


Georgia



Milestones

Assessment System

Coordinate Algebra
Mathematics
Item and Scoring Sampler
2018

TABLE OF CONTENTS

Introduction	1
Types of Items Included in the Sampler and Uses of the Sampler	1
Mathematics Constructed-Response Item Types	1
Item Alignment	1
Depth of Knowledge	2
Item and Scoring Sampler Format	3
Mathematics	4
Item 1: Constructed-Response	5
Item-Specific Scoring Rubric	6
Student Responses	7
Item 2: Extended Constructed-Response	12
Item-Specific Scoring Rubric	14
Student Responses	16

INTRODUCTION

The Georgia Milestones Coordinate Algebra 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 types of constructed-response items that appear on the operational Georgia Milestones Coordinate Algebra 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 items are provided in this sampler, along with any related stimulus information such as a passage or graphic. Following each item is the scoring guide for the constructed-response item. The scoring guide includes the item information table, the item-specific scoring rubric, and annotated sample student responses at each score point.

For mathematics items, each item-specific scoring rubric 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:
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Coordinate Algebra

MATHEMATICS

Sample Constructed-Response Items

ITEM 1: CONSTRUCTED-RESPONSE

MGSE9-12.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.**

Scoring Guide

Item 1 Information

<p>Standard: MGSE9-12.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>
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ITEM-SPECIFIC SCORING RUBRIC

Score	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><u>Exemplar Response:</u> Part A: -7, -5, -3 (1 point) Part B: $f(n) = -11 + 2n$ or equivalent (1 point) OR 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 of recognizing that sequences are functions.</p>

STUDENT RESPONSES

MGSE9-12.F.IF.3

Response Score: 2



- 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 the standard being tested. The student correctly provides the next three terms in the given sequence for Part A. In Part B, the student correctly interprets the sequence as a function.

MGSE9-12.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. **Write your answer in the space provided on your answer document.**

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

Part A -7, -5, -3

Part B $f(n) = -9 + 2(n-1)$

The response demonstrates a complete understanding of the standard being tested. The student correctly provides the next three terms in the sequence for Part A and in Part B responds with an appropriate function for the sequence.

MGSE9-12.F.IF.3

Response Score: 1



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, -2

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

$-9 + 2(n - 1)$

The response demonstrates partial understanding of the standard being tested. The student correctly identifies a function for Part B but incorrectly identifies the fourth term of the sequence for Part A.

MGSE9-12.F.IF.3

Response Score: 1

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.**

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

Part A	<u>-7, -5, -3</u>
Part B	<u>$f(n) = 9n - 2$</u>

The response demonstrates partial understanding of the standard being tested. The student correctly provides the next three terms in the given sequence for Part A. In Part B, the student provides an incorrect function.

MGSE9-12.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 little to no understanding of the standard being tested. 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.

ITEM 2: EXTENDED CONSTRUCTED-RESPONSE

MGSE9-12.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.
Write your answer in the space provided on your answer document.

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.

$$g = 1,408.45(\underline{\quad})^k$$

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.**

Part C Explain the type of function that g is 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.

Part A	
Part B	
Part C	

Scoring Guide

Item 2 Information

<p>Standard: MGSE9-12.F.LE.1c Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.</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>
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ITEM-SPECIFIC SCORING RUBRIC

Score	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><u>Exemplar Response:</u> Part A: $y = 500x$ (1 point) Part B: 1.42 (1 point) Part C: Gina used an exponential function (1 point) AND because the total profit increased by a constant percent OR Other valid explanation (1 point)</p>
3	<p>Response demonstrates nearly complete 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 of recognizing situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.</p>

NO TEST MATERIAL
ON THIS PAGE

STUDENT RESPONSES

MGSE9-12.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.
Type your answer in the space provided.

$y = 500x$

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? **Type your answer in the space provided.**

1.42	▼ □ ▲
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Part C Explain the type of function that g is 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, increases by the same percent every day	▼ □ ▲
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The response demonstrates a complete understanding of the standard being tested. The student correctly constructs a linear function for Part A and identifies the growth factor for Part B. In Part C, the student correctly states the function is exponential and gives an appropriate explanation.

MGSE9-12.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.
Write your answer in the space provided on your answer document.

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
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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.**

Part C Explain the type of function that g is 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.

Part A $f(x) = 500x$

Part B 1.42

Part C

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

The response demonstrates a complete understanding of the standard being tested. The student correctly constructs a linear function for Part A and identifies the growth factor for Part B. The student also identifies the type of function Gina created as exponential and provides an accurate explanation for Part C.

MGSE9-12.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.
Type your answer in the space provided.

$y = 500x$

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? **Type your answer in the space provided.**

0.42	▼ □ ▲
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Part C Explain the type of function that g is 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	▼ □ ▲
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The response demonstrates a nearly complete understanding of the standard being tested. The student provides a correct answer in Part A and provides a correct answer and explanation in Part C. The student understands how to construct a linear function. The student incorrectly uses 0.42 instead of 1.42 to complete Part B, but the student still recognizes that Gina created an exponential function.

MGSE9-12.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.
Write your answer in the space provided on your answer document.

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)
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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.**

Part C Explain the type of function that g is 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.

Part A 500 + x

Part B 1.42

Part C

exponential Gina's profit goes
up every day by the same
percent

The response demonstrates a nearly complete understanding of the standard being tested. The student is unable to write a correct linear function for Part A but answers Part B with the correct factor growth and correctly answers and explains why it is exponential for Part C.

MGSE9-12.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.
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)
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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	▼ □ ▲
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Part C Explain the type of function that g is 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.**

its exponential	▼ □ ▲
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The response demonstrates partial understanding of the standard being tested. The student correctly identifies the value needed for Part B. For Part C, the student is also able to identify that it is an exponential function. The student does not answer Part A or provide an explanation for Part C.

MGSE9-12.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.
Write your answer in the space provided on your answer document.

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

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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.**

Part C Explain the type of function that g is 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.

Part A	$y = 500x$
Part B	0.70
Part C	<p>exponential because there is an exponent</p> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>

The response demonstrates partial understanding of the standard being tested. The student provides the correct answer in Part A and knows that the function for Part C is exponential. The student incorrectly answers Part B and does not provide an adequate explanation as to why the function is exponential.

MGSE9-12.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.
Type your answer in the space provided.

$500 + x$

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)
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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	<input type="button" value="▼"/> <input type="button" value="□"/> <input type="button" value="▲"/>
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Part C Explain the type of function that g is 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	<input type="button" value="▼"/> <input type="button" value="□"/> <input type="button" value="▲"/>
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The response demonstrates minimal understanding of the standard being tested. The student correctly answered Part B but is unable to write the linear function for Part A. The student does not correctly answer what type of function it is or provide an explanation for Part C.

MGSE9-12.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.
Write your answer in the space provided on your answer document.

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.

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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.**

Part C Explain the type of function that g is 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.

Part A	$y = 500x$
Part B	2000
Part C	because its money

The response demonstrates minimal understanding of the standard being tested. The student correctly identifies the linear function for Part A. The student is unable to answer Part B correctly or answer Part C with a type of function or an appropriate explanation.

MGSE9-12.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.
Type your answer in the space provided.

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	<input type="button" value="▼"/> <input type="button" value="□"/> <input type="button" value="▲"/>
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Part C Explain the type of function that g is 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	<input type="button" value="▼"/> <input type="button" value="□"/> <input type="button" value="▲"/>
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The response demonstrates limited to no understanding of the standard being tested. The student is unable to correctly write a linear function for the profit for Part A. The student does not find the appropriate growth factor for Part B or give a correct type of function or explanation for Part C.

MGSE9-12.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.
Write your answer in the space provided on your answer document.

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)
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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.**

Part C Explain the type of function that g is 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.

Part A	$y = x$
Part B	
Part C	<p>linear because you add the money</p>

The response demonstrates limited to no understanding of the standard being tested. The student does not write an appropriate linear function for Part A. The student does not address Part B and thinks the function is linear not exponential for Part C. The explanation shows no understanding of exponential functions.

