


Georgia



Milestones

Assessment System

Algebra I
Mathematics
Item and Scoring Sampler
2016

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INTRODUCTION

The Georgia Milestones Algebra I assessment is a criterion-referenced test designed to provide information about how well a student has mastered the grade-level state-adopted content standards in mathematics. This assessment consists of a variety of item types including selected-response and constructed-response items.

TYPES OF ITEMS INCLUDED IN THE SAMPLER AND USES OF THE SAMPLER

The purpose of this sampler is to provide samples of the type of constructed-response items that appear on the operational Georgia Milestones Algebra I assessment. The items in this sampler may be used for classroom instruction purposes. The samples may be copied, and classroom teachers may find it beneficial to have students respond to one or more of the samples. Teachers can then use the information in the sampler as a guide to score responses written by their own students.

MATHEMATICS CONSTRUCTED-RESPONSE ITEM TYPES

A mathematics **constructed-response** item asks a question and solicits the student to provide a response constructed on his or her own, as opposed to selecting from options provided. The constructed-response items on the EOC Mathematics assessment are worth up to two points. Partial credit may be awarded if part of the response is correct.

An **extended constructed-response** item is a specific type of constructed-response item that elicits a longer, more detailed response from the student than does a two-point constructed-response item. The extended constructed-response items on the EOC assessment are worth up to four points. Partial credit may be awarded if part of the response is correct.

ITEM ALIGNMENT

Each constructed-response item included in this sampler has been through a rigorous review process with Georgia educators to ensure alignment with the content standards. The content standard for each sample item is provided in this sampler in the item information tables.

DEPTH OF KNOWLEDGE

In addition to being aligned to the standards, the sample items included in this sampler were developed with a particular emphasis on cognitive complexity, or Depth of Knowledge (DOK). The DOK level is provided for each item in this sampler in the Item Information Table. DOK measures the level of cognitive demand required to complete an assessment item. The following descriptions show the expectations of the DOK levels in greater detail.

Level 1 (Recall of Information) generally requires students to identify, list, or define, often asking them to recall who, what, when, and where. Consequently, this level usually asks students to recall facts, terms, concepts, and trends and may ask them to identify specific information contained in documents, excerpts, quotations, maps, charts, tables, graphs, or illustrations. Items that require students to “describe” and/or “explain” could be classified at Level 1 or Level 2, depending on what is to be described and/or explained. A Level 1 “describe” and/or “explain” would require students to recall, recite, or reproduce information.

Level 2 (Basic Reasoning) includes the engagement of some mental processing beyond recalling or reproducing a response. A Level 2 “describe” and/or “explain” would require students to go beyond a description or explanation of recalled information to describe and/or explain a result or “how” or “why.”


Level 3 (Complex Reasoning) requires reasoning, using evidence, and thinking on a higher and more abstract level than Level 1 and Level 2. Students will go beyond explaining or describing “how and why” to justifying the “how and why” through application and evidence. Level 3 questions often involve making connections across time and place to explain a concept or “big idea.”

Level 4 (Extended Reasoning) requires the complex reasoning of Level 3 with the addition of planning, investigating, applying significant conceptual understanding, and/or developing that will most likely require an extended period of time. Students should be required to connect and relate ideas and concepts within the content area or among content areas in order to be at this highest level. The distinguishing factor for Level 4 would be evidence (through a task, a product, or an extended response) that the cognitive demands have been met.

ITEM AND SCORING SAMPLER FORMAT

Sample constructed-response questions are provided in this sampler, along with any related stimulus information such as a passage or graphic. Following the test question is the scoring guide for the constructed-response question. The scoring guide includes the Item Information Table, the item-specific scoring guideline, and annotated sample student responses at each score point.

For mathematics items, each item-specific scoring guideline includes an exemplar as one possible correct response. Readers are trained to give credit to alternate valid responses.

The Georgia Milestones assessment may be administered in paper-and-pencil format or online. As a result, this sampler includes samples of students' responses in both formats. This symbol  is used to note the format of a sample online item. It also indicates a sample online response.

Example Constructed-Response Item Information Table

| | |
|------------------|---------------------------------|
| Standard: | Item Depth of Knowledge: |
|------------------|---------------------------------|

Algebra I
MATHEMATICS
Sample Constructed-Response Items

CONSTRUCTED-RESPONSE ITEM

F.IF.3



1. The first term in a sequence is -9. The common difference is 2.

Part A: Write the next three terms in this sequence. Type your answer in the space provided.

Part B: Write a function, $f(n)$, to represent this sequence. Type your answer in the space provided.

#1 Item Information

| | |
|---|---|
| <p>Standard: F.IF.3 Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. (Generally, the scope of high school math defines this subset as the set of natural numbers 1, 2, 3, 4, ...) By graphing or calculating terms, students should be able to show how the recursive sequence $a_1 = 7, a_n = a_{n-1} + 2$; the sequence $s_n = 2(n - 1) + 7$; and the function $f(x) = 2x + 5$ (when x is a natural number) all define the same sequence.</p> | <p>Item Depth of Knowledge: 3 Strategic Thinking Student uses reasoning and develops a plan or sequence of steps; process has some complexity.</p> |
|---|---|

ITEM-SPECIFIC SCORING GUIDELINE

| Score Point | Rationale |
|-------------|--|
| 2 | <p>Response demonstrates a complete understanding of the standard.</p> <p>Give 2 points for student identifying the next three terms in the sequence and providing the function to represent the sequence.</p> <p>Exemplar Response: Part A: -7, -5, -3 (1 point) Part B: $f(n) = -11 + 2n$ or equivalent (1 point) <u>OR</u> Other valid response</p> |
| 1 | <p>Response demonstrates partial understanding of the standard.</p> <p>Student earns 1 point for answering 1 key element.</p> |
| 0 | <p>Response demonstrates limited to no understanding of the standard.</p> <p>Student earns 0 points because the student does not show understanding.</p> |

STUDENT RESPONSES

F.IF.3

Response Score: 2



1. The first term in a sequence is -9. The common difference is 2.

Part A: Write the next three terms in this sequence. Type your answer in the space provided.

-7,-5,-3

Part B: Write a function, $f(n)$, to represent this sequence. Type your answer in the space provided.

$f(n)=-11+2n$

The response demonstrates a complete understanding of recognizing sequences as functions. The student correctly provides the next three terms in the given sequence for Part A (-7, -5, -3). In Part B, the student correctly interprets the sequence as a function: $f(n) = -11 + 2n$.

F.IF.3

Response Score: 1

- The first term in a sequence is -9. The common difference is 2.

Part A: Write the next three terms in this sequence. Write your answer in the space provided on your answer document.

| |
|--------------|
| $-7, -5, -3$ |
| |
| |
| |

Part B: Write a function, $f(n)$, to represent this sequence. Write your answer in the space provided on your answer document.

| |
|-----------------|
| $f(n) = 9n - 2$ |
| |
| |
| |

The response demonstrates partial understanding of recognizing sequences as functions. The student correctly provides the next three terms in the given sequence for Part A (-7, -5, -3). In Part B, the student provides an incorrect function.

F.IF.3

Response Score: 0



1. The first term in a sequence is -9. The common difference is 2.

Part A: Write the next three terms in this sequence. Type your answer in the space provided.

The next three terms are -11, -13 and -15

Part B: Write a function, $f(n)$, to represent this sequence. Type your answer in the space provided.

$F(n)=2n+1$

The response demonstrates inadequate understanding of recognizing sequences as functions. The student provides an incorrect response for Part A that uses -2 as the common difference instead of 2. In Part B, the student provides an incorrect function.

EXTENDED CONSTRUCTED-RESPONSE ITEM

F.LE.1c



2. Gina opens a small store. Each day her store is open, her profit increases by approximately \$500.00.

Part A: Construct a function that BEST represents the estimated total profit after x days. Explain the type of function you created and why. Type your answer in the space provided.

The table shows the total profits after Gina runs a newspaper advertisement for her store. Her profit the day she runs the advertisement is \$1,408.45.

Store Profits

| Days After Advertisement Is Placed | Total Profit (dollars) |
|------------------------------------|------------------------|
| 1 | 2,000.00 |
| 2 | 2,840.00 |
| 3 | 4,032.80 |
| 4 | 5,726.58 |
| 5 | 8,131.74 |

Gina uses this function, g , to represent the total profit k days after her newspaper advertisement is placed.

$$g = 1,408.45(_)^k$$

MATHEMATICS

Part B: What number belongs in the blank space to complete Gina’s function? Type your answer in the space provided.

Part C: Explain the type of function Gina created and why that is the best type of function to represent the total profit k days after her newspaper advertisement is placed. Type your answer in the space provided.

#2 Item Information

Standard: F.LE.1c

Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.

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 | <p>Response demonstrates a complete understanding of the standard.</p> <p>Give 4 points for constructing a correct function and explaining why a linear function was chosen in Part A, correctly identifying 1.42 as the number that completes the equation in Part B, and correctly explaining why the exponential function Gina created is the best type of function to represent the total profit in Part C.</p> <p>Exemplar Response: Part A: $y = 500x$ (1 point) <u>AND</u> I chose a linear function because the rate of increase is constant. (1 point) Part B: 1.42. (1 point) Part C: Gina used an exponential function because the total profit increased by a constant percent. (1 point) <u>OR</u> Other valid response</p> |
| 3 | <p>Response demonstrates partial understanding of the standard.</p> <p>Student earns 3 points for answering 3 key elements.</p> |
| 2 | <p>Response demonstrates partial understanding of the standard.</p> <p>Student earns 2 points for answering 2 key elements.</p> |
| 1 | <p>Response demonstrates minimal understanding of the standard.</p> <p>Student earns 1 point for answering 1 key element.</p> |
| 0 | <p>Response demonstrates limited to no understanding of the standard.</p> <p>Student earns 0 points because the student does not show understanding.</p> |

NO TEST MATERIAL
ON THIS PAGE

F.LE.1c

Response Score: 4

2. Gina opens a small store. Each day her store is open, her profit increases by approximately \$500.00.

Part A: Construct a function that BEST represents the estimated total profit after x days. Explain the type of function you created and why. Write your answer in the space provided on your answer document.

$f(x) = 500x$ it's a linear equation because the profit increased the same amount every day

The table shows the total profits after Gina runs a newspaper advertisement for her store. Her profit the day she runs the advertisement is \$1,408.45.

Store Profits

| Days After Advertisement Is Placed | Total Profit (dollars) |
|------------------------------------|------------------------|
| 1 | 2,000.00 |
| 2 | 2,840.00 |
| 3 | 4,032.80 |
| 4 | 5,726.58 |
| 5 | 8,131.74 |

Gina uses this function, g , to represent the total profit k days after her newspaper advertisement is placed.

$$g = 1,408.45(_)^k$$

Part B: What number belongs in the blank space to complete Gina’s function? Write your answer in the space provided on your answer document.

1.42

Part C: Explain the type of function Gina created and why that is the best type of function to represent the total profit k days after her newspaper advertisement is placed. Write your answer in the space provided on your answer document.

Gina's function is exponential because the profit always goes up 42% each day

The response demonstrates a complete understanding by providing a correct answer in Part A with a correct explanation, a correct answer for Part B (1.42), and a correct explanation in Part C. The student demonstrates how to construct a linear function in Part A with $f(x)=500x$ and correctly explains why a linear function is used by stating that “the profit increased the same amount every day.” The student also identifies the type of function Gina created as exponential and correctly explains that “the profit always goes up 42% each day.”

F.LE.1c

Response Score: 3



2. Gina opens a small store. Each day her store is open, her profit increases by approximately \$500.00.

Part A: Construct a function that BEST represents the estimated total profit after x days. Explain the type of function you created and why. Type your answer in the space provided.

| | |
|--|--------|
| $y=500x$ Linear because the rate, 500 is the same for every day | ▼ ▲ |
|--|--------|

The table shows the total profits after Gina runs a newspaper advertisement for her store. Her profit the day she runs the advertisement is \$1,408.45.

Store Profits

| Days After Advertisement Is Placed | Total Profit (dollars) |
|------------------------------------|------------------------|
| 1 | 2,000.00 |
| 2 | 2,840.00 |
| 3 | 4,032.80 |
| 4 | 5,726.58 |
| 5 | 8,131.74 |

Gina uses this function, g , to represent the total profit k days after her newspaper advertisement is placed.

$$g = 1,408.45(_)^k$$

Part B: What number belongs in the blank space to complete Gina’s function? Type your answer in the space provided.

| | |
|------|---|
| 0.42 | <div style="border: 1px solid black; width: 15px; height: 15px; margin: 0 auto; display: flex; align-items: center; justify-content: center;"> ▼ </div> <div style="border: 1px solid black; width: 15px; height: 15px; margin: 0 auto; display: flex; align-items: center; justify-content: center;"> ▲ </div> |
|------|---|

Part C: Explain the type of function Gina created and why that is the best type of function to represent the total profit k days after her newspaper advertisement is placed. Type your answer in the space provided.

| | |
|---|---|
| exponential the profit is increasing by the same percentage every day instead of a constant value | <div style="border: 1px solid black; width: 15px; height: 15px; margin: 0 auto; display: flex; align-items: center; justify-content: center;"> ▼ </div> <div style="border: 1px solid black; width: 15px; height: 15px; margin: 0 auto; display: flex; align-items: center; justify-content: center;"> ▲ </div> |
|---|---|

The response demonstrates nearly complete understanding by providing a correct answer in Part A with a correct explanation and providing a correct explanation in Part C. The student understands how to construct a linear function and to explain that a linear equation is used because the profit is increasing at a constant rate. Even though the wrong value was used to complete the equation, the student is still able to recognize that Gina created an exponential function because “*the profit is increasing by the same percentage every day instead of a constant value.*” However, the student uses 0.42 instead of 1.42 to complete the equation in Part B, so the response does not demonstrate complete understanding of the concepts being measured.

F.LE.1c

Response Score: 2

2. Gina opens a small store. Each day her store is open, her profit increases by approximately \$500.00.

Part A: Construct a function that BEST represents the estimated total profit after x days. Explain the type of function you created and why. Write your answer in the space provided on your answer document.

$$y = 500x$$

The table shows the total profits after Gina runs a newspaper advertisement for her store. Her profit the day she runs the advertisement is \$1,408.45.

Store Profits

| Days After Advertisement Is Placed | Total Profit (dollars) |
|------------------------------------|------------------------|
| 1 | 2,000.00 |
| 2 | 2,840.00 |
| 3 | 4,032.80 |
| 4 | 5,726.58 |
| 5 | 8,131.74 |

Gina uses this function, g , to represent the total profit k days after her newspaper advertisement is placed.

$$g = 1,408.45(_)^k$$

Part B: What number belongs in the blank space to complete Gina’s function? Write your answer in the space provided on your answer document.

1.42

Part C: Explain the type of function Gina created and why that is the best type of function to represent the total profit k days after her newspaper advertisement is placed. Write your answer in the space provided on your answer document.

It is an exponential function

The response demonstrates partial understanding by providing a correct answer in Part A ($y = 500x$), though no explanation is provided, and a correct answer for Part B (1.42). In Part C, the student has an incomplete response. Although the student correctly identifies Gina’s function as an exponential function, an explanation as to why that is the best type of function is omitted.

F.LE.1c

Response Score: 1



2. Gina opens a small store. Each day her store is open, her profit increases by approximately \$500.00.

Part A: Construct a function that BEST represents the estimated total profit after x days. Explain the type of function you created and why. Type your answer in the space provided.

$y = 500 + x$

The table shows the total profits after Gina runs a newspaper advertisement for her store. Her profit the day she runs the advertisement is \$1,408.45.

Store Profits

| Days After Advertisement Is Placed | Total Profit (dollars) |
|------------------------------------|------------------------|
| 1 | 2,000.00 |
| 2 | 2,840.00 |
| 3 | 4,032.80 |
| 4 | 5,726.58 |
| 5 | 8,131.74 |

Gina uses this function, g , to represent the total profit k days after her newspaper advertisement is placed.

$$g = 1,408.45(_)^k$$

Part B: What number belongs in the blank space to complete Gina’s function? Type your answer in the space provided.

| | |
|------|--|
| 1.42 | <div style="border: 1px solid black; width: 15px; height: 15px; margin: 0 auto;">▼</div> <div style="border: 1px solid black; width: 15px; height: 15px; margin: 0 auto;">□</div> <div style="border: 1px solid black; width: 15px; height: 15px; margin: 0 auto;">▲</div> |
|------|--|

Part C: Explain the type of function Gina created and why that is the best type of function to represent the total profit k days after her newspaper advertisement is placed. Type your answer in the space provided.

| | |
|----------------------------|--|
| The function is for profit | <div style="border: 1px solid black; width: 15px; height: 15px; margin: 0 auto;">▼</div> <div style="border: 1px solid black; width: 15px; height: 15px; margin: 0 auto;">□</div> <div style="border: 1px solid black; width: 15px; height: 15px; margin: 0 auto;">▲</div> |
|----------------------------|--|

The response demonstrates a minimal understanding by providing a correct answer for Part B. Although the student constructs a linear function for Part A, it is incorrect based on the information given (the student adds 500 to x rather than multiplying 500 by x). In Part C, the student incorrectly identifies the function as “for profit.”

F.LE.1c

Response Score: 0



2. Gina opens a small store. Each day her store is open, her profit increases by approximately \$500.00.

Part A: Construct a function that BEST represents the estimated total profit after x days. Explain the type of function you created and why. Type your answer in the space provided.

$y=500$

The table shows the total profits after Gina runs a newspaper advertisement for her store. Her profit the day she runs the advertisement is \$1,408.45.

Store Profits

| Days After Advertisement Is Placed | Total Profit (dollars) |
|------------------------------------|------------------------|
| 1 | 2,000.00 |
| 2 | 2,840.00 |
| 3 | 4,032.80 |
| 4 | 5,726.58 |
| 5 | 8,131.74 |

Gina uses this function, g , to represent the total profit k days after her newspaper advertisement is placed.

$$g = 1,408.45(_)^k$$

Part B: What number belongs in the blank space to complete Gina’s function? Type your answer in the space provided.

| | |
|-----|--|
| 1.2 | <div style="border: 1px solid black; width: 15px; height: 15px; margin: 0 auto; display: flex; flex-direction: column; align-items: center;"> ▼ ▲ </div> |
|-----|--|

Part C: Explain the type of function Gina created and why that is the best type of function to represent the total profit k days after her newspaper advertisement is placed. Type your answer in the space provided.

| | |
|---|--|
| It’s the best because gina created the function | <div style="border: 1px solid black; width: 15px; height: 15px; margin: 0 auto; display: flex; flex-direction: column; align-items: center;"> ▼ ▲ </div> |
|---|--|

The response demonstrates inadequate understanding of the concepts being measured. Although the student does provide the correct value of the coefficient of x (500), the equation provided does not correctly represent the total profit after x days. The student provides the incorrect value (1.2) to complete Gina’s function in Part B. In Part C, the student does not identify the type of function that Gina created.

END OF SAMPLER
QUESTIONS

END OF SAMPLER
QUESTIONS

