



Criterion-Referenced Competency Tests

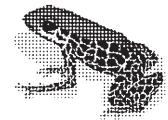
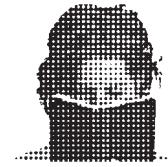
Grade 4

# CRCT

# Study

# Guide

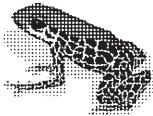
Reading  
English/Language Arts  
Mathematics  
Science  
Social Studies To be available 2008-09





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## Chapter 4

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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/](http://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.

## About the CRCT

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# 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 covered 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. They are measured on their 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](http://www.gadoe.org/ci_testing.aspx?PageReq=CI_TESTING_CRCT) and click the link for "2007 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](http://www.gadoe.org/lexile.aspx) for more information on this national reading measure.

## About the CRCT

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# Preparing for the CRCT

## Test-Taking Strategies

**Weeks Before the Test** Set academic goals with students for the upcoming weeks and months (short and long term). Write down and post students' goals where they can be seen at least once a day.

Help students gather study materials ahead of time.

Set up a place to work that is free of distractions.

Build in time to review what was learned in the last study session.

Divide assignments into manageable chunks. Studying for a long time non-stop is not productive!

Model and have students mark the main idea of each paragraph with a pencil as they read. This will help them focus on what they are reading.

Have students ask questions that arise while they are studying and encourage them to find the answers.

At the end of each study session, review what they have learned.

**Day Before  
the Test** Remind students to get a good night's rest.

Remind students that they can talk to a teacher or parent if they are feeling nervous about the test.

Assure students that this test is only one measure of their knowledge.

**During  
the Test** *Remind students of the following strategies to use during the test:*

Relax by taking slow, deep breaths.

Read the directions carefully. Make sure you understand what you need to do. If you are not sure, ask the teacher.

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 locations on your answer sheet.

Fill in the corresponding circle fully when you choose your answer. Erase any marks outside of the circle.

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

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. This is a chance for you to show what you know. Do the best you can!

## Related Links

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

Georgia Performance Standards:  
**[www.georgiastandards.org/](http://www.georgiastandards.org/)**

CRCT Content Descriptions:  
**[www.gadoe.org/ci\\_testing.aspx?PageReq=CITestingCRCTDesc](http://www.gadoe.org/ci_testing.aspx?PageReq=CITestingCRCTDesc)**

Lexile Framework for Reading:  
**[www.gadoe.org/lexile.aspx](http://www.gadoe.org/lexile.aspx)**

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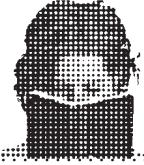
Best practices in education indicate that teachers should first model new skills for students. Next, teachers should provide opportunities for guided practice. Only then should teachers expect students to successfully complete an activity independently.

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

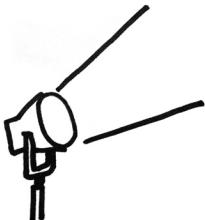
Students in Grade 4 expand and deepen their knowledge of reading, writing, and speaking, as well as their understanding of the connections among different types of communication. Students read and comprehend texts from a variety of genres (fiction, nonfiction, poetry, and drama), and they can understand and learn from texts without having a teacher preview the material for them. Grade 4 students also read and understand informational texts from other subject areas in addition to language arts. As they read, students in Grade 4 independently use a variety of meta-cognitive strategies to deepen and expand their understanding of the material. These strategies include using self-questioning techniques when reading materials seem contradictory or hard to understand.

The Reading activities are focused on some of the concepts that are assessed on the Grade 4 CRCT 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 Standard ELA4R3

Within the Reading Skills and Vocabulary Acquisition domain, students learn the skills necessary to read, interpret, and apply difficult text. Students in Grade 4 will distinguish among and apply the appropriate usage of antonyms (opposites), synonyms (words with similar meanings), and homophones (words that sound the same). They will learn to determine the meanings of unknown words by identifying and inferring the meaning of common root words, by recognizing the meaning of common prefixes (e.g., *un-*, *re-*, *dis-*, *in-*) and by using context clues. Grade 4 students will use grade-level words with multiple meanings and will determine the meaning of words and alternate word choices using a dictionary or thesaurus.

The following activities develop skills in this domain:

- To increase students' understanding of antonyms, synonyms and homophones, play a game of *Fishing for Words*. Write the words from the tables below on index cards, one word per card. Students should sit in a circle with the cards spread out, face up, in the middle. Call out a clue such as *Which word is the opposite of deep?* *Which word means the same as humorous?* or *Which word means a flat piece of wood?* Students should raise their hands if they spot the target word. Call on a student to fish the word out of the pond. If the student chooses the right word, and uses it correctly in a sentence, he or she can keep the word. The student with the most word cards at the end of the game wins.

#### **Antonyms**

deep/shallow	gigantic/small
fortunate/unfortunate	silent/loud
rapid/slow	entertaining/dull
careful/careless	possible/impossible

#### **Synonyms**

talk/speak	humorous/funny
probable/likely	excellent/superb
remember/recall	believe/think
listen/hear	foreign/unfamiliar

#### **Homophones**

board/bored	close/clothes
heard/herd	piece/peace
knew/new	their/there
threw/through	whole/hole



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- To develop students' understanding of root words and prefixes, present students with word-building tasks. Write prefixes (e.g., *un-*, *re-*, *dis-*, *in-*) and root words (see table below) on index cards. Create at least one task card for each word in the table. Task cards should direct students to form words based on the definitions. For example, *Make a word that means to find something for the first time*. Students should combine prefixes and root words until they build the word that fits the given meaning (in this case, the word *discover*). Students should write their own sentences using the newly formed word. They will see how a word's meaning is often the sum of its parts.

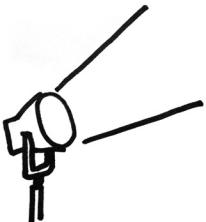
able	cycle	frequent	pack
appear	different	interest	play
certain	equal	kind	read
comfort	fair	like	real
cover	fill	obey	search

- To provide students with practice using the thesaurus, challenge them to a game of *Break the Code*. Present individual students or pairs of students with a sentence that contains advanced vocabulary. For example, *The garrulous professor gesticulated wildly as he articulated his ideas*. Students should read the sentence and circle any words they don't understand. They should look up the unknown words in a thesaurus or on an Internet thesaurus site. They will rewrite the sentence replacing the unknown words with words they understand. Students should read the original sentence to the class and then present their translations.
- To familiarize students with dictionary entries, set up a word hunt. Assign each student one word that has multiple definitions. Students will look up the words using a dictionary or a dictionary website. They will copy the word's pronunciation, parts of speech, and corresponding definitions onto a piece of lined paper. At the bottom of the paper they will write a sentence using the word. They will present their word and definitions, share the sentences they wrote, and explain which definition of the word they used. Students should tell whether they found their words in a dictionary or on the Internet and explain the steps they took to find their words. Once the presentations are finished, students should discuss the pros and cons of using an actual dictionary versus looking up a word on a dictionary website.

Further support can be found in the GPS Reading Framework available at [www.georgiastandards.org/elaframework.aspx](http://www.georgiastandards.org/elaframework.aspx)



## Activities



### ② Literary Comprehension

*Georgia Performance Standard ELA4R1*

Within the Literary Comprehension domain, Grade 4 students learn a variety of skills to comprehend and explore literary works. They will recognize and analyze literary elements such as setting, characterization, and plot, and will identify the speaker of a poem or story. They will make judgments and inferences about setting, characters, and events, and will recognize the relevance of foreshadowing clues. Students in Grade 4 will also recognize and interpret sensory details and figurative language such as personification (description of an inanimate object as animate), simile (comparison using *like* or *as*), and metaphor (comparison using *is*), as well as rhyme, rhythm, and repetition in poems. Students will determine themes and lessons in fiction passages, and draw comparisons between literary content and the actual experiences of an author's life.

The following activities develop skills in this domain:

- To help students analyze the setting of a literary work, provide time for them to draw their favorite scene from a book containing no pictures. Students should reread passages that describe where and when their favorite event takes place. They should visualize what the text describes and draw what they imagine. While students work, write the following questions on the board:  
*Could your favorite scene have taken place anywhere else or at any other time? Why or why not?* Students should think about these questions and prepare to present their answers to the class. When presenting, students should begin with a brief overview of the book (title, author, and characters), and a short summary of the scene they have drawn (where and when it takes place, who is there, and what is happening). Next, students should explain whether they think the scene they drew could have taken place anywhere else or at any other time. Students will see the different ways that setting influences the characters and events of a text.
- Foreshadowing suggests events that have yet to occur in a literary text. To build students' abilities to recognize foreshadowing, retrace the steps that lead to a plot's culminating event. After students read a short story, fable, folktale, or drama, work together to identify the text's main ending event. Write it down on a piece of construction paper labeled *Main Event* and tape it high up on a wall. Students should reread the text looking for clues leading up to the event. Clues may tell how a character was feeling, explain how an event occurred, or describe the setting in which an event takes place. Trace footprints on construction paper so that students can cut them out. Students will write each clue they found on a separate footprint. They will group any repeated clues together, and arrange the rest in the order that they occurred in the text. Attach the footprints to the wall starting with the first clue at the bottom so they lead up to the culminating event.
- To develop students' understanding of figurative language, present them with examples to interpret. Take examples of personification, metaphor, and simile from texts students are reading, or write them from scratch. Give each student



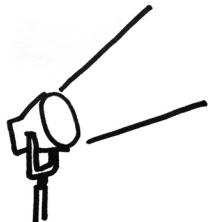
one example of figurative language. Students should read their examples and answer the question, *What does this sentence make you see, taste, feel, hear, or smell?* Remind students that not every sentence will appeal to all of the senses. Students should paste their examples on the top of a piece of construction paper. Then they should think about which sense (sight, taste, touch, sound, or smell) is most central to the sentence and draw an eye, a tongue, a hand, an ear or a nose below it. Students will read their examples to the class and explain which sense is primary to the sentence, as well as what it makes them see, taste, feel, hear, or smell. Post the examples around the room as reminders of the sensory effects of figurative language.

- To help students draw connections between a text's setting, characters, and events, and the actual experiences of the author's life, set up Ask the Author interviews. After reading a short story, poem, or narrative, students should research the author's life. They should look for biographies in the library and search for information on the Internet. Students will work in pairs to prepare and role-play interviews. One student will pretend to be the author of the text, while the other is the interviewer. They will come up with questions that ask the author how his or her writing is related to experiences from his or her life. Sample questions are *Were you ever in a place similar to the setting of your book? Do you have anything in common with any of your characters? What character are you most like?* Students will rehearse answers to their questions before performing their interviews in front of the class.

Further support can be found in the GPS Reading Framework available at  
[www.georgiastandards.org/elaframework.aspx](http://www.georgiastandards.org/elaframework.aspx)



## Activities



### ③ Information and Media Literacy

*Georgia Performance Standards ELA4R1 and ELA4LSV2*

Within the Information and Media Literacy domain, students in Grade 4 learn to read, recall, and analyze details and information from various texts such as informational essays, articles, subject-area texts, and reference sources. They also learn the skills required to analyze and evaluate various types of workplace, consumer, and media reading materials. Grade 4 students will analyze text to summarize the main idea and supporting details, determine and explain cause-and-effect relationships, and distinguish between facts and opinions. They will analyze text and sentence structure (e.g., chronological and cause-and-effect), and interpret both textual features (e.g., paragraphs, topic sentences, concluding sentences, glossary) and graphic features (e.g., diagrams, illustrations, charts, maps). Grade 4 students will recall explicit facts, draw conclusions, and make predictions. They will understand how media play a part in dispensing information and forming public opinion, in addition to providing entertainment.

The following activities develop skills in this domain:

- To help students analyze text structure, challenge them to put the scrambled sentences of a chronological paragraph in order. Type a short paragraph that describes a sequence of events or explains the steps necessary to complete a task. Reorder the sentences and leave two blank lines after each sentence so that students can cut them out. Students should look for chronological language such as *first*, *then*, *next*, and *finally* as they move the sentences around to find the original order. They should look for a sentence that introduces the topic in a broad way and position it as the topic sentence. They should look for a sentence that closes the topic and position it as the concluding sentence. Students will order any remaining sentences using other context clues. After students have tried the challenge on their own, come together and arrange the paragraph as a group. Students will share their reasoning for the order they chose and discuss why the original sequence makes sense.
- To develop students' abilities to recognize and explain cause-and-effect relationships, create two-part posters. Students should read an informational text that describes cause-and-effect relationships (e.g., a science article that explains why a species became extinct, a history text that explains the causes of a war, or a biography that explains what contributed to a leader's success). They will fold a piece of paper in half and label the top left *Cause* and the top right *Effect*. They will locate an effect in the text and write it on the top right side of their papers. Next, they will reread the text looking for causes that lead to the effect they chose. They will write them on the top left side of their papers. Finally, they will draw pictures to illustrate the cause(s) and effect, and present their posters to the class.
- To help students identify the best supporting details for a given main idea, provide them with supporting details to sort. Prepare a worksheet with a list of the supporting details contained in an informational text they have read.



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Include one sentence that summarizes the main idea, and add details that are not relevant to the topic at hand. Students should read the sentences on the worksheet and decide which one represents the main idea. They will cut out that sentence, place it at the top of a piece of construction paper, and draw a line underneath it. Next, they will read the rest of the sentences, cut out those that support the main idea, and place them at the bottom part of their papers. Before gluing any of the sentences in place, students should make sure they have the main idea above and all relevant supporting details below. Go over the sentences together so that students can explain how each detail supports the main idea.

- To show students how to analyze a media message, present them with a television or magazine advertisement and prompt them to discuss and respond to the following questions: *What is the message of the advertisement? Are there multiple interpretations of the message? What information is communicated? Is it factual or does it represent someone's opinion? Who created the message? Is it an individual or a corporation? What do the creators of the message want viewers to do? For whom did the creators make the advertisement? How did the creators design the ad so that people in the target audience would like it? Have students ever seen or heard a message that was similar? Do they think the advertisement is effective? Why or why not?*

Further support can be found in the GPS Reading Framework available at [www.georgiastandards.org/elaframework.aspx](http://www.georgiastandards.org/elaframework.aspx)



## Practice Quiz



Genre: Fiction

Read the passage below and answer the questions that follow.

### The Fair

Jenna always looked forward to the annual “School’s Out!” Fair. It was the best part about the end of the school year. Whenever Jenna went to the fair, she usually went with Grandma. Grandma would walk with Jenna and her friends and laugh as they explored the colorful booths and rides with the blinking lights. As Jenna and her friends ran off to play the games, Grandma would always joke, “Win the stuffed giraffe for me!”

When the day of the fair came, Jenna was excited. All day, she waited impatiently for school to end. On the way home from school, she could see people setting up the rides in the park. She tried to imagine the smell of popcorn and the bright rides, like necklaces of lights in the night sky. She couldn’t wait for evening to come!

However, when Jenna got home, her mother had bad news. Grandma had called. She had to baby-sit for Jenna’s new cousin Andrew. Since Andrew wasn’t old enough to go to the fair yet, Grandma wouldn’t be able to take Jenna to the fair that night. Right away, Jenna was very upset. She knew that her mother was busy and wouldn’t be able to take her. That meant that she wouldn’t be able to go to the fair at all!

Jenna’s mother tried to console her. “I’m sorry, dear,” Jenna’s mother said. “You can always go next year. You can go keep Grandma company tonight, though.”

“But, Mom,” Jenna said, “I don’t want to miss the fair!”

After seeing how disappointed Jenna was, Jenna’s mother made a phone call. Jenna’s older cousin Rachel said that she would be able to take the girls. When Jenna found out, she felt better. At first, Jenna thought it would be strange to be at the fair without Grandma. When she thought of all the fun she would have at the fair, though, she forgot all about it.

Once Jenna got to the fair, she had an empty feeling. She talked to her friends, ate cotton candy, and rode the fast rides, but something was missing.

“Something is not right,” Jenna thought to herself as she roamed through the fair.

Jenna didn’t really feel like playing the games, but she played them anyway. She barely even noticed when she won a prize at the Frisbee toss. Before she knew it, a man was handing her a big, stuffed giraffe. When she saw the giraffe, Jenna suddenly realized what was wrong. Without Grandma there, the fair just wasn’t the same. Jenna knew what she had to do.

She immediately said goodbye to Rachel and ran to Grandma’s house. When she got there, she used her key to let herself in. Grandma was sitting on the couch,



holding the baby. She was surprised to see Jenna. Jenna walked over to Grandma with a huge smile on her face.

"Here, Grandma. This is for you," Jenna said proudly, as she presented Grandma with the big giraffe. Grandma's eyes lit up, and a smile of surprise spread across her face.

"Oh, Jenna!" Grandma said. "What a wonderful gift!"

Suddenly, everything felt right.

**1 Which of these events from the passage happens LAST?**

- A Grandma calls Jenna's mother.
- B Jenna runs to Grandma's house.
- C Jenna goes to the fair with her friends.
- D Grandma jokes about the stuffed giraffe.

**2 When does this passage take place?**

- A at the end of summer
- B in the middle of summer
- C at the end of the school year
- D in the middle of the school year

**3 What is the MAIN problem in the passage?**

- A Grandma cannot take Jenna to the fair.
- B Jenna needs to win a prize for Grandma.
- C Grandma forgets about going to the fair.
- D Jenna does not want to give Grandma the giraffe.

**4 Which of these is used in the sentence?**

She tried to imagine the smell of popcorn and the bright rides, like necklaces of lights in the night sky.

- A simile
- B idiom
- C metaphor
- D personification

**5 Which of these senses is MOST important to the sentence?**

Grandma would walk with Jenna and her friends as they explored the colorful booths and rides with the blinking lights.

- A taste
- B sight
- C touch
- D sound



**6 Why does the author MOST LIKELY include the following sentences?**

At first, Jenna thought it would be strange to be at the fair without Grandma. When she thought of all the fun she would have at the fair, though, she forgot all about it.

- A to show that Jenna does not want to go to the fair
- B to suggest that Jenna will not enjoy herself at the fair
- C to show that Jenna cannot go on the rides without Grandma
- D to suggest that Jenna has not spent much time with Grandma

**7 Which of these is MOST LIKELY true about Grandma?**

- A She is tired of going to the fair.
- B She likes spending time with Jenna.
- C She likes visiting the fair by herself.
- D She is upset that Jenna has come over.

**8 Which of these BEST describes why the stuffed giraffe is important to the passage?**

- A It is a gift from Grandma.
- B It is a prize Grandma wins for Jenna.
- C It reminds Jenna of time spent with Grandma.
- D It reminds Jenna of how much she enjoys the fair.

**9 What does the word **console** mean in the sentence?**

Jenna's mother tried to console her.

- A tell someone a story
- B give a gift to someone
- C make someone feel better
- D explain a problem to someone

**10 Which of these is the root word of *impatiently* in the sentence?**

All day, she waited impatiently for school to end.

- A pat
- B patent
- C patient
- D impatient



## Solutions

Number	Correct Answer	Explanation
1	B	<p><i>Identifies and analyzes the elements of plot, character, and setting in stories read, written, viewed, or performed. (ELAR41b)</i></p> <p>The correct answer is <b>Choice (B) Jenna runs to Grandma's house.</b> The last main event of the story is Jenna's visit to her Grandmother's house. Choices (A) and (C) are incorrect because they are both events that happened <i>before</i> the last part of the story. Choice (D) is incorrect because although Grandma receives the stuffed giraffe at the end of the story, she does not joke about it then.</p>
2	C	<p><i>Identifies and analyzes the elements of plot, character, and setting in stories read, written, viewed, or performed. (ELAR41b)</i></p> <p>The correct answer is <b>Choice (C) at the end of the school year.</b> The passage describes the "School's Out!" Fair, which takes place at the end of the school year. Choices (A) and (B) are incorrect because the end of the school year does not take place in the summer. Choice (D) is incorrect because the "School's Out!" Fair does not take place in the middle of the school year.</p>
3	A	<p><i>Identifies and analyzes the elements of plot, character, and setting in stories read, written, viewed, or performed. (ELAR41b)</i></p> <p>The correct answer is <b>Choice (A) Grandma cannot take Jenna to the fair.</b> The main problem of the passage is that Grandma cannot take Jenna to the fair because she has to baby-sit for Jenna's new cousin. Choice (B) is incorrect because Jenna does not <i>need</i> to win a prize for Grandma—that is just something they joke about. Choice (C) is incorrect because Grandma does not forget about going to the fair. Choice (D) is incorrect because Jenna <i>does</i> want to give Grandma the giraffe—she wants to do it so badly she leaves the fair early.</p>



Number	Correct Answer	Explanation
4	A	<p><i>Identifies sensory details and figurative language.</i> <i>(ELA4R1d)</i></p> <p>The correct answer is <b>Choice (A) simile</b>. In the sentence provided, the “bright rides” are compared to “necklaces of lights in the night sky”. The use of the word “like” signals that this comparison is a simile. Choice (B) is incorrect because the sentence does not use an <i>idiom</i> (an expression particular to a given language). Choice (C) is incorrect because although the sentence compares two things, it does not use the word <i>is</i> as would be the case with a <i>metaphor</i>. Choice (D) is incorrect because the sentence does not incorporate <i>personification</i> (description of an inanimate object as animate).</p>
5	B	<p><i>Identifies sensory details and figurative language.</i> <i>(ELA4R1d)</i></p> <p>The correct answer is <b>Choice (B) sight</b>. The sentence describes visual imagery such as “colorful booths” and “blinking lights”. It appeals mostly to the sense of sight. Choices (A), (C), and (D) are incorrect because taste, touch, and sound are not the senses most important to the sentence.</p>
6	B	<p><i>Identifies and shows the relevance of foreshadowing clues.</i> <i>(ELA4R1e)</i></p> <p>The correct answer is <b>Choice (B) to suggest that Jenna will not enjoy herself at the fair</b>. The author includes the sentences to foreshadow that Jenna will not enjoy herself at the fair because she will miss her grandmother. Choice (A) is incorrect because these sentences do not show that Jenna does not want to go to the fair—in fact, they show her thinking of all the fun she will have there. Choice (C) is incorrect because these sentences do not show that Jenna cannot go on the rides without Grandma. Choice (D) is incorrect because these sentences do not suggest that Jenna has been able to spend much time with Grandma.</p>



Number	Correct Answer	Explanation
7	B	<p>Makes judgments and inferences about setting, characters, and events, and supports them with elaborating and convincing evidence from the text. (ELA4R1f)</p> <p>The correct answer is <b>Choice (B) She likes spending time with Jenna.</b> The first paragraph of the passage explains how “Grandma would walk with Jenna and her friends and laugh as they explored the colorful booths and rides with the blinking lights.” It also describes how she would joke. Choice (A) is incorrect because there is nothing in the passage that states or implies that Grandma is tired of going to the fair. Choice (C) is incorrect because there is nothing in the passage that states or implies that Grandma likes visiting the fair by herself. Choice (D) is incorrect because there is nothing in the passage that states or implies that Grandma was upset when Jenna came over. On the contrary, “Grandma’s eyes lit up, and a smile of surprise spread across her face,” when Jenna came over.</p>
8	C	<p>Summarizes main ideas and supporting details. (ELA4R1f)</p> <p>The correct answer is <b>Choice (C) It reminds Jenna of time spent with Grandma.</b> The stuffed giraffe is important to the passage because it represents a joke Jenna and her Grandma shared. Choices (A) and (B) are incorrect because the giraffe was not a gift or prize that Grandma gave to Jenna. Choice (D) is incorrect because although the giraffe may remind Jenna of the fair, it more directly reminds Jenna of her grandmother.</p>
9	C	<p>Determines meanings of unknown words using their context. (ELA4R3b)</p> <p>The correct answer is <b>Choice (C) make someone feel better.</b> The context for the sentence provided can be found in the third and fourth paragraphs. Jenna’s mother tries to make Jenna feel better after she finds out her grandmother won’t be able to take her to the fair. Choices (A), (B), and (D) are incorrect because “console” does not mean to tell someone a story, to give a gift to someone, or to explain a problem to someone.</p>

Number	Correct Answer	Explanation
10	C	<p><i>Identifies the meaning of common root words to determine the meaning of unfamiliar words. (ELA4R3c)</i></p> <p>The correct answer is <b>Choice (C) patient</b>. Once the prefix <i>im-</i> and the suffix <i>-ly</i> are removed from the word <i>impatiently</i>, the root word <i>patient</i> is left. Choices (A) and (B) are incorrect because <i>pat</i> and <i>patent</i> are not root words of <i>impatiently</i>. Choice (D) is incorrect because <i>impatient</i> contains the prefix <i>-im</i>.</p>

# **English/Language Arts**





## Chapter 2

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# English/Language Arts

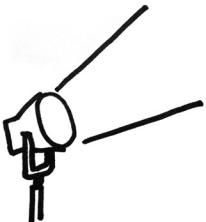
Students use writing as a tool for learning, and they write for a variety of purposes and audiences. Grade 4 students write daily in order to maximize and formalize their writing skills. Students communicate their personal voices in writing, expressing ideas through journals, notes, and e-mail. Students are aware of the connections between reading and writing, and they begin to use reading and writing strategies interchangeably. Grade 4 students are ready for opportunities to discuss books and to expand their vocabularies for deeper comprehension of texts. They understand and articulate how authors use a variety of techniques and craft in their writing, and they show evidence of the author's craft in their own writing.

The English/Language Arts activities focus on some of the concepts that are assessed on the Grade 4 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 ELA4C1*

Within the Grammar/Sentence Construction domain, students learn to recognize the subject-predicate relationship in sentences, the four basic parts of speech (noun, verb, adverb, adjective), and correct mechanics (end marks, commas for series, capitalization). Students use and identify words or word parts from other languages that have been adopted into the English language and write legibly in cursive. They use knowledge of letter sounds, word parts, word segmentation, and syllables to monitor and correct spelling. Finally, students spell common homophones correctly, vary sentence structure by type, and eliminate fragments and run-ons from writing.

The following activities develop skills in this domain:

- To give students practice spelling words correctly, play the *Tic-Tac-Toe Spelling Game*. Using masking tape, make a large tic-tac-toe board on the floor. Divide the students into two teams: Xs and Os. Give students index cards with their team symbol written on one side. Say a word to spell. If the student writes it on the chalk board with correct spelling, he or she or she gets to choose a square on the game board. The student will hold up the card showing an X or an O and place it on the game board. If the word is misspelled, the other team gets a chance to spell it correctly and choose a square. This activity may be adapted to review syllables, word parts, and proper use of punctuation symbols. Using either a large or small hand-drawn tic-tac-toe board, the review game is also effective when played one-on-one.
- Help students understand the two parts of a sentence—the subject and predicate—by playing *Break Point*. Write a series of sentences on the board, one at a time. For each sentence, students take turns going up to the board and marking a slash where the break between the subject and predicate occurs. Here are some examples:
  - *Chelsea / ate her dinner quickly.*
  - *Daniel and his puppy / walked to the park, the store, and to the neighbor's house.*
  - *The sisters / needed to finish their homework before playing outside.*

After students mark the slashes, ask other students to identify which words form the subject and which form the predicate. Continue with the activity until each student understands the two necessary parts of a complete sentence.

- Using correct homophones is an essential part of accurately expressing ideas in writing. To help students with this skill, divide them into two teams and read aloud a sentence with a common homophone such as there/their/they're or too/to/two. Teams will get one point for each round by sending a representative up to the board to write the correct homophone. If the team representative writes the incorrect homophone, the other team gets its



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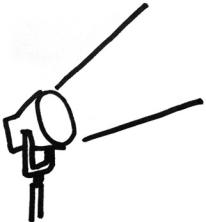
chance at the board. To conduct the activity one-on-one, simply read sentences to a student and ask him or her to write the correct homophone on a sheet of paper. After the game is over, discuss the experience using guiding questions such as the following: *Which homophones are easy to confuse? What are some ways to remember them more easily?*

- To give students practice identifying errors in grammar and mechanics, pair students up, and hand each student a red pencil. Then, using a regular pencil, each student should write a sentence that his or her partner will proofread and correct with the red pencil. When writing sentences, students should give their partners opportunities to find different types of errors and to recognize correctly written sentences. Students should switch papers each time both partners have finished their writing or proofreading tasks. This activity may also be used when working one-on-one with a student.

Further support can be found in the GPS English/Language Arts Framework at [www.georgiastandards.org/elaframework.aspx](http://www.georgiastandards.org/elaframework.aspx)



## Activities



### ② Research/Writing Process

*Georgia Performance Standards ELA4W1, ELA4W2, ELA4W3, and ELA4W4*

Within the Research/Writing Process domain, students select a focus, organizational structure, and point of view for their writing. Students use transition elements, sensory details, and concrete language to ensure coherence and develop reader interest. Students locate information in reference texts by using organizational features such as prefaces, indices, and glossaries. Students use various reference materials (electronic information, almanacs, atlases, magazines, newspapers, and key words), display keyboarding skills, and demonstrate familiarity with computer terminology (hard drive, software, memory). Students revise drafts by consolidating and rearranging text, excluding extraneous details, editing to correct errors in punctuation, and giving closure to their writing.

The following activities develop skills in this domain:

- To help students identify unnecessary details and extraneous information in a text, modify several newspaper articles and magazine features by adding sentences that do not belong. These sentences should be off-topic or unnecessary. Hand out the revised versions to students and challenge students to eliminate extraneous sentences. Encourage students to help each other and discuss their reasoning. At the end of the activity, clear up any sentences students missed or that caused confusion during the discussion.
- To help students identify and determine the purpose of a text's organizational features, such as its preface, appendix, index, glossary, and table of contents, students will perform a book dissection. Working in small groups, students will first choose a book and find an example of each of the features listed above. They will label each feature with a sticky note. Then, make a copy of each labeled page. Next, give students poster board and tape. Students will tape the copies of the different features of the book on the poster board and label each of the organizational features. These labels should also explain the purpose of the feature. For example, the label for an index might say, *An index has an alphabetical list of works found in the book and tells on which page you can find information on that word.* When students are done with their dissection, they should have a poster-sized display of all the parts of a book to keep in the classroom as a reference. Finally, lead a discussion about the organizational features of a book, encouraging students to refer to their displays while they answer. Here are some sample guiding questions:
  - *Cynthia wants to know on what page the word \_\_\_\_\_ is found. What feature should she use?*
  - *When does it make more sense to use a table of contents instead of an index?*
  - *Charles needs to find the definition of a bolded word in his book. Where should he look?*



- 
- To help students learn to revise text for coherence and logical progression, students will play *Paragraph Puzzle*. First, copy and paste a paragraph from an Internet site into a blank document and increase the font size. Put each sentence in the paragraph on its own line. Print out the paragraph and cut up the sentences into individual strips. Working together, students will put the strips in the correct order. When the activity is complete, facilitate a discussion about how students figured out the correct order of their sentences. Ask guiding questions such as, *What clues did you use? Can any of the sentences in the paragraph be removed altogether? and What organizational pattern does this paragraph use (chronological, similarity and difference)?* As extension activities, students should play *Paragraph Puzzle* using paragraphs their classmates have written. They should also practice writing paragraphs according to specified organizational patterns.

Further support can be found in the GPS English/Language Arts Framework at  
**[www.georgiastandards.org/elaframework.aspx](http://www.georgiastandards.org/elaframework.aspx)**



## Practice Quiz



**1 What is the subject of the sentence?**

The girl bounced the orange ball.

- A girl
- B bounced
- C orange
- D ball

**2 What is the underlined word in the sentence?**

Our neighbors waved cheerfully from across the street.

- A noun
- B verb
- C adverb
- D adjective

**3 Where is the BEST place to separate the run-on sentence into two sentences?**

Stuart has the key he will have to unlock the door.

- A after *Stuart*
- B after *key*
- C after *he*
- D after *unlock*

**4 The sentence below has a spelling error. Which of the underlined words in the sentence is spelled incorrectly?**

The mysterious man with the mustache sat on the stool and drank a gallen of milk.

- A mysterious
- B mustache
- C stool
- D gallen

**5 Which type of sentence is this?**

Walk to school with us.

- A declarative
- B imperative
- C interrogative
- D exclamatory



**6 Where would this information most likely be found?**

The town of Livingston was founded in 1825. Henry Keane was elected the first mayor of Livingston in 1835. The Keane House is the oldest home still standing in Essex County.

- A a visitor's guide to Livingston
- B a map of the town of Livingston
- C an interview with a family who lives in Livingston
- D a newspaper article about Livingston's new mayor

**7 What kind of organization does the paragraph use?**

Choosing the best spot is the first step to growing a great garden. Look around your yard to find a spot where your plants will get plenty of sunlight. Usually a spot that is on the south side of a building works best. Next, plan your garden so that it will not be in the way of people walking through the yard. Finally, once you have chosen your spot, the real gardening can begin.

- A cause and effect
- B chronological order
- C question and answer
- D similarity and difference

**8 Which sentence would BEST support the information in the paragraph?**

After the Louisiana Purchase in 1803, President Jefferson sent Lewis and Clark to explore the new land bought by the United States. A Native American woman, Sacagawea, agreed to help them on their journey. Together, they led a group of explorers through the new territory west of the Mississippi River, over the Rocky Mountains, and on to the Pacific Ocean.

- A The travelers drew maps of the land that they explored.
- B Lewis and Clark brought their dog along for the journey.
- C The Rocky Mountains are the great backbone of North America.
- D It is interesting to visit the places that Lewis and Clark explored.



**9 Which sentence is unrelated to the paragraph?**

<sup>1</sup>I learned many new things during my week at camp. <sup>2</sup>I learned to paddle a canoe and to sail a sailboat. <sup>3</sup>I learned how to make a campfire. <sup>4</sup>I also learned how to identify the footprints of the animals in the woods. <sup>5</sup>I did not see a skunk. <sup>6</sup>My week at camp was fun and full of learning.

- A sentence 2
- B sentence 3
- C sentence 4
- D sentence 5

**10 What is the BEST closing sentence for the paragraph?**

Cezar waited patiently for his parents to come home from the pet store. They were bringing home a new puppy! Cezar made a soft bed for the puppy to sleep in. The water and food bowls were filled. A basket of puppy toys sat on the front porch.

- A Cezar's parents were always on time.
- B Cezar was prepared for his new puppy.
- C The food and water bowls were made out of plastic.
- D The pet store had everything that the new puppy needed.



## Solutions

Number	Correct Answer	Explanation
1	A	<p><i>Recognizes the subject-predicate relationship in sentences. (ELA4C1a)</i></p> <p>The correct answer is <b>Choice (A) girl</b>. The subject of the sentence answers the question <i>who?</i> or <i>what?</i> Who bounced the orange ball? The girl. Choice (B) is incorrect because <i>bounced</i> is the verb. Choice (C) is incorrect because <i>orange</i> is an adjective that describes the noun <i>ball</i>. Choice (D) is incorrect because <i>ball</i> is the object of the sentence.</p>
2	C	<p><i>Uses and identifies four basic parts of speech (adjective, noun, verb, adverb). (ELA4C1b)</i></p> <p>The correct answer is <b>Choice (C) adverb</b>. An adverb modifies a verb. In the sentence, “cheerfully” describes the way the neighbors waved, so it function as an <i>adverb</i>. Many, though not all, adverbs end in <i>-ly</i>. Choice (A) is incorrect because “cheerfully” is not a <i>noun</i>. It is not a person, place, or thing. Choice (B) is incorrect because “cheerfully” is not a <i>verb</i>. Verbs show an action or state of being. Choice (D) is incorrect because “cheerfully” is not an <i>adjective</i>. Adjectives modify nouns, not verbs.</p>
3	B	<p><i>Uses and identifies correct mechanics (end marks, commas for series, capitalization), correct usage (subject and verb agreement in a simple sentence), and correct sentence structure (elimination of sentence fragments). (ELA4C1c)</i></p> <p>The correct answer is <b>Choice (B) after key</b>. You can break up a run-on sentence by separating two thoughts or ideas. “Stuart has the key” has both a subject and a predicate. A period can be added after this phrase to create a complete sentence. “He will have to unlock the door” can also stand alone as a complete sentence because it has both a subject and a predicate. Choice (A) is incorrect because placing a period after <i>Stuart</i> creates an incomplete sentence. Sentences must have a subject and a predicate and <i>Stuart</i> by itself is only a subject. Choice (C) is also incorrect because a period placed after <i>he</i> creates another incomplete sentence. “Will have to unlock the door” does not have a subject, so it is not complete. Choice (D) is incorrect because if a period is placed after <i>unlock</i>, it creates the incomplete sentence “the door.”</p>



<b>Number</b>	<b>Correct Answer</b>	<b>Explanation</b>
4	<b>D</b>	<p>Uses knowledge of letter sounds, word parts, word segmentation, and syllabication to monitor and correct spelling. (ELA4C1f)</p> <p>The correct answer is <b>Choice (D) gallen</b>. <i>Gallen</i> is an incorrect spelling of the word <i>gallon</i>. Choices (A), (B), and (C) are all incorrect because these words are spelled correctly.</p>
5	<b>B</b>	<p>Varies the sentence structure by kind (declarative, interrogative, imperative, and exclamatory sentences and functional fragments), order, and complexity (simple, compound). (ELA4C1h)</p> <p>The correct answer is <b>Choice (B) imperative</b>. An imperative sentence gives a command or makes a request. “Walk to school with us” is a command and therefore an <i>imperative</i> sentence. Choice (A) is incorrect because a <i>declarative</i> sentence makes a statement with an explicit subject and “Walk to school with us” does not do this. The subject is understood to be <i>you</i>. Choice (C) is incorrect because an <i>interrogative</i> sentence asks a question and “Walk to school with us” does not ask a question. Choice (D) is incorrect because an <i>exclamatory</i> sentence makes a statement of emotion or urgency and “Walk to school with us” does not do this.</p>
6	<b>A</b>	<p>Locates information in reference texts by using organizational features (i.e., prefaces, appendices, indices, glossaries, and tables of contents). (ELA4W3b)</p> <p>The correct answer is <b>Choice (A) a visitor’s guide to Livingston</b>. The selection tells about Livingston’s town history. This type of information would be found in a visitor’s guide. Choice (B) is incorrect because a map would include a visual representation of the town instead of a text description of it. Choice (C) is incorrect because the selection gives town history. An interview with a family who lives there would be more likely to include information and details about what it is like there today, and read more informally in style. Choice (D) is incorrect because the selection doesn’t give any information about the town’s current mayor. It mentions only a mayor who lived many generations ago.</p>



<b>Number</b>	<b>Correct Answer</b>	<b>Explanation</b>
7	<b>B</b>	<p><i>Uses traditional structures for conveying information (e.g., chronological order, cause and effect, similarity and difference, and posing and answering a question). (ELA4W1c)</i></p> <p>The correct answer is <b>Choice (B) chronological order.</b> Words such as “next” and “finally” are transition words that organize the directions in a step-by-step manner through time. Choice (A) is incorrect because the selection doesn’t give any causes or effects related to the topic. Choice (C) is incorrect because the selection doesn’t pose questions or offer answers. Choice (D) is incorrect because the selection doesn’t compare and contrast two things.</p>
8	<b>A</b>	<p><i>Supports a position with relevant evidence. (ELA4W2c)</i></p> <p>The correct answer is <b>Choice (A) The travelers drew maps of the land they explored.</b> This detail gives relevant information about an action directly connected to the purpose of Lewis and Clark’s expedition. Choice (B) is incorrect because it is not important whether the explorers brought a dog with them. Choice (C) is incorrect because it is an opinion about the Rocky Mountains instead of a relevant fact about the explorers. Choice (D) is incorrect because it speaks to a modern-day tourist instead of giving information about Lewis and Clark and what they did, like the rest of the paragraph.</p>
9	<b>D</b>	<p><i>Excludes extraneous details and inconsistencies. (ELA4W2e)</i></p> <p>The correct answer is <b>Choice (D) sentence 5.</b> “I did not see a skunk” does not support the main idea of the paragraph. The topic sentence states that the paragraph will be about things learned at camp. Choices (A), (B), and (C) are incorrect because these sentences each give an example of something learned at camp, which means that these sentences fit with the main idea and give relevant details.</p>



<b>Number</b>	<b>Correct Answer</b>	<b>Explanation</b>
10	<b>B</b>	<p><i>Provides a sense of closure to the writing. (ELA4W2h)</i></p> <p>The correct answer is <b>Choice (B) Cezar was prepared for his new puppy.</b> The closing sentence should summarize the paragraph. The paragraph describes Cezar preparing for the arrival of his new puppy, so this sentence is the summary of that process. Choice (A) is incorrect because it gives an irrelevant detail about Cezar's parents. Choice (C) is incorrect because it gives an unnecessary detail about the food and water bowls instead of summarizing the paragraph. Choice (D) is incorrect because it gives an unnecessary detail about the pet store instead of summarizing what Cezar did in the paragraph.</p>

# **Mathematics**





## Chapter 3

# Mathematics

By the end of Grade 4, students will add and subtract decimal fractions and common fractions with common denominators. They will also understand how and when it is appropriate to use rounding. Students will use common measurement units to determine weight. Students will develop their understanding of measuring angles with appropriate units and tools. Students will understand the characteristics of geometric plane and solid figures. They will also use tables, graphs, and charts to record and analyze data.

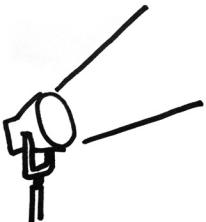
The Mathematics activities focus on some of the concepts that are assessed on the Grade 4 CRCT Mathematics domains. These domains are as follows:

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

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 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 Standards M4N1, M4N2, M4N3, M4N4, M4N5, M4N6, and M4N7*

Within the Number and Operations domain, students will identify places from hundredths through one million and equate a number's word name, its standard form, and its expanded form. They will determine situations in which rounding numbers would be appropriate. Students will round numbers to the nearest ten, hundred, or thousand and round decimal fractions to the nearest whole number. They will round the results of computation and use rounding to estimate sums. Students will know the division facts with understanding and fluency. They will solve problems involving multiplication of 2–3 digit numbers by 1–2 digit numbers and division by a 2-digit number, including those generating a remainder. Students will understand the relationship between dividend, divisor, quotient, and remainder and explain the effect on the quotient of multiplying or dividing both the divisor and dividend by the same number. They will understand decimals as part of the base-ten system and order them by size. Students will add and subtract 1- and 2-digit decimals, and multiply and divide 1- and 2-digit decimals by whole numbers. They will understand simple equivalent fractions, and add and subtract fractions and mixed numbers with common denominators no greater than 12. Students will convert and use mixed numbers and improper fractions interchangeably. They will describe the relationships among the four operations (+, −, ×, ÷) and use mental math and estimation strategies. Students will compute using the order of operations (including parentheses) and the commutative, associative, and distributive properties.

The following activities develop skills in this domain:

- Students will improve their understanding of addition and subtraction of fractions and mixed numbers by using counters and egg cartons. Gather 12 egg cartons, about 140 small counters (e.g., dried beans or popcorn kernels), and about 100 cotton balls. Prepare the cartons for the denominator used by filling unnecessary cups with cotton balls. For example, to show fractions with a denominator of 8, you would fill 4 cups with cotton balls. The 8 open cups would each represent one equal part ( $\frac{1}{8}$ ) of the whole ( $\frac{8}{8}$ ). The fraction  $\frac{3}{8}$  would then be shown by placing counters in 3 of the 8 open cups. The cartons can be adjusted in this way to accommodate fractions with denominators ranging from 2 to 12. Arrange the egg cartons on a large table so there are a few inches between two sets of 6 cartons each. Make two index cards, one labeled with a plus sign (+) and the other with a minus sign (−). Place the appropriate card between the two sets of cartons to show addition or subtraction. Students will use this arrangement to perform manipulatives-based addition and subtraction of fractions, improper fractions, or mixed numbers with like denominators. (All numbers should be less than 6 to fit into 6 cartons.) Give students a problem to solve, building to include the need for regrouping. Students should fill each set of egg cartons with enough counters to represent the number. For improper fractions and mixed numbers, you will need more than one egg carton to represent the number. For example, to represent the number  $3\frac{3}{4}$  students should fill the 4 open cups in each of three cartons and



3 open cups in a fourth. Students will use the same process for the second number and then tally the result of the addition or subtraction by combining or removing counters. They should check to confirm that the results match their paper calculations and discuss any differences.

- To improve skills solving problems involving division by a two-digit number, students will play a game with number cubes. Create a game board on a piece of paper or cardboard. Draw a series of 40–50 boxes that form a winding pathway from one corner of the board to the opposite corner. Write a 3-digit number in each space. To play the game, students will roll a six-sided number cube two times. The first roll will show how many squares to move forward and also determine the first digit of a divisor. The second roll will determine the second digit of the divisor. For instance, a student rolling a 3 will move 3 spaces. If the second roll is a 7, the student will divide the number in the box by 37 and calculate the result on a piece of paper, including remainder. If the calculation is correct, the student rolls again. The goal is to make it all the way across the game board in the fewest turns.
- The following application gives opportunities for students to use values from hundredths to millions. Tell students to imagine that they just won a contest. The prize will be awarded in one of two ways. They can choose to receive:
  - One million dollars in cash immediately
  - One penny on the first day, two pennies on the second day, and so on, doubling the amount they receive each day for a month

Students should write down their choices before starting any calculations. To increase suspense, students will calculate the amount one week at a time, using a table like the one below. Students should explain the operation used in each column and read amounts aloud for practice identifying place values. Ask if any students would like to round the value to the nearest dollar (from \$1.28 to \$1.00) at the beginning of the second week so they don't have to keep track of so many pennies. Students who choose this will continue the same process with whole dollar amounts, knowing that they might lose some money. At the end of the activity, discuss the difference between the results for those who opted for a million up front, those who rounded after week 1, and those who continued doubling the original amount without rounding.

#### **Week 1**

<b>Day</b>	<b>Amount collected each day</b>	<b>Total amount collected</b>
1	\$0.01	\$0.01
2	\$0.02	\$0.03
3	\$0.04	\$0.07
4	\$0.08	\$0.15
5	\$0.16	\$0.31
6	\$0.32	\$0.63
7	\$0.64	\$1.27

- The following story problems use the basic operations including the order of operations. Students will write a mathematical expression to demonstrate how they solved the problems along with their solutions.

*A veterinarian wants to be sure that she has enough dog food available. She will be taking care of four dogs. The amount of food each dog eats per day is listed below:*

- one pug: 1 cup of food
- two terriers: 2 cups of food each
- one German shepherd: 4 cups of food

*How many cups of food will she need to feed all four dogs for the day?*

Students will determine the proper operations and remember to follow the order of operations as they calculate the answer. After they have finished, students will discuss their results and the expressions they wrote to solve the problem. Students will then write mathematical expressions to demonstrate how they solved the problem along with their solutions.

*The next day the veterinarian will be taking care of five dogs. The amount of food each dog eats per day is listed below:*

- the same two terriers: 2 cups of food each
- one collie: 3 cups of food
- two Tibetan mastiffs: 7 cups of food each

*The veterinarian has 30 cups of food remaining. How many cups will she have left after feeding all five dogs for the day? If she splits the remaining food equally among three containers, how many cups of food will there be in each container?*

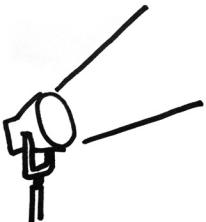
Further support can be found in the GPS Mathematics Framework:

Unit 1: Numeration; Unit 2: Multiplication and Division; and Unit 5: Fractions and Decimals.

The Mathematics Framework documents are available at  
**[www.georgiastandards.org/mathframework.aspx](http://www.georgiastandards.org/mathframework.aspx)**



## Activities



### 2 Measurement

*Georgia Performance Standards M4M1 and M4M2*

Within the Measurement domain, students will know and use metric and standard units (grams, kilograms, ounces, pounds, and tons) to measure the weight of objects. They will compare one unit to another within a single system of measurement. Students will use tools (e.g., protractor, angle ruler) and other methods (e.g., paper folding, drawing a diagonal in a square) to measure angles. They will understand the meaning of a half rotation ( $180^\circ$ ) and a full rotation ( $360^\circ$ ).

The following activities develop skills in this domain:

- Students will compare different units of weight within the standard system using an everyday object. Tell students the following about what happened to the penny before they were born. Explain that even though all pennies look alike, they are not all the same. Pennies made before 1983 are 95% copper and 5% zinc. To cut the cost of making them, pennies made after 1983 are 97.6% zinc and only 2.4% copper. (Pennies made in 1983 can be either.) If there is access to a scale that can measure ounces, weigh 25 pennies from 1983 or later and compare them with 25 pennies from 1982 or earlier. If not, use the following base weights:
  - 1982 or earlier pennies: 25 weigh about 2.7 oz
  - 1984 or later pennies: 25 weigh about 2.2 oz

From this information, students should work out why the pennies weigh different amounts. They should ascertain, through questioning, that zinc weighs slightly more than copper.

Students will use these base weights to determine the weights of larger groups of pennies. Students should find answers to the following questions:

- *If you had \$1.00 in 1979 pennies, what would be the total weight in ounces? In pounds?*
- *If you had \$8.00 in 1999 pennies, what would be the total weight in ounces? In pounds?*
- *If you had \$20.00 in pennies with half from 1979 and half from 1999, how much would they weigh in ounces? In pounds?*

To extend the activity, students should figure out how much one ton of each type of penny would be worth in dollars.

- Using the weights of common objects is a fun way to estimate with standard and metric units. Choose a number of objects that cover a wide range of weights and find or print pictures of them from a magazine, a newspaper, or the Internet. Here are a few examples:

- Hen’s egg (large): about 2 oz or 57 g
- Mobile phone: about 8 oz or 227 g
- Gallon of milk: about 8.5 lbs or 3.9 kg
- Refrigerator: about 150 lbs or 68 kg
- Mid-size motorcycle: about 450 lbs or 204 kg
- Adult milk cow: about 1,400 lbs or 635 kg
- 62-passenger school bus: about 10 tons or 9,071 kg
- Mid-size passenger jet: about 45 tons or 41,145 kg

Show students the objects without listing their weights. Students should choose the appropriate unit of weight for each, in both metric (grams, kilograms) and standard (ounces, pounds, tons) measures. Students will share results and discuss the reasoning behind each of their choices. Share the actual weights with students and confirm the appropriate unit for each.

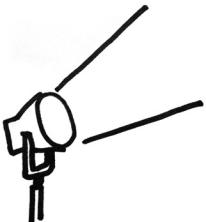
- Students will develop skills measuring angles with tools using drawings of real-world structures. Provide copies of drawings of buildings or other everyday items found in books and magazines on architecture and interior design at the local library or on the Internet. Choose images that contain a variety of shapes and angle measures distinct enough for students to work with. Use a magic marker to outline common shapes and various angles found on each drawing. Students will identify each shape and use a protractor or angle ruler to measure each angle. Students should compare and discuss their findings.

Further support can be found in the GPS Mathematics Framework:  
Unit 3: *Angle and Weight Measurement*.

The Mathematics Framework documents are available at  
[www.georgiastandards.org/mathframework.aspx](http://www.georgiastandards.org/mathframework.aspx)



## Activities



### ③ Geometry

*Georgia Performance Standards M4G1, M4G2, and M4G3*

Within the Geometry domain, students will classify and identify triangles by their angles. They will describe parallel and perpendicular lines in plane geometric figures. Students will examine and classify quadrilaterals (including parallelograms, squares, rectangles, trapezoids, and rhombi) and compare and contrast the relationships among them. They will compare and contrast a cube and a rectangular prism in terms of the number and shape of their faces, edges, and vertices. Students will describe parallel and perpendicular lines and planes in connection with the rectangular prism. They will construct and collect models for solid geometric figures (cube, prism, cylinder, etc.). Students will also understand, locate, graph, and apply points in the first quadrant in the coordinate plane and name the ordered pairs.

The following activities develop skills in this domain:

- Students will improve understanding of ordered pairs in the coordinate plane by physically moving to different points on a large grid. Use masking tape to create x- and y-axes that form the first quadrant of a coordinate plane on a floor with square tiles. Each tile will represent one unit on the grid. Label positive values from 1 through 10 on each axis, and the origin at the point  $(0, 0)$ . If an outdoor play area is more convenient, create the grid using chalk. Using spinners or pieces of paper drawn from a hat, students will generate two values between 1 and 10. Students will write down a coordinate pair, using the first number as the x-value and the second as the y-value. A student will move to the grid and stand on the origin. He or she should then walk to his or her point one unit at time to the right of and then above the origin, stopping at the locations matching his or her ordered pair.
- To describe parallel and perpendicular lines and planes in a rectangular prism, students will work with box-shaped objects. Gather several cereal boxes, shoe boxes, and other real-life examples of rectangular prisms. Students will examine each object and identify pairs of parallel and perpendicular lines. Students should be able to explain their choices by showing how a pair of lines displays the characteristics of parallels or perpendiculars. Next, students will create a list of other objects they encounter that have parallel and perpendicular lines, such as comb teeth, bookshelves, street intersections, and railroad tracks. Students will create and label simple drawings for each object to reinforce the concepts of parallel and perpendicular lines.
- Students will examine and classify quadrilaterals as they play a game of elimination using the attributes of figures. On a piece of blank white copy paper, draw a set of 10 figures: 2 parallelograms, 2 squares, 2 rectangles, 2 trapezoids, and 2 rhombi. Vary the order of figures so that pairs of the same figure are not necessarily adjacent and not identical in size and orientation. Make copies of the sheet to hand out to students. On the board or on a piece of posterboard, draw a large example of each of the five types of shapes with

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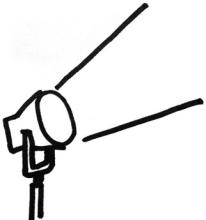
space below each to fill in attributes as the game progresses. Play a game where figures are eliminated based on the presence or absence of a given attribute. For example, if the first attribute is *I am a figure with 2 sets of parallel sides* students should cross off the two rhombi. If the second attribute is *I am a figure with 4 right angles* students should cross off the 2 parallelograms and the 2 trapezoids. As each shape is eliminated, students should state what attribute(s) they used to make their decisions, and write the attribute(s) under the same shape on the board. Depending on the given attributes, students may end up with only one pair or more than one pair of shapes. Since each shape differs slightly in size or orientation from its partner, the students will develop an understanding of how figures differ by attributes rather than merely appearance. Repeat using different attributes or different sheets of shapes, building the attribute lists on the board as the activity progresses.

Further support can be found in the GPS Mathematics Framework:  
Unit 4: *Coordinate Geometry and Graphs*.

The Mathematics Framework documents are available at  
**[www.georgiastandards.org/mathframework.aspx](http://www.georgiastandards.org/mathframework.aspx)**



## Activities



### 4 Algebra

*Georgia Performance Standard M4A1*

Within the Algebra domain, students will understand and apply patterns and rules to describe relationships and solve problems. They will write and evaluate mathematical expressions, using symbols (such as  $\square$  or  $\triangle$ ) and different values to represent unknown quantities.

The following activities develop skills in this domain:

- To apply writing and evaluating expressions using symbols, show students a page from any monthly calendar. One student should pick any four dates that form a square (as shown by the shaded area below), keeping the choice secret. The student should find the total when the four dates are added together. Using the example below, the student's total would be  $10 + 11 + 17 + 18 = 56$ . The student will read just the total out loud. On a small sheet of paper, quickly divide the total by 4 and then subtract 4. Impress the student by revealing the first of the four dates he or she chose. Reveal to students that using algebra is the secret to the trick. Represent the first unknown value with the symbol  $\triangle$ . Through questioning, students will understand the relationships of the other three numbers to the first unknown value. They should discover that they may represent the other unknown dates using the same symbol: the second unknown will be  $\triangle + 1$ ; the third will be  $\triangle + 7$ ; and the fourth will be  $\triangle + 8$ . Students will write an expression to show the relationship between the four unknowns and the sum of the chosen dates:  $\triangle + (\triangle + 1) + (\triangle + 7) + (\triangle + 8) = \text{Sum of the Chosen Dates}$ . Fill in the total and solve for  $\triangle$ . The result is the value of the first date. Students should use different blocks of dates.

1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

- Students will develop their ability to understand and apply patterns by solving word problems such as the one shown below:

*A band is going to march in a parade. The first row has 1 flute player, the second row has 2 saxophone players, the third row has 3 trumpet players, and so on. If there are a total of 10 rows and the same pattern continues for all rows, how many band members are marching in the parade?*

Students should develop the pattern using numbers, pictures, or pattern blocks and add to find the total. Students should answer the question, *What if*

*the band director adds 5 new rows of members following the same pattern?*

After students have found the solution, they should work with another pattern formed by an odd number of members in each row: the first row with 1 flute player, the second row with 3 saxophone players the third row with 5 trumpet players; and so on. Students should develop a pattern to find the total for 10 rows and then for 15 rows of band members.

- Students will use symbols to represent unknowns by matching the correct number sentence to a given situation. Write a number sentence for each operation: addition, subtraction, multiplication, and division. Think of a few real-life situations to match each number sentence. Keep the fixed numbers consistent in each number sentence so that students will not be able to match on that basis alone. Here are some examples:

- Expression:  $\Delta = 12 \div 4$ 
  - Situation: *4 students share 12 pizzas equally. How many pieces does each student get?*
  - Situation: *A coach has each of 4 basketball players run the same number of laps. The total number of laps they run is 12. How many laps does each basketball player run?*
  - Situation: *Alicia rents 4 videos each costing the same amount. She spends a total of \$12. How much does each video rental cost?*
- Expression:  $12 = 4 + \square$ 
  - Situation: *Jon has 12 marbles. 4 of them are red and the rest are blue. How many marbles are blue?*
  - Situation: *Marcus is 12 years old. Tonya is 4 years younger than Marcus. How old is Tonya?*
  - Situation: *Arturo looks at his watch and sees that it is 12:00 p.m. He started work four hours ago. What time did he start work?*

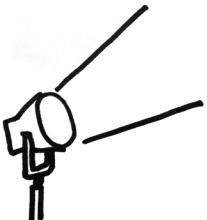
Write copies of each number sentence on three or four strips of paper and tape them up on the board. Divide students into teams. Read one of the real-life situations out loud. Once a team is ready, select a member of the team to come to the board and choose the matching number sentence. Students should explain how the number sentence matches the situation. Students can remove correct matches from the board. Continue until all situations have been matched.

Further support can be found in the GPS Mathematics Framework:  
Unit 6: *Algebra*.

The Mathematics Framework documents are available at  
[www.georgiastandards.org/mathframework.aspx](http://www.georgiastandards.org/mathframework.aspx)



## Activities



### 5 Data Analysis

Georgia Performance Standard M4D1

Within the Data Analysis and Probability domain, students will gather, organize, and display data in bar graphs, line graphs, and pictographs. They will investigate the features and tendencies of graphs and compare different graphical representations for a given set of data. Students will identify missing information and duplications in data.

The following activities develop skills in this domain:

- Students will improve skills representing data in line graphs by watching and recording the growth of a plant in the classroom. Choose a fast-growing plant that is easy to care for in the classroom (e.g., corn, *Brassica rapa*, marigolds, mung beans). Students will measure the height of the plant in centimeters every Monday, Wednesday, and Friday, and record the results in a table. At the end of the chosen period of time, they should represent their results in a line graph. Students should choose a title for the graph. Ask the students what measurement should be represented on the vertical scale and what should be represented along the bottom of the graph. Ask students what the line of the graph represents and what they think would happen to the line if they continued to measure the growth of the plant.
- To develop students' abilities to identify missing information in graphs of data, gather up a number of examples of bar graphs and pictographs. Make a photocopy of each graph and then remove one piece of information. For instance, cut out the labels from one axis or tape a piece of white paper over the key. After altering each graph, make another copy so that the changes won't be obvious. Divide students into teams. Hold up an altered graph and award points to the first team that identifies what is missing from the graph. Students should develop questions about the graph that cannot be answered without the missing information. For instance, a bar graph about weather is missing labels showing the type of weather indicated by each bar, so the question *How many days did it rain during the month?* cannot be answered. Students should also develop questions that can still be answered using the graph. In the example above, students can still answer the question *How many different types of weather were observed?*
- Students will improve the ability to compare different graphical representations of a given set of data by evaluating their own data shown in different forms. On one sheet of paper, list tables of data collected in previous student work. On another sheet create a graph representing each data table: a pictograph (e.g., using previously collected data about the number of students participating in each of four sports), a bar graph (e.g., using data about attendance at the school talent show in each of the last five years), or a line graph (e.g., using data about the high temperature each day over the course of a week). To save time, use a spreadsheet program or tools for creating graphs that you can easily find on the Internet. Label each data table with a large colored letter, and each graph with a large colored number.

Spread all sheets out on a large, flat surface. Students will choose a data table, find its matching graph, and explain how they made their choices. Students should answer questions about the features of each graph, such as *What do the numbers at the bottom of the graph represent?* or *What is the title of the graph?* Next, have at least one example prepared that shows the same data set represented by more than one graph. Students should compare the features of the different graphs.

Further support can be found in the GPS Mathematics Framework:  
Unit 4: *Coordinate Geometry and Graphs*.

The Mathematics Framework documents are available at  
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## Practice Quiz



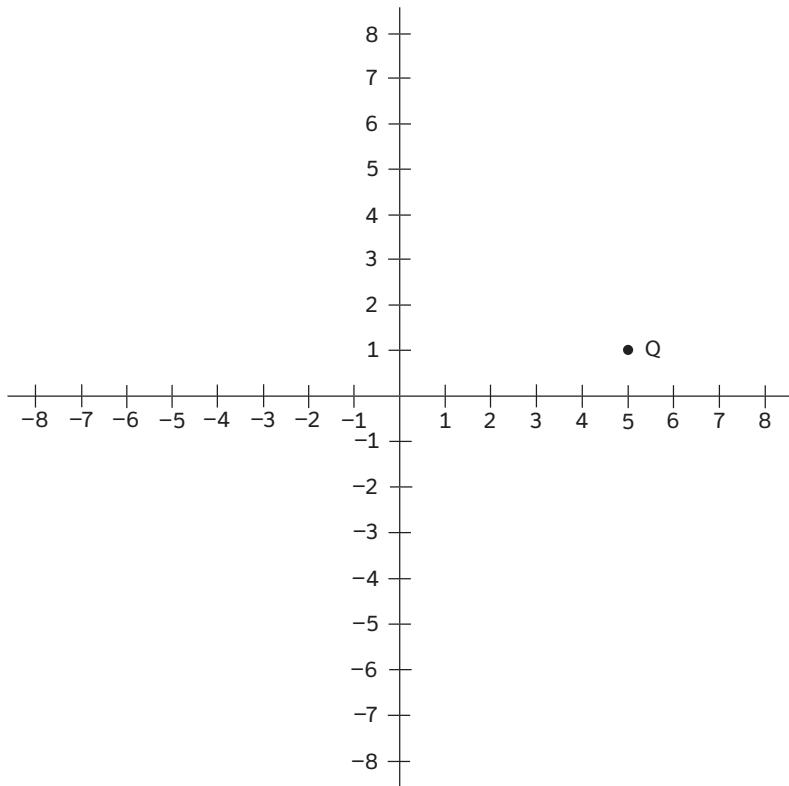
- 1 Milton bought a video game for \$50.25 and a pack of trading cards for \$5.55. How much, to the nearest dollar, did Milton spend in all?
  - A \$55.00
  - B \$55.80
  - C \$56.00
  - D \$60.00
  
- 2 Mira is putting 100 colored pencils into boxes. Each box holds 16 pencils. How many boxes are needed to hold ALL of Mira's pencils?
  - A 4
  - B 5
  - C 6
  - D 7
  
- 3 Cathy has 1.3 ounces of dried cherries. Marley has 0.76 ounces of dried cherries. How many more ounces of dried cherries does Cathy have than Marley?
  - A 0.54 ounces
  - B 0.63 ounces
  - C 0.89 ounces
  - D 1.46 ounces
  
- 4 For a recipe, Julius used cups of  $2\frac{1}{3}$  white flour and  $1\frac{1}{3}$  cups of whole-wheat flour. Which improper fraction shows the total amount of flour he used?
  - A  $\frac{5}{3}$
  - B  $\frac{11}{6}$
  - C  $\frac{7}{3}$
  - D  $\frac{11}{3}$

- 5 Solve.

$$18 + 6 \div (3 + 3) =$$

- A 4
- B 18
- C 19
- D 23

- 6 Lenny took three of his textbooks home one night. He wanted to find how much his backpack weighed. Which of these units is **MOST APPROPRIATE** for measuring the weight of Lenny's backpack?
- A tons  
B grams  
C pounds  
D ounces
- 7 Wanda drew a triangle that had two  $45^\circ$  angles and one  $90^\circ$  angle. What type of triangle did Wanda draw?
- A right  
B acute  
C obtuse  
D equiangular
- 8 Point Q is in the first quadrant of the coordinate system.

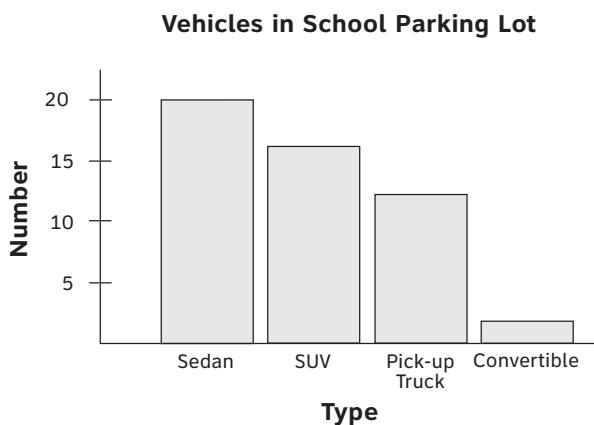


Which ordered pair represents point Q?

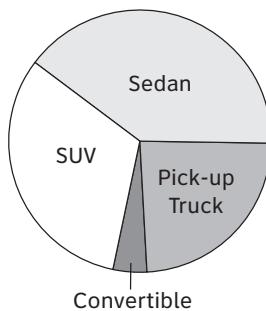
- A (1, 5)  
B (5, 1)  
C (-1, -5)  
D (-5, -1)



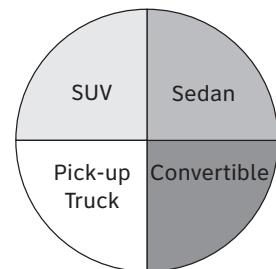
- 9 Arin and Morgan are saving quarters. Arin has  $\triangle$  quarters, and Morgan has 17 quarters. Which expression shows the number of quarters they have together?
- A  $\triangle + 17$   
 B  $\triangle - 17$   
 C  $\triangle \times 17$   
 D  $\triangle \div 17$
- 10 Which circle graph represents the same data as presented in the bar graph?



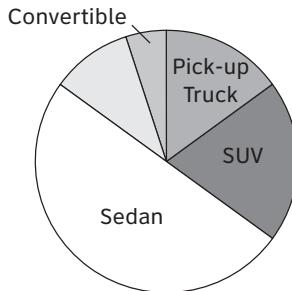
A **Vehicles in School Parking Lot**



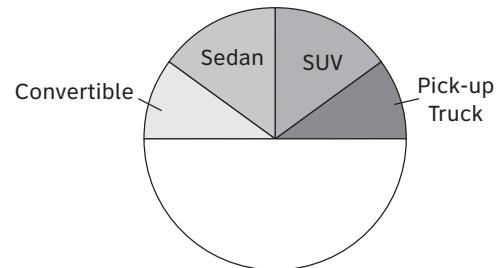
B **Vehicles in School Parking Lot**



C **Vehicles in School Parking Lot**



D **Vehicles in School Parking Lot**



## Solutions

Number	Correct Answer	Explanation
1	<b>C</b>	<p><i>Represent the results of computation as a rounded number when appropriate and estimate a sum or difference by rounding numbers. (M4N2d)</i></p> <p>The correct answer is <b>Choice (C) \$56.00</b>. The sum of \$50.25 and \$5.55 is \$55.80. Dollar values ending in .50 or greater are rounded up, so the total rounded to the nearest dollar is \$56.00. Choice (A) is incorrect because \$55.00 is the result when rounding down, not up. Choice (B) is incorrect because \$55.80 is the exact value before rounding. Choice (D) is incorrect because \$60.00 is rounded to the nearest ten dollars, not the nearest dollar.</p>
2	<b>D</b>	<p><i>Solve problems involving division by a 2-digit number (including those that generate a remainder). (M4N4b)</i></p> <p>The correct answer is <b>Choice (D) 7</b>. To find out how many boxes Mira needs, divide the number of pencils by the number of pencils each box can hold: <math>100 \div 16</math>. The result is 6 full boxes and 4 pencils left over. To hold <i>all</i> of the pencils, 7 boxes are needed. Choices (A), (B), and (C) are incorrect because they are all too small. Choice (C) is closest, but doesn't account for the box needed to hold the 4 pencils left over.</p>
3	<b>A</b>	<p><i>Add and subtract both one- and two-digit decimal fractions. (M4N5c)</i></p> <p>The correct answer is <b>Choice (A) 0.54 ounces</b>. The phrase "How many more...than" is a cue to subtract the smaller value from the larger value: <math>1.30 - 0.76 = 0.54</math>. Choice (B) is incorrect because 0.63 is the result of mistakenly moving the decimal and subtracting 0.13 from 0.76. Choice (C) is incorrect because 0.89 is the result of the <i>addition</i> of 1.30 and 0.76. Choice (D) is incorrect because 1.46 is greater than each original amount.</p>



Number	Correct Answer	Explanation
4	D	<p>Convert and use mixed numbers and improper fractions interchangeably. (M4N6c)</p> <p>The correct answer is <b>Choice (D) <math>\frac{11}{3}</math></b>. Since the question asks for an improper fraction, represent each mixed number as an improper fraction with a like denominator: <math>2\frac{1}{3} = \frac{7}{3}</math> and <math>1\frac{1}{3} = \frac{4}{3}</math>. Next, add the two values: <math>\frac{7}{3} + \frac{4}{3} = \frac{11}{3}</math>. Alternately, add the whole numbers together, then add the fractions together, and finally convert result to an improper fraction. Choice (A) is incorrect because <math>\frac{5}{3}</math> is less than the original amount of white flour. Choice (B) is incorrect because <math>\frac{11}{6}</math> results from improperly adding the denominators. Choice (C) is incorrect because <math>\frac{7}{3}</math> is the amount of white flour, not the total.</p>
5	C	<p>Compute using the order of operations, including parentheses. (M4N7b)</p> <p>The correct answer is <b>Choice (C) 19</b>. Use the order of operations to solve, starting with the values inside the parentheses, moving on to division, and finally performing addition: <math>18 + 6 \div (3 + 3) = 18 + 6 \div 6 = 18 + 1 = 19</math>. Choice (A) is incorrect because 4 is the result of adding <math>18 + 6</math> before dividing <math>6 \div 6</math>. Choice (B) is incorrect because 18 results from incorrectly dividing 6 by 6 and getting 0. Choice (D) is incorrect because 23 results from performing division before solving the contents of the parentheses.</p>
6	C	<p>Know units used to measure weight (gram, kilogram, ounces, pounds, and tons). (M4M1b)</p> <p>The correct answer is <b>Choice (C) pounds</b>. The weight of three textbooks and a backpack is most likely between 5 and 10 pounds. Choice (A) is incorrect because tons is a unit used for very large weights (1 ton = 2000 lb). Choices (B) and (D) are incorrect because grams and ounces are units used for very small weights.</p>

<b>Number</b>	<b>Correct Answer</b>	<b>Explanation</b>
7	<b>A</b>	<p><i>Examine and compare angles in order to classify and identify triangles. (M4G1a)</i></p> <p>The correct answer is <b>Choice (A) right</b>. The measure of a right angle is <math>90^\circ</math> and any triangle containing a right angle is a right triangle. Choice (B) is incorrect because in an <i>acute</i> triangle all angles must be less than <math>90^\circ</math>. Choice (C) is incorrect because in an <i>obtuse</i> triangle one angle must be greater than <math>90^\circ</math>. Choice (D) is incorrect because an <i>equiangular</i> triangle must have three equal angles of <math>60^\circ</math>.</p>
8	<b>B</b>	<p><i>Understand and apply ordered pairs in the first quadrant of the coordinate system. (M4G3a)</i></p> <p>The correct answer is <b>Choice (B) (5, 1)</b>. Points in the first quadrant have positive <math>x</math> and <math>y</math> coordinates. Point Q is located further to the right of the <math>y</math>-axis than it is above the <math>x</math>-axis, which indicates that its <math>x</math>-coordinate should be larger than its <math>y</math>-coordinate. Choice (A) is incorrect because (1, 5) indicates the point is further above the <math>x</math>-axis than it is right of the <math>y</math>-axis, and may indicate the student has the <math>x</math> and <math>y</math> coordinates confused. Choices (C) and (D) are incorrect; each has negative values for the <math>x</math> and <math>y</math> coordinates, which would indicate that they lie in the third quadrant.</p>
9	<b>A</b>	<p><i>Represent unknowns using symbols, such as <math>\square</math> and <math>\triangle</math>. (M4A1b)</i></p> <p>The correct answer is <b>Choice (A) <math>\triangle + 17</math></b>. The phrase "shows the number of quarters they have together" indicates the need to add Arin's quarters (<math>\triangle</math>) and Morgan's quarters (17). Choices (B) and (D) are incorrect because <math>\triangle - 17</math> and <math>\triangle \div 17</math> would both be smaller than Arin's original amount. Choice (C) is incorrect because <math>\triangle \times 17</math> uses multiplication rather than addition.</p>



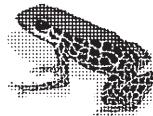
Number	Correct Answer	Explanation
10	A	<p><i>Compare different graphical representations for a given set of data. (M4D1c)</i></p> <p>The correct answer is the circle graph in <b>Choice (A)</b>. There are far fewer <i>Convertibles</i> than any other vehicle type, so the <i>Convertible</i> slice should be much smaller than the others. There are roughly 20 <i>Sedans</i>, 16 <i>SUVs</i>, and 14 <i>Pick-ups</i>, so the <i>Sedan</i> slice should be slightly larger than the <i>SUV</i> slice, which should be slightly larger than the <i>Pick-up</i> slice. Choice (A) is the only option with four slices that matches this description. Choice (B) is incorrect because the size of the <i>Convertible</i> slice is the same as the <i>Sedan</i> and <i>SUV</i> slices, which would indicate that there are as many <i>Convertibles</i> as there are <i>Sedans</i> or <i>SUVs</i>. Choices (C) and (D) are incorrect; each has five slices, which would indicate that there are five different kinds of vehicles in the parking lot.</p>



**Science**



## Chapter 4



# Science

Grade 4 students differentiate between observations and ideas, and speculate about observations they make. They list common materials for making simple mechanical constructions and for repairing things. Grade 4 students use records, tables, or graphs to identify patterns of change. They write instructions and make sketches that allow others to carry out a scientific procedure. They determine whether or not a comparison is fair, if conditions are different for each thing being compared, and question claims or statements made by people outside their field of expertise (such as “4 out of 5 dentists say....”). They know that safety is a fundamental concern in all experimental science and adhere to rules and guidelines to show they are responsible with materials and equipment. Grade 4 students gather and interpret data. They add, subtract, multiply, and divide whole numbers on paper, mentally, and with calculators. They are able to construct meaningful models that allow them to gain understandings of the natural world, and are active learners. They do not simply read about science; they *do* science. As a result, they are able to differentiate observations from ideas and engage in investigations inside and outside the classroom.

Students in Grade 4 will use models in the study of interactions and interdependence of ecosystems. They will gain a basic understanding of how weather relates to the stages of the water cycle. Students will investigate the stars in the universe and our solar system. They will look at characteristics of sound and light, and how they interact with the environment.

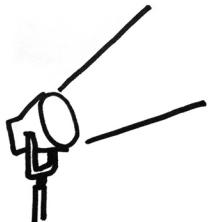
The Science activities focus on some of the concepts that are assessed on the Grade 4 CRCT Science domains. These domains are as follows:

- 1 Earth Science**
- 2 Physical Science**
- 3 Life Science**

The *Characteristics of Science* skills are integrated throughout the domains. These skills are co-requisites 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.

## Activities



### 1 Earth Science

*Georgia Performance Standards S4E1, S4E2, S4E3, and S4E4*

Within the Earth Science domain, students are expected to investigate the stages of the water cycle and how each stage is formed, by relating it to the states of water. They will understand how clouds are formed and learn about the use of weather instruments in predicting weather. Students will study stars in the universe and our solar system by observing stars in the night sky. They will use various texts and media resources to learn about the number, colors, sizes, and positions of stars in the sky. They will also identify constellations and planets in our solar system according to appearance, position, and number, as viewed in the night sky. They will compare and contrast planets and stars using reference materials and models to explore their relative size and order from the sun. They should describe relationships involving the Earth, moon, and sun. Students will use models, graphic displays, and written reports to explain Earth's day/night cycle, phases of the moon, and seasonal changes on Earth.

The following activities develop skills in this domain:

- Creating a true scale model of the solar system will help students understand the differences among planets and their locations in space. Students will represent the solar system at a ten-billion-to-one scale. They will choose and measure objects (beads, pins, candy-coated chocolate candies, balls) to represent the Sun, asteroids, and planets, and attach them to large index cards or cardboard squares labeled with names and pertinent information (mass, diameter, etc.). For this activity, accompany students outdoors, where they will place each card along the ground, at distances that scale to actual distances from the Sun. At this scale, the distance is less than half a mile. Along the way, explain the characteristics of the terrestrial planets (Mercury, Venus, Earth, Mars), asteroids, and gas giants (Jupiter, Saturn, Uranus, Neptune). Discuss with students the differences between this model and other models of the solar system they have seen. The table on the next page may serve as a guide.

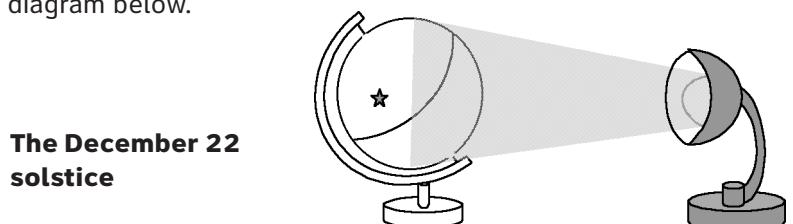


<b>Object</b>	<b>Scaled Diameter (cm)</b>	<b>Suggested Materials</b>	<b>Scaled Distance from Sun (m)</b>	<b>Scaled Distance from Previous Object (m)</b>
Sun	20	ball or balloon	0	0
Mercury	0.1	pinhead or small bead	9	9
Venus	0.2	candy or bead	16	7
Earth	0.2	candy or bead	24	8
Mars	0.1	pinhead or small bead	37	13
Asteroid belt (spreads out farther than this model shows)	varies	fine sand (sprinkled on a streak of glue)	56	19
Jupiter	2.3	gumball or small ball	124	87
Saturn	1.8	marble or pebble	226	102
Uranus	0.8	candy or bead	453	227
Neptune	0.8	candy or bead	710	257

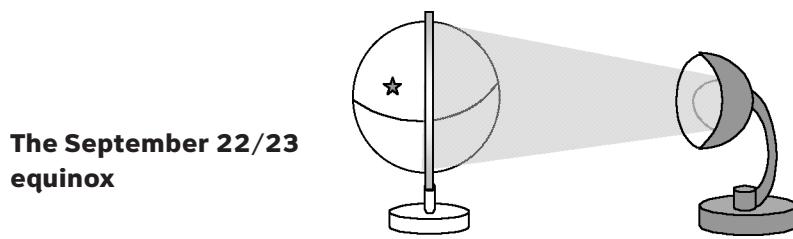
- Hands-on activities that demonstrate the evaporation and condensation of water will allow students to understand the water cycle. Students should fill a wide-mouth glass jar one-quarter full of room-temperature water. They should fill a second mason jar with the same amount of heated water (~130°F) and mark the water levels on the outside of the jars. Students will find that more of the warmer water will evaporate in a given amount of time. Students will also explore condensation using a chilled glass rod (or small glass, spoon, etc.) and a warm one. They will partially fill two jars with hot water, and then insert a glass rod into each. The cooler rod will have more water droplets on it. If a heat source is not available, placing one jar in a sunny window and one away from the window may show the same principle due to the heat from the sun. Next, demonstrate fog formation by filling a jar with a half-inch of very hot water and placing a strainer with crushed ice over the mouth of the jar. (First rinse the jar with hot water to equilibrate its temperature and prevent it from cracking.) Discuss how cooler temperatures lead to more condensation, while warmer temperatures encourage evaporation. Relate these observations to the water cycle. Ask, *Will more water evaporate in cool or warm weather? When will clouds be more likely to form?*



- A hands-on demonstration will help students better understand how Earth's tilt causes seasonal changes. Required materials for this activity include a small desk lamp or flashlight, a globe, and a marker (piece of clay or small flag) placed at Georgia's location on the globe. In a darkened room, position the lamp on a table so that the light is centered on the globe. Ask students, *What causes the seasons?* and discuss how the Northern and Southern Hemispheres have opposite seasons. Position the globe as on June 22 (the northern tip of the axis is toward the lamp) and spin the globe on its axis. Students should notice that Georgia spends more time in daylight than in darkness. Discuss how the reverse phenomenon occurs in the Southern Hemisphere, such as in South America. Repeat the demonstration for the remaining solstice (the northern tip of the axis positioned away from the lamp) and equinoxes (the axis tilted to the left and right of the lamp). See diagram below.



**The December 22 solstice**



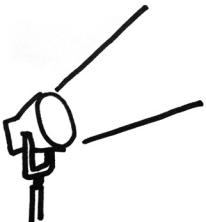
**The September 22/23 equinox**

Further support can be found in the GPS Science Framework:  
*The Stars and Our Solar System* and *Weather*.

The Science Framework documents are available at  
[www.georgiastandards.org/scienceframework.aspx](http://www.georgiastandards.org/scienceframework.aspx)



## Activities



### 2 Physical Science

Georgia Performance Standards S4P1, S4P2, and S4P3

Within the Physical Science domain, students are expected to describe how tools such as mirrors, prisms, and lenses affect light, and how sound is produced and changed. They are also expected to explain how simple machines are used. They will have a variety of experiences in getting objects to move or to stop moving, in changing the direction or speed of objects that are already in motion, and in exploring how simple machines use motion to make work easier. Students will understand that forces are the “pushes and pulls” that are responsible for movement in our world.

The following activities develop skills in this domain:

- Students can better understand the nature of forces by observing their effects in familiar situations, such as playground activities. Students will play tug-of-war to demonstrate pulling forces. (Note: In the interest of safety, this activity is best done in cooperation with an experienced physical education teacher.) Vary the number of students on each side of the rope to show the effect of unequal forces. Ask, *How did the different forces move the rope? What happened when there were more students on one side? Why?* Next, students will use swings to demonstrate how forces add together. Push a student on the swing and compare the effect to having a smaller student push a larger person on a swing. Ask, *Which caused the person on the swing to go higher? Why?* Student volunteers should hang by their arms from monkey bars or other climbing structures to observe the force of gravity acting on them. Students should feel the force on their arms as they pull themselves against gravity. Ask, *How does this compare to the tug of war? What force are you pulling against?* Discuss how gravity is a force pulling everything toward the Earth’s center.
- Observing simple machines in everyday use will help students better understand the function of these devices. Students will observe one simple machine (lever, pulley, wedge, inclined plane, screw, or wheel and axle) in use around them each day. In their journals, students will record answers to the following questions: *Which simple machine was used in this device? What was its function? How did it make work easier?* Students should draw or paste a picture of the device in their journals. For example, students may record that the lid on a jar of peanut butter features a screw (an inclined plane that winds around itself). Its function is to keep the lid attached to the jar. It makes work easier by allowing the lid to be attached and removed by turning it many times, instead of applying a large force all at once. Other examples of simple machines include hammers, bottle openers, bicycle wheels, knives, window blind pulls, and access ramps.

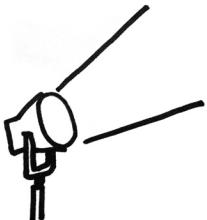
- Students will investigate how light behaves when it hits transparent, translucent, and opaque surfaces. They will use materials that differ in these qualities, such as an aluminum pie plate, clear plastic from a picture frame, large sunglasses, a glass of milk, a piece of cardboard, or waxed paper. To begin, students will aim a lamp or flashlight beam at a surface, such as a wall. They should then place each of the materials in the path of the beam and observe the effects on the light hitting the surface. Discuss with students that these materials can also be reflective (like the aluminum and plastic) or absorbent (like the cardboard).
- Performing a hands-on investigation of changes in pitch will help students to understand the nature of sound waves. (Emphasize safety as students perform this activity, and ensure that students wear safety goggles.) Students will stretch a large, strong rubber band across two pencils held parallel by a partner. They will pluck the rubber band to observe the sound it produces. They should stretch the rubber band to varying degrees by moving the pencils farther apart or closer together. They also should pluck the rubber band and note the effect of distance on the sound produced. Keeping the pencils the same distance apart, the person holding the pencils should change the length of the rubber band by pinching it along its length. Students should again investigate the resulting sounds. Students should then repeat the procedure using thinner or thicker rubber bands. They should observe the bands' vibrations and draw diagrams of the motion. Following the activity, discuss how the variations affected the sounds the bands produced.

Further support can be found in the GPS Science Framework: *Forces and Motion* and *Light and Sound*.

The Science Framework documents are available at  
[www.georgiastandards.org/scienceframework.aspx](http://www.georgiastandards.org/scienceframework.aspx)



## Activities



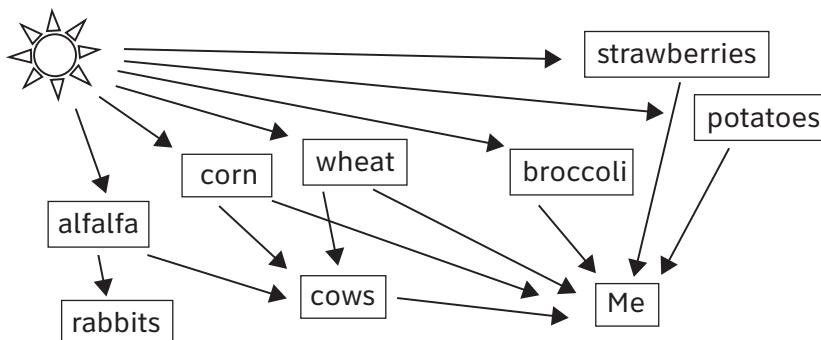
### 3 Life Science

Georgia Performance Standards S4L1 and S4L2

Within the Life Science domain, students should understand the roles of organisms, explain how energy moves in an ecosystem, and predict how changes to part of the system affect the other parts. Students will identify features that affect the survival of organisms and factors that may lead to their extinction.

The following activities develop skills in this domain:

- Students will better understand the energy relationships depicted by a food web if they include themselves in a web. Students should think about what organisms they eat and create a food chain or web that includes them. They should start with the sun and include some of their favorite foods. If students eat milk, eggs, or meat, they should include the foods that the animals feed on. (You may want to research with students common animal feed ingredients. For example, commercial chickens are fed anchovies, corn, and kelp, among other staples.) A sample food web is shown below. To find more specific or complex food webs, consult reference sources in a library or on the Internet.



- To learn about the relationships depicted by food chains and food webs, students will take part in an ecosystem simulation. Draw a food chain on an erasable board and write values representing population numbers beneath each organism or population. The numbers don't need to be exact, just an approximation (e.g., 100,000 for grass, 10,000 for crickets, 1,000 shrews, 100 hawks, etc.). Students will choose an event to begin the game (e.g., a drought reduces the amount of grass, more hawks are born one season, etc.). Change the relevant number (e.g., 50,000 for grass) and discuss how, because crickets eat grass, the cricket population will subsequently decrease. Ask, *Which other populations will now be affected? How will they change?* Simply estimate the numbers; the important point is that each population affects the other populations in the web. Reset the numbers when extinction occurs.

- Researching and characterizing adaptations will show students understand how specialized traits help organisms to survive. Students will create a *Wall of Adaptations* featuring various organisms with unusual traits. To create the *Wall of Adaptations*, divide a wall, bulletin board, or other large surface into the categories below. Throughout the year, students will use library and/or Internet resources to investigate organisms with various types of adaptations. Students will draw or find a picture of each organism and write a short description of how its adaptation helps it survive. Place students' work in the appropriate place on the wall. The chart below lists some common types of adaptations.

#### **Common Types of Adaptations**

<b>Energy-Related</b>	<b>Defense</b>	<b>Camouflage/Mimicry</b>	<b>Sensory</b>
hibernation	release unpleasant substances	skin or fur that blends in	sight
migration	hard outer shell	changing skin color to blend in	hearing
slow movement or specialized diet	poisonous bites or stings	body that looks like a common object	touch
heat-saving	bitter taste	body that looks like a similar, poisonous organism	smell
cooling	thorns or spines	other color or pattern that fools predators	other

- Learning about native species and their interdependence will lead to a better understanding of how producers and consumers interact in an ecosystem. Students will choose a Georgia habitat or ecosystem (e.g., marsh, coastal plain, etc.) and research six to ten organisms that inhabit it. Students will create posters showing how each ecosystem's organisms interact in a food web. Students should include feeding relationships as well as other ways that organisms depend on other types of organisms (e.g., the gopher tortoise burrows are also used by other creatures). Posters should show information about threats to particular species (e.g., pollution, hunting, climate changes) and how this would affect other populations (e.g., with fewer gopher tortoises, animals that depend on their burrows will have a harder time surviving).

Further support can be found in the GPS Science Framework: *Ecosystems*.

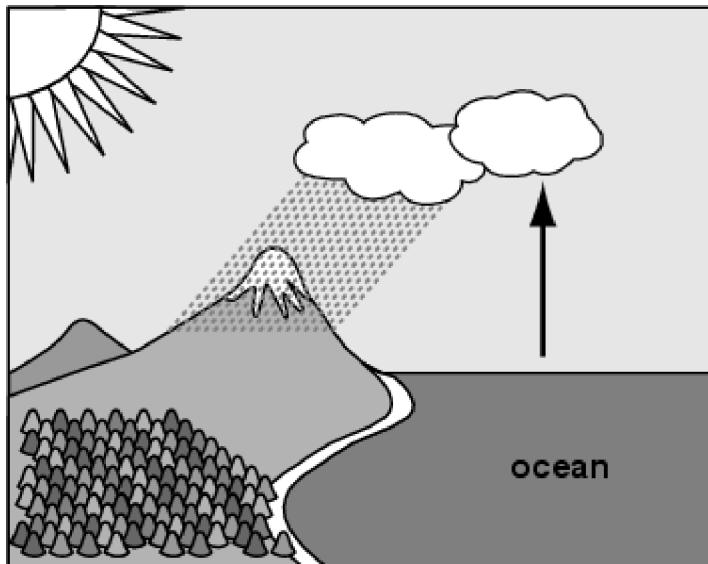
The Science Framework documents are available at  
[www.georgiastandards.org/scienceframework.aspx](http://www.georgiastandards.org/scienceframework.aspx)



## Practice Quiz



1 Look at the picture below.



**What causes the water vapor rising from the ocean to become a cloud?**

- A cooling of the air temperature
- B warming of the air temperature
- C cooling of the ocean temperature
- D warming of the ocean temperature

2 In a certain ecosystem, grass is scarce because of a lack of rain. Mice feed on grass. Snakes then eat the mice in the ecosystem. Which of these events MOST LIKELY describes what will happen to the ecosystem?

- A The population of mice will increase causing a decrease in the population of snakes.
- B The population of mice will increase causing an increase in the population of snakes.
- C The population of mice will decrease causing a decrease in the population of snakes.
- D The population of mice will decrease causing an increase in the population of snakes.

3 Which of the processes below BEST describes how a water droplet gets from the ocean to a cloud?

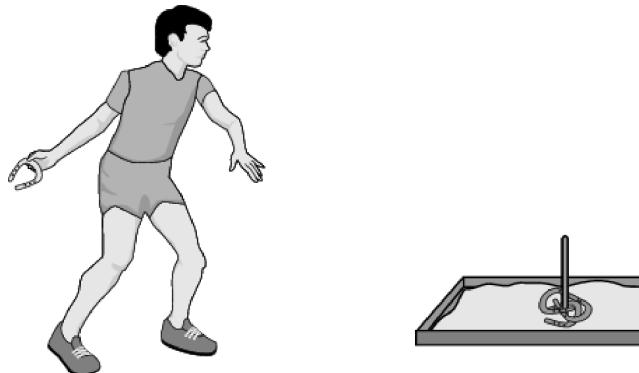
- A evaporation and then precipitation
- B precipitation and then evaporation
- C evaporation and then condensation
- D condensation and then evaporation



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- 4 **Mauricio heard a horn honk while he was walking to school. Later that day, he heard students whispering in the library. Which of the choices below describes how the two sounds are alike?**
- A They have the same pitch.
  - B They are the same volume.
  - C They make vibrations in air.
  - D They travel in a straight path.
- 5 **Helen uses a knife to cut an apple in half. What type of simple machine is the knife blade when it is used to cut the apple?**
- A lever
  - B pulley
  - C screw
  - D wedge
- 6 **Which organisms would be LEAST LIKELY to survive in a forest with ground predators?**
- A birds that are unable to fly
  - B mammals that have thick fur
  - C insects that live only underground
  - D lizards that are able to change colors
- 7 **A salamander is able to change its color to match its surroundings. How might this ability to change color help the salamander to survive?**
- A It keeps the salamander's body temperature cooler.
  - B It makes the salamander less likely to be seen by its predators.
  - C It helps the salamander to scare other animals.
  - D It allows the salamander to store more body fat.
- 8 **Garlic mustard is a plant that is not naturally found in Georgia. When it is brought into an area, it causes a decrease in the population of wildflowers normally found in the area, such as spring beauty and wild ginger. Which of these BEST describes another result of garlic mustard being brought into an area?**
- A The population of trees in the area would decrease.
  - B The population of butterflies in the area would increase.
  - C The population of animals that eat wild ginger would decrease.
  - D The population of animals that eat spring beauty would increase.



- 
- 9 The picture below shows Eli throwing a horseshoe.



Which of these causes the path of the horseshoe to curve downward after being thrown?

- A friction
  - B gravity
  - C magnetism
  - D wind
- 10 Every night, Jeff enjoys going outside to watch the objects in the sky. Which objects in the night sky are the farthest away from Jeff?
- A airplanes
  - B mars
  - C the Moon
  - D stars

## Solutions

Number	Correct Answer	Explanation
1	A	<p><i>Investigate how clouds are formed. (S4E3c)</i></p> <p>The correct answer is <b>Choice (A) cooling of the air temperature.</b> When air temperature cools, water vapor in the air condenses to form clouds. Choice (B) is incorrect because <i>warming of the air temperature</i> allows the air to hold more moisture, not less. Choices (C) and (D) are incorrect because <i>cooling or warming of the ocean temperature</i> affects the rate of evaporation, not cloud formation.</p>
2	C	<p><i>Predict effects on a population if some of the plants or animals in the community are scarce or if there are too many. (S4L1d)</i></p> <p>The correct answer is <b>Choice (C) the population of mice will decrease causing a decrease in the population of snakes.</b> Less grass to eat means fewer mice, which in turn means less food for the snake population. Choices (A) and (B) are incorrect because a shortage of grass will lead to a decrease, not an increase, in mice. Choice (D) is incorrect because fewer mice will cause a food shortage for the snakes, causing their population to decrease, not increase.</p>
3	C	<p><i>Explain the water cycle (evaporation, condensation, and precipitation). (S4E3d)</i></p> <p>The correct answer is <b>Choice (C) evaporation and then condensation.</b> Water droplets in the ocean evaporate to form water vapor, which then cools and condenses to form clouds. Choices (A) and (B) are incorrect because <i>precipitation</i> describes how water leaves a cloud. Choice (D) is incorrect because, in cloud formation, the evaporation allowing ocean water to move into the air must occur before <i>condensation</i>.</p>
4	C	<p><i>Investigate how sound is produced. (S4P2a)</i></p> <p>The correct answer is <b>Choice (C) They make vibrations in air.</b> All sound waves are vibrations in air or another medium. Choice (A) is incorrect because a horn honk and a whisper can have different pitches. Choice (B) is incorrect because a horn honk and a whisper differ in volume. Choice (D) is incorrect because sound waves do not travel only in straight lines.</p>



Number	Correct Answer	Explanation
5	D	<p><i>Identify simple machines and explain their uses (lever, pulley, wedge, inclined plane, screw, wheel, and axle). (S4P3a)</i></p> <p>The correct answer is <b>Choice (D) wedge</b>. A wedge is a modified incline plane that can be used to force something apart or open. The knife acts as a wedge when it forces the two halves of the apple apart. Choice (A) is incorrect because the knife does not act as a <i>lever</i> in this example; it is not being pivoted to move the apple. Choices (B) and (C) are incorrect because a knife does not act as a <i>screw</i> or a <i>pulley</i>.</p>
6	A	<p><i>Identify factors that may have led to the extinction of some organisms. (S4L2b)</i></p> <p>The correct answer is <b>Choice (A) birds that are unable to fly</b>. These birds would be vulnerable to predators on the ground in a forest. Choice (B) is incorrect because thick fur serves to protect mammals. Choice (C) is incorrect because insects can avoid predators by living underground. Choice (D) is incorrect because a lizard can hide from ground predators by changing its color.</p>
7	B	<p><i>Identify external features of organisms that allow them to survive or reproduce better than organisms that do not have these features (for example: camouflage, use of hibernation, protection, etc.). (S4L2a)</i></p> <p>The correct answer is <b>Choice (B) It makes the salamander less likely to be seen by its predators</b>. Camouflage helps an organism match its surroundings and hide from predators. This adaptation does not Choice (A) keep its <i>body temperature cooler</i>, Choice (C) help it to <i>scare other animals</i>, or Choice (D) allow it to <i>store more body fat</i>.</p>



Number	Correct Answer	Explanation
8	<b>C</b>	<p><i>Predict how changes in the environment would affect a community (ecosystem) of organisms. (S4L1c)</i></p> <p>The correct answer is <b>Choice (C) The population of animals that eat wild ginger would decrease.</b> A decrease in wild ginger will reduce the food available to animals that eat it, resulting in a population decrease for those animals. Choice (A) is incorrect because the introduction of garlic mustard reduces wildflower populations, not tree populations. Choice (B) is incorrect because butterfly populations will not increase if native wildflower species decrease. Choice (D) is incorrect because a decrease in spring beauty will cause animals that rely on it for food to <i>decrease</i> in population rather than increase.</p>
9	<b>B</b>	<p><i>Demonstrate the effect of gravitational force on the motion of an object. (S4P3d)</i></p> <p>The correct answer is <b>Choice (B) gravity.</b> Though the force from the throw propels the horseshoe toward the stake, the gravitational force pulls it toward the ground. Choice (A) is incorrect because <i>friction</i> may slow the motion of an object, but it does not pull objects toward the ground. Choice (C) <i>magnetism</i> is incorrect because magnets are not involved. Choice (D) is incorrect because <i>wind</i> does not pull things toward the ground.</p>
10	<b>D</b>	<p><i>Compare the similarities and differences of planets to the stars in appearance, position, and number in the night sky. (S4E1b)</i></p> <p>The correct answer is <b>Choice (D) stars.</b> Stars occur throughout the universe and are therefore farthest away from Jeff. The closest star visible in the night sky lies outside of our solar system. Choice (A) <i>airplanes</i> is incorrect because they travel within the Earth's atmosphere. Choice (B) <i>Mars</i> is incorrect because it lies within our solar system. Choice (C) <i>the moon</i> is incorrect because it orbits the Earth.</p>



