Place Value Structure

5th Grade

K-12 Math Institute

March 2nd, 2026

MATHEMATICS

STRATEGIC COMPETENCE: BALANCING THE HOW, WHY, AND WHEN.

COBB COUNTY SCHOOL DISTRICT | ONE TEAM.ONE GOAL. STUDENT SUCCESS.

Lesson 4.03: Place Value Structure

Instructional Notes

This activity encourages students to think about the place value structure in real world contexts and previews measurement concepts later in the unit. Draw on students understanding of powers of ten and metric measurements from 4th grade during the lesson.

Lesson Description
In this learning plan, students will use base ten blocks to visually create numbers and show how the place value system is used to efficiently multiply and divide powers of ten.

Big Idea(s)/Topic(s)
Numerical Reasoning

- Understand Place Value: Powers of 10 up to 10^3
- Use place value to reason about the magnitude of numbers.

Suggested Learning Targets

- I can identify that a digit to the left is worth ten times more than the digit to the right.
- I can identify that a digit to the right is worth 1/10 the value of the digit to the left.

Georgia Standard and Learning Objectives

- 5.MP: Demonstrate skills and strategies needed to succeed in mathematics, including perseverance, patient problem-solving, critical thinking, reasoning and sense-making, effective collaboration and expression. Seek help and apply feedback. Set and monitor goals.
- 5.NR.1 Use place value understanding to solve real-life, mathematical problems.
    - 5.NR.1.1 Explain that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left.

Background Knowledge

- In previous grades, students examined the relationships of the digits in numbers for whole numbers. This standard extends

this understanding to the relationship of decimal fractions.

Common Misconceptions

- Students may need guidance in deriving the rules for multiplying a number by a power of ten. Many students correctly recognize that multiplying a whole number by a power of ten will result in a product with as many zeros at the end as were in the power of 10. However, when students transition to multiplying decimal numbers by powers of ten, they often generalize this "rule" without thinking about the value that results. It is important to create dialogue around this misconception, especially during the initial stages of deriving rules for multiplying and dividing numbers by powers of ten.

Materials Required

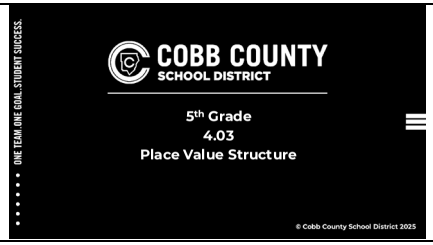
- Base ten blocks
- Virtual Base ten blocks (Optional: Choose the thousandths to ones place value chart.)

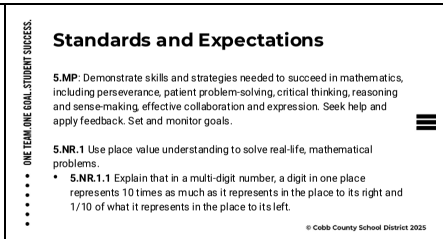
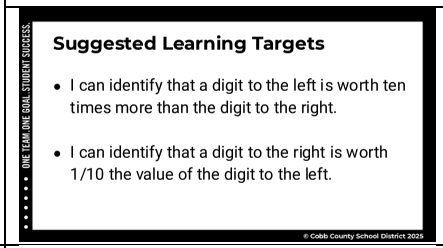
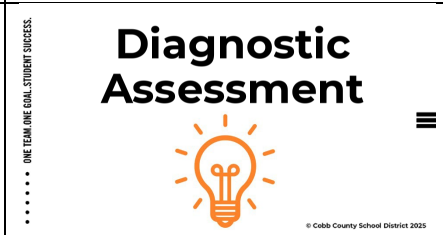
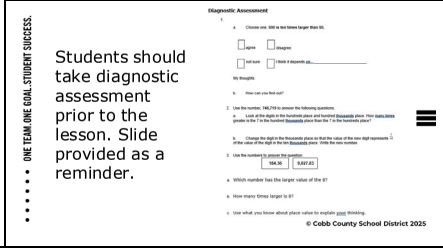
Additional Planning Considerations

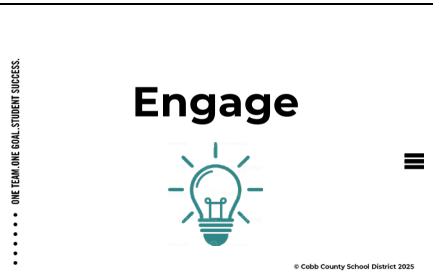
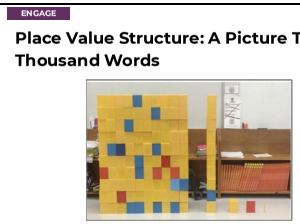
- Grouping suggestions: Engage: Partners. Explore and Apply: Small Groups. Reflect: Individual.

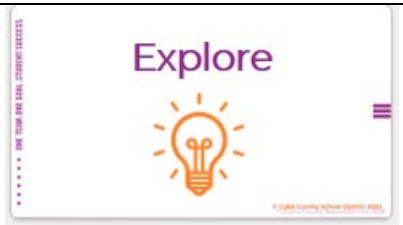
Lesson Details

You, as the teacher, have the autonomy to adapt this lesson to best meet the needs of your students.

Section	Slide	Implementation Guidance	Answer(s) if applicable
Intro		Purpose: Introduce the lesson	

		Purpose: Standards and expectations for the lesson
		Purpose: Suggested learning target(s)
Diagnostic		Purpose: Transition slide
		Purpose: Students should take this diagnostic a few days prior to the lesson. The slide is included as a reminder. Teacher guidance: This diagnostic assessment will identify how well students understand the concept of multiplying by powers of ten using whole numbers. Students will leverage their previous knowledge of multiplying and dividing by powers of ten with whole numbers to expand this knowledge with decimals.

<table>
<tr><td rowspan="2">Engage</td><td> 
</td><td>Purpose: transition to the engage segment of the lesson.</td></tr>
<tr><td> 
</td><td>Purpose: Students engage in conversations about what they notice and wonder. Connect students' discoveries to concept standards and provide clarification as needed.

Teacher Guidance:
• Display the image to students. Ask, what do you notice, what do you wonder?
• Allow students independent think time before engaging in a think-pair-share.
• Ask students to share their noticings and wonders.
• Record student responses on the slide, labeling noticings using the picture as needed.
• Listen for students’ connection with the structure of the base ten blocks and place value. Students share responses with partners and the whole class.</td></tr>
<tr><td>Explore</td><td> 
</td><td>Purpose: Transition to the explore segment of the session.</td></tr>
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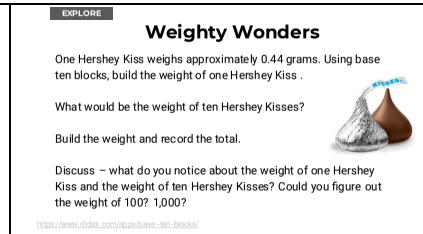
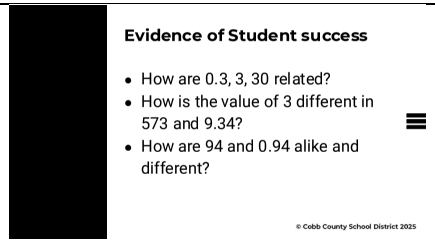
	EXPLORE **Place Value Structure: Base Ten** **The value of the large cube is one.** What do you notice? What do you wonder? 	Purpose: This activity introduces students to multiplying and dividing by a power of ten. Students use their understanding of base ten blocks and place value to represent tenths, hundredths, and thousandths with manipulatives and decimals. The manipulatives highlight the relationship between these quantities: • There are 10 tenths in a whole • There are 10 hundredths in a tenth • There are 10 thousandths in a hundredth. Students will then use this understanding to multiply by a power of ten. Teacher Guidance: Students should work with a partner or small group to discuss what they notice and wonder about the cube. Teacher monitors students responses, highlighting key understandings of the relationships between places. Teacher records what students notice and what they wonder.	
	EXPLORE **Place Value Structure: Base Ten** How many flats, rods, and small cubes do we need to make one large cube?  Number of flats Number of rods Number of small cubes	Purpose: Continue to explore values and relationships to the whole. Teacher Guidance: Allow students to discuss in small groups and record on the student activity page. Students should have materials available at their desks/in their groups to manipulate while discussing. Use physical or digital manipulatives to demonstrate student thinking and highlight relationships.	10 100 1000
	EXPLORE **Place Value Structure: Base Ten** If one large cube has a value of 1. Find the value of one flat, rod, and a small cube.  Number of flats Number of rods Number of small cubes	Purpose: Continue to explore values and relationships to the whole. Teacher Guidance: Allow students to discuss the prompt in small groups and record on the student activity page. Students should make the connection between how many of each block it took to make the cube and the relative value. Use place value chart to highlight that understanding as needed.	0.1 0.01 0.001

		Purpose: Students relate the base ten block exploration to a real world context. Teacher Guidance: Student should work in partners/groups to build the weight of a Hershey Kiss using base ten blocks. After building, use animation feature to bridge student thinking to multiplying by 10, 100, and 1,000. Student should build the representation using base ten blocks while the teacher records the standard value and expression on the board. *Note – if there are not enough cubes to represent the value of ten Hershey kisses, encourage students to draw their representation or record using a place value chart.* Transition to application task by using animation feature to display question about dividing values by ten – ask students to consider the question independently, then use their base ten blocks to explore their solution. Record the expression that 0.44 / 10 = 0.044 and discuss what this would look like in a place value chart.	*One Hershey Kiss would be represented with four flats and four rods.* *Ten Hershey Kisses would be 4 cubes and 4 flats (4.4g).* *0.44 x 10 = 4.4* *100 Hershey Kisses is 0.44 x 100 = 44* *1,000 Hershey Kisses is 0.44 x 1,000 = 440* *0.44 / 10 = 0.044 (moving to the right is the same as dividing by 10 AKA it's 1/10 the value)*
Apply		Purpose: transition to the apply segment of the lesson.	

	APPLY **Place Value Structure: Weighty Tens** • Kipton has a digital scale. He puts a marshmallow on the scale, and it reads 7.2 grams. • How much would you expect 10 marshmallows to weigh? Why?  APPLY **Place Value Structure: Weighty Tens** • Kipton takes the marshmallows off the scale. He puts on 10 jellybeans and the scale reads 12.0 grams. • How much would you expect 1 jellybean to weigh? Why?  APPLY **Place Value Structure: Weighty Tens** • Kipton takes off the jellybeans and puts on 10 brand-new pink erasers. The scale reads 312.4 grams. • How much would you expect 1,000 pink erasers to weigh? Why? 	Slides 14 - 16 Purpose: Students will use their knowledge of knowing the value of a digit as being worth ten times more than the digit to the right or that a digit to the right is worth 1/10 the value of the digit to the left to apply to situations. Teacher Guidance: Allow students time to discuss their thinking about the problem with a partner. Encourage students to use the following sentence stems to share their thinking: • I agree with your thinking because… • I disagree with your thinking because… • Have you considered the following information…	72 grams 1.2 grams 312,400 grams
Reflect		Purpose: Transition to the reflect segment of the lesson	

		Purpose: This activity is intended to support student thinking with powers of 10 in a fun context. Teacher Guidance: Pose the would you rather scenario to students. Students should discuss their thinking with a partner, then make a claim. Teachers can direct students to stand on different sides of the classroom to "show" their thinking and discuss or use hand signals to vote and discuss. Teacher should highlight that students can use understanding of place value to solve the problem. Use a place value chart and equations to represent the solution as needed.
Evidence of Student Success		Purpose: This should be used to assess students' understanding that the value of a digit as being worth ten times more than the digit to the right or that a digit to the right is worth 1/10 the value of the digit to the left. Guidance: After the students have engaged in the learning experiences in this learning plan, provide them with a copy of the Place Value Structure Formative Assessment

Supports	**Student Supports** • Students will use base ten blocks to create and show how the place value system is used to multiply and divide powers of 10. • Concrete or virtual manipulatives can help to support students who are grappling that in a multi-digit number, the value of a digit is worth ten times more than the digit to the right or that a digit to the right is worth 1/10 the value of the digit to the left. **Language Supports:** • To support comprehension and make mathematics content linguistically understandable, provide temporary scaffolds that include: ○ Making language visible through repeated teacher modeling and thinking aloud • Drawings and visual representation of word problems with arrays and manipulatives • Provide multiple opportunities for structured peer interactions or conversations (pairs or triads). Allow multi-lingual students to practice English using pictures of arrays, manipulatives to build arrays, a word bank, and sentence frames to support the discussion. • Make language visible by acting out the story or modeling commands for the students' total physical response. Use visual representations of word problems using manipulatives and drawings such as arrays to support sensemaking. • Provide multiple opportunities for structured peer interactions or conversations (pairs or triads) to negotiate the meaning of rows and columns, repeated addition, multiplication, etc., using listening cues and highlighted or reduced text. • Pose purposeful questions to assess prior knowledge and elicit student thinking to address concepts needing review. Break class into small discussion groups to work collaboratively and then have groups report back to the whole group.

Extensions	• Support students with thinking about place value patterns and input/output tables by asking them to calculate values outside of powers of 10. For example, ask students - If one sunflower seed weighs 0.05 g, predict the weight of 2,500 seeds. If 10 sunflower seeds weigh **0.5 g**, how many seeds would weigh **5 g**?
Additional Resources	Students can continue supporting their learning by engaging in the game Scholastic Study Jams: Place Value Decimals This online activity allows students to practice place value behind the decimal. Place Value Riddles Lesson adapted from: https://lor2.gadoe.org/gadoe/file/9b117309-1b63-454e-9b1d-88d8816e971e/1/Place-Value-Structure-Grade-5-Unit-2.pdf

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COBB COUNTY SCHOOL DISTRICT

5th Grade
4.03
Place Value Structure

1

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Standards and Expectations

5.MP: Demonstrate skills and strategies needed to succeed in mathematics, including perseverance, patient problem-solving, critical thinking, reasoning and sense-making, effective collaboration and expression. Seek help and apply feedback. Set and monitor goals.

5.NR.1 Use place value understanding to solve real-life, mathematical problems.

- **5.NR.1.1** Explain that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left.

2

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Suggested Learning Targets

- I can identify that a digit to the left is worth ten times more than the digit to the right.
- I can identify that a digit to the right is worth 1/10 the value of the digit to the left.

3

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Diagnostic Assessment

4

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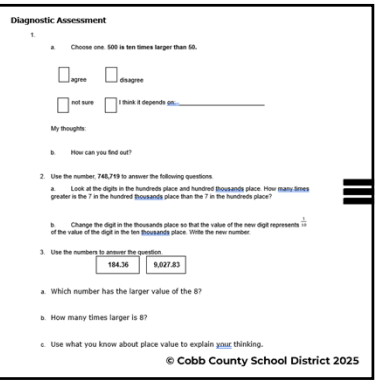
Students should take diagnostic assessment prior to the lesson. Slide provided as a reminder.



Diagnostic Assessment

1.

a. Choose one. **500 is ten times larger than 50.**

☐ agree ☐ disagree

☐ not sure ☐ I think it depends on: _____

My thoughts:

b. How can you find out?

2. Use the number, **748,719** to answer the following questions.

a. Look at the digits in the hundreds place and hundred thousands place. How many times greater is the 7 in the hundred thousands place than the 7 in the hundreds place?

b. Change the digit in the thousands place so that the value of the new digit represents $\frac{1}{10}$ of the value of the digit in the ten thousands place. Write the new number.

3. Use the numbers to answer the question.

184.36	9,027.83

a. Which number has the larger value of the 8?

b. How many times larger is 8?

c. Use what you know about place value to explain your thinking.

5

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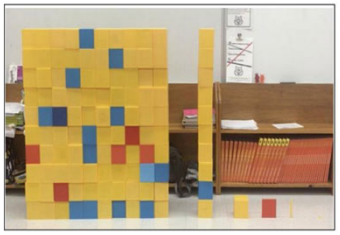
Engage

6

ENGAGE

Place Value Structure: A Picture Tells a Thousand Words



7

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Explore

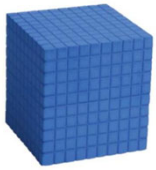
8

EXPLORE

Place Value Structure: Base Ten

The value of the large cube is one.

What do you notice?
What do you wonder?



https://www.didax.com/apps/base-ten-blocks/

9

EXPLORE

Place Value Structure: Base Ten

How many flats, rods, and small cubes do we need to make one large cube?

Number of flats

Number of rods

Number of small cubes

https://www.didax.com/apps/base-ten-blocks/

10

EXPLORE

Place Value Structure: Base Ten

If one large cube has a value of 1. Find the value of one flat, rod, and a small cube.

Number of flats

Number of rods

Number of small cubes

https://www.didax.com/apps/base-ten-blocks/

11

EXPLORE

Weighty Wonders

One Hershey Kiss weighs approximately 0.44 grams. Using base ten blocks, build the weight of one Hershey Kiss.

What if we cut a Hershey Kiss into ten equal sized pieces? What would each piece weigh?

Wha

Build

Disc one Hershey Kiss and the weight of ten Hershey Kisses? Could you figure out the weight of 100? 1,000?

https://www.didax.com/apps/base-ten-blocks/

12

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Apply

13

APPLY

Place Value Structure: Weighty Tens

- Kipton has a digital scale. He puts a marshmallow on the scale, and it reads 7.2 grams.
- How much would you expect 10 marshmallows to weigh? Why?

14

APPLY

Place Value Structure: Weighty Tens

- Kipton takes the marshmallows off the scale. He puts on 10 jellybeans and the scale reads 12.0 grams.
- How much would you expect 1 jellybean to weigh? Why?

15

APPLY

Place Value Structure: Weighty Tens

- Kipton takes off the jellybeans and puts on 10 brand-new pink erasers. The scale reads 312.4 grams.
- How much would you expect 1,000 pink erasers to weigh? Why?

16

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Reflect

17

REFLECT

Would You Rather

Carry 1,000 grains of rice, each weighing 0.02 grams

Carry 100 sunflower seeds, each weighing 0.05 grams

1 kg = 1,000 grams

18

Evidence of Student success

- How are 0.3, 3, 30 related?
- How is the value of 3 different in 573 and 9.34?
- How are 94 and 0.94 alike and different?

19

Resources

Place Value Structure GaDOE Lesson Plan

20

4.03 – Place Value Structure

Name: _____ Date: _____

Weighty Tens

Answer the following questions. Use a place value chart and/or base ten blocks if needed.

1. Kipton has a digital scale. He puts a marshmallow on the scale, and it reads 7.2 grams. How much would you expect 10 marshmallows to weigh? Why?

2. Kipton takes the marshmallows off the scale. He then puts on 10 jellybeans and then the scale reads 12.0 grams. How much would you expect 1 jellybean to weigh? Why?

3. Kipton then takes off the jellybeans and puts on 10 brand-new pink erasers. The scale reads 312.4 grams. How much would you expect 1,000 pink erasers to weigh? Why?

5th Grade Mathematics Expanded Framework

Unit 4 – Building Place Value Understanding Using Measurement and Data Reasoning

4 weeks

Standard(s):	Expectations:
• **5.NR.1:** Use place value understanding to solve real-life, mathematical problems. Click here for a video overview of the standard. • **5.MDR.7:** Solve problems involving customary measurements, metric measurements, and time and analyze graphical displays of data to answer relevant questions. Click here (data) or here (measurement) for a video overview of the standard.	• **5.NR.1.1** Explain that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left. • **5.NR.1.2** Explain patterns in the placement of digits when multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10, up to 10^3. • **5.MDR.7.3** Convert among units within the metric system and then apply these conversions to solve multistep, practical problems. • **5.MDR.7.4** Convert among units within relative sizes of measurement units within the customary measurement system. • **5.MDR.7.1** Explore realistic problems involving different units of measurement, including distance, mass, weight, volume, and time. • **5.MDR.7.2** Ask questions and answer them based on gathered information, observations, and appropriate graphical displays to solve problems relevant to everyday life. • **5th Grade:** Create statistical investigative questions that can be answered by using quantitative (numerical) and categorical data. Determine strategies for gathering data to answer questions. Collect, analyze, and interpret data presented on dot plots and bar graphs from real situations to answer questions about the data distribution, spread, and center.

Suggested Learning Arc by Topic

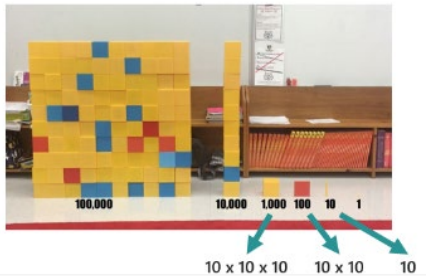
Week	Topic	Learning Materials
1	Powers of 10	• Day 1: Multiply by Powers of Ten • Day 2: Divide by Powers of Ten • Day 3: Place Value Structure • Day 4: Patterns in Powers of Ten • Day 5: Ten Again
2	Problem solving with metric conversions Mixed measurement conversion problems	• Day 6: Convert Metric Units of Length • Day 7: Solve Problems Involving Metric Units of Length • Day 8: Convert Metric Units of Capacity • Day 9: Solve Problems Involving Metric Units of Capacity • Day 10: Convert Metric Units of Mass • Day 11: Solve Problems Involving Metric Units of Mass • Day 12: Problem Solving with Metric Units
3	Problem solving with customary conversions Mixed measurement conversion problems	• Day 13: Convert Customary Units of Length • Day 14: Convert Customary Units of Capacity • Day 15: Convert Customary Units of Weight • Day 16: Solve Problems Involving Customary Units • Day 17: Convert Units of Time • Day 18: Solve Word Problems Involving Time • Day 19: Measure, Measure • Day 20: Assessment
5	Mathematical Modeling & Application	• Constructive and Destructive Forces Investigative Research

Suggested Vocabulary

Tier 2			Tier 3		
• Analyze • Apply • Ask • Collect • Compare • Create	• Describe • Determine • Display • Estimate • Explain • Explore	• Gather • Identify • Interpret • Justify • Measure • Represent	• Bar graph • Base-ten • Categorical data • Centimeter (cm) • Cups (c) • Conversion/convert • Center (of data) • Customary system • Data • Data distribution • Decimal • Digit • Dot plot • Exponent • Feet (ft)	• Fluid ounces • Gallons (gal) • Grams (g) – kilo (kg), milli (mg) • Inches (in) • Liters (L) – kilo (kL), milli (mL) • Length • Liquid volume • Mass • Measurement • Metric system • Meters (m) -kilo (km), centi (cm),	• milli (mm) • Miles (mi) • Pattern • Pints • Place Value • Pounds (lbs) • Power of 10 • Quantity • Tons (t) • Unit (of measurement) • Value • Weight • Yards (y)

Suggested Instructional Considerations

Concept	Manipulatives/Visuals	Strategies
Place value and multi-digit numbers	• Give students hands on experiences with shifting digits in the place value system when multiplying or dividing by a multiple of ten using base ten blocks and recording the subsequent value in a place value chart. • As students are working in the place value system moving digits to the right and left, support this idea by using an interactive place value chart and/or a physical chart and digit cards, demonstrating how the digits move in the place value chart, not the decimal point.	• Avoid using the language “add a zero” or “move the decimal” when showing how values change when multiplied or divided by 10. This is a “rule” that expires when students begin to multiply decimals by ten in this standard since they can’t simply “add a zero” to a decimal to show that the number has been multiplied by 10. Read more about Rules that Expire by clicking here. • In 4th grade, students examined the relationships of the digits in



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Students should see the place value system as a pattern, noting the relationship between digits in different places and the value of those digits in relation to multiplying and dividing by a power of ten. Students use base ten blocks, pictures of base ten blocks, and interactive images of base ten blocks to manipulate and investigate the place value relationships. They use their understanding of unit fractions to compare decimal places and fractional language to describe those comparisons.

</td>
<td>numbers for whole numbers only. This standard extends this understanding to the relationship of decimal fractions. Including visuals related to students understanding of decimal fractions such as base ten blocks will support this transition.</td>
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<tr>
<td>Exponents</td>
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Students should have experiences working with connecting the pattern of the number of zeros in the product when you multiply by powers of 10. Students should notice the shift of the digits when multiplying by a power of 10.
For example: $2.5 \times 10^3 = 2.5 \times (10 \times 10 \times 10) = 2.5 \times 1{,}000 = 2{,}500$

<table>
<tr><td>10^4</td><td>10^3</td><td>10^2</td><td>10^1</td><td>10^0</td></tr>
<tr><td>Ten-Thousands</td><td>Thousands</td><td>Hundreds</td><td>Tens</td><td>Ones</td></tr>
</table>

Students should relate each shift in the place value system to a subsequent multiplication problem and see that as a related exponent.

<table>
<tr><th>Millions</th><th>Hundred-Thousands</th><th>Ten-Thousands</th><th>Thousands</th><th>Hundreds</th><th>Tens</th><th>Ones</th></tr>
<tr><td></td><td></td><td></td><td></td><td>x 10 (10^1)</td><td>7</td><td>2</td></tr>
<tr><td></td><td></td><td></td><td>x 10 x 10 (10^2)</td><td>7</td><td>2</td><td>0</td></tr>
<tr><td></td><td></td><td>x 10 x 10 x 10 (10^3)</td><td>7,</td><td>2</td><td>0</td><td>0</td></tr>
</table>
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<td>

Students' experiences with squares and cubes should relate to their understanding of using these symbols when recording area and perimeter. Note that area is a square because it is a length x a length. Volume is cubed because we add in a third dimension. Relate this prior experience and understanding to their work with multiplying in the place value system.

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<td>Measurement conversions</td>
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Students work with measurement conversions began in third grade with customary units and continued in 4th grade with metric units. In both grades, students explored measurement conversions as patterns and used two-column tables to record their thinking. In 5th grade, students work with both systems and begin conversions within the same system for length, mass, and liquid volume.

<table>
<tr><th>Kilograms (kg)</th><th>Grams (g)</th></tr>
<tr><td>1/2</td><td></td></tr>
<tr><td>1</td><td>1,000</td></tr>
<tr><td>3</td><td></td></tr>
<tr><td></td><td>5,000</td></tr>
<tr><td></td><td>6,500</td></tr>
<tr><td>12 1/2</td><td></td></tr>
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<td>

Teaching conversions should focus on the relationship of the measurements, not merely rote memorization.
Students are not expected to know e.g., that there are 5280 feet in a mile. Conversion factors should be given to the students. However, in a teaching situation it is worth having them realize that they need that

</td>
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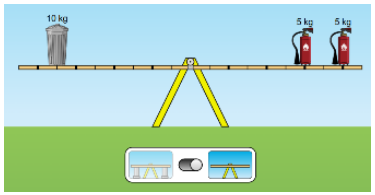
	• Encourage students to "undo" the pattern to determine if their entries are accurate. Students should be able to use the inverse of the operation(s) when working with conversions. • Estimation is a key component of measurement. Students should develop benchmarks for common measurement units to use when estimating prior to measuring, then compare their measurement to their estimation to further support this skill. Activities like Estimation180 can help develop estimation skills.	information rather than giving it to them upfront; having students identify what information they need to have to solve the problem and knowing where to go to find it allows them to engage in Mathematical Practice 5, Use appropriate tools strategically.
Multi-step problems and conversions.	• Students can use bar models to create a visual that represents the context of the word problem. Ensure that students have a deep understanding of the part-whole relationship of bar models while introducing. • Use physical tools to illustrate conversions or act out word problems. Tools like balance scales or interactives can support students with visualizing equivalencies in conversions and acting out problems. 	• When solving problems that require renaming units, students use their knowledge of renaming the numbers as with whole numbers. Ensure students understand the unit involved when converting to avoid mistakes (such as trading 1 foot for 10 inches)
Dot Plots / Line Plots	• The term dot plot and line plot can be used interchangeably. Students should see both dots and x's used to represent data points on a dot/line plot. • This is students third year working with numerical data. Numerical data is expressed in numbers rather than categories (bar/pictographs) and is best represented on a dot/line plot.	• In this standard, students should work with graphical displays to the nearest 1/8. • Context of this expectation should be explored through customary or metric units.

Progress Monitoring & Assessments

Prerequisite	Midpoint	Evidence in Student Learning

The pre-requisite (or beginning-of-unit) assessment measures students' understanding of prior-year standards that align with the upcoming unit. This assessment is intended to be given prior to the unit of instruction to allow teachers time to support students with pre-requisite skills and understanding needed to be successful in instruction.	The midpoint assessment evaluates students' mastery of content taught during the first part of the unit. This assessment is intended to support teachers with identifying students who may need additional support on standards already covered to demonstrate mastery by the end of the unit.	The post-assessment measures students' overall mastery of all standards and expectations within the unit of study. This assessment is intended to provide teachers with information on students' mastery and can be used to guide future small group instruction to ensure all students achieve mastery of the standards.

Student Supports

Language Supports	Grade 5 Mathematics Resource Companion for Language Supports ***Provide extended opportunities for ELs to practice Listening, Speaking, Reading, and/or Writing throughout each lesson*** (4 domains of language) ***Provide extended opportunities for ELs to use language by Informing, Explaining, and/or Arguing*** (WIDA ELD Standards, Key Language Uses) ***Additional language supports can be found in Ellevation Activities*** **Vocabulary** (Clarify Input) • Anchor Charts o *Example: Allow students to construct anchor charts with unit-specific vocabulary, including measurements and relevant sample problems. Reference the anchor charts often throughout the unit.* **Explore** (Build Background) • Brainstorm Walk

	○ *Example: Write a different unit of measurement on several sheets of chart paper. Have students in groups move around the room to discuss each unit and write what they know about it on the chart. Students can write where they have seen it before or name something that is measured using that unit. Discuss the chart paper responses before starting the lesson.* • Think, Write, Pair, Share ○ *Example: Create a table with equivalent measures represented. Model how to convert measurements to smaller or larger units. Then provide students with an example. They think, write the conversion, and then discuss their answer with a partner. As a class, discuss the correct conversion and then continue with other examples.* **Apply** (Fortify Output) • Numbered Heads Together ○ *Example: Students work in groups to determine the answers to unit conversions and note how they know they are correct. Students engage in meaningful conversations and respond to questions about the conversions when their number is called.* **Reflect** (Develop Academic Language) • Cloze Sentences ○ *Example: Provide a copy of the measurements of several objects with missing phrases. Students convert the measurements and fill in the missing units or measurements. Review as a group, discussing the correct conversions and how students determined the answers.*
Intervention	**Scaffolding:** *Just like a physical scaffold supports a building under construction, educational scaffolding supports the learner until they can stand on their own. The assistance is gradually withdrawn as the student gains proficiency, ultimately leading to independent mastery.* **Key Characteristics** • **Temporary Support:** The help is not permanent. It's designed to be removed once the student can perform the task independently.

	• **Adjustable:** The level of support is adjusted based on the students' needs. Beginners might need more explicit guidance, while those with some understanding might only need subtle prompts. • **Enables Independence:** The goal is to empower students to solve problems and understand concepts without assistance. • **Focus on the Zone of Proximal Development (ZPD):** Scaffolding operates within Vygotsky's ZPD, which is the gap between what a student can do independently and what they can achieve with guidance. **Here are some ways scaffolding is applied in a math classroom:** • **Breaking Down Complex Problems:** A teacher might break a multi-step word problem into smaller, manageable parts. • **Providing Graphic Organizers:** Using diagrams, charts, or flowcharts to help students organize information and visualize problem-solving steps. • **Using Manipulatives:** Concrete objects like blocks, counters, or fraction tiles can help students understand abstract mathematical concepts. • **Think-Alouds:** The teacher verbalizes their thought process while solving a problem, demonstrating strategies and reasoning. • **Providing Sentence Starters or Prompts:** Offering phrases like "First, I need to..." or "What information is given?" to guide students' thinking. • **Worked Examples:** Presenting fully solved problems that students can reference as they work on similar ones. • **Checklists or Rubrics:** Giving students a clear set of criteria for completing a task or solving a problem. By providing timely and appropriate support, scaffolding helps students build confidence and develop a deeper understanding of mathematical concepts. **Differentiation:** *Differentiation is about customizing instruction to meet each student's unique learning needs, while also providing opportunities for those who are ready for more advanced challenges. This approach recognizes the diverse needs of students in a classroom*.

	Here are strategies for differentiated instruction that we can use to meet the diverse needs of our students: • **Integrate Low Floor, High Ceiling Tasks:** Tasks have a low barrier to entry to be accessible to all (low floor), but they also offer opportunities for deeper exploration and advanced challenges (high ceiling). This strategy ensures that every student can engage with the material while also allowing those ready for more complexity to thrive. Most math tasks can be revised to have a low floor, high ceiling by removing numbers, allowing students to use their own models rather than dictating which methods to use, or providing alternative directions for existing assessments. • **Introduce Manipulatives:** Using hands-on tools can also help older students understand abstract concepts. Manipulatives can increase engagement and allow students to explore ideas and grasp subjects like math and science more effectively. • **Assemble Small Groups:** Breaking the class into smaller groups allows for more targeted instruction. Educators can address specific needs, answer questions, and provide targeted assistance to students based on their progress and needs. • **Provide Student Choice:** Offering students choice in their learning empowers them. Students can choose topics, projects, or assignments that align with their interests, making the learning experience more engaging and relevant. Choice boards, for example, provide students with activity and assessment options and can be used across subject areas. • **Use Graphic Organizers:** Not only are graphic organizers useful visual tools for organizing complex information, but they can also assist students in understanding the information. Organizers can be used for learning a range of subjects. **Metacognitive Strategies:** *Metacognitive strategies for math students are techniques they use to* ***think about their thinking*** *while learning and problem-solving. These strategies help students become more aware of their own learning processes, identify what they understand and what they don't, and take steps to improve their comprehension and performance.*

	Before Solving a Problem
	• **Understanding the Task:**
	  o **Activating Prior Knowledge:** "What do I already know about this type of problem?" or "Have I seen a similar problem before?"
	  o **Deconstructing the Prompt:** "What is the question really asking me to do?" or "What are the key terms and information given?"
	  o **Goal Setting:** "What am I trying to achieve by solving this problem?"
	• **Planning:**
	  o **Strategy Selection:** "What strategies could I use to solve this (e.g., drawing a diagram, making a list, using a formula)?"
	  o **Predicting Outcomes:** "What do I expect the answer to look like?" or "Does this problem seem simple or complex?"
	  o **Resource Identification:** "What tools or resources might I need (calculator, notes, textbook)?"
	
	During Problem Solving
	
	• **Monitoring Comprehension:**
	  o **Self-Questioning:** "Am I understanding each step?" or "Does this make sense so far?"
	  o **Checking Progress:** "Am I on the right track?" or "Is my current step leading me closer to the solution?"
	  o **Identifying Obstacles:** "Where am I getting stuck?" or "What part is confusing me?"
	  o **Re-reading/Re-evaluating:** "Should I go back and re-read the problem or my notes?"
	• **Adapting and Adjusting:**
	  o **Strategy Shifting:** "If this strategy isn't working, what else could I try?"
	  o **Error Detection:** "Did I make any calculation errors?" or "Is there a mistake in my reasoning?"
	  o **Seeking Help (Strategically):** "When should I ask for help, and what specific question should I ask?"

	After Solving a Problem
	
	• **Evaluating Performance:**
	  ○ **Checking Solutions:** "Does my answer make sense in the context of the problem?" or "Is my answer reasonable?"
	  ○ **Verifying Accuracy:** "Can I double-check my calculations?" or "Is there another way to solve this to verify my answer?"
	• **Reflecting on Learning:**
	  ○ **Self-Assessment:** "What did I do well in solving this problem?" or "What could I have done differently?"
	  ○ **Generalizing:** "What did I learn from solving this problem that I can apply to future problems?"
	  ○ **Identifying Areas for Improvement:** "What concepts do I still need to practice or understand better?"
	  ○ **Summarizing Learnings:** "How would I explain this problem and its solution to someone else?"
	
	Georgia Numeracy Project Support Activities
	• GloSS/IKAN Activities & Resources (3-8)
	
	Concrete – Representational – Abstract Supports
	• CRA
	
	Word Problem Supports
	• Schema Based Instruction (word problems)
	• 3-Read Protocol
	
	Visual Representations
	• Math is Visual

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<tr><th>Standards</th><th>Learning Objectives</th><th>Name of Intervention Task/Activity</th><th>Skills Addressed</th></tr>
<tr><td rowspan="3">5.NR.3</td><td>5.NR.3.2</td><td>Non-Unit Fractions</td><td>Determine “closeness to 1” or distance from 1 for a variety of fractions</td></tr>
<tr><td rowspan="2">5.NR.3.3</td><td>More Packets of Lollipops</td><td>Solve problems that involve adding and subtracting fractions with related denominators</td></tr>
<tr><td>Comparing Apples to Apples Revisited</td><td>Solve problems that involve adding and subtracting fractions</td></tr>
</table>
</td></tr>
<tr><td>Enrichment and Extension</td><td>Exemplars are performance tasks designed to promote and assess problem solving skills in mathematics. They enhance critical thinking, reasoning, and communication skills. The Exemplar(s) described below can be accessed in full by clicking the provided link. Access the Exemplars problem solving rubric here: Click here.

• Cordwood Dilemma: I ordered 2 cords of wood that were just delivered. I finally got it stacked, and I am wondering if I really received 2 cords of wood or if the company cheated me. A cord is defined as wood stacked 4 feet by 4 feet by 8 feet. I measured my 2 stacks of wood. One is 72 inches by 167 inches by 16 inches. The other is 65 inches by 266 inches by 16 inches. Did I get about 2 cords of wood?</td></tr>
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	• **A Stinky Situation:** My dog, Charlie, got sprayed by a skunk and had to have a tomato juice bath. My bathtub needs 21 gallons of water. How many pints of tomato juice do I need to buy to fill my tub halfway for my dog's bath? • **Taco Spread:** Mrs. Smith is getting ready for her family to go on summer vacation. She decided that she needs to use up any leftovers that are in the refrigerator or throw them out. She discovered that she has 12 ounces of cream cheese that she would like to use to make a taco spread for her family. Mrs. Smith has dug out a recipe but is stumped as to how much of each ingredient she must include if she is going to use up all the cream cheese she has in the refrigerator. **Thinking routines provided by Harvard's Project Zero may be incorporated across standards and content areas. Those listed below have been identified for their potential in providing greater depth. Guides detailing each routine can be accessed in full by clicking the provided link.** • **Name, Describe, Act:** This routine can be used to enhance close looking, develop descriptive language, and develop working memory. Depending on the stimulus/context, it can also be used to facilitate analysis of a topic. • **Portable Surprise:** This is a routine for finding (often surprising) patterns in a topic and similar patterns in very different situations. • **3-2-1 Bridge:** This routine helps students understand their own process of learning by considering their conceptions of a topic before and after a learning experience and how their conceptions changed. • **Connect, Extend, Challenge:** This routine helps students connect new ideas to those they know and encourages them to reflect upon how they have extended their thinking as a result of what they are learning about or experiencing. • **Take Note:** This routine can be used to enhance students' memory of and engagement with ideas by focusing on capturing the heart and distilling key issues and questions after a learning episode rather than in the midst of it. This allows them to participate fully knowing that there are times to consolidate their learning afterwards.

	• **The Complexity Scale:** This routine helps students build a more multi-dimensional mental model of a topic by identifying different aspects of the topic and considering their complexity. The benefit of the routine consists mainly in the reasoning students do in order to choose and explain their ratings. Of less importance is assigning each idea to the "right" place on the scale.
Students with Disabilities	*Specialized instruction in mathematics will be aligned to the student's unique learning needs and designed to support meaningful access to grade-level standards, with teachers using the student's learning profile documents to guide instructional planning*. SI Data Documents Math.docx **Planning for Students with Disabilities** https://lor2.gadoe.org/gadoe/file/efd9a621-abac-42ca-970a-b6edb9966429/1/Thinking-Through-a-Learning-Plan-Protocol.pdf **Georgia DOE Grade 5 Resource Companion for Students with Disabilities:** Grade-5-Mathematics-Resource-Companion-for-Students-with-Disabilities **Strategies Toolkit to Address Learner Variability:** K-5-Georgia-Mathematics-Strategies-Toolkit.pdf **Specially Designed Instruction:** UPDATED-Specially-Designed-Instruction-SDI-Mathematics.pdf **Making Sense of Standard Computational Algorithms** https://lor2.gadoe.org/gadoe/file/08554c4d-8b44-4425-b1a9-3c384bb6e7dd/1/Making-Sense-of-Standard-Computational-Algorithms.pdf The purpose of this document is to enhance the understanding of standard algorithms and student-centered approaches to mathematical computation and problem-solving. **Engage** *Within this section, the learning experiences include evidence-based instructional strategies that can be used as an introduction that mentally engages students to capture their interest, provides an opportunity to communicate what they know, and allows them to connect what they know to new ideas.*

	• Example: Notice and Wonder using visuals Notice and Wonder Graphic Organizer 3-8.pdf Notice and Wonder Organizer with Sentence Frames and Lines.pdf **Explore** *Within this section, the learning experiences include evidence-based instructional strategies that allow students to engage in hands-on activities to explore the new concept/big idea at a deep level.* • Demonstrate concepts or procedures in a logical, mathematical progression using "think alouds"— the teacher verbalizing his or her thought process while demonstrating the concept or procedure. Encourage the student to verbalize the strategy they are using to solve the problem and reasons for doing so together. ***Think Aloud Checklist:*** Think-Aloud-Checklist.pdf **Apply** *Within this section, the learning experiences include evidence-based instructional strategies that allow students to apply what they have learned in a new situation to develop a deeper understanding of the big idea.* • Encourage the student to verbalize the strategy they are using to solve the problem and reasons for doing so • Teach students chunking strategies **Reflect** *Within this section, the learning experiences include evidence-based instructional strategies that allow students the opportunity to review and reflect on their own learning and new understandings.* What does success and mastery of the concept look like? Determine the impact of strategic, data driven instruction. Is the student benefiting from the specially designed instruction as evidenced by progress towards the IEP goals? Consider how the data informs next steps in instruction.

	General Strategies to Support Students with Disabilities: • Use of tactile and concrete objects • Teach one step at a time – gradually combine steps (provide checklists) • Background knowledge connections • Explicit vocabulary Instruction Vocabulary Word Routine Math.docx **Technology Supports:** *To enhance accessibility and engagement for students with disabilities, the following technology tools and platforms can be integrated into instruction:* • Desmos: Interactive graphing calculator with accessibility features for screen readers. Desmos provides an interactive graphing calculator with screen reader support and tools for modeling volume and expressions. • Microsoft Immersive Reader: Enhances reading comprehension with features like text-to-speech, line focus, and picture dictionary. • Virtual manipulatives: Allows students to build and manipulate 3D rectangular prisms virtually, supporting spatial reasoning. Offers interactive tools like Number Pieces and Pattern Shapes to support conceptual understanding of volume and expressions. • Digital Graphic Organizers • Tools like **Canva** can help students organize their thinking visually. Useful for scaffolding problem-solving steps or vocabulary development. • Use "Collaborate Board" for students to interpret graphs and share insights. Embed interactive charts for real-life data sets. • PowerPoint: Animated examples showing how to calculate elapsed time step-by-step.
Developed during Phase II with support of internal departments.	

Moving the Needle – 5.NR.1

Standard
5.NR.1 Use place value understanding to solve real-life, mathematical problems. Click here for a video overview of the standard.

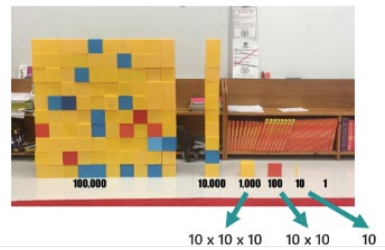
Achievement Level Descriptors

Students who score PROFICIENCT (level 3) on EOG can…
• Explain that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left. • Explain patterns in the placement of digits when multiplied or divided by a power of 10, up to 10^3. • Solve real-life, mathematical problems to explain patterns in the place value system.

Key Vocabulary

• Base-ten • Compare • Describe	• Digit • Divide • Exponent	• Multiply • Numerical patterns • Place value	• Power of 10 • Product • Quotient

Key Concepts and Skills

Key Concept/Skill	Recommended Strategies and Supports
Place value and multi-digit numbers	• Give students hands on experiences with shifting digits in the place value system when multiplying or dividing by a multiple of ten using base ten blocks and recording the subsequent value in a place value chart.  • Avoid using the language “add a zero” or “move the decimal” when showing how values change when multiplied or divided by 10. This is a “rule” that expires when students begin to multiply decimals by ten in this standard since they can’t simply “add a zero” to a decimal to show that the number has been multiplied by 10. Read more about Rules that Expire by clicking here. • As students are working in the place value system moving digits to the right and left, support this idea by using an interactive place value chart and/or a physical chart and digit cards, demonstrating how the digits move in the place value chart, not the decimal point.
Exponents	• Students should have experiences working with connecting the pattern of the number of zeros in the product when you multiply by powers of 10. Students should notice the shift of the digits when multiplying by a power of 10. For example: $2.5 \times 10^3 = 2.5 \times (10 \times 10 \times 10) = 2.5 \times 1{,}000 = 2{,}500$ 10^4 Ten-Thousands; 10^3 Thousands; 10^2 Hundreds; 10^1 Tens; 10^0 Ones • Students should reason that the exponent above the 10 indicates how many places the digits are shifting. It’s important that students see that the decimal point does not shift in numbers, but that the digits shift within the place value system and therefore the decimal point moves. Ensure students understand that the decimal point remains stationary between the ones and tenths place. Students can act this out by using digit cards and stationary place value charts as they multiply or divide by a power of ten. • Additionally, students should understand that the digits are shifting due to the number becoming 10 times greater the number of times indicated by the exponent.

5.NR.1 CCC Support

Vertical Alignment

4th Grade	6th Grade
4.NR.1.1 Read and write multi-digit whole numbers to the hundred-thousands place using base-ten numerals and expanded form. **4.NR.1.2** Recognize and show that a digit in one place has a value ten times greater than what it represents in the place to its right and extend this understanding to determine the value of a digit when it is shifted to the left or right, based on the relationship between multiplication and division.	**6.NR.3** Solve a variety of problems involving whole numbers and their opposites; model rational numbers on a number line to describe problems presented in relevant, mathematical situations. **8.NR.2.1** Apply the properties of integer exponents to generate equivalent numerical expressions. **8.NR.2.3** Use numbers expressed in scientific notation to estimate very large or very small quantities, and to express how many times as much one is than the other.

CCC Question 1: What is it we expect students to learn?

When reviewing expectations, it's important to consider the priority standard, learning objectives, evidence of student learning, and supporting teacher resources to get a full picture of what we want our students to learn. Click here to access the entire standards document.

CCC Question 2: How will we know when they have learned it?

Which expression is equal to 3,520?

(a) 0.352×10^3

(b) 3.52×10^3

(c) 35.2×10^3

(d) 352×10^3

John writes the number **1**,000,000 on his paper. Aaron writes the number 697,**1**43 on his paper. How does the value of the digit 1 in Aaron's number compare to the digit 1 in John's number?

John	Aaron
1,000,000	617,943

The value of the digit 1 in Aaron's number is _____ the value of the digit 1 in John's number.

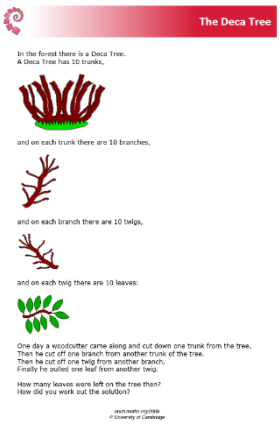
Source – Evidence of Student Learning (CTLS) Unit 2 & Ga Experience Online Assessment Guide

CCC Question 3: How will we respond when they don't learn?

Intervention task provided by GaDOE Unit 1 Overview page 25

Learning Expectation	*Name of Task*	*Skills Addressed*
5.NR.1.1	*Close to 100 or 1000*	*Identify relative values of digits in different places.*
	Sherpa (Tensing)	*Multiply by 10s, 100s, 1000s, and other multiples of 10.*
5.NR.1.2	*Hut Building*	*Convert between metric units, using whole numbers and commonly used decimals.*

CCC Question 4: How will we respond when they already know it?



Source: NRICH Maths

Algebra Readiness Connection

This standard supports students Algebra readiness by ensuring deep understanding of place value relationships and powers of 10. This helps students recognize numerical patterns, laying the groundwork for manipulating expressions and equations in algebra. By interpreting and using exponents and patterns in multiplication/division, students build a conceptual foundation for scientific notation, algebraic expressions, and function rules in later grades.

ONE TEAM.ONE GOAL.STUDENT SUCCESS.

MATHEMATICS

STRATEGIC COMPETENCE: BALANCING THE HOW, WHY, AND WHEN.

5th Grade Math Milestone Minute

Standard: 5.NR.1: Use place value understanding to solve real-life, mathematical problems.

Beginning Learner	Developing Learner	Proficient Learner	Distinguished Learner
5.NR.1: Use place value understanding to solve real-life, mathematical problems.			
• Identify the value of a digit up to 100 times the value or 1/1,000 the value of another digit in a multi-digit number. • Use whole-number exponents to denote powers of 10, up to 10^3.	• Describe the relationship between two identical digits with different place values as being up to 100 times the value or 1/1,000 the value of the other digit. • Use place value understanding to multiply or divide a number by 10, 10^2, or 10^3.	• Explain that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left. • Explain patterns in the placement of digits when multiplied or divided by a power of 10, up to 10^3. • Solve real-life, mathematical problems to explain patterns in the place value system	• Solve multi-step, real-life, mathematical problems to explain patterns in the place value system.

MATHEMATICS

Question 3

Chris placed ten pennies on a digital scale. The scale read 24 grams. How much would you expect one penny to weigh?

A. 240 grams
B. 24 grams
C. 2.4 grams
D. 0.24 grams

MATHEMATICS

Question 3 Answer

Chris placed ten pennies on a digital scale. The scale read 24 grams. How much would you expect one penny to weigh?

A. 240 grams
B. 24 grams
C. 2.4 grams
D. 0.24 grams

MATHEMATICS