correct Answer	Explanation
6	B	<p><i>Locate and evaluate the importance of key physical features on the development of Georgia; include the Fall Line, Okefenokee Swamp, Appalachian Mountains, Chattahoochee and Savannah Rivers, and Barrier Islands. (SS8G1c)</i></p> <p>The correct answer is Choice (B) Its rapid rivers provided water power for industrial plants. The Fall Line is a region in Georgia where rivers and streams run across resistant rock formations that create waterfalls. The water pressure from the waterfalls is used to provide power for nearby industrial plants. Choice (A) is incorrect because the Fall Line did not help the lumber industry. Choice (C) is incorrect because the Fall Line is not located near the coast of Georgia and did not affect the shipment of goods. Choice (D) is incorrect because, although high mountains and scenic beauty may have encouraged tourism, growth in the tourism industry did not encourage industrial growth.</p>
7	D	<p><i>Describe the organization of the General Assembly, with emphasis on leadership and the committee system. (SS8CG2b)</i></p> <p>The correct answer is Choice (D) Lieutenant Governor. The responsibility of presiding over the state Senate was one of the roles of the Lieutenant Governor when the office was created in the 1945 revision of the Georgia Constitution. Choices (A), (B), and (C) are incorrect because all play different roles in Georgia's government that are not directly related to the authority of the Senate.</p>



Number	Correct Answer	Explanation
8	B	<p><i>Evaluate how the legislative branch fulfills its role as the lawmaking body for the state of Georgia. (SS8CG2c)</i></p> <p>The correct answer is Choice (B) The governor either signs the bill into law or vetoes it. According to Article III, section V, paragraph XIII of the Georgia State Constitution, once a bill has been approved by both houses of the General Assembly the governor has the option to sign it into law or veto the bill. Choice (A) is incorrect because the president of the United States is not involved in approval of state laws. Choice (C) is incorrect because the judicial branch has nothing to do with passing laws. Choice (D) is incorrect because the citizens are not involved in this step of proposing or making laws.</p>
9	D	<p><i>Describe the functions of special-purpose governments. (SS8CG5c)</i></p> <p>The correct answer is Choice (D) operating an airport. Operating an airport is the function of a special-purpose government because most airports are owned by state or local governments and are leased to private corporations. Choices (A), (B), and (C) list functions of other government branches. Conducting trials, appointing individuals to office, and enforcing state laws are all standard functions of state, county, and city governments in Georgia.</p>
10	B	<p><i>The student will explain personal money management choices in terms of income, spending, credit, saving, and investing. (SS8E5)</i></p> <p>The correct answer is Choice (B) loan from a bank. The money obtained through a bank loan becomes a credit in the account of the person who secured the loan. Choice (A) is incorrect because interest is earned on an account such as savings or an investment. Choice (C) is incorrect because wages from a job is money earned and has nothing to do with credit. Choice (D) is incorrect because purchasing stocks is an investment.</p>

