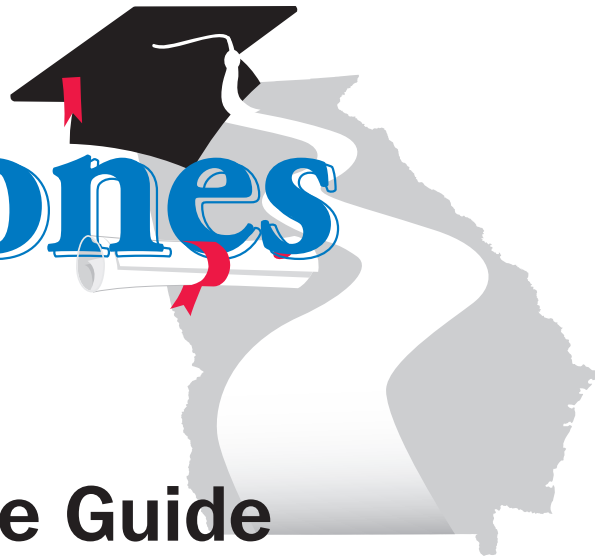


Georgia Milestones

Assessment System



Study/Resource Guide for Students and Parents

Grade 3 Math Items Only



The Study/Resource Guides are intended to serve as a resource for parents and students. They contain practice questions and learning activities for each content area. The standards identified in the Study/Resource Guides address a sampling of the state-mandated content standards.

For the purposes of day-to-day classroom instruction, teachers should consult the wide array of resources that can be found at www.georgiastandards.org.

Study/Resource Guide

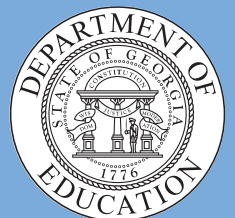


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THE GEORGIA MILESTONES ASSESSMENT SYSTEM



Dear Student,

This **Georgia Milestones Grade 3 Study/Resource Guide for Students and Parents** is intended as a resource for parents and students. It contains sample questions and helpful activities to give you an idea of what test questions look like on Georgia Milestones and what the Grade 3 End-of-Grade (EOG) assessment covers.

These sample questions are fully explained and will tell you why each answer is either correct or incorrect.

Get ready—open this guide—and get started!

HOW TO USE THIS GUIDE

Let's get started!

* **Get it together!**

- This guide
- Pen or pencil
- Highlighter
- Paper



* **Gather materials**

- Classroom notebooks
- Textbooks

* **Study space**

- Find a comfortable place to sit.
- Use good lighting.
- Time to focus—no TV, games, or phones!

* **Study time**

- Set aside some time after school.
- Set a goal—how long are you going to study?
- Remember—you cannot do this all at one time.
- Study a little at a time every day.

* **Study buddy**

- Work with a friend, sister, brother, parent—anyone who can help!
- Ask questions—it is better to ask now and get answers.
- Make sure you know what you need to do—read the directions before you start.
- Ask your teacher if you need help.

* **Test-taking help**

- Read each question and all of the answer choices carefully.
- Be neat—use scratch paper.
- Check your work!

PREPARING FOR TAKING TESTS

Getting ready!



Here are some ideas to think about before you take a test.

- Get plenty of rest and eat right. Take care of your body and your mind will do the rest.
- If you are worried about a test, don't be. Talk with a teacher, parent, or friend about what is expected of you.
- Review the things you have learned all year long. Feel good about it.
- Remember that a test is just one look at what you know. Your class work, projects, and other tests will also show your teachers how much you have learned throughout the year.

Try your best!

OVERVIEW OF THE END-OF-GRADE ASSESSMENT

What is on the End-of-Grade Assessment?

- * English Language Arts (ELA)
- * Mathematics
- * Science
- * Social Studies

TYPES OF ITEMS

- * **Selected-response items**—also called multiple-choice
 - English Language Arts (ELA), Mathematics, Science, and Social Studies
 - There is a question, problem, or statement that is followed by four answer choices.
 - There is only ONE right answer, so read EACH answer choice carefully.
 - Start by eliminating the answers that you know are wrong.
 - Then look for the answer that is the BEST choice.
- * **Constructed-response items**
 - English Language Arts (ELA) and Mathematics only
 - There is a question, problem, or statement but no answer choices.
 - You have to write your answer or work out a problem.
 - Read the question carefully and think about what you are asked to do.
 - In English Language Arts (ELA), go back to the passage to look for details and information.
 - You will be scored on accuracy and how well you support your answer with evidence.
- * **Extended constructed-response items**
 - English Language Arts (ELA) and Mathematics only
 - These are similar to the constructed-response items.
 - Sometimes they have more than one part, or they require a longer answer.
 - Check that you have answered all parts of the question.
- * **Extended writing prompt**
 - English Language Arts (ELA) only
 - There is a question, problem, or statement.
 - You may be asked to do more than one thing.
 - In English Language Arts (ELA), you will be asked to read two passages and then write an essay.
 - You will be scored on how well you answer the question and the quality of your writing.
 - Organize your ideas clearly.
 - Use correct grammar, punctuation, and spelling.
 - Support your answer with evidence from the text.

DEPTH OF KNOWLEDGE

Test questions are designed with a Depth of Knowledge (DOK) level in mind. As you go from Level 1 to Level 4, the questions get more and more challenging. They take more thinking and reasoning to answer. You may have experienced these types of questions in your classroom as your teachers find ways to challenge you each day.

A Level 1 item may not require as much thinking as a Level 4 item—but that does not mean it's easy.

A Level 4 item may have more than one part or ask you to write something.

Here is some information to help you understand just what a DOK level really is.

Level 1 (Recall of Information)

- * Identify, list, or define something.
- * Questions may start with *who*, *what*, *when*, and *where*.
- * Recall facts, terms, or identify information.

Level 2 (Basic Reasoning)

- * Think about things—it is more than just remembering something.
- * Describe or explain something.
- * Answer the questions “how” or “why.”

Level 3 (Complex Reasoning)

- * Go beyond explaining or describing “how and why.”
- * Explain or justify your answers.
- * Give reasons and evidence for your response.
- * Make connections and explain a concept or a “big idea.”

Level 4 (Extended Reasoning)

- * Complex thinking required!
- * Plan, investigate, or apply a deeper understanding.
- * These items will take more time to write.
- * Connect and relate ideas.
- * Show evidence by doing a task, creating a product, or writing a response.

Depth of Knowledge

Level 1—Recall of Information

Level 1 asks you to identify, list, or define. You may be asked to recall *who*, *what*, *when*, and *where*. You may also be asked to recall facts and terms or identify information in documents, quotations, maps, charts, tables, graphs, or illustrations. Items that ask you to “describe” and/or “explain” could be Level 1 or Level 2. A Level 1 item requires that you just recall, recite, or repeat information.

Skills Demonstrated	Question Cues
• Make observations • Recall information • Recognize formulas, properties, patterns, processes • Know vocabulary, definitions • Know basic concepts • Perform one-step processes • Translate from one representation to another • Identify relationships	• Tell who, what, when, or where • Find • List • Define • Identify; label; name • Choose; select • Compute; estimate • Express as • Read from data displays • Order

Level 2—Basic Reasoning

Level 2 includes some thinking that goes beyond recalling or repeating a response. A Level 2 “describe” and/or “explain” item would require that you go beyond a description or explanation of information to describe and/or explain a result or “how” or “why.”

Skills Demonstrated	Question Cues
• Apply learned information to abstract and real-life situations • Use methods, concepts, and theories in abstract and real-life situations • Perform multi-step processes • Solve problems using required skills or knowledge (requires more than habitual response) • Make a decision about how to proceed • Identify and organize components of a whole • Extend patterns • Identify/describe cause and effect • Recognize unstated assumptions; make inferences • Interpret facts • Compare or contrast simple concepts/ideas	• Apply • Calculate; solve • Complete • Describe • Explain how; demonstrate • Construct data displays • Construct; draw • Analyze • Extend • Connect • Classify • Arrange • Compare; contrast

Level 3—Complex Reasoning

Level 3 requires reasoning, using evidence, and thinking on a higher level than Level 1 and Level 2. You will go beyond explaining or describing “how and why” to justifying the “how and why” through reasons and evidence. Level 3 items often involve making connections across time and place to explain a concept or a “big idea.”

Skills Demonstrated	Question Cues
• Solve an open-ended problem with more than one correct answer • Create a pattern • Generalize from given facts • Relate knowledge from several sources • Draw conclusions • Make predictions • Translate knowledge into new contexts • Compare and discriminate between ideas • Assess value of methods, concepts, theories, processes, and formulas • Make choices based on a reasoned argument • Verify the value of evidence, information, numbers, and data	• Plan; prepare • Predict • Create; design • Ask “what if?” questions • Generalize • Justify; explain why; support; convince • Assess • Rank; grade • Test; judge • Recommend • Select • Conclude

Level 4—Extended Reasoning

Level 4 requires the complex reasoning of Level 3 with the addition of planning, investigating, applying deeper understanding, and/or developing that will require a longer period of time. You may be asked to connect and relate ideas and concepts *within* the content area or *among* content areas in order to be at this highest level. The Level 4 items would be a show of evidence—through a task, a product, or an extended response—that the higher level demands have been met.

Skills Demonstrated	Question Cues
• Analyze and synthesize information from multiple sources • Examine and explain alternative perspectives across a variety of sources • Describe and illustrate how common themes are found across texts from different cultures • Apply mathematical models to illuminate a problem or situation • Design a mathematical model to inform and solve a practical or abstract situation • Combine and synthesize ideas into new concepts	• Design • Connect • Synthesize • Apply concepts • Critique • Analyze • Create • Prove

MATHEMATICS

DESCRIPTION OF TEST FORMAT AND ORGANIZATION

The Grade 3 Mathematics EOG assessment consists of a total of 73 items.

You will answer a variety of item types on the test. Some of the items are selected-response (multiple-choice), which means you choose the correct answer from four choices. Some items will ask you to write your response.

The test will be given in two sections.

- You may have up to 85 minutes per section to complete Sections 1 and 2.
- The test will take about 120 to 170 minutes.

CONTENT

The Grade 3 Mathematics EOG assessment will measure the Grade 3 standards that are described at www.georgiastandards.org.

The content of the assessment covers standards that are reported under these domains:

- Operations and Algebraic Thinking
- Number and Operations
- Measurement and Data
- Geometry

ITEM TYPES

The Mathematics portion of the Grade 3 EOG assessment consists of selected-response (multiple-choice) items, constructed-response items, and extended constructed-response items.

MATHEMATICS DEPTH OF KNOWLEDGE EXAMPLE ITEMS

Example items that represent applicable DOK levels are provided for you on the following pages. The items and explanations of what is expected of you to answer them will help you prepare for the test.

All example and sample items contained in this guide are the property of the Georgia Department of Education.

Example Item 1

DOK Level 1: This item is a DOK level 1 item because it asks students to use what they know about units of mass and make an estimate.

Mathematics Grade 3 Content Domain: Measurement and Data

Standard: MGSE3.MD.2. Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem.

Which of these is the BEST estimate for the mass of a feather?

- A. 1 gram
- B. 100 grams
- C. 1 kilogram
- D. 10 kilograms

Correct Answer: A

Explanation of Correct Answer: The correct answer is choice (A) 1 gram. A gram is a small unit of mass. A paper clip has a mass of about 1 gram, which is about the same as the mass of a feather. Choice (B) is incorrect because 100 grams is about the mass of 100 paper clips, which has a greater mass than a feather. Choice (C) is incorrect because 1 kilogram is about the mass of a textbook, which is much heavier than a feather. Choice (D) is incorrect because 10 kilograms is about the mass of 10 textbooks, which is much heavier than a feather.

Example Item 2

DOK Level 2: This is a DOK level 2 item because it assesses the ability to solve a multiplication problem and explain the strategy used for solving it.

Mathematics Grade 3 Content Domain: Operations and Algebraic Thinking

Standard: MGSE3.NBT.3. Multiply one-digit whole numbers by multiples of 10 in the range 10–90 (e.g., 9×80 , 5×60) using strategies based on place value and properties of operations.

Part A: Solve.

$$60 \times 7 = \square$$

Part B: Explain each step you used to solve the problem.

Correct Answer: 420

Example of Correct Answer: The answer is 420. Another way to look at this is as repeated addition using multiples of ten. Seven groups of 6 tens is the same as $60 + 60 + 60 + 60 + 60 + 60 + 60$, or 420. OR, this is the same as $6 \times 7 \times 10$, which is 42×10 or 420.

Scoring Rubric

Points	Description
2	The response achieves the following: • Response demonstrates a complete understanding of multiplying one-digit numbers by multiples of ten. • Give two points for the correct answer and a complete, correct explanation of using a strategy based on place value or properties of operations to show how the answer was calculated. • Response is correct and complete. • Response shows application of a reasonable and relevant strategy. • Mathematical ideas are expressed coherently through a clear, complete, logical, and fully developed response using words, calculations, and/or symbols, as appropriate.
1	The response achieves the following: • Response demonstrates a partial understanding of multiplying one-digit numbers by multiples of ten. • Give one point for the correct answer but a partially correct explanation shown OR a correct explanation with a calculation error. • Response is mostly correct, but contains either a computational error or an unclear or incomplete explanation. • Response shows application of a relevant strategy, though it may be only partially applied or remain unexplained. • Mathematical ideas are expressed only partially using words, calculations, and/or symbols, as appropriate.
0	The response achieves the following: • The response demonstrates no understanding of multiplying one-digit numbers by multiples of ten. • Response is incorrect. • Response shows no application of a strategy. • Mathematical ideas cannot be interpreted or lack sufficient evidence to support even a limited understanding.

Exemplar Response

Points Awarded	Sample Response
2	The answer is 420. AND To calculate the answer use repeated addition. Seven groups of 6 tens is the same as 60 and 60 and 60 and 60 and 60 and 60 and 60, or 420. <i>OR other valid process</i>
1	The answer is 420. OR Seven groups of 6 tens is the same as 60 and 60 and 60 and 60 and 60 and 60 and 60. <i>OR other valid process</i>
0	<i>Response is irrelevant, inappropriate, or not provided.</i>

Example Item 3

DOK Level 3: This is a DOK level 3 item because it asks students to create a word problem using an existing equation, solve the problem, and write an explanation of how their word problem matches the equation. This is an open-ended problem with more than one correct answer.

Mathematics Grade 3 Content Domain: Operations and Algebraic Thinking

Standard: MGSE3.OA.3. Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities,[†] e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.¹² [†]See Glossary: *Multiplication and Division Within 100*.

This number sentence represents a word problem.

$$32 \div \square = 8$$

Part A: Use the number sentence to write a story word problem.

Part B: Solve the problem.

Solution: _____

Part C: Write the number sentence using numbers and symbols.

Number Sentence: _____

Scoring Rubric

Points	Description
4	The response achieves the following: • The response demonstrates a complete understanding of using multiplication and division to solve word problems by using drawings and equations. • Give four points if student response includes a word problem AND its correct solution AND a number sentence AND provides a clear understanding of how the word problem and solution match the number sentence. • Response is correct and complete. • Response shows application of a reasonable and relevant strategy. • Mathematical ideas are expressed coherently through a clear, complete, logical, and fully developed response using words, calculations, and/or symbols, as appropriate.
3	The response achieves the following: • The response demonstrates a good understanding of using multiplication and division to solve word problems by using drawings and equations. • Give three points if student response indicates an error in the word problem, solution, or explanation OR one part is incomplete. • Response is mostly correct, but contains either a computational error or an unclear or incomplete explanation. • Response shows application of a relevant strategy, though it may be only partially applied or remain unexplained. • Mathematical ideas are expressed only partially, using words, calculations, and/or symbols, as appropriate.
2	The response achieves the following: • The response demonstrates a partial understanding of using multiplication and division to solve word problems by using drawings and equations OR two parts are incomplete. • Give two points if student response indicates two errors in the word problem, solution, or explanation. • Response is only partially correct. • Response shows application of a relevant strategy, though it may be only partially applied or remain unexplained. • Mathematical ideas are expressed only partially, using words, calculations, and/or symbols, as appropriate.
1	The response achieves the following: • The response demonstrates a limited understanding of using multiplication and division to solve word problems by using drawings and equations. • Give one point if student response indicates three errors in the word problem, solution, or explanation OR all three parts are incomplete. • Response is only partially correct. • Response shows incomplete or inaccurate application of a relevant strategy. • Mathematical ideas are expressed only partially, using words, calculations, and/or symbols, as appropriate.

Points	Description
0	The response achieves the following: • The response demonstrates no understanding of using multiplication and division to solve word problems by using drawings and equations. • Response is incorrect. • Response shows no application of a strategy. • Mathematical ideas cannot be interpreted or lack sufficient evidence to support even a limited understanding.

Exemplar Response

Points Awarded	Sample Response
4	There were 32 guests at a party. They were asked to sit at some tables. The guests sat 8 to a table. How many tables were at the party? <i>OR other valid word problem</i> AND There were 4 tables at the party. AND $32 \div 8 = 4$ <i>OR other equivalent number sentence</i> AND The first number, 32, in the word problem is the total amount, or the total number of people. The total is divided into an unknown number of equal groups, or the number of tables. The number in each group, or the number of people at each table, is 8. After 32 people sat at 4 tables, there were 8 people at each table. <i>OR other valid process or explanation</i>
3	The student correctly answers three out of the four parts.
2	The student correctly answers two out of the four parts.
1	The student correctly answers one of the four parts.
0	<i>Response is irrelevant, inappropriate, or not provided.</i>

MATHEMATICS CONTENT DESCRIPTION AND ADDITIONAL SAMPLE ITEMS

In this section, you will find information about what to study in order to prepare for the Grade 3 Mathematics EOG assessment. This includes key terms and important vocabulary words. This section also contains practice questions, with an explanation of the correct answer, and activities that you can do on your own or with your classmates or family to prepare for the test.

All example and sample items contained in this guide are the property of the Georgia Department of Education.

CONTENT DESCRIPTION

- Develop an understanding of place value and properties of operations.
- Perform multi-digit arithmetic and develop an understanding of fractions as numbers.
- Represent and solve problems involving multiplication and division.
- Understand properties of multiplication and the relationship between multiplication and division.
- Multiply and divide within 100.
- Solve problems involving the four operations.
- Identify and explain patterns in arithmetic.
- Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects.
- Represent and interpret data.
- Understand concepts of area and perimeter.
- Reason with shapes and their attributes.

Unit 1: Numbers and Operations in Base Ten

In this unit, you will understand the place-value system. You will be able to perform operations in the correct order, using the distributive, commutative, and associative properties. You will graph information and use line plots.

KEY TERMS

Place value: The value of a digit in a number based on its location. For example, the digit 4 in 243 is in the tens place and has a value of 4 tens, or 40. (NBT.1)

A number can be **rounded** to the nearest ten or hundred. Use a number line to see which multiple of 10 or 100 the given number is closest to. (NBT.1)

Add and **subtract** whole numbers up to 1000 using strategies, including models such as Base Ten blocks and the properties of operations. (NBT.2)

Properties of Operations:

- **Associative Property of Addition:** If there are three or more **addends**, they can be grouped together in any way and the **sum** will stay the same.
- **Commutative Property of Addition:** Numbers can be added in any order and the **sum** will stay the same.
- **Identity Property of Addition:** The sum of a number and zero does not change the value of the original number. (NBT.2)

Scaled picture graph: Graph information or **data** using symbols. One symbol can be used to represent more than one object. **Half a symbol** would show half the number of objects. For example, a picture of a cat on a graph is equal to 4 cats. (MD.3)

Scaled bar graph: Graph information or **data** using shaded squares. Each square on the bar graph can be used to represent more than one object. For example, one square on a graph is equal to seven people. (MD.3)

Use the information recorded on picture and bar graphs to answer questions such as “How many more people have a cat as a pet than a dog?” (MD.3)

Line plot: A line plot is used to record measurements for a group of objects. The measurement values are shown, and a picture or mark is placed above the value for each object being measured. A line plot can include rational measurements. (MD.4)

Important Tip

- ✍ Models can be useful when adding and subtracting numbers. Use pictures, Base Ten blocks, or number lines to create a model of the problem before solving it on paper.

Sample Items 1–4

Item 1

There are 461 books in the library.

To the nearest hundred, ABOUT how many books are in the library?

- A. 400
- B. 460
- C. 470
- D. 500

Item 2

Solve.

$$724 + 152 = \square$$

- A. 776
- B. 875
- C. 876
- D. 975

Item 4

Part A: Measure the length of each line segment to the nearest quarter inch.

A _____ Measurement =

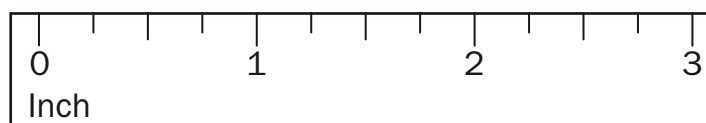
B _____ Measurement =

C _____ Measurement =

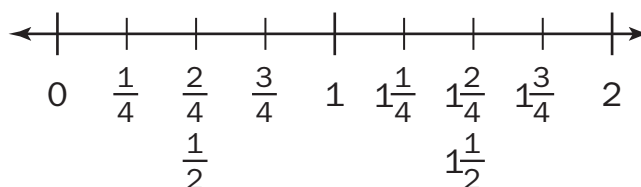
D _____ Measurement =

E _____ Measurement =

F _____ Measurement =



Part B: Display the length data from part A on this line plot.



What do the fractions under the number line in the plot represent?

Unit 2: Operations and Algebraic Thinking: The Relationship Between Multiplication and Division

In this unit, you will learn about the properties of multiplication and division and the relationship between them. You will use models to represent multiplicative and divisional equations.

KEY TERMS

Multiplication is used to find the total number of objects in a set of equal groups. For example, 3 groups of 4 objects have a total of 12 objects. (OA.1)

Division is used to partition or break apart the total number of objects into a number of groups or into groups of a specific size. For example, 12 objects divided into 4 groups have 3 objects in each group, or 12 objects divided into groups of 4 will create 3 groups. (OA.2)

Models can be used to represent multiplication and division equations. Use **equal groups**, **arrays**, or **measurements** to solve the equations. (OA.3)

Use the relationship between three numbers in an equation to find the value of the **unknown** number. Use the given information to create a visual representation using arrays, counters, or drawings of groups and find the missing value that makes the equation true. (OA.4)

Properties of Operations:

- **Commutative Property:** Numbers can be multiplied in any order and the **product** will stay the same.
- **Associative Property:** Three or more **factors** can be grouped together in any way and the **product** will stay the same.
- **Distributive Property:** Knowing that $8 \times 5 = 40$ and $8 \times 2 = 16$, one can find 8×7 as $8 \times (5 + 2) = (8 \times 5) + (8 \times 2) = 40 + 16 = 56$.

There is a **relationship between multiplication and division**. Both operations relate equal groups of objects to a total number of objects. A multiplicative equation can be rewritten as a divisional equation. For example, $5 \times 6 = 30$ and $30 \div 5 = 6$. (OA.6)

Knowing the product of two one-digit numbers can help in multiplying one-digit numbers by a **multiple of 10**. For example, 3 groups of 2 has a product of 6, 3 groups of 20 has a product of 60. (NBT.3)

Important Tip

 Equations can use symbols, letters, empty boxes, or even question marks to represent an unknown number. In a multiplicative equation, the unknown number might be the product or one of the factors. In a divisional equation, the unknown number might be the dividend, divisor, or quotient.

Sample Items 5–8**Item 5**

Look at the problem.

$$42 \div 6 = \square$$

Which number sentence will help solve this problem?

- A. $6 \times \square = 42$
- B. $42 \times 6 = \square$
- C. $6 + \square = 42$
- D. $42 - \square = 6$

Item 6

Solve.

$$14 \times 7 = \square$$

- A. 2
- B. 21
- C. 78
- D. 98

Item 7

Look at the number sentence.

$$8 \times \square = 64$$

What number belongs in the $\square$ to make this number sentence TRUE?

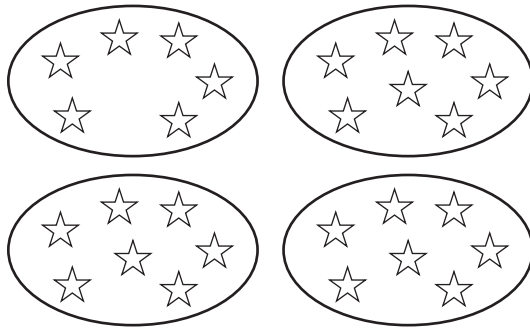
- A. 8
- B. 9
- C. 56
- D. 72

Item 8

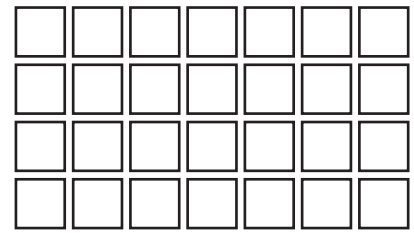
A bookshelf has 4 shelves. Max puts 7 books on each shelf.

Part A: Which drawing correctly shows how many books Max put on the shelf altogether? Explain how you know.

Drawing A



Drawing B



Part B: Which number sentence could you use to solve this problem?

--

Unit 3: Operations and Algebraic Thinking: Patterns in Addition and Multiplication

In this unit, you will work with word problems, arrays, and arithmetical patterns. You will calculate the area of a shape.

KEY TERMS

Use drawings, counters, or other tools to model a **word problem** involving **two steps**. Then write an **equation** to represent the problem. Use a **letter** such as x to represent an **unknown number** in the equation. Use the four operations to solve the problem. (OA.8)

Arithmetical patterns: A pattern in the solutions to equations using the four operations. For example, any number times two is an even number. (OA.9)

Identify arithmetical patterns found in any set of equations by looking at the change, likeness, or difference in the solutions. Arithmetic patterns can also be found in the **addition table** or **multiplication table**. Use properties of operations to explain the patterns. (OA.9)

Area: The size of a plane shape. (MD.5)

Square unit: A square that is one unit of measure long and one unit of measure wide. This can include square inches, square feet, and other measurements. (MD.5)

The area of a shape can be measured by covering the surface with square unit tiles. The tiles cannot **overlap** each other or leave **gaps**. (MD.5) The total number of squares used to cover the shape is equal to the area of the shape. (MD.6)

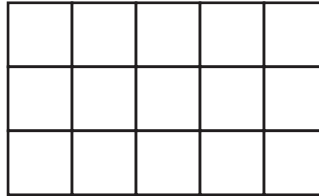
A rectangle covered with square unit tiles will create an **array** of rows and columns that are equal to the length and width of the shape. The total number of tiles in the array can be found using repeated **addition** or **multiplication**. (MD.7)

Important Tip

 A letter can stand for the unknown in many different equations. A letter such as x will not be equal to the same number every time. The value of an unknown number depends on the problem.

Sample Items 9–13**Item 9**

The diagram represents the floor of a rectangular garage.



KEY	
	= 1 square meter

What is the **TOTAL** area of the floor?

- A. 8 square meters
- B. 15 square meters
- C. 16 square meters
- D. 20 square meters

Item 10

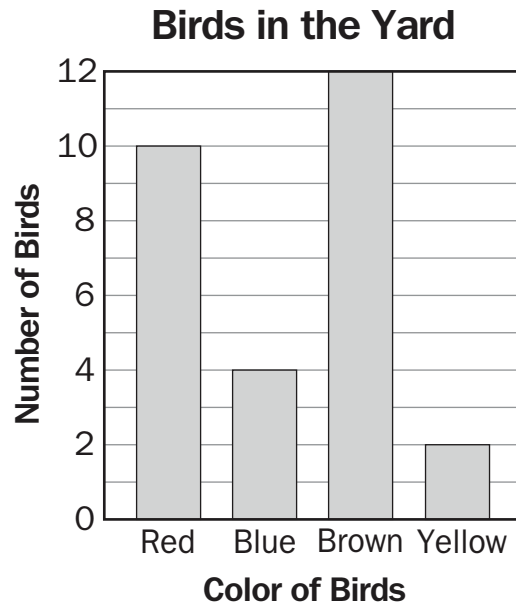
Pam had 3 bags of marbles. There were 6 marbles in each bag. Pam gave 5 marbles to her friend.

How many marbles did Pam have left?

- A. 13 marbles
- B. 14 marbles
- C. 18 marbles
- D. 23 marbles

Item 11

Ben counted the number of birds he saw in his yard over the weekend. The bar graph shows his data.



How many more red birds than yellow birds did Ben count? Explain how you found your answer.

Item 12

Study the hundreds chart.

Hundreds Chart

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Describe **FOUR** patterns found in this hundreds chart.

Item 13

Miss Kelly's class collected data about favorite pets. The tally chart shows the data.

Favorite Pets in Miss Kelly's Class	
Dog	
Cat	
Fish	
Bird	

If each smiley face represents two students, which picture graph correctly shows the data from this tally chart?

 = 2 students

A.

Pets	
Dog	       
Cat	         
Fish	     
Bird	 

B.

Pets	
Dog	   
Cat	   
Fish	     
Bird	 

C.

Pets	
Dog	   
Cat	    
Fish	  
Bird	

D.

Pets	
Dog	    
Cat	    
Fish	  
Bird	 

Unit 4: Geometry

In this unit, you will explore plane shapes and their attributes. You will work with square units to find the area of a plane shape. You will also find the perimeters of shapes.

KEY TERMS

Plane shapes: A flat shape that can be measured in two dimensions, length and width. (G.1)

Attributes: Properties of plane shapes that can be used to sort the shapes into categories.

- Number of sides
- Length of sides
- Parallel lines
- Angles (G.1)

Shapes are put into **categories** with other shapes that have the same attributes. A shape can belong to more than one category. For example, a shape with 2 long sides and 2 short sides can be placed in the rectangle and quadrilateral categories. (G.1)

Shapes can be **partitioned** or divided into parts that have equal areas. Each part is the same size and represents a fraction of the whole shape. (G.2)

Area: The size of a plane shape in square units. (MD.7)

Square unit: A square that is one unit of measure tall and one unit of measure wide. This can include square inches, square feet, and other measurements. (MD.7)

The area of a shape can be measured by covering the surface with square unit tiles. The tiles cannot **overlap** each other or leave **gaps**. The total number of squares used to cover the shape is equal to the area of the shape. (MD.7)

A rectangle covered with square unit tiles will create an **array** of rows and columns that are equal to the length and width of the shape. The total number of tiles in the array can be found using repeated **addition** or **multiplication**. (MD.7)

Perimeter: The total length of all sides of a shape. (MD.8)

The perimeter of a shape can be found by **adding** the length of all its sides. The length of an **unknown** side can be found if all other side lengths are given along with the perimeter, using an equation with a letter or symbol for the unknown value. (MD.8)

Important Tips

-  Use the attributes of a shape to determine its category. Shapes can be turned and may appear different, but that does not change their shape.
-  Shapes may belong to more than one category. For example, a rectangle can be in the quadrilateral category and the parallelogram category, because it shares attributes with both categories.

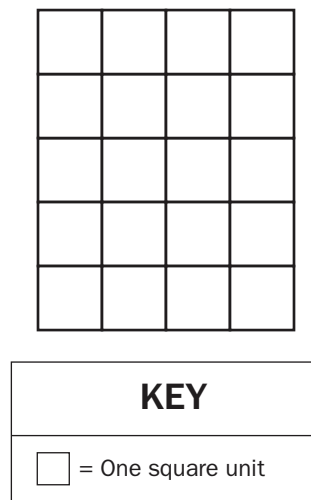
Sample Items 14–16**Item 14**

Which one of these quadrilaterals ALWAYS has four sides of equal length?

- A. rectangle
- B. square
- C. trapezoid
- D. parallelogram

Item 15

A wall is covered in square tiles, as shown in the diagram.



Which expression shows how to find the area of this wall?

- A. $4 + 5$
- B. 5×5
- C. 5×4
- D. $4 + 5 + 4 + 5$

Item 16

A rectangular board has an area of 1 square foot. Sam cuts the board into 4 parts that have equal areas. He uses one part to make a birdhouse. What is the area of the part that Sam uses?

- A. $\frac{1}{4}$ square foot
- B. $\frac{3}{4}$ square foot
- C. $1\frac{1}{4}$ square feet
- D. $\frac{4}{1}$ square feet

Unit 5: Representing and Comparing Fractions

In this unit, you will work with fractions. You will develop an understanding of equivalent fractions and comparing fractions. You will also use models, number lines, and pictures to compare fractions.

KEY TERMS

Fraction: A number used to represent equal parts of a whole. (NF.1)

Numerator: The top number shows the number of equal parts you are referring to. (NF.1)

Denominator: The bottom number shows the total number of equal parts the whole is divided into. (NF.1)

Use a **number line** to represent fractions by dividing the line between 0 and 1 into **equal parts**. The denominator shows how many equal parts the number line is divided into. The numerator shows how many equal parts out of the whole make up the number. For example, to show the fraction $\frac{1}{4}$, divide the number line into 4 equal sections between 0 and 1. The numerator shows that the fraction represents 1 equal section out of the total of 4. (NF.2)

Equivalent fractions: Fractions that are the same size or at the same point on the number line and represent the same values. (NF.3)

Whole numbers can also be written as fractions. The number 1 can be written using the total number of equal parts in the whole as both the numerator and the denominator, as in the example $\frac{3}{3}$. A whole number greater than one is shown as the whole number over a denominator of one. The denominator shows that the whole is one equal part and the numerator shows how many wholes are in the number, such as $\frac{3}{1}$ or $\frac{6}{2}$. (NF.3)

Compare: Determine the value or size of two fractions to see which fraction is larger. Fractions can be compared by looking at the number of equal parts and the size of the equal parts.

- **Greater than:** If a fraction is larger in size and value, use the symbol $>$.
- **Less than:** If a fraction is smaller in size and value, use the symbol $<$.
- **Equal to:** If the fractions are the same size, so they are equivalent fractions, use the symbol $=$. (NF.3)

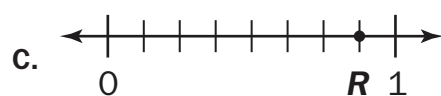
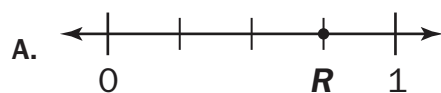
Important Tips

- ✍ A fraction with a large denominator will have smaller equal parts. A fraction with a small denominator will have larger equal parts. So, $\frac{1}{4}$ has a value less than $\frac{1}{2}$ because the size of the equal part is smaller.
- ✍ When comparing fractions, look at both the numerator and the denominator to find the value of the fraction. The numerator tells the number of parts out of the whole number. The denominator tells the size of the whole.
- ✍ Fraction models, number lines, and pictures can be used to show fractions. Use the same size and shape model for fractions that have the same whole when comparing.

Sample Items 17–20

Item 17

Which number line shows point R at $\frac{3}{4}$?



Item 18

The shaded part of the rectangle is $\frac{1}{2}$ of the rectangle.

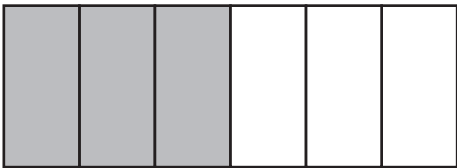


Which fraction is equivalent to $\frac{1}{2}$?

A. $\frac{3}{4}$



B. $\frac{3}{6}$



C. $\frac{2}{3}$

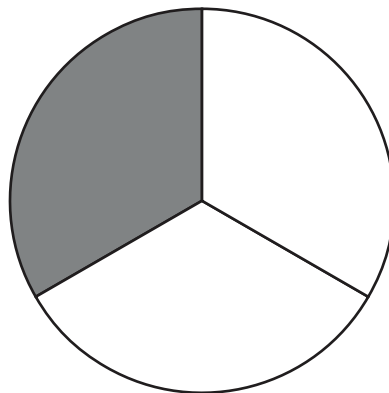


D. $\frac{5}{8}$



Item 19

Look at the circle.

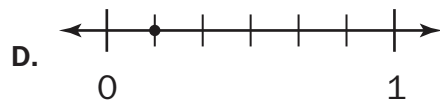
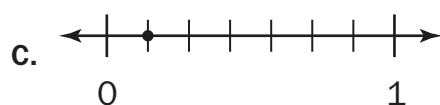
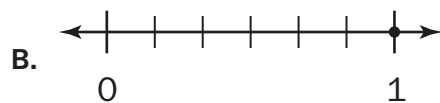
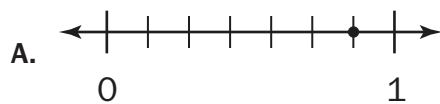


Which fraction represents the SHADED part of this circle?

- A. $\frac{1}{3}$
- B. $\frac{2}{3}$
- C. $\frac{2}{4}$
- D. $\frac{1}{4}$

Item 20

Which number line BEST shows the fraction $\frac{1}{6}$?



Unit 6: Measurement

In this unit, you will work with different kinds of measurement. You will tell and write time and determine elapsed time. You will estimate and measure liquid volume and mass.

KEY TERMS

Tell and write time to the nearest minute, using a digital or analog clock. (MD.1)

Elapsed time: The time interval or amount of time an event takes. (MD.1)

Use **addition** and **subtraction** to solve word problems involving elapsed time. A **number line** can be used to show the beginning and ending time of an event or to measure the length of time, in minutes, an event occurs. (MD.1)

Estimate liquid volume and mass of objects. Then **measure** liquid volume and mass using drawings of a beaker, scale, or other measurement tools. (MD.2)

Length: Distance of an object from one end of the object to the other end of the object.

Liquid volume: The amount of liquid a container holds is measured in liters. (MD.2)

Mass: The weight of an object is measured in grams or kilograms. (MD.2)

Use the four operations to solve problems involving liquid volume and mass with the same units of measure. For example, 15 grams of flour added to 12 grams of sugar will result in a total of 27 grams all together. (MD.2)

Important Tips

-  When solving problems involving liquid volume and mass, all measurements must be in the same unit.
-  Determine the intervals on measurement scales before measuring a mass or liquid volume. Measurement tools can use different intervals; for example, one beaker may use intervals of 5 liters and another container may use intervals of 2 liters.

Sample Items 21–24

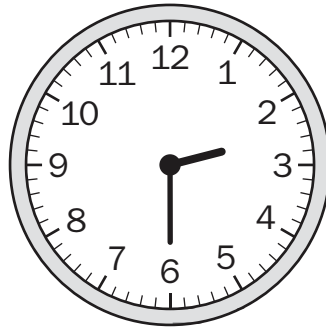
Item 21

Which of these is the **BEST** estimate for the amount of water needed to fill a bathtub?

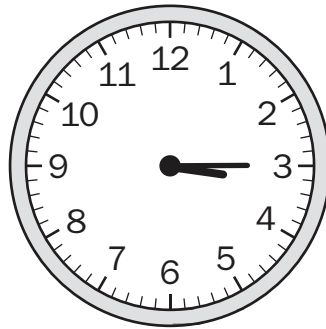
- A. 2 liters
- B. 20 liters
- C. 200 liters
- D. 2,000 liters

Item 22

Sara began her swim lesson at this time.



She ended her swim lesson at this time.

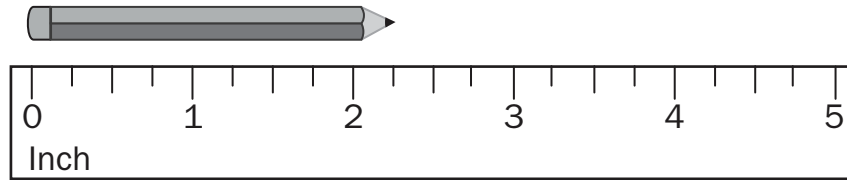


How long was her swim lesson?

- A. 30 minutes
- B. 45 minutes
- C. 60 minutes
- D. 90 minutes

Item 23

Look at this pencil and ruler.



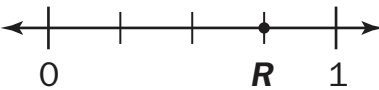
What is the length of the pencil to the nearest quarter inch?

- A. 2 inches
- B. $2\frac{1}{4}$ inches
- C. $2\frac{1}{2}$ inches
- D. $2\frac{3}{4}$ inches

MATHEMATICS ADDITIONAL SAMPLE ITEM KEYS

Item	Standard/ Element	DOK Level	Correct Answer	Explanation
1	MGSE3.NBT.1	2	D	The correct answer is choice (D) 500. To round to the nearest hundred, the value of the digit in the tens place needs to be evaluated. If the digit in the tens place is 5 or greater, the digit in the hundreds place rounds up to the greater hundred. Choice (A) is incorrect because it is the result of rounding down to the lesser hundred. Choice (B) is incorrect because it shows rounding to the nearest ten, not to the nearest hundred. Choice (C) is incorrect because it incorrectly shows rounding to the nearest ten.
2	MGSE3.NBT.2	2	C	The correct answer is choice (C) 876. Choice (A) is incorrect because the one hundred of 152 was not added. Choice (B) is incorrect because the ones place was added incorrectly. Choice (D) is incorrect because the digits were incorrectly aligned and the digits were added from the outside in—7 with 2, 2 with 5, and 4 with 1.
3	MGSE3.NBT.2	2	N/A	See scoring rubric and sample response beginning on page 106.
4	MGSE3.MD.4	3	N/A	See scoring rubric and sample response beginning on page 108.
5	MGSE3.OA.6	2	A	The correct answer is choice (A) $6 \times \square = 42$. Multiplication is the inverse operation of division. Choices (B), (C), and (D) are incorrect because they will not help solve this division problem.
6	MGSE3.OA.5	2	D	The correct answer is choice (D) 98. The product of 14 times 7 requires regrouping to the tens place. Choice (A) is not correct because 2 is the answer using the operation of division. Choice (B) is incorrect because 21 is the answer using the operation of addition. Choice (C) is incorrect because the factors were incorrectly multiplied; regrouping of the tens was not used.
7	MGSE3.OA.4	2	A	The correct answer is choice (A) 8. The number in the box is the factor that when multiplied by 8 equals 64. Choice (B) is incorrect because when 8 is multiplied by 9, the product is 72. Choice (C) is incorrect because 56 is the answer when 8 is subtracted from 64. Choice (D) is incorrect because 72 is the answer when 8 is added to 64.

Item	Standard/ Element	DOK Level	Correct Answer	Explanation
8	MGSE3.OA.3	2	N/A	See scoring rubric and sample response beginning on page 112.
9	MGSE3.MD.6	1	B	The correct answer is choice (B) 15 square meters. There are 3 rows of 5 squares. Choice (A) is incorrect because it is the answer to adding two side lengths. Choice (C) is incorrect because it adds the outside squares. Choice (D) is incorrect because it would mean an extra row of squares was added to the rectangle.
10	MGSE3.OA.8	2	A	The correct answer is choice (A) 13 marbles. First, 3 groups of 6 were multiplied to find a total of 18 marbles. Then 5 marbles were subtracted from the total. Choice (B) is incorrect because the answer is found by adding 3, 6, and 5. Choice (C) is incorrect because after the total number of marbles in the three bags was found, 5 marbles needed to be subtracted from the product. Choice (D) is incorrect because after the total number of marbles in the three bags was found, the 5 marbles needed to be subtracted from, not added to, 18.
11	MGSE3.MD.3	2	N/A	See scoring rubric and sample response on page 114.
12	MGSE3.OA.9	3	N/A	See scoring rubric and sample response beginning on page 115.
13	MGSE3.MD.3	2	C	The correct answer is choice (C). Each smiley face correctly represents 2 students. Choice (A) is incorrect because each smiley face needs to represent 2 students, not 1 student. Choices (B) and (D) are incorrect because the smiley faces incorrectly represent the tally marks.
14	MGSE3.G.1	1	B	The correct answer is choice (B) square. A square is a quadrilateral, a polygon with four sides, and all of the sides have the same length. Choices (A) and (C) are incorrect because all sides are not equal. Choice (D) is incorrect because only opposite sides are the same length.
15	MGSE3.MD.7	2	C	The correct answer is choice (C) 5×4 . This expression shows that the area of the rectangle is the product of the length and width. Choice (A) is incorrect because it shows an addition problem. Choice (B) is incorrect because it shows an incorrect equation. Choice (D) is incorrect because it shows how to find the figure's perimeter, not area.

Item	Standard/ Element	DOK Level	Correct Answer	Explanation
16	MGSE3.G.2	2	A	The correct answer is choice (A) $\frac{1}{4}$ square foot. The whole area of 1 foot is divided into 4 equal parts, so each part is $\frac{1}{4}$ of the whole area. Choice (B) is incorrect because it is the area of the parts Sam does not use. Choice (C) is incorrect because it is the sum of the whole and the part. Choice (D) is incorrect because it is the product of the whole area and 4.
17	MGSE3.NF.2b	1	A	The correct answer is choice (A)  . The number line is divided into fourths, and the point is located on the third of the four division lines. Choice (B) is incorrect because the point is located at $\frac{2}{6}$. Choice (C) is incorrect because the point is located at $\frac{7}{8}$. Choice (D) is incorrect because the point is located at $\frac{1}{3}$.
18	MGSE3.NF.3a	2	B	The correct answer is choice (B) $\frac{3}{6}$. The shaded value of $\frac{3}{6}$ is equal to the shaded value of $\frac{1}{2}$. Choices (A), (C), and (D) are incorrect because the shaded value in each rectangle is not equal to the shaded value of $\frac{1}{2}$.
19	MGSE3.NF.1	2	A	The correct answer is choice (A) $\frac{1}{3}$. The circle is divided into three equal parts, represented by the denominator of 3. There is one shaded part, represented by the numerator of 1. Choice (B) is incorrect because the circle shows 1 part shaded, not 2. Choices (C) and (D) are incorrect because these fractions represent a whole divided into 4 parts, not 3.

Item	Standard/ Element	DOK Level	Correct Answer	Explanation
20	MGSE3.NF.2ba	1	D	The correct answer is choice (D). It shows the number line partitioned into sixths and the first division plotted with a point to show $\frac{1}{6}$. Choice (A) is incorrect because the number line is partitioned into sevenths. Choice (B) is correctly partitioned into sixths but the choice is incorrect because the point is incorrectly plotted and shows one. Choice (C) is incorrect because the number line is partitioned into sevenths, so the plotted point shows $\frac{1}{7}$.
21	MGSE3.MD.2	2	C	The correct answer is choice (C) 200 liters. A large bottle of water holds about 1 liter, and it would take about 200 bottles to fill a bathtub. Choice (A) is incorrect because 2 bottles of water would not fill a bathtub. Choice (B) is incorrect because 20 bottles of water would not fill a bathtub. Choice (D) is incorrect because 2,000 bottles would be too much—a bathtub could not hold that much water.
22	MGSE3.MD.1	2	B	The correct answer is choice (B) 45 minutes. The swim lesson started at 2:30 and ended at 3:15, a total of 45 minutes. Choices (A), (C), and (D) are incorrect because they are incorrect numbers of minutes.
23	MGSE3.MD.4	2	B	The correct answer is choice (B) $2\frac{1}{4}$ inches. The ruler is marked in fourths, and the pencil ends closest to the first mark after 2. Choice (A) is incorrect because the pencil ends closer to the first quarter-inch mark after 2, not to 2. Choice (C) is incorrect because the pencil ends closer to the first quarter-inch mark after 2 than to the second. Choice (D) is incorrect because the pencil ends closer to the first quarter-inch mark after 2 than to the third.
24	MGSE3.MD.1	3	N/A	See scoring rubric and sample response beginning on page 117.

MATHEMATICS SAMPLE SCORING RUBRICS AND EXEMPLAR RESPONSES

Item 3

Scoring Rubric

Points	Description
2	The response achieves the following: • Response demonstrates a complete understanding of solving a multi-digit subtraction problem that requires regrouping. • Give two points for answer (247) and a complete explanation of the strategy used to solve the problem. • Response shows application of a reasonable and relevant strategy to solve. • Mathematical ideas are expressed coherently through clear, complete, logical, and fully developed responses using words, calculations, and/or symbols, as appropriate.
1	The response achieves the following: • Response demonstrates a partial understanding of solving a multi-digit subtraction problem that requires regrouping. • Give one point for the correct answer of 247 but no process shown OR a correct process with a calculation error. Response is only partially correct. • Response shows application of a relevant strategy, though it may be only partially applied or remain unexplained. • Mathematical ideas are expressed only partially, using words, calculations, and/or symbols, as appropriate.
0	The response achieves the following: • Response demonstrates limited to no understanding of how to solve a multi-digit subtraction problem that requires regrouping. • The student is unable to perform any of the solution steps correctly. • Response shows no application of a strategy or shows application of an irrelevant strategy. • Mathematical ideas cannot be interpreted or lack sufficient evidence to support even a limited understanding.

Exemplar Response

Points Awarded	Sample Response
2	247 AND I used a number line and counting back to subtract. I started at 571 and counted back by hundreds 3 times to subtract 300 and ended at 271. Then I counted back by tens 2 times to subtract 20 and ended at 251. Then I counted back by ones 4 times to subtract 4 and ended at 247. <i>OR other valid process</i>
1	247
0	<i>Response is irrelevant, inappropriate, or not provided.</i>

Item 4

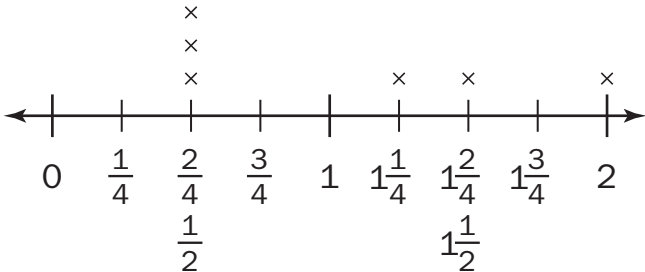
Scoring Rubric

Points	Description
4	The response achieves the following: • Response demonstrates a complete understanding of measuring objects to the nearest quarter inch, creating a line plot with the data, and explaining the units on the plot. • Give four points if student response indicates the correct measurement for each line segment AND correctly describes how to create a line plot with the measurement data AND provides a clear understanding of the line plot's units. Response is correct and complete. • Response shows application of a reasonable and relevant strategy. • Mathematical ideas are expressed coherently through clear, complete, logical, and fully developed responses, using words, calculations, and/or symbols, as appropriate.
3	The response achieves the following: • Response demonstrates a nearly complete understanding of measuring objects to the nearest quarter inch, creating a line plot with the data, and explaining the units on the plot. • Give three points if student response indicates an incorrect measurement in Part A, but the incorrect measurement is used correctly in the description of how to create the line plot AND the units are correctly explained AND response is nearly completely correct. • Response shows application of a reasonable and relevant strategy. • Mathematical ideas are expressed coherently through clear, complete, logical, and fully developed responses, using words, calculations, and/or symbols, as appropriate.
2	The response achieves the following: • Response demonstrates a partial understanding of measuring objects to the nearest quarter inch, creating a line plot with the data, and explaining the units on the plot. • Give two points if student response indicates two or three incorrect measurements in Part A, but incorrect measurements are used correctly in the description of how to create the line plot AND the units are correctly explained AND response is partially correct. • Response shows application of a relevant strategy, though it may be only partially applied or remain unexplained. • Mathematical ideas are expressed only partially, using words, calculations, and/or symbols, as appropriate.

Points	Description
1	The response achieves the following: • Response demonstrates minimal understanding of measuring objects to the nearest quarter inch, creating a line plot with the data, and explaining the units on the plot. • Give one point if student response indicates at least two correct measurements and has a partially complete description of the line plot's units and how to create the line plot AND response is only partially correct. • Response shows application of a relevant strategy, though it may be only partially applied or remain unexplained. • Mathematical ideas are expressed only partially, using words, calculations, and/or symbols, as appropriate.
0	The response achieves the following: • Response demonstrates limited to no understanding of measuring objects to the nearest quarter inch, creating a line plot with the data, or explaining the units on the plot. • The student is unable to measure to the nearest quarter inch, explain how to create a line plot, or explain the units on a line plot. • Response shows no application of a strategy or applies an irrelevant strategy. • Mathematical ideas cannot be interpreted or lack sufficient evidence to support even a limited understanding.

Exemplar Response

Points	Sample Response
4	Part A: $A = \frac{1}{2}$ inch $B = 1\frac{3}{4}$ inches $C = 2$ inches $D = \frac{1}{2}$ inch $E = \frac{1}{2}$ inch $F = 1\frac{1}{4}$ inches AND Part B: They represent length measurements to the quarter inch. A number line is shown with arrows at both ends. It has major tick marks at 0, 1, and 2. Between these major marks, there are three smaller tick marks, dividing each unit into four equal parts. Below the line, the following fractions are labeled: 0, $\frac{1}{4}$, $\frac{2}{4}$, $\frac{3}{4}$, 1, $1\frac{1}{4}$, $1\frac{2}{4}$, $1\frac{3}{4}$, and 2. Above the line, 'x' marks are placed at the following positions: $\frac{2}{4}$ (labeled $\frac{1}{2}$ below), $1\frac{1}{4}$, $1\frac{3}{4}$, and 2.

Points	Sample Response
3	Part A: $A = \frac{1}{2}$ inch $B = 1\frac{1}{2}$ inches $C = 2$ inches $D = \frac{1}{2}$ inch $E = \frac{1}{2}$ inch $F = 1\frac{1}{4}$ inches AND Part B: They represent length measurements to the quarter inch. 
2	Part A: $A = \frac{1}{4}$ inch $B = 1\frac{1}{4}$ inches $C = 2$ inches $D = \frac{1}{2}$ inch $E = \frac{1}{2}$ inch $F = 1\frac{1}{4}$ inches AND Part B: They represent length measurements to the quarter inch.

Points	Sample Response
1	Part A: $A = \frac{1}{2} \text{ inch}$ $B = 2 \text{ inches}$ $C = 2 \text{ inches}$ $D = \frac{1}{2} \text{ inch}$ $E = \frac{1}{2} \text{ inch}$ $F = \frac{3}{4} \text{ inches}$ AND Part B: They represent length measurements.
0	<i>Response is irrelevant, inappropriate, or not provided.</i>

Item 8

Scoring Rubric

Points	Description
2	The response achieves the following: • Response demonstrates a complete understanding of the meaning of multiplication, through groups of objects or an array. • Give two points for an answer that identifies the correct drawing AND explains the identification AND gives the correct number sentence. • Response shows application of a reasonable and relevant strategy. • Mathematical ideas are expressed coherently through clear, complete, logical, and fully developed responses, using words, calculations, and/or symbols, as appropriate.
1	The response achieves the following: • Response demonstrates a partial understanding of the meaning of multiplication. • Give one point for an answer that identifies the correct drawing AND gives the correct number sentence, but does not explain the identification. • Response shows application of a relevant strategy, though it may be only partially applied. • Mathematical ideas are expressed only partially, using words, calculations, and/or symbols, as appropriate.
0	The response achieves the following: • Response demonstrates limited to no understanding of the meaning of a multiplication problem. • The student is unable to perform any of the solution steps correctly. • Response shows no application of a strategy or shows application of an irrelevant strategy. • Mathematical ideas cannot be interpreted or lack sufficient evidence to support even a limited understanding.

Exemplar Response

Points Awarded	Sample Response
2	Part A: Drawing B is correct. It shows an array with 4 rows for the 4 bookshelves. The 7 squares in each row show the 7 books on each shelf. <i>OR other valid explanation</i> AND Part B: $4 \times 7 = 28$
1	Part A: Drawing B is correct. It shows an array with 4 rows for the 4 bookshelves. The 7 squares in each row show the 7 books on each shelf. <i>OR other valid explanation</i> OR Part B: $4 \times 7 = 28$
0	<i>Response is irrelevant, inappropriate, or not provided.</i>

Item 11

Scoring Rubric

Points	Description
2	The response achieves the following: • Response demonstrates a complete understanding of how to solve “how many more” problems using information presented in a scaled bar graph. • Give two points for a correct answer and explanation of using the graph to find the answer. • Response shows application of a reasonable and relevant bar graph.
1	The response achieves the following: • Response demonstrates a partial understanding of how to solve “how many more” problems using information presented in a scaled bar graph. • Give one point for a correct answer but incorrect or incomplete explanation of using the graph to find the answer. • Response shows application of understanding how to show data as a graph, though it may be only partially applied. • Mathematical ideas are expressed only partially, using words, calculations, and/or symbols as, appropriate.
0	The response achieves the following: • Response demonstrates limited to no understanding of how to solve “how many more” problems using information presented in a scaled bar graph. • The student is unable to use the graph to solve the problem. • Response shows no application of a strategy or shows application of an irrelevant strategy. • Mathematical ideas cannot be interpreted or lack sufficient evidence to support even a limited understanding.

Exemplar Response

Points Awarded	Sample Response
2	Ben counted 8 more red birds than yellow birds. The bar for red ends at 10 to show that Ben counted 10 red birds. The bar for yellow ends at 2 to show that Ben counted 2 red birds. 10 minus 2 is 8. <i>OR other valid explanation</i>
1	Ben counted 8 more red birds than yellow birds.
0	<i>Response is irrelevant, inappropriate, or not provided.</i>

Item 12

Scoring Rubric

Points	Description
4	The response achieves the following: • Response demonstrates a complete understanding of patterns in the multiplication table. • Give four points if student response indicates four correct patterns in the hundreds chart. Response is correct and complete. • Response shows application of a reasonable and relevant strategy. • Mathematical ideas are expressed coherently through clear, complete, logical, and fully developed responses, using words, calculations, and/or symbols, as appropriate.
3	The response achieves the following: • Response demonstrates a nearly complete understanding of patterns in the multiplication table. • Give three points if student response indicates three correct patterns in the hundreds chart. Response is nearly completely correct. • Response shows application of a reasonable and relevant strategy. • Mathematical ideas are expressed coherently through clear, complete, logical, and fully developed responses, using words, calculations, and/or symbols, as appropriate.
2	The response achieves the following: • Response demonstrates a partial understanding of patterns in the hundreds chart. • Give two points if student response indicates two correct patterns. • Response shows application of a relevant strategy, though it may be only partially applied or remain unexplained. • Mathematical ideas are expressed only partially, using words, calculations, and/or symbols, as appropriate.
1	The response achieves the following: • Response demonstrates minimal understanding of patterns on the hundreds chart. • Give one point if student response indicates at least one correct pattern. • Response shows application of a relevant strategy, though it may be only partially applied or remain unexplained. • Mathematical ideas are expressed only partially, using words, calculations, and/or symbols, as appropriate.
0	The response achieves the following: • Response demonstrates limited to no understanding of patterns on the hundreds chart. • The student is unable to identify patterns. • Response shows no application of a strategy or applies an irrelevant strategy. • Mathematical ideas cannot be interpreted or lack sufficient evidence to support even a limited understanding.

Exemplar Response

Points	Sample Response
4	Pattern 1: For each multiple of 9, the digits can be added together to equal nine. Pattern 2: When 4 is multiplied by any number, the product is an even number. Pattern 3: Multiples of 5 have either a 5 or a 0 in the ones place. Pattern 4: An odd factor times an odd factor equals an odd product. <i>OR other valid patterns</i>
3	The student correctly answers three out of the four parts.
2	The student correctly answers two out of the four parts.
1	The student correctly answers one of the four parts.
0	<i>Response is irrelevant, inappropriate, or not provided.</i>

Item 24

Scoring Rubric

Points	Description
2	The response achieves the following: • Response demonstrates a complete understanding of telling and writing time to the nearest minute and determining elapsed time. • Give two points if student response indicates the correct start time AND provides a clear understanding of how the start time was determined. Response is correct and complete. • Response shows application of a reasonable and relevant strategy. • Mathematical ideas are expressed coherently through clear, complete, logical, and fully developed responses, using words, calculations, and/or symbols, as appropriate.
1	The response achieves the following: • Response demonstrates a partial understanding of telling and writing time to the nearest minute. • Give one point if student response indicates the correct start time but no explanation is given. • Response shows application of a relevant strategy, though it may be only partially applied or remain unexplained. • Mathematical ideas are expressed only partially, using words, calculations, and/or symbols, as appropriate.
0	The response achieves the following: • Response demonstrates limited to no understanding of telling and writing time to the nearest minute and determining elapsed time. • The student is unable to tell and write time to the nearest minute or determine elapsed time. • Response shows no application of a strategy or applies an irrelevant strategy. • Mathematical ideas cannot be interpreted or lack sufficient evidence to support even a limited understanding.

Exemplar Response

Points	Sample Response
2	The start time was 2:15. The clock shows the movie ended at 3:45. Ninety minutes is the same as 60 minutes plus 30 minutes. First, I found that an hour earlier than 3:45 would be 2:45. Then, I determined 30 minutes earlier than 2:45 was 2:15.
1	The start time was 2:15.
0	<i>Response is irrelevant, inappropriate, or not provided.</i>

ACTIVITY

The following activity develops skills in Unit 3: Operations and Algebraic Thinking: Patterns in Addition and Multiplication.

Standards: MGSE3.OA.1, MGSE3.OA.2, MGSE3.OA.3, MGSE3.OA.4, MGSE3.OA.5, MGSE3.OA.6, MGSE3.OA.7, MGSE3.NBT.3, MGSE3.MD.3, MGSE3.MD.4

Work with manipulatives such as Base Ten blocks and counters.

- Make arrays with counters to determine the total amount. Choose a total amount and determine how many rows and columns are needed to show the number as an array.
- Use Base Ten blocks to show regrouping in addition problems.

Write problems with unknowns as you use manipulatives.

- For example: *I know there are 4 groups of counters. I don't know how many are in each group, but I know there are 16 total counters and each group has the same amount. How many counters are in each group?*
- Act out the problem with the counters and record the equation with the unknown.

Use multiplication tables to work with finding patterns.

- Use the chart for multiplication and division facts.

Act out word problems with friends or family.

- For example: *There are 12 students in class. They line up in 4 equal lines during gym class. How many students are in each line?*
- Write your own word problems and act them out.

ACTIVITY

The following activity develops skills in Unit 6: Measurement.

Standards: MGSE3.MD.1, MGSE3.MD.2, MGSE3.MD.3, MGSE3.MD.4

Determine time to the nearest minute and measure elapsed time using real-life examples.

- Over a few days, keep a log of the times you start and stop activities.
- Then calculate the amount of time you spent on each activity.

Use sticky notes or small pieces of paper to gather data about your family and friends.

- For example, ask your friends or family what their favorite color is and then write the name of the color on a sticky note or small piece of paper.
- Use the sticky notes or pieces of paper to create a bar graph, and then read it and interpret the data.
- Use the bar graph to create a picture graph.

Measure to the nearest half or quarter inch using a ruler.

- For example: *What is the length of your shoe?*
- Use the data to make line plots to display and interpret the data.

Explore volume and mass.

- Weigh items by comparing to the weight of a paper clip or feather.
- Use measuring cups, bowls, and pitchers to work with liquid volume.



Grade 3
Mathematics
Item and Scoring Sampler
2015

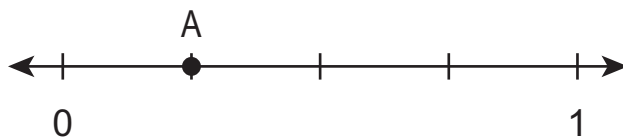
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CONSTRUCTED-RESPONSE ITEM

MCC3.NF.2

5. Look at point A on the number line.



Point A represents a fraction.

$\frac{1}{\square}$

What number belongs in the box to represent point A? Explain how you found your answer.
Write your answer in the space provided on your answer document.

#5 Item Information

Standard: MCC3.NF.2 Understand a fraction as a number on the number line; represent fractions on a number line diagram. a. Represent a fraction $\frac{1}{b}$ on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into b equal parts. Recognize that each part has size $\frac{1}{b}$ and that the endpoint of the part based at 0 locates the number $\frac{1}{b}$ on the number line.	Item Depth of Knowledge: 2 Basic Application of Skill/Concept Student uses information, conceptual knowledge, and procedures.
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ITEM-SPECIFIC SCORING GUIDELINE

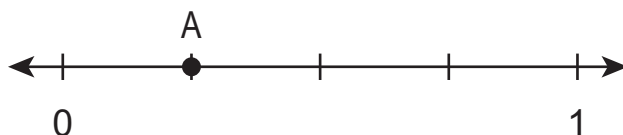
Score Point	Rationale
2	Response demonstrates a complete understanding of the standard. Give 2 points for student identifying the denominator as 4 and providing a complete, correct explanation that shows the student sees the interval from 0 to 1 as having 4 equal sections (or equivalent). Exemplar Response: The number that goes in box is 4. (1 point) <u>AND</u> From 0 to 1 is divided into 4 equal parts. A is $\frac{1}{4}$. (1 point) <u>OR</u> Other valid response
1	Response demonstrates partial understanding of the standard. Student earns 1 point for answering 1 key element. <u>OR</u> Give 1 point when student identifies a different denominator <u>and</u> provides an explanation that shows understanding of equal parts from 0 to 1.
0	Response demonstrates limited to no understanding of the standard. Student earns 0 points because the student does not show understanding that fractions represent equal parts of a whole.

STUDENT RESPONSES

MCC3.NF.2

Response Score: 2

5. Look at point A on the number line.



Point A represents a fraction.

$\frac{1}{\square}$

What number belongs in the box to represent point A? Explain how you found your answer. Write your answer in the space provided on your answer document.

4. because each dash increases by $\frac{1}{4}$ on the number line.

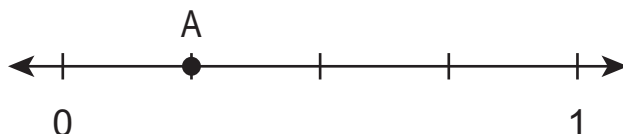
The response demonstrates a complete understanding by providing the correct response (denominator of 4) and by providing an explanation that correctly defines the scale of the interval on the number line shown. The student understands that the number line shown is partitioned into four equal parts and that point A is on the first of those four marks.

MCC3.NF.2

Response Score: 1



5. Look at point A on the number line.



Point A represents a fraction.

$\frac{1}{\square}$

What number belongs in the box to represent point A? Explain how you found your answer.

Type your answer in the space provided.

3

The number line is divided into 3 equal parts so the denominator is 3.

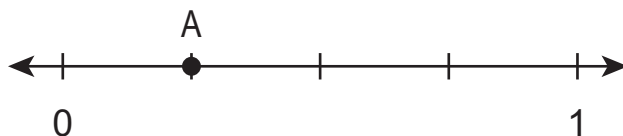
The response demonstrates a partial understanding by providing an explanation that defines a denominator based on an error in interpreting the scale of the interval on the number line shown. Although the student misunderstands and states that the number line shown is partitioned into three equal parts rather than four, the student correctly defines the denominator based on the misunderstanding. If it were true, as the student suggests, that the number line is partitioned into three equal parts, then at point A the denominator would be 3.

MCC3.NF.2

Response Score: 0



5. Look at point A on the number line.



Point A represents a fraction.

$\frac{1}{\square}$

What number belongs in the box to represent point A? Explain how you found your answer.

Type your answer in the space provided.

1 the dashes increase by one each time.

The response demonstrates little to no understanding of the concepts being measured. While the student is aware that marks on a number line represent intervals ("dashes increase by one each time"), the student does not provide a correct answer or explanation related to the fraction represented at point A.

CONSTRUCTED-RESPONSE ITEM

MCC3.NBT.3

6.

Part A: What is the value of 9×3 ? **Write your answer in the space provided on your answer document.**

Part B: What is the value of 90×3 ? Use your answer from Part A to explain how you found your answer. **Write your answer in the space provided on your answer document.**

Part C: Look at the number sentences.

$$8 \times 6 = 48$$

$$8 \times \underline{\quad} = 480$$

What number belongs in the blank to make the number sentence true? **Write your answer in the space provided on your answer document.**

#6 Item Information

Standard: MCC3.NBT.3

Multiply one-digit whole numbers by multiples of 10 in the range 10–90 (e.g., 9×80 , 5×60) using strategies based on place value and properties of operations.

Item Depth of Knowledge: 3

Strategic Thinking

Student uses reasoning and develops a plan or sequence of steps; process has some complexity.

ITEM-SPECIFIC SCORING GUIDELINE

Score Point	Rationale
4	Response demonstrates a complete understanding of the standard. Give 4 points for correctly multiplying in Part A to get 27, correctly multiplying again in Part B to get 270 and correctly explaining that since 9×10 is 90 then 90×3 is equivalent to 27×10, and then in Part C correctly identifying the missing value as 60. Exemplar Response: Part A: 27 (1 point) Part B: 270 (1 point) <u>AND</u> Since $10 \times 9 = 90$, I can rewrite 90×3 as $10 \times 9 \times 3$ and then put in 27 in place of 9×3. Now I can solve 10×27. (1 point) Part C: 60 (1 point) <u>OR</u> Other valid response
3	Response demonstrates nearly complete understanding of the standard. Student earns 3 points for answering 3 key elements.*
2	Response demonstrates partial understanding of the standard. Student earns 2 points for answering 2 key elements.*
1	Response demonstrates minimal understanding of the standard. Student earns 1 point for answering 1 key element.*
0	Response demonstrates limited to no understanding of the standard. Student earns 0 points because the student does not show understanding of multiplying with multiples of 10.

**If a student makes an error in Part A that is carried through to Part B (or subsequent parts), then the student is not penalized again for the same error.*

STUDENT RESPONSES

MCC3.NBT.3

Response Score: 4



6.

Part A: What is the value of 9×3 ? **Type your answer in the space provided.**

Part B: What is the value of 90×3 ? Use your answer from Part A to explain how you found your answer. **Type your answer in the space provided.**

Part C: Look at the number sentences.

$$8 \times 6 = 48$$

$$8 \times \underline{\quad} = 480$$

What number belongs in the blank to make the number sentence true? **Type your answer in the space provided.**

27

270 because $9 \times 10 = 90$ then take your answer $27 \times 10 = 270$

60

The response demonstrates a complete understanding by providing the correct answer in Part A (27) and in Part C (60) and by providing an explanation that correctly defines how the answer can be derived using an understanding of the impact of multiples of 10. Though the student's response to Part B is not a typical response, the student understands that the number 90 in Part B is 10 times the number 9 from Part A. The student then provides proof by multiplying the answer to Part A by 10 to derive the answer of 270 (since $9 \times 3 = 27$ and $9 \times 10 = 90$, $90 \times 3 = 27 \times 10$).

MCC3.NBT.3

Response Score: 3

6.

Part A: What is the value of 9×3 ? **Write your answer in the space provided on your answer document.**

Part B: What is the value of 90×3 ? Use your answer from Part A to explain how you found your answer. **Write your answer in the space provided on your answer document.**

Part C: Look at the number sentences.

$$8 \times 6 = 48$$

$$8 \times \underline{\quad} = 480$$

What number belongs in the blank to make the number sentence true? **Write your answer in the space provided on your answer document.**

27 270 60
--

The response demonstrates a nearly complete understanding by providing the correct answer in Part A (27) and in Part C (60) and by providing a correct, but incomplete, response to Part B (270). The student does not provide any explanation to show how the number 90 in Part B is related to the number 9 in Part A. The correct answer in Part B is evidence that the student understood the mathematics involved to derive an answer to 90×3 , but without an explanation, the response is incomplete.

MCC3.NBT.3

Response Score: 2



6.

Part A: What is the value of 9×3 ? **Type your answer in the space provided.**

Part B: What is the value of 90×3 ? Use your answer from Part A to explain how you found your answer. **Type your answer in the space provided.**

Part C: Look at the number sentences.

$$8 \times 6 = 48$$

$$8 \times \underline{\quad} = 480$$

What number belongs in the blank to make the number sentence true? **Type your answer in the space provided.**

26

260 because 90×3 is equal to $10 \times 9 \times 3$ so $10 \times 26 = 260$

6

The response demonstrates a partial understanding of the concepts being measured. While the student's answers to Part A and Part C are both wrong, the answer and explanation in Part B is correct given the value (26) the student determined in Part A. The response that " 90×3 is equal to $10 \times 9 \times 3$ " demonstrates that the student understands that the number 90 in Part B is a multiple of 10 of the number 9 in Part A. The student is not penalized a second time for making the same arithmetic error ($9 \times 3 = 26$) in both Part A and Part B. Therefore, while an answer of 260 is incorrect, given that the student thinks that $9 \times 3 = 26$, the correct application of the multiple of 10 generates an erroneous answer of 260.

MCC3.NBT.3

Response Score: 1

6.

Part A: What is the value of 9×3 ? **Write your answer in the space provided on your answer document.**

Part B: What is the value of 90×3 ? Use your answer from Part A to explain how you found your answer. **Write your answer in the space provided on your answer document.**

Part C: Look at the number sentences.

$$8 \times 6 = 48$$

$$8 \times \underline{\quad} = 480$$

What number belongs in the blank to make the number sentence true? **Write your answer in the space provided on your answer document.**

The response demonstrates a minimal understanding of the concepts being measured. While the student has failed to respond to Part A and Part C, the answer in Part B is still correct, but incomplete. The student does not attempt to provide an explanation to define how the value of the number 9 in Part A is related to the value of the number 90 in Part B. Without an explanation, the student is unable to demonstrate how the two given numbers are related by a multiple of 10.

MCC3.NBT.3

Response Score: 0



6.

Part A: What is the value of 9×3 ? **Type your answer in the space provided.**

Part B: What is the value of 90×3 ? Use your answer from Part A to explain how you found your answer. **Type your answer in the space provided.**

Part C: Look at the number sentences.

$$8 \times 6 = 48$$

$$8 \times \underline{\quad} = 480$$

What number belongs in the blank to make the number sentence true? **Type your answer in the space provided.**

12	
12 it's the same as part a	
6	

The response demonstrates little to no understanding of the concepts being measured. In Part A, the student adds the two values together rather than multiplying the two values. In Part B, the response is incorrect (12) and provides an invalid statement ("it's the same as part a") that does not provide any information related to the question asked. The response to Part C is also incorrect.