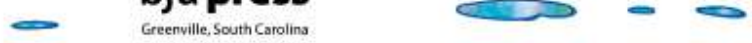


# Teacher Edition



Fourth Edition



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## Review Features

### Daily Review

#### Practice and Review Activities

Practice and Review activities are included in every lesson so that the students are continually practicing the essential skills from this grade level and furthering their understanding. These activities may be scheduled for any time during the day.

#### Activities

The Activities workbook provides two pages of optional practice for each lesson. The first page reinforces the Worktext lesson and may be used to assess daily grades. The second page provides a spiral review of concepts as well as standards-based strategies and skills.

### Review by Chapter

#### Chapter Sequence

The chapter sequence helps the students develop a deeper conceptual knowledge of the core topics presented at this grade level. This sequence allows connections to be made and enables the students to review and build upon previously taught concepts as they develop new math skills.

### Chapter Review

The Chapter Review provides an overview of the main concepts of the chapter. Chapter Review pages can be used as a study guide for the Chapter Test.

#### Cumulative Review

The Cumulative Review pages are located at the end of each chapter in the Activities book. Use these pages to review math concepts and evaluate which essential skills need reteaching. A *Cumulative Review Answer Sheet* (Teacher Resources) is available for your students to practice the standardized test format.

#### Fact Reviews

Fact Reviews are provided to help your students work toward fact memorization. Daily fact practice should include a variety of practice methods, such as using flashcards, games, and written practice. Speed drills are available at [AfterSchoolHelp.com](http://AfterSchoolHelp.com).

### Review in the Classroom

If available, computer-based apps and games may be used for review. Visit [TeacherToolsOnline.com](http://TeacherToolsOnline.com) for additional review ideas.



## New to This Edition

### STEAM

Each chapter features a special lesson that emphasizes science, technology, engineering, arts, and math (STEAM). Each STEAM lesson is intended to pique students' interest as they collaborate to solve a problem through inquiry, active learning, and creativity.

### Biblical Worldview Shaping

The STEAM lesson of each chapter focuses on a biblical worldview truth. While identifying and solving a real-world problem, students learn how math shows that our world is designed and how it helps us to do work, make wise choices, and help others.

### Chapter Information

This section at the beginning of each chapter indicates the type of foundational knowledge the chapter builds upon and provides helpful information pertaining to the chapter.

### Lesson Focus

For every lesson, this book offers a Lesson Focus, which is to be conveyed to your students before the lesson begins. Students should discuss what they have learned before they begin their practice on the Worktext pages.

### Problem-Solving Emphasis

Processing word problems successfully will help your students become lifelong problem solvers. Ask the students to listen for what action is taking place and whom the problem is about as you read each word problem the first time. As you reread the word problem one sentence at a time, encourage your students to picture the problem, write an equation, solve the problem, and then explain how their answer makes sense. Finally, help the students craft a summary sentence to explain the solution.

### Reasoning and Critical Thinking

The lessons establish a pattern of asking students to explain their answers or reasoning. It is expected that students will give their reasoning for all answers where appropriate. A gear icon (⚙️) is used to help you identify higher-order thinking questions. Supply any prompts or background needed to guide the student to the answer.

### Collaborative Learning

Students sometimes work in pairs or groups, allowing collaboration and interaction among peers. For optimal learning for all students, each group should include students with varying strengths and abilities.

## Lesson Features

Objectives point out the skills taught in the lesson.

The Lesson Focus prepares the students for what they will learn in the lesson.

A variety of activities allows the students to practice analytical thinking and see math at work in real-life contexts.

The Materials section lists items that are used in the lesson.

Teach for Understanding and Check for Understanding provide background information and questions to effectively engage the students in learning the math concepts for each lesson. Lessons incorporate manipulatives to promote a problem-solving approach that develops critical-thinking skills.

Group work promotes collaborative learning. Students learn by working together as a class and sometimes by working in smaller groups.

### Lesson 119 Worktext pages 195–96

#### Objectives

- Identify the problem that needs to be solved
- Collaboratively design and build a pasta car
- Make predictions, conduct tests, and record results
- Analyze design, construct arguments, and critique reasoning
- Evaluate how math is not always helpful to people in a billion world

#### Other Teaching Aids

- Uncooked pasta (angelini, penne, spaghetti, etc. for each group)
- Round candles with a hole in the center (for each group) (optional)
- Hot glue gun (for each group)
- Fordstick or tape measure
- Stopwatch
- 18"-24" ramp (e.g., a board supported by a stack of books to form an incline)

#### Teach for Understanding

##### Lesson Focus

In this lesson your group will design and build a pasta car and test it against others.

##### Identify the problem that needs to be solved

- Explain that the students will work in groups to design and build a pasta car that is fast and visually appealing.
- What design features might affect how fast your pasta car will travel? *weight, aerodynamics, materials, and efficiency of construction*
- What design features might affect its visual appeal? *function, shape, balance, and color*
- See the example car in the diagram below. (Note: You may not want to display the diagram, depending on the needs of your students.) Encourage the students to be creative and come up with their own designs.

##### Collaboratively design and build a pasta car

- Group the students. Provide each group with an assortment of pasta and candles. Explain that each group's car should be able to travel down a ramp and across a flat surface.
- Direct attention to problem 1 on Worktext page 196. Encourage the students to work together in their groups to design their group's car. Individual students may show their ideas for the car's design in problem 1 so the group can critique and evaluate ideas as they arrive at a final design.
- Direct each group to indicate when they are ready to begin assembling their car so you can assist with the glue gun. Wheels can be held on by putting a large dot of glue on the ends of spaghetti axles, or students may think of other ways to make a wheel. Encourage creativity and experimentation.



150 Lesson 119

##### Make predictions, conduct tests, and record results

- Direct attention to problem 2 on the Worktext page. As each group displays its car, instruct each student to assign a name or number to the car and to write it in the table.
- Which car do you predict will travel the farthest?  
Which car do you predict will travel the fastest?
- Record the students' predictions for display.
- Decide ahead of time what units will be used to measure distance (inches, feet, or yards). Test the cars on the prepared ramp. Designate students to measure the entire distance each car travels (from the top of the ramp to whenever the car stops) as the other students record the measurements in the table on their Worktext pages.

To measure speed, the students can time in seconds how long it takes each car to travel from a beginning point to a predetermined end point. Students can record the speed in the table as a fraction (such as 4 ft/2 sec). The fastest car is the one that travels the set distance in the shortest time.

For a more objective evaluation, students may test each car at least twice and average the data, with different students taking the measurements each time.

Encourage the students to use the table to record any notes that might help them improve their groups' design as the cars are tested.

- Compare the results of the tests to the students' predictions. Then instruct the students to complete question 3a on the Worktext page.

##### Analyze design, construct arguments, and critique reasoning

- Lead a discussion to analyze the design elements of each car and evaluate which elements may have contributed to distance and speed. Allow the students to state theories, question others' theories, and state their reasons for agreement or disagreement. Encourage students to be kind and respectful in stating their opinions.

Initiate discussion using questions such as the following:

- What feature of the car that traveled the farthest do you think helped it do so?  
What feature of the fastest car do you think made it travel fastest?  
What scientific or mathematical reason can you give to support your opinion?
- Write for display some of the students' statements, reasons, and arguments. Lead a discussion about how to validate reasons and plan for improvement.
- How would you test these theories? You could make two identical cars but change one element on one of them and see if it makes a difference.  
Based on our discussion, what would you change about your car's design to improve it?
- Direct each student to rate each car's appearance on a scale of 1 to 5 and to record his rating in the Appearance column of the table on the Worktext page.
- What is something you like about the look of each car?  
Point out that this is an opportunity for the students to encourage one another.
- Instruct the students to complete question 3b on the Worktext page.

Involving the students in interactive learning through discussion encourages them to construct reasonable proof for their solutions.

Discussion of real-world math problems helps students relate math to biblical worldview truths.

- Take a vote to see which car the students like best for each of the following elements. You may choose to give awards: function: the car that traveled the farthest, the fastest car; design: the most attractive car.

**Evaluate how math is not always helpful to people in a fallen world**

- Read the first two paragraphs on Worktext page 195. Discuss the idea that in a fallen world full of sin, math can sometimes be used in ways that hurt people, even though the hurt can be unintentional.

*Henry Ford was a brilliant pioneer. How did he use math to do some good things? He figured out how to mass produce inexpensive cars so that many people could buy cars. He provided jobs for many people.*

*What problems did his mathematical solutions lead to? Workers became unhappy doing boring jobs for long hours.*

*Read Romans 9:22. Explain that because of the effects of the curse that came upon the world when man sinned, every part of our world is damaged by sin. This means that both math and the way we use it are affected by the fall.*

*Why did Ford face problems even when his math made sense? Even though Ford used math well, he and his workers were still fallen people living in a world that was under the Curse. Math helped Ford solve some problems, but because math, too, is under the Curse, it couldn't solve all problems or undo the Curse.*

- Direct the students to complete question 3c.
- Explain that Ford's response to the problem of worker dissatisfaction was to increase wages, which caused his workers to be content to stay on the job. Whether or not Ford knew it, this use of math to benefit his workers also lessened the biblical principle that "the labourer is worthy of his hire" (Luke 10:7).
- Challenge the students to continue their innovation by designing another car at home and bringing it to class for display and voting.



Reduced Worktext pages provide the answers in magenta. Use these pages to evaluate student progress and to determine where more guidance is needed.

**Chapter 10**

**Let's Roll!**

When you sit in a moving car, you usually don't even think about the fact that you're sitting in a car. You just sit there, and the car takes you where you want to go. But when you think about it, you realize that the car is doing a lot of things for you. It's keeping you safe, it's keeping you comfortable, and it's keeping you from getting tired. The car is doing a lot of things for you, and you don't even think about it. You just sit there, and the car takes you where you want to go.

Henry Ford was a brilliant pioneer. He used math to design a car that was easy to use and could be made in large numbers. This was a big deal because it meant that many more people could afford a car. Ford's car was called the Model T, and it was a huge success. It changed the way people traveled and the way cars were made.

But there were some problems with Ford's car. One problem was that the workers had to work long hours and do boring jobs. This was because the car was so simple that it could be made quickly, but it also meant that the workers had to do the same thing over and over again. This was not always helpful to the workers.

Even though Ford used math well, he and his workers were still fallen people living in a world that was under the Curse. Math helped Ford solve some problems, but because math, too, is under the Curse, it couldn't solve all problems or undo the Curse.

1. Read the page.

2. Use your own words. **Answers will vary.**

Car	Material	Weight	Speed	Number of Miles	Notes

3. Answer the questions.

a. **Answers will vary.**

*Students may tell how the car was made or whether it was fast or slow, especially compared to others.*

b. **Answers will vary.**

*Answers may include making adjustments to the car, the construction of the design, or the car's usefulness to people.*

c. **Answers will vary.**

*Students may say that math is used in a way that can help or hurt people. This happens because people are fallen and the world is under the Curse.*