Core Knowledge® MATHEMATICS

Connecting Math to Our World:

How Math Helps Us

Teacher Support

How Math Helps Us

Teacher Support

Core Knowledge®

ISBN: 978-1-68380-491-8

GRADE 3

How Math Helps Us
Teacher Support

About This Series

Everyone uses math every day, but many people don't realize it! The Core Knowledge Connecting Math to Our World series underscores the ubiquity of math and encourages learners to "find the math" in familiar situations. When learners see situations where math skills are used to solve problems, they develop an understanding of why learning math skills is important. The instructional focus for this series is not on *practicing* math skills but on recognizing *where*, *when*, and *why* we use math.

Through both fiction and nonfiction readings, the series seeks to help learners see when and how math skills can be useful and increase their overall understanding of and interest in math. Students do not need to have achieved proficiency in specific skills to understand the importance of math. Mathematical thinking is a part of countless aspects of day-to-day life. Math appears throughout nature. Individuals, groups, and governments use math to plan and make decisions. Math is also embedded throughout creative endeavors—in poetry, music, visual art, and design. Math is integral to all sorts of discoveries. Math supports our understanding and appreciation of culture and helps us function as active and engaged citizens.

Each chapter tells a story or explores a situation in which a mathematical idea plays a role. It's important to note that these chapters are *not* intended to be a complete lesson. Instead, they can serve as a flexible resource throughout the school day and beyond.

- Because the chapters do not need to be read in order, you may wish to use a chapter to foster interest in a math idea before or after a skill is taught in your core math curriculum. Chapters are adaptable enough to be used in any situation, including enrichment or remediation, depending on the teacher's approach.
- These chapters can be used as a cross-curricular extension to support reading skills such as following lines of text as it is read aloud, asking students to read chapters or sections of chapters, and making inferences about content from the engaging images on the pages.
- This series is recommended to parents looking to enhance engagement with both reading and math at home.

No matter when or how you choose to use the readings or the order in which the chapters are read, introduce learners to the Student Reader with a reading of the invitation that appears on page 1.

Making the Most of the Student Reader

Preparing to use a chapter.

1. ***Read the chapter's Teacher Support.*** Reviewing the Teacher Support will alert you to the math connections and applications being made in the chapter, allowing you to better point them out when sharing the chapter with the class.

2. ***Preview the chapter.*** Identify where and how math is being used in the selection.
3. ***Identify vocabulary for which students may need support.*** This may include reviewing math vocabulary or providing context for unfamiliar non-math vocabulary.
4. ***Choose a reading routine.*** We suggest using the Student Reader as part of a reading routine with your students. In Grade 3, students are making the shift from the beginning stages of "learning to read" to the more advanced skills involved in "reading to learn." Students who have successfully mastered the skills taught in K–2 CKLA now have both the basic and advanced code knowledge needed to decode and read nearly all possible sound spellings in the English language. At this point, if and when students encounter words with the few sound spellings that may not have been taught explicitly, they should be able to analyze these words based on existing code knowledge and make sense of the text using contextual clues.

   Several whole-class routines appropriate for students in this grade are listed below. Of course, based on your students' reading levels and other factors, you may wish to read a given chapter aloud, allowing students to concentrate on listening and looking at the images:

   - **Echo Reading** The teacher models reading a short section of text, and then students repeat the reading, echoing the teacher's pronunciation, pacing, and inflection.
   - **Partner Reading** One student reads aloud while the other listens. Roles then reverse with the partner reading the same passage again.
   - **Quiet Reading** Students quietly read a passage to themselves, and the teacher then questions students on comprehension.
   - **Reading Discussions** Students read silently with a partner. Partners then discuss the passage with each other, pointing out important details.
   - **Dramatic Reading** Students are assigned characters and read the "lines" attributed to that character.
5. ***Activity Pacing.*** Depending on the depth of your question-and-answer facilitation with students during and after reading, any given chapter could take as little as 10 minutes or might be extended to 30 minutes or more.

Making the Most of the Teacher Support

For each chapter, the Teacher Support pages provide several sections:

1. **Prepare to read** includes a chapter summary, the math connection, and a suggestion to choose a reading strategy.
2. **Focus student attention** provides a strategy for setting the scene with students.
3. **Read together** includes reading prompts and strategies for helping students identify the math in the selection.
4. **Emphasize the Main Idea** focuses on how the selection connects everyday life to math.

The following chart identifies which Core Knowledge Sequence Skills are covered in each chapter. You can use the chart to determine which chapters best match your curriculum throughout the year.

Chapter	Math Connection
1. One Step at a Time, page 5	**Measurement and Data** • Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures. **Geometry** • Reason with shapes and their attributes.
2. Farmer Quinn, page 6	**Operations and Algebraic Thinking** • Represent and solve problems involving multiplication and division.
3. Poetry Patterns, page 7	**Operations and Algebraic Thinking** • Solve problems involving the four operations.
4. Six Symmetry Sightings, page 8	**Geometry** • Reason with shapes and their attributes.
5. Do-Si-Do, page 9	**Geometry** • Reason with shapes and their attributes.
6. Friends of the Frog, page 10	**Measurement and Data** • Represent and interpret data.
7. Concert for a Cause, page 11	**Number and Operations in Base Ten** • Use place value understanding and properties of operations to perform multi-digit arithmetic.
8. Trail Tales: A Hiker's Journal, page 12	**Measurement and Data** • Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects. • Represent and interpret data.
9. Baking with Nadia, page 13	**Number and Operations—Fractions** • Develop understanding of fractions as numbers. **Measurement and Data** • Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects.
10. The Mural Makers, page 14	**Number and Operations—Fractions** • Develop understanding of fractions as numbers.
11. Love, Tennis, page 16	**Measurement and Data** • Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures.
12. A Bigger Burger?, page 17	**Number and Operations—Fractions** • Develop understanding of fractions as numbers.
13. Measuring Up with the Metric System, page 18	**Measurement and Data** • Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects.
14. And the Survey Says . . ., page 19	**Measurement and Data** • Represent and interpret data.
15. Ticking Through Time, page 20	**Number and Operations—Fractions** • Develop understanding of fractions as numbers. **Measurement and Data** • Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects.

16. Feline Design, page 20	**Measurement and Data** • Geometric measurement: understand concepts of area and relate area to multiplication and to addition. • Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures.
17. Mondrian Art, page 21	**Geometry** • Reason with shapes and their attributes.
18. Kaleidoscope, page 22	**Geometry** • Reason with shapes and their attributes.
19. Geometric Art, page 23	**Geometry** • Reason with shapes and their attributes.
20. Amazing Cakes, page 24	**Geometry** • Reason with shapes and their attributes.
21. Wild and Free, p. 25	**Measurement and Data** • Geometric measurement: understand concepts of area and relate area to multiplication and to addition. • Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures.
22. It's a Keeper! p. 26	**Operations and Algebraic Thinking** • Solve problems involving the four operations.
23. Solving a Water Problem, p. 27	**Measurement and Data** • Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects.
24. A Curator's Big Day, p. 28	**Measurement and Data** • Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects. • Represent and interpret data.

Chapter 1: One Step at a Time, Student Reader page 2

1. Prepare to read.

Chapter Summary: In this chapter, Charlotte and her family visit an art festival. Before the festival begins, a lot of steps need to be completed. As they visit the artist booths, they take part in making different types of art, each of which is made by following steps. When they get home, Charlotte's mom follows steps to build a desk for Charlotte's room. Then, Charlotte follows steps to make a penguin. Following steps is important! An underlying idea in this chapter is that creating art uses math.

Math Connection: This chapter emphasizes the importance of following steps. It also demonstrates ways math is used in making art.

Choose a Reading Routine: Based on your students' reading levels and other factors, identify how this chapter will be read.

2. Focus student attention.

Before You Read: Point out the chapter title: "One Step at a Time." Explain to students that this chapter is about Charlotte and her family visiting an art festival. Following steps in the correct order is important in making art, doing mathematics, and completing other tasks. Ask students to pay special attention to situations where steps are used in this chapter. Artists use math to make art. Math often uses steps as well.

3. Read together.

Use questions such as these to facilitate student engagement as well as to help students make connections to the use of math in the world:

- What steps do you think the organizers take to make a map of the art festival? (*Sample answer: They identify the artists, the type of art they sell, how big of a space they need to display their art, etc.*)
- What steps might the artists take to set up their booth? (*Sample answers: They may have to set up a canopy, tables, and racks to hold their art. Then, they need to display their art.*)
- On page 3: How does the artist use math at this booth? (*Sample answers: The artist uses symmetry to draw the butterfly wings of the butterfly; the wings must allow a person to fit between them.*)
- On page 4: At this booth, how is math used? (*Sample answers: The participants match the number on the paint cans to the numbers on the mural. Each person paints 10 squares. The mural is divided into equal-sized squares.*) How does this booth use steps? (*Participants pick a color with a number, they find that number on the squares on the mural, and they paint 10 squares.*)
- On page 7: What on this page involves steps? (*Charlotte begins to draw a penguin using her new step-by-step drawing book. Her first step is to draw the circle that will be the penguin's body.*)

4. Emphasize the Main Idea.

Plans have steps that must be followed to complete a goal.

- Ask students to design an art project, such as a mask or something else that involves steps. Have students brainstorm the steps they will need to take their project from design to completion.

Chapter 2: Farmer Quinn, Student Reader page 8

1. Prepare to read.

Chapter Summary: Farmer Quinn spends winter preparing for the growing season. He uses math to calculate how many seeds he will need and then plants and organizes them. Next, he plans for the seedlings to be planted in the field. He uses math to plant them so they can grow and be healthy. Finally, he harvests and counts his crops to be sold!

Math Connection: This chapter demonstrates some ways that farmers use math to produce and sell their crops. Some of these math skills are measuring, estimating time, organizing in arrays, and counting.

Choose a Reading Routine: Based on your students' reading levels and other factors, identify how this chapter will be read.

2. Focus student attention.

Before You Read: Point out the chapter title: "Farmer Quinn." Explain to students that the chapter is about Farmer Quinn and his work on a farm. Remind them to pay special attention to how successful farming depends on math. Have students turn and talk about plants they eat that come from a farm. How do they think the farmer uses math to grow crops and to get them to market?

3. Read together.

Use questions such as these to facilitate student engagement as well as to help students make connections to the use of math in the world:

- What kinds of things might Farmer Quinn be thinking about when snow is covering the farm? (*Sample answer: He might be thinking about when he can plant again, what he will plant, and what chores he can work on before he plants.*)
- How does Farmer Quinn use math on the farm? (*Sample answers: He decides how many seeds he needs. He decides how many plants will be in each row based on what the plants need as they grow. He measures the distance between the young plants as they are placed in the ground. He must subtract, or remove, plants to help other plants grow. He makes sure that his crops have enough water to grow. He estimates the amount of crops he has to sell.*)
- How does Farmer Quinn know how many plants are planted? (*He can use multiplication because he knows how many plants are in each row and how many rows there are.*)

4. Emphasize the Main Idea.

Farmers use different types of math operations to plan, grow and harvest crops, and manage their farms.

- Make a chart with these headings: plan, add, subtract, multiply, divide, and estimate. Have students identify where Farmer Quinn used each of these skills in the chapter.
- Ask students to think about the seed trays that are used to grow young plants. Have students explain how these trays help a farmer calculate how many seeds have been planted.

Chapter 3: Poetry Patterns, Student Reader page 14

1. Prepare to read.

Chapter Summary: This chapter is an exploration of a variety of ways math is incorporated in poetry. Patterns such as line length, various rhyme schemes, and syllables per line are explored through haiku, limericks, and Fibonacci sequences, among others.

Math Connection: This chapter identifies how math is used in poetry while focusing on patterns.

Choose a Reading Routine: Based on your students' reading levels and other factors, identify how this chapter will be read.

2. Focus student attention.

Before You Read: Point out the chapter title: "Poetry Patterns." Explain to students that this chapter is about how poetry incorporates many math concepts. Explain to students that they should look closely at the words in the verses, especially looking at the rhymes and rhythm of the lines.

3. Read together.

Use questions such as these to facilitate student engagement as well as to help students make connections to the use of math in the world:

On page 14:

- What other word does *couplet* remind you of? How are these 2 words related? (Couplet *reminds me of* couple. *A couple is 2 people. A couplet is a stanza with 2 lines of poetry.*)
- How many stanzas does the poem have? (*The poem has 2 stanzas.*)
- How many lines are there in each stanza? (*There are 4 lines in each stanza.*)
- What else do you notice about this poem? (*Sample answer: Line 3 is longer than the other lines in each stanza.*)

On page 15:

- How many stanzas does the poem have? (*The poem has 3 stanzas.*)
- How many lines are there in each stanza? (*There are 4 lines in each stanza.*)
- What do you notice about the rhyming pattern? (*The first and third lines of each stanza rhyme, and the second and fourth lines of each stanza rhyme.*)
- How is the last stanza different from the other two? (*Sample answer: Lines 2 and 4 are longer* (*have one more syllable*) *in stanza 3 than those lines in the other two stanzas.*)

On pages 16–17:

- How many stanzas does a haiku have? (*It has 1 stanza.*)
- What feelings do you have as you read the haiku poems about nature? (*Sample answer: They make me feel quiet and peaceful.*)

On page 18:

- Which words rhyme in this limerick, and in which lines do they appear? (*Lines 1* (beard), *2* (feared), *and 5* (beard) *rhyme, as do lines 3* (Hen) *and 4* (Wren).)
- How many syllables does each line have? (*Lines 1, 2, and 5 each have 8 syllables; lines 3 and 4 each have 5 syllables.*)
- How are the numbers of syllables and the rhymes related? (*The lines with eight syllables all rhyme, and the lines with five syllables both rhyme.*)

On page 19:

- How are the numbers in a Fibonacci sequence related? (*Each number is the sum of the 2 preceding numbers.*)
- How is this sequence related to the number of syllables in a Fibonacci poem? (*Each line has the same number of syllables as the sum of the syllables in the two preceding lines.*)
- How does this sequence affect the shape of the poem? (*Each line is longer than the last.*)

4. Emphasize the Main Idea.

Rhythm, rhyme, and patterns are found in poetry.

- Challenge students to choose a poetic structure and write their own poem or poems. Have students identify the number of stanzas, lines, and syllables in their poems.

Chapter 4: Six Symmetry Sightings, Student Reader page 20

1. Prepare to read.

Chapter Summary: Symmetry is everywhere! This chapter describes 6 symmetrical objects (butterflies, snowflakes, sea stars, flower petals, animal markings, and human faces). Students think about what patterns make these objects symmetrical and how being symmetrical helps them survive.

Math Connection: Symmetry is found in nature.

Choose a Reading Routine: Based on your students' reading levels and other factors, identify how this chapter will be read.

2. Focus student attention.

Before You Read: Point out the chapter title: "Six Symmetry Sightings." Explain to students that the chapter is about 6 different objects that have symmetry. Uncover initial ideas about symmetry by asking students if they can name things with symmetry and if symmetry helps those things in any way.

3. Read together.

Use questions such as these to facilitate student engagement as well as to help students make connections to the use of math in the world:

- Based on the images, what do you think mirror symmetry is? (*It is when things look the same on both sides but the sides are reversed.*)
- How does symmetry help [butterflies, sea stars, flowers, other living things] survive? (*Sample answer: For butterflies, it helps them fly straight and provides protection.*)
- Describe the patterns you see in these objects that make them symmetrical. (*Sample answer: They have the same spots and stripes, body parts, and colors repeated.*)
- How is this type of symmetry different from or similar to the other examples? (*Sample answer: The butterflies are mirrors, and the snowflakes have six-sided symmetry.*)
- In what ways do you have symmetry? How does this help you? (*Sample answers: It is easier to move around with 2 legs than one. It is easier to do things with 2 arms than with one. Having two eyes allows us to see more of what is around us. Being the same on both sides keeps us balanced.*)

4. Emphasize the Main Idea.

Symmetry in nature not only is beautiful but has other uses as well.

- Challenge students to find objects that are symmetrical both inside and outside the classroom. Probe student ideas to describe different types of symmetry they have noticed and how it helps these things function.

Chapter 5: Do-Si-Do, Student Reader page 26

1. Prepare to read.

Chapter Summary: How does dancing use math? The square dance, line dance, and round dance all use shapes. This chapter focuses on square dancing. To begin a square dance, you must use math to know how many people there are and where to stand. The rhythm guides dancers to know how to move. The different dance moves are patterns that repeat throughout.

Math Connection: The context of square dancing illustrates how counting and patterns are utilized in everyday actions like dancing and listening to music.

Choose a Reading Routine: Based on your students' reading levels and other factors, identify how this chapter will be read.

2. Focus student attention.

Before You Read: Point out the chapter title: "Do-Si-Do." Explain to students that this chapter is about a dance called a square dance. Remind them to pay special attention to how dancers know what to do. Ask students to share a time they have seen a group of people dancing the same way. How do the dancers know what to do? What would you need to know to join in the dance?

3. Read together.

Use questions such as these to facilitate student engagement as well as to help students make connections to the use of math in the world:

- What is similar about line, square, and round dancing? (*In each dance, the dancers form shapes.*)
- How is math used in a square dance? (*There must be an even number of dancers, the dancers make shapes and lines, and dancers must count the steps.*)
- How do dancers know how to move at the same time? (*They listen to the rhythm and count the beats. The dance routines have patterns that are repeated.*)

Guide students to notice that no matter the culture, math is a common language that is used in dancing.

- What might happen if you want to have more than one square in the square dance? How can math help? (*You would use multiplication to help you figure out how many people you need.*)
- How are square dancing and the music it uses all about patterns? (*The music uses patterns in the rhythm. The way a dance starts is a pattern because 2 people stand on each side of the square. The movements follow a pattern.*)

4. Emphasize the Main Idea.

Rhythm and patterns are used in dancing.

- Teach students how to do a square dance or line dance. As you explain the directions, emphasize when math is being used.

Chapter 6: Friends of the Frog, Student Reader page 32

1. Prepare to read.

Chapter Summary: The town of Willowbrook is concerned about how new development is impacting the living things in Willow Lake. The town works with scientists to estimate the total number of frogs in the lake and how many are unhealthy. They plan to use this data to monitor the health of the lake moving forward.

Math Connection: This chapter demonstrates that estimating as well as collecting and interpreting data are useful skills that can be applied to problem-solving real-world situations.

Choose a Reading Routine: Based on your students' reading levels and other factors, identify how this chapter will be read.

2. Focus student attention.

Before You Read: Point out the chapter title: "Friends of the Frog." Explain to students that this chapter is about how a town works with scientists to evaluate the health of Willow Lake. Ask students to look for how math is used and what the town will do with the data the scientists collect. If possible, show students some images of silt fences in use.

3. Read together.

Use questions such as these to facilitate student engagement as well as to help students make connections to the use of math in the world:

- Why did the scientists study frogs? (*Frogs are sensitive to pollution. If they are unhealthy, scientists will know that the water is polluted.*)
- Why do you think the scientists estimated the number of frogs in Willow Lake rather than counting them? (*They didn't need an exact number, and an exact number would be impossible to count because frogs move around.*)

To help students visualize the estimation process described in the chapter, draw grids on the board to represent Willow Lake. Highlight one square and record data that is described.

- How did the scientists use math to determine that Willow Lake is a healthy lake? (*They multiplied the number of frogs found in one square area times the total number of squares. Then they compared the number of healthy frogs to the number of unhealthy frogs.*)
- How did this process help scientists know if there is pollution in the environment? (*If they counted too many unhealthy frogs in that square, they assumed that the other squares also had unhealthy frogs. This makes helps the scientists determine if the environment is polluted.*)

4. Emphasize the Main Idea.

Estimating is a way of making a good guess about a number of something that is difficult to count precisely.

- Show students a large jar filled with small objects such as beads, jelly beans, or coins. Have groups of students come up with a way to estimate the total number in the jar. Try out the different ways, and compare these to the actual number in the jar. Talk about what worked and what didn't.

Chapter 7: Concert for a Cause, Student Reader page 38

1. Prepare to read.

Chapter Summary: Marcus, Nora, Max, and Yami are helping to plan a concert. From planning space and seats to calculating the number of tickets sold and money made from the sales, math helps them have a successful event.

Math Connection: This chapter addresses the math skills of organizing data, addition, subtraction, multiplication, and division. This chapter helps students understand that these skills can help them make sense of problems and solve them.

Choose a Reading Routine: Based on your students' reading levels and other factors, identify how this chapter will be read.

2. Focus student attention.

Before You Read: Point out the chapter title: "Concert for a Cause." Explain to students that the chapter is about planning a concert competition. Remind them to pay special attention to the information they need to plan correctly and how the students get the information. The chapter describes how they use math operations to support their planning. Ask students to look for the math in this chapter.

3. Read together.

Use questions such as these to facilitate student engagement as well as to help students make connections to the use of math in the world:

- How did the students use math operations when figuring out the number of performers? (*They counted the number of people in each group and added these numbers. They also used a chart to organize their information.*)
- What kind of information might the students gather to make a schedule? (*They need to know what groups will be performing at the concert and how many people are in each group. They need to know how much time and room each group needs to get ready for the concert, how much time they will be on stage, and the time they need to clean up when they are done performing.*)
- How does Max know that they are close to running out of tickets? (*He subtracts tickets sold from available tickets.*)
- What operation can we use to know how much each ticket was? (*We can use division.*)

4. Emphasize the Main Idea.

Operations with math are important tools for solving real-world problems and making real-world plans.

- Ask students what they would do if some of the groups canceled at the last minute. How might this affect the friends's schedule? What math skills might they use to fix the problem?

Chapter 8: Trail Tales: A Hiker's Journal, Student Reader page 44

1. Prepare to read.

Chapter Summary: This hiker's journal takes students through the stages of planning and along the hike. The hiker must use addition and subtraction throughout the trip to do things like calculate total miles covered, miles left to go, total weight they are carrying, and pace and schedule.

Math Connection: This chapter demonstrates how hikers can use math to help them during their hikes.

Choose a Reading Routine: Based on your students' reading levels and other factors, decide how this chapter will be read.

2. Focus student attention.

Before You Read: Point out the chapter title: "Trail Tales: A Hiker's Journal." Explain to students that this chapter is a journal that a hiker kept during a trip. Remind them to pay special attention to how the hiker tracks their progress. Ask students to look for ways the hiker relies on math during their journey.

3. Read together.

Use questions such as these to facilitate student engagement as well as to help students make connections to the use of math in the world:

- What does the hiker check each day before that day's hike begins? How does that use math? (*Sample answer: They add the weight that is in their pack. They add the total miles they have hiked and figure out the miles left to go.*)
- How does the hiker know how many miles they have left in the hike? (*The total hike will be 313 miles. They add up the miles they have hiked so far and subtract from 313.*)
- The hiker plans how much weight they would be carrying before starting. How do they do that? Why is it necessary? (*The hiker uses addition. This helps them determine their pace and where they will need to stop to refill the supplies they've used.*)
- How does carrying food and water in the pack involve both addition and subtraction? Why is this important? (*You add when you buy more food or refill water, and you subtract when you eat or drink it. The hiker doesn't want to run out of food or water.*)

4. Emphasize the Main Idea.

Hikers continually add and subtract weights and distances.

- Share maps of hikes of local or well-known areas. Ask students to use these to plan a hike. Make sure to write down miles left to go, total miles hiked, what they expect to see and feel there, and what supplies they need to bring. Discuss how math helps in the planning process.

Chapter 9: Baking with Nadia, Student Reader page 50

1. Prepare to read.

Chapter Summary: A baking show is making a yummy treat—chocolate cupcakes! Planning is the first step to baking. Before you bake, you must make sure you have the time, equipment, and ingredients needed. Next, you need to carefully measure each ingredient and follow the recipe exactly. Many of the ingredients are measured in fractions. What happens if you don't have the right measuring tool? There's a way to solve that using math!

Math Connection: Baking requires an understanding of fractions and measurement.

Choose a Reading Routine: Based on your students' reading levels and other factors, decide how this chapter will be read.

2. Focus student attention.

Before You Read: Point out the chapter title: "Baking with Nadia." Explain to students that the chapter is about a cooking show. Remind them to pay special attention to what the baker needs to do in order to make the perfect chocolate cupcakes. How is math used in the chapter?

3. Read together.

Use questions such as these to facilitate student engagement as well as to help students make connections to the use of math in the world:

- What is the first step in baking? Why is this step so important? (*Planning is the first step; if you don't plan, you might run out of ingredients or time.*)
- What are important things to notice when looking at the list of ingredients? (*ingredients needed and the amount needed of each*)

It may be helpful to provide students with fraction strips to model the fractions that are described in the chapter.

- What do you notice about the fractions when you look at the list of ingredients? (*Many of them are different.*)
- What do you notice about the units of measurement? (*Some are cups, and some are teaspoons.*)
- Why does it work to use a $\frac{1}{3}$ cup measuring cup but not a different size to measure out $\frac{2}{3}$ of a cup? (*A different-sized cup would not be able to make up $\frac{2}{3}$ of a cup evenly.*)
- How does the baker use equivalent fractions to help her measure? (*She uses a $\frac{1}{3}$ cup measuring cup to make $\frac{2}{3}$ of a cup.*)
- Besides fractions, what other math is involved in baking? (*A baker uses time and temperature.*)

4. Emphasize the Main Idea.

We use math skills when we bake.

- Provide students with recipes. Ask them to highlight any places that use math skills. Have students identify when equivalent fractions can be used when measuring ingredients.

Chapter 10: The Mural Makers, Student Reader page 56

1. Prepare to read.

Chapter Summary: Four friends have been invited to paint a large mural at the community center. They decide that each person will have an equal portion of the wall to paint on. The friends use knowledge of fractions and division to separate the portions before they paint. They paint their pictures but decide that the mural is better as a whole instead of separated into parts.

Math Connection: In this chapter, the characters must divide a wall into even parts.

Choose a Reading Routine: Based on your students' reading levels and other factors, decide how this chapter will be read.

2. Focus student attention.

Before You Read: Point out the chapter title: "The Mural Makers." Explain to students that this chapter is about four friends painting a mural on a wall. Remind them to pay special attention to how the friends decide how they will divide the wall as well as the work. Ask students to talk about a time they had to split something up among people. What was it? How did they split it up? You may wish to display a tape measure as shown on page 58 and demonstrate how it can be used to easily measure longer distances instead of using a ruler or yardstick.

3. Read together.

Use questions such as these to facilitate student engagement as well as to help students make connections to the use of math in the world:

- Why do you think it makes sense for the mural to be partitioned, or divided into parts? (*Students may suggest that it gives each person an equal amount of the mural to complete.*)
- Before reading page 58: Ask students to brainstorm how they would divide the wall space and make sure the portions are equal. (*Answers will vary. Probe ideas for reasoning that includes using fractions and division.*)
- Why was it helpful for the friends to use math to make sure the portions are equal? (*When they measured and then divided, it helped them be exact about the size of each portion.*)
- How do they know how much space each person has to work with? (*They divided 16 feet by 8 and then multiplied by 2 so that each person had 2 two-foot sections for a total of 4 feet.*)
- How can you use fractions to describe the amount of space each person was given? (*The fractions are* $\frac{6}{24}$, $\frac{2}{8}$, *or* $\frac{1}{4}$. *Probe student reasoning.*)
- What kind of math is used to describe when the friends decide to make one big scene? (*Addition or multiplication can be used. They are combining the sections.*)

4. Emphasize the Main Idea.

We can divide a whole into equal parts.

- Provide students with a number of different situations, and ask them to decide how they would split something up equally among different numbers of people. Examples could include a pie, a cake, a number of homework problems, chores, or $100. Discuss how using fractions can be helpful.

Chapter 11: Love, Tennis, Student Reader page 62

1. Prepare to read.

Chapter Summary: This chapter introduces students to the sport of tennis. The tennis court is partitioned into halves and fourths and has many other lines and areas that are important as well. Tennis matches are separated into sets, which are made up of at least 6 games.

Math Connection: Exploring tennis demonstrates how an understanding of fractions, shapes, and geometric measurement is used when playing this game.

Choose a Reading Routine: Based on your students' reading levels and other factors, decide how this chapter will be read.

2. Focus student attention.

Before You Read: Point out the chapter title: "Love, Tennis." Explain to students that this chapter is about the game of tennis. Remind them to pay special attention to the rules, how the score is kept, and how the court is divided. Ask students if they have ever played tennis and to describe what they remember about the game.

3. Read together.

Use questions such as these to facilitate student engagement as well as to help students make connections to the use of math in the world:

- On each page: In what ways is math used on this page? (*Answers should include counting, shapes, measurement, fractions, lines, addition, and comparing.*)

On page 64:

- Why do you think the doubles sideline is 4 feet outside the singles sideline? (*I think they need a bigger court because there are 2 people instead of 1 person playing on each side.*)
- In the image of the tennis court, what shapes do you see? Why do you think they don't use a different shape? (*I see mostly rectangles. A different shape might not be as easy to partition into equal parts.*)
- Point to the different areas in the tennis court image. Ask: How can we use both shapes and fractions to describe this area? (*Sample answer: This rectangle is* $\frac{1}{4}$ *of the tennis court.*)
- Why is it important that the tennis court be separated into these parts? (*The parts help people know where to go, where to aim, and what is out-of-bounds.*)
- On page 65: Why are counting and comparing scores an important part of tennis? (*You must keep track of your score and compare your score to the opponent's score to know how many games and sets to play.*)

4. Emphasize the Main Idea.

Fractions and counting strategies help with understanding and playing tennis.

- Project a real tennis game being played for students to watch. Ask them to follow along with the game, and point out things that relate to math.

Chapter 12: A Bigger Burger?, Student Reader page 68

1. Prepare to read.

Chapter Summary: Greta's Grill and Best Burger are both burger joints in town. Recently, Greta made a change to her burgers—her restaurant now offers $\frac{1}{3}$ pound burgers instead of $\frac{1}{4}$ pound burgers. But many customers are confused and think the new burgers are smaller! Greta knows she has to educate people on fractions to help sell more burgers.

Math Connection: When ordering burgers, fractions are sometimes used to describe the burger.

Choose a Reading Routine: Based on your students' reading levels and other factors, decide how this chapter will be read.

2. Focus student attention.

Before You Read: Point out the chapter title: "A Bigger Burger?" Preview to students that the chapter is about a competition between two restaurants that sell burgers. When one restaurant changes its burgers to $\frac{1}{3}$ pound of beef, things get confusing. Remind them to look for why understanding fractions is important in this chapter.

3. Read together.

Use questions such as these to facilitate student engagement as well as to help students make connections to the use of math in the world:

- Why is $\frac{1}{3}$ bigger than $\frac{1}{4}$? (*Three is smaller than four. Answers should reveal an understanding that the denominator represents the number of parts the whole is divided or separated into.*)
- Why are people still confused about the new size of the burger? (*They don't understand that $\frac{1}{3}$ is bigger than $\frac{1}{4}$. The pictures aren't helping them see or feel the difference in weight.*)
- Which size of burger would you order? Defend your answer using fractions. (*Sample answer: I would order the $\frac{1}{4}$ pound burger. It is smaller, and I don't eat that much.*)
- Sometimes we use words like *a quarter of an hour* or *half an hour* to describe time. How could that help Greta? (*She could say that a quarter ($\frac{1}{4}$) of an hour (60 minutes) is 15 minutes. Half ($\frac{1}{2}$) an hour is 30 minutes. A half hour is bigger than a quarter hour even though the denominator is smaller.*)

4. Emphasize the Main Idea.

When the bottom number in a fraction is bigger, the whole is divided into more parts, so the parts are smaller.

- Invite students to create advertisements for Greta's Grill to help explain to customers why its burgers are the biggest!

Chapter 13: Measuring Up with the Metric System, Student Reader page 74

1. Prepare to read.

Chapter Summary: This chapter introduces students to the metric system of measurement. This system allows people to have a common language to describe mass, length, and volume. Students learn how math was used to develop the system and how prefixes are used.

Math Connection: This lesson demonstrates how the metric system uses fractions, multiplication, and division and is based on the number 10.

Choose a Reading Routine: Based on your students' reading levels and other factors, decide how this chapter will be read.

2. Focus student attention.

Before You Read: Point out the chapter title: "Measuring Up with the Metric System." Explain to students that they are going to read about a measurement system that is used around the world. Remind them to pay special attention to how scientists developed the system.

3. Read together.

Use questions such as these to facilitate student engagement as well as to help students make connections to the use of math in the world:

- What challenges were solved by the development of the metric system? (*There were many different systems, so it was probably confusing. A numeric quantity represented different amounts in different units or systems.*)
- How did scientists use math to develop the metric system? (*They used a fraction of the distance between the equator and the North Pole. They used the number 10 as the base of the system.*)

A common measurement system in the United States is the customary system, in which liquids are measured in cups and distances in inches, feet, and miles. Ask students to name units for volume in the customary system or to compare different units such as gallons and cups.

- How does using the metric system compare to using the customary system? (*The metric system is easier because you only need to know the base and the prefixes. It is easier to understand the measurements and compare them to each other, e.g., compare a liter to a milliliter.*)

4. Emphasize the Main Idea.

The metric system of measurement is based on the number 10 and is used in most places throughout the world.

- Go on a metric system scavenger hunt in the classroom. Ask students to find objects in the classroom that can be described using the metric system.

Chapter 14: And the Survey Says . . . , Student Reader page 80

1. Prepare to read.

Chapter Summary: Surveys are tools for information gathering. Governments have used them for many different reasons for many years, as have companies to find out opinions of their products. Different types of graphs are used to present survey results.

Math Connection: This chapter demonstrates how gathering, analyzing, and presenting data can be used to make decisions.

Choose a Reading Routine: Based on your students' reading levels and other factors, decide how this chapter will be read.

2. Focus student attention.

Before You Read: Point out the chapter title: "And the Survey Says . . ." Explain to students that the chapter is about how we can use math to gather and report important information. Remind them to pay special attention to what information is collected in this chapter. Engage students by taking an impromptu survey, such as who drank orange juice, apple juice, water, or milk for breakfast. Brainstorm why information like this might be useful.

3. Read together.

Use questions such as these to facilitate student engagement as well as to help students make connections to the use of math in the world:

- Why would someone want to survey people on ice cream flavor? (*Answers will vary. Student answers should demonstrate the understanding that there is an underlying purpose for surveys.*)
- What kinds of questions do you think might be on a survey about opinions of TV shows? Technology use? Sports? (*Answers will vary.*)
- Why would you choose to use a picture graph instead of a bar graph and vice versa? (*A picture graph looks more interesting, but a bar graph is easier to read with large numbers.*)

4. Emphasize the Main Idea.

A survey is a tool for gathering information from groups of people, and the information can be displayed in different ways.

- A community is deciding what type of sports to offer children of different ages. What types of questions could a survey include in order to gather data about the interest in sports? How could the community decide from this survey what sports to offer?

Chapter 15: Ticking Through Time, Student Reader page 86

1. Prepare to read.

Chapter Summary: In the past, moon phases, the position of the sun in the sky, and seasons helped people know the time of day, month, and year. Sundials, water clocks, mechanical clocks, pocket watches, wristwatches, stopwatches, and digital clocks were developed to display more accurate time. Time zones rely on patterns in nature but also make timekeeping more accurate and more complex.

Math Connection: We use math skills when we tell time.

Choose a Reading Routine: Based on your students' reading levels and other factors, decide how this chapter will be read.

2. Focus student attention.

Before You Read: Point out the chapter title: "Ticking Through Time." Explain to students that they are going to read about how people have told time throughout history. Remind them to pay special attention to how observations of patterns in nature are used to tell time.

3. Read together.

Use questions such as these to facilitate student engagement as well as to help students make connections to the use of math in the world:

- What did the patterns in nature help people keep track of? (*The placement of the sun in the sky told them the time of day, seasons told them the time of year, and moon phases revealed the time of month.*)
- Why is it important for people to keep track of time? (*Sample answers: I need to know what time to be at school. Knowing what time to go to bed and wake up makes sure I get enough sleep.*)
- What are some issues with using shadows or water to tell time? (*They might not work right if it is a cloudy day or if the size of the holes are different and water drips faster or slower than it should. They are estimates and not exact.*)
- How did timekeeping become both more complex and more accurate over time? (*Answers should use examples of timekeeping methods that moved from being simple but with more possibility for error to more complex but accurate. For example, the division of a day into 24 hours, hours into 60 minutes, and minutes into 60 sections made timekeeping more complex but more accurate, especially for measuring small lengths of time.*)
- How are time zones related to Earth's spin? (*Because Earth spins, or rotates, the sun is in a different part of the sky in different locations. Therefore, time differs based on one's location on Earth.*)

4. Emphasize the Main Idea.

Timekeeping and ways of thinking about time have changed from ancient times to today.

- Have students research past timekeeping devices. Challenge them to describe how they worked and how they used patterns.

Chapter 16: Feline Design, Student Reader page 92

1. Prepare to read.

Chapter Summary: Harrison and Greyson are excited to play the new game *Feline Design*, in which they help Tommy Cat redesign his house. First, they decide what to measure and which tools to use. They use these measurements to calculate area to know how much carpet and tile Tommy will need to buy, then calculate perimeter to know how much wood is needed for kitten scratching logs.

Math Connection: When doing a home improvement project, we often calculate area and perimeter.

Choose a Reading Routine: Based on your students' reading levels and other factors, decide how this chapter will be read.

2. Focus student attention.

Before You Read: Point out the chapter title: "Feline Design." Explain to students that the chapter is about brothers playing a design game. Remind them to pay special attention to what the brothers need to know to play this game. Students should watch for the information Greyson and Harrison need before they buy things like carpet or wood. Ask students to speculate why measurement is an important part of design.

3. Read together.

Use questions such as these to facilitate student engagement as well as to help students make connections to the use of math in the world:

- What steps do you think Greyson and Harrison did to set up the house for Pumpkin? (*Answers will vary but should indicate some sort of construction or design.*)
- Why is it helpful to measure before going to the store for new carpet? (*You need to know how much carpet to buy. If Greyson and Harrison don't measure, they are guessing and could get the wrong amount.*)
- How do Greyson and Harrison calculate the area of the floor? (*They multiply the length by the width.*)
- How do Greyson and Harrison know to use the same process in the kitchen as in the first room? (*They know they are calculating the area in both.*)
- How is Tommy's work in the playroom different from and similar to what he did in the first 2 rooms? (*He used the same measuring tools in both. The brothers measure the length of all 4 walls in the playroom and the length and width in the other 2 rooms. They use these measurements to calculate the perimeter in the playroom and area in the other rooms.*)
- Why is it important that Tommy measures correctly? (*He might not have enough of his materials, or he may have extra, which is wasteful.*)

4. Emphasize the Main Idea.

Measuring tells how much of the different materials we need for home improvement projects.

- Have students create a room or house of their own design. They should indicate the design elements (e.g., carpet, paint, tile), what they would calculate (perimeter, area), and how they would go about executing the design (what tools they would need, what measurements they would take).

Chapter 17: Mondrian Art, Student Reader page 98

1. Prepare to read.

Chapter Summary: Dutch artist Piet Mondrian's work initially started with more realistic images like farmhouses and windmills, but later he focused on creating simple art that focused on squares, rectangles, and simple colors. His artwork was simple but powerful, and people loved how his art made them think and feel.

Math Connection: Art can use shapes, colors, and lines to express an idea or emotion.

Choose a Reading Routine: Based on your students' reading levels and other factors, decide how this chapter will be read.

2. Focus student attention.

Before You Read: Point out the chapter title: "Mondrian Art." Explain to students that the chapter is about abstract artist Piet Mondrian. Remind them to pay special attention to the way the images make them think or feel. Piet Mondrian's abstract art used common shapes and colors.

3. Read together.

Use questions such as these to facilitate student engagement as well as to help students make connections to the use of math in the world:

- In what ways do you think this is an accurate image of the windmill? What changes has Mondrian made? (*Answers will vary.*)
- Mondrian used simple shapes and colors. Why do you think people like his paintings so much? (*Sample answer: Mondrian's paintings use shapes in a way that is organized. This could be calming.*)
- How do you think changing the colors, sizes of rectangle, or where lines are might change the painting? (*Sample answer: Bright colors may be less calming. More shapes may feel more crowded.*)
- If Mondrian's art helped him to express his way of seeing the universe, what do you think his views were? (*Sample answer: I think he saw things as either right or wrong—there is no gray area.*)
- Why might Mondrian have named his artwork as *New York City I*? (*The squares and lines make me think of buildings and streets.*) What do you think he thought of New York City? (*Sample answer: I think he thought it was very busy and smooshed together but also organized.*)

4. Emphasize the Main Idea.

Simple lines and colors can be used to compose art that people find special.

- Mondrian used art to express his way of seeing the universe. Invite students to create art using shapes and colors that help them express their thoughts or feelings toward the universe, nature, or another topic of their choosing.

Chapter 18: Kaleidoscope, Student Reader page 104

1. Prepare to read.

Chapter Summary: Kaleidoscopes are tubes filled with mirrors and shapes made of colored glass or plastic. This seemingly simple toy has captured the attention of many over the past two hundred years. Developed by Sir David Brewster, the kaleidoscope uses mirrors to reflect the pieces inside to produce ever-changing symmetrical patterns.

Math Connection: Kaleidoscopes use geometric principles such as symmetry and reflections to produce patterns.

Choose a Reading Routine: Based on your students' reading levels and other factors, decide how this chapter will be read.

2. Focus student attention.

Before You Read: Point out the chapter title: "Kaleidoscope." Explain to students that the chapter is about kaleidoscopes. Remind them to pay special attention to how the different patterns are made. If possible, allow students to look through a kaleidoscope (or ask if they have ever looked through a kaleidoscope before) and to describe what they see.

3. Read together.

Use questions such as these to facilitate student engagement as well as to help students make connections to the use of math in the world:

- Ask students to study each kaleidoscope image on the pages. Discuss evidence of math, such as shapes, patterns, and symmetry. Ask: What shapes and pattern do you see in the image on this page? (*Answers will vary based on the page.*)
- Why are mirrors an important part of the kaleidoscope? (*Reflections in the mirrors are what make the symmetrical patterns.*)
- What, if any, patterns did you notice discussed on this page? (*Answers will vary based on page.*)
- How are the shapes and patterns used as a form of entertainment? (*They are beautiful, so people like to look at them. Because the shapes and patterns keep changing, people view this as a form of entertainment.*)

4. Emphasize the Main Idea.

A kaleidoscope uses mirror reflections to make patterns that can be understood through geometry, the math study of shapes.

- Have students make their own kaleidoscopes. Instructions and materials can be found online.

Chapter 19: Geometric Art, Student Reader page 110

1. Prepare to read.

Chapter Summary: Islamic art encompasses the diverse visual arts created by culturally Islamic populations. Islamic art uses different shapes to make detailed patterns. Buildings that have this type of art on them often display patterns that continue on and on, seeming endless. The patterns in Islamic art not only are ornamental but also demonstrate a spiritual understanding of the universe and its order. Islamic art uses symmetry in its design or combines shapes to make new ones.

Math Connection: Islamic art has a strong mathematical foundation, using geometric shapes, symmetry, and repetition.

Choose a Reading Routine: Based on your students' reading levels and other factors, decide how this chapter will be read.

2. Focus student attention.

Before You Read: Point out the chapter title: "Geometric Art." Explain to students that the chapter is about Islamic art. This art is found on mosques, in museums, and at historical sites. Remind them to pay special attention to how the artists use shapes to make patterns. Ask students to think about why shapes and patterns can be considered art.

3. Read together.

Use questions such as these to facilitate student engagement as well as to help students make connections to the use of math in the world:

- Do the designs use multiple types of shapes or just one? Which would create more interest? (*They use multiple types of shapes. This makes a more complex and interesting pattern.*)
- Do these patterns have a stopping place? Where do you think it is? (*Accept all answers. Guide students to recognize that patterns can continue indefinitely.*)
- Point to the different parts of this image that are symmetrical. (*Sample answer: There is a window that is the same as the other side. The hedge is the same as the other.*)
- Look at the different shapes in the design. How do you think they were made using other shapes? (*Answers will vary. Encourage students to try to re-create the shape by drawing on paper.*)
- What does it mean that art and mathematics are connected? (*It means that artists may use math when creating art. Math can be beautiful, too.*)

4. Emphasize the Main Idea.

Islamic art repeats simple shapes to make elaborate geometric patterns.

- Challenge students to design their own geometric art. Invite them to share their art, describing how their process and choices helped create unity and order.

Chapter 20: Amazing Cakes, Student Reader page 116

1. Prepare to read.

Chapter Summary: A conversation between a reporter and a baker known for illusion cakes highlights how bakers combine art, baking, and math. Chef Eric discusses how he uses his understanding of shapes and fractions to both create and cut his cakes. He uses his creativity mixed with patience and practice to develop his amazing cakes.

Math Connection: Pastry chefs use three-dimensional shapes and fractions when creating cakes.

Choose a Reading Routine: Based on your students' reading levels and other factors, decide how this chapter will be read.

2. Focus student attention.

Before You Read: Point out the chapter title: "Amazing Cakes." Explain to students that the chapter is a transcript of a conversation between a reporter and a chef. Remind them to pay special attention to how the chef combines math and art with baking.

3. Read together.

Use questions such as these to facilitate student engagement as well as to help students make connections to the use of math in the world:

- How does this cake show how the baker combines art and baking? How does he combine art and baking with math? (*The baker is creative when baking. He uses shapes.*)
- Why do artists need to understand geometry? (*They need to be able to see the basic shapes of things.*) Extend conversation to include other math ideas, such as lines, sizes, and symmetry.
- Why do cake artists need to understand fractions? (*They need to know how big layers, or tiers, should be and how to cut the cakes.*)
- Which method of cutting a cake in the shape of a cylinder do you prefer? Which do you think is most fair? (*Answers will vary, but students should use fractions and shapes to defend their ideas.*)

4. Emphasize the Main Idea.

Bakers use math skills when they work.

- Challenge students to use math to create their own design for a cake.

Chapter 21: Wild and Free, Student Reader page 122

1. Prepare to read.

Chapter Summary: A rancher is looking for a bigger property to house his growing number of horses. He knows that each horse needs a certain number of acres and a fence to keep it safe. After he buys the new ranch, he thinks about the size of the horse barn, exercise arena, flooring, and corral. He calculates the area and perimeter needed for all.

Math Connection: Ranchers use area and perimeter.

Choose a Reading Routine: Based on your students' reading levels and other factors, decide how this chapter will be read.

2. Focus student attention.

Before You Read: Point out the chapter title: "Wild and Free." Explain to students that the chapter is about a rancher looking for a larger ranch that can hold all his horses. Remind them to pay special attention to how he figures out how much space his animals need. Probe initial ideas by asking students if they have any pets at home. How would you know how big of a bed they need or how many supplies to buy?

3. Read together.

Use questions such as these to facilitate student engagement as well as to help students make connections to the use of math in the world:

- Why does Will need to do math when looking for new properties? (*He needs to be able to calculate the area, both the acres his horses need and how many acres the property has.*)
- How would Will use math to help if he had different kinds of animals? (*He would research and learn the area needed for each animal and add it together or multiply it by the number of animals.*)
- What math does Will need to use when he is considering buying the ranch? (*He is using his knowledge of perimeter and area.*)
- What problems does Will solve by measuring and calculating the area or perimeter on this page? (*Answers vary based on page but should reflect that these calculations help him know how big of a building or space he needs or how much material he should buy.*)

4. Emphasize the Main Idea.

Ranchers use area and perimeter to solve problems at their ranches.

- Invite students to plan a ranch of their own. They should decide which animals they want and the structures those animals will need. For each structure, they should identify if they need to calculate area or perimeter and why.

Chapter 22: It's a Keeper!, Student Reader page 128

1. Prepare to read.

Chapter Summary: Lobsterman Janine has to pay attention to seasonal patterns in her work to make sure of the distance she needs to travel offshore to catch lobsters. She expects to catch more lobsters in the summer when it is warm. She has to count and measure to know if lobsters are big enough to keep and sell or whether they must be thrown back. Note: *Lobsterman* is a gender-neutral term.

Math Connection: Lobstermen use counting, patterns, measurement, fractions, and multiplication in their work.

Choose a Reading Routine: Based on your students' reading levels and other factors, decide how this chapter will be read.

2. Focus student attention.

Before You Read: Point out the chapter title: "It's a Keeper!" Explain to students that the chapter is about a lobsterman named Janine. Remind them to pay special attention to all of the instances where Janine uses math as she works. Ask students to think about the tools Janine might use to help her do math as she works. Explain to students that *lobsterman* is a gender-neutral term.

3. Read together.

Use questions such as these to facilitate student engagement as well as to help students make connections to the use of math in the world:

- Janine's work follows the rhythms of seasons and tides. How is that using math? (*It is noticing and using patterns.*)
- What is the pattern between seasons, lobster activity, and number of lobsters caught? (*During cold winters, lobsters aren't active, and she catches few. During the warm summer, lobsters are more active, and she catches a lot.*)
- What are the different ways Janine uses measurement in her work? (*She has to know the size of her territory. She measures the size and weight of her traps. She measures the lobsters.*)
- On page 131, the text states, "Counting and measuring are a regular part of the lobsterman's routine." Where do lobstermen use counting? (*They count the lobsters they catch, the number they throw back, and the number of traps.*)
- How does Janine use math to help her figure out her weekly catch with helpers? (*She counts her daily catch and multiples by 7. She multiplies that by number of helpers.*)

4. Emphasize the Main Idea.

Lobstermen use their knowledge of fractions and measurements to manage their harvesting business responsibly.

- Have students research facts about what fish or other game (e.g., largemouth bass, deer) are allowed to be caught and any restrictions in your state. Have students suggest tools that might be needed by the fishers or hunters to ensure they meet rules, such as measuring tools or counting strategies.

Chapter 23: Solving a Water Problem, Student Reader page 134

1. Prepare to read.

Chapter Summary: Temperatures are climbing, and a soccer team needs to be prepared! Four friends remind the team to bring water to practice. It's so hot, though, that they need more water to drink while they play. They need to use math to figure out how much water the team needs and how many water bottles are required to hold the water.

Math Connection: This chapter shows how understanding measurement can help you solve a problem.

Choose a Reading Routine: Based on your students' reading levels and other factors, decide how this chapter will be read.

2. Focus student attention.

Before You Read: Point out the chapter title: "Solving a Water Problem." Explain to students that the chapter is about a soccer team preparing to play on hot days. Remind them to pay special attention

to the problems they are trying to solve. Remind students that water is measured by volume. Water bottles are often measured in liters. Ask students if they take water to any activities. How do they know how much water to take? What if they had to take extra water one day?

3. Read together.

Use questions such as these to facilitate student engagement as well as to help students make connections to the use of math in the world:

- Why is understanding temperature important in identifying a problem in this chapter? (*They know that the temperature is going up. This means they need extra water.*)
- What is the connection between temperature and the amount of water needed? (*As temperatures rise, more water is needed.*)
- Why do the friends decide to count the water bottles instead of just taking them? (*They want to be sure they have enough for everyone on the team.*)
- What operations do they use to figure out how much water and how many water bottles everyone would need? (*They know that one half-liter bottle only lasts half of practice. They need to multiply.*)
- Why is it a problem when the coach says everyone needs one and a half liters at the game? (*They only have two half-liter bottles for a total of one liter per player. They need half a liter more.*)

4. Emphasize the Main Idea.

You can use math operations to solve real-world problems such as figuring out how to bring enough water to sports practices or events.

- Hand out water bottles of various sizes. Remind students that in the United States, a common measurement of volume is ounces instead of liters. Explain that the general recommendation for children's water intake is to try to drink half an ounce of water for each pound you weigh. How would they use math to figure out how many bottles they need to drink? How might that change on hot days or days when they are playing outside? (Ensure that students do not need to share their weight with one another.)

Chapter 24: A Curator's Big Day, Student Reader page 140

1. Prepare to read.

Chapter Summary: Claire is a museum curator, and she is preparing the Fossil Shark Tooth Collection. The museum has some new teeth to add to the collection. Claire is recording data on each new tooth before she puts it in the exhibit. She organizes her data in a line plot to share with others. When people visit the exhibit, they learn about the shapes and sizes of fossilized teeth from different kinds of sharks.

Math Connection: Organizing and sharing data using charts and tables, measurement, and shape comparisons are skills central to the job of a museum curator.

Choose a Reading Routine: Based on your students' reading levels and other factors, decide how this chapter will be read.

2. Focus student attention.

Before You Read: Point out the chapter title: "A Curator's Big Day." Explain to students that the chapter is about a curator at a natural history museum. Remind them to pay special attention to how Claire specifically measures the newest shark teeth to the collection. If possible, show students a digital caliper, and demonstrate how it works.

3. Read together.

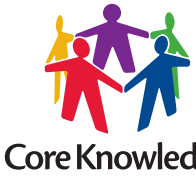
Use questions such as these to facilitate student engagement as well as to help students make connections to the use of math in the world:

- What are the features that Claire looks at when she organizes each new tooth? (*She looks at the shape and size of each tooth.*)
- Why is the shape of each tooth important? (*It tells you the type of shark the tooth came from.*)
- What process might Claire use to make a line plot of the shark tooth data? (*Students should describe creating an x-axis, giving the plot a title, deciding on the scale, and making dots to show measurements.*)
- What information can you learn from the line plot of shark teeth and their size? (*You can count and see that the total number of teeth is 28. You can see how many teeth are in each size group. One is 6 inches long.*)
- How can 6 teeth be 0 inches on the plot? (*She rounds to the nearest inch, so they must be very small.*)
- What are some differences about shark teeth that you notice? (*Sharks have different numbers of teeth. The teeth are different shapes and sizes.*)
- Why is it important for scientists to agree that teeth should be measured a certain way? (*You wouldn't be able to compare the size of the teeth if they were measured different ways.*)
- Why do you think it is important for museum curators to count and measure their specimens and share these data with others? (*Answers will vary. Emphasize responses that focus on learning from others, comparing data, and answering questions about nature.*)

4. Emphasize the Main Idea.

Museum curators count and measure specimens, and they record and share data.

- Invite students to develop their own collections (rocks, flowers, toy cars, etc.). How can they count and measure the specimens and share their data with others?



CKMath™

Core Knowledge Mathematics™

Managing Editor, STEM
Sally Guarino

Subject Matter Expert

Holly Caldwell-Taylor, DBA, CPA
Associate Professor and Department Chair
Department of Economics and Business Administration
Bridgewater College
Bridgewater, VA

Illustration and Photo Credits

Ivan Pesic: Cover, Title Page

CKMath™

Core Knowledge Mathematics

Connecting Math to Our World:

Grade 3 - How Math Helps Us

Math is found in almost every aspect of our lives. This series encourages learners to *find the math* in familiar situations, where they can benefit from seeing real-world connections to math. The instructional focus for this series is not on *practicing* math skills but on *where, when*, and *why* we use math. Through both fiction and nonfiction readings, learners see how math skills are useful. The readings increase an overall understanding of and interest in math and demonstrate the importance of learning math skills.

www.coreknowledge.org

ISBN: 978-1-68380-491-8