


Georgia
Milestones
Assessment System



**Analytic Geometry
Mathematics
Item and Scoring Sampler
2016**

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
Constructed-Response Item	5
#1 Item Information	6
Item-Specific Scoring Guideline	6
Student Responses	7
Extended Constructed-Response Item	11
#2 Item Information	11
Item-Specific Scoring Guideline	12

INTRODUCTION

The Georgia Milestones Analytic Geometry 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 Analytic Geometry 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.

INTRODUCTION

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:
------------------	---------------------------------

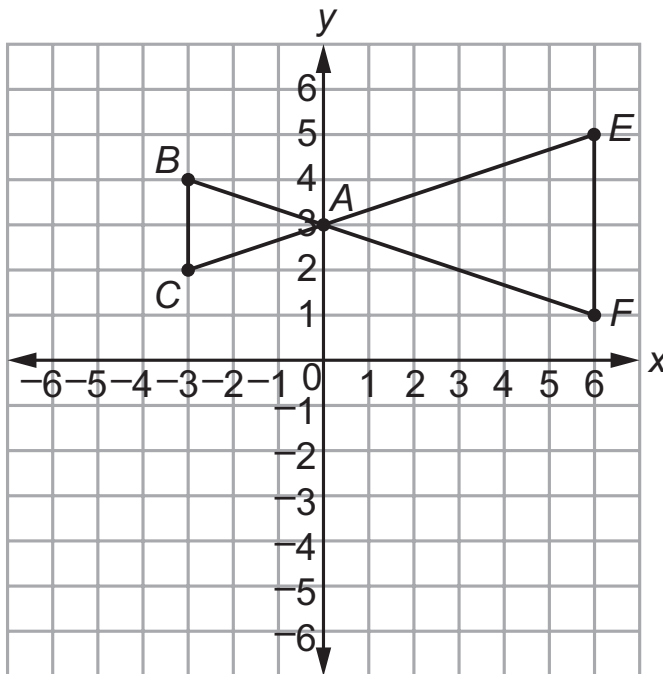
Analytic Geometry
MATHEMATICS
Sample Constructed-Response Items

CONSTRUCTED-RESPONSE ITEM

G.SRT.3



1. Consider the two triangles shown.



Part A: What transformation or series of transformations maps triangle ABC onto triangle AEF ? Type your answer in the space provided.

Part B: Explain why $\angle ABC$ is congruent to $\angle AEF$ and why $\angle ACB$ is congruent to $\angle AFE$. Type your answer in the space provided.

#1 Item Information

<p>Standard: G.SRT.3 Use the properties of similarity transformations to establish the AA criterion for two triangles to be similar.</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

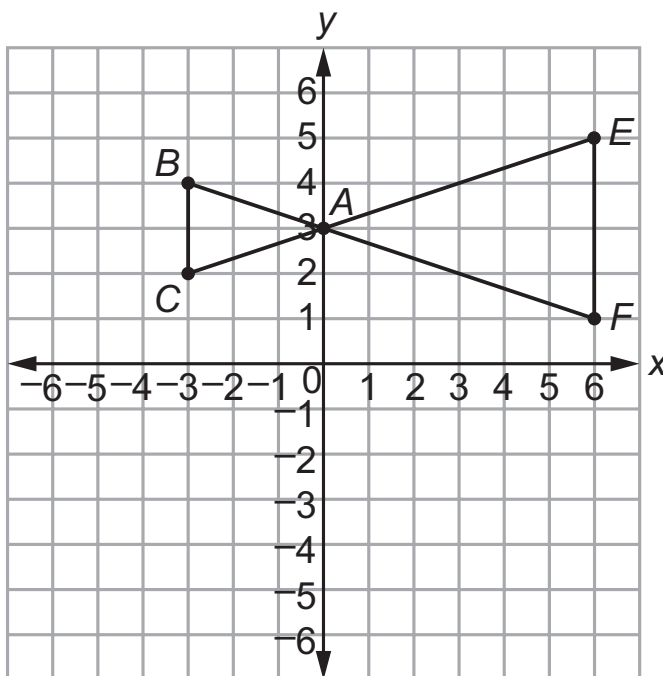
Score Point	Rationale
2	<p>Response demonstrates a complete understanding of the standard.</p> <p>Give 2 points for student identifying a series of transformations that maps triangle ABC onto triangle AEF and explaining why the corresponding angles are congruent.</p> <p>Exemplar Response: Reflection across the y-axis and then dilation about point A by a scale factor of 2. <i>(1 point)</i> <u>AND</u> The dilation makes the triangles similar, and similar triangles have congruent angles. <i>(1 point)</i> <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 of establishing the AA criterion using transformation.</p>

STUDENT RESPONSES

G.SRT.3

Response Score: 2

1. Consider the two triangles shown.



Part A: What transformation or series of transformations maps triangle ABC onto triangle AEF ? Write your answer in the space provided on your answer document.

Dilation with the center at point A with a scale factor of 2 and then a reflection over the y-axis

Part B: Explain why $\angle ABC$ is congruent to $\angle AEF$ and why $\angle ACB$ is congruent to $\angle AFE$. Write your answer in the space provided on your answer document.

Because the triangles can be mapped onto each other that proves they are similar and the corresponding angles are equal

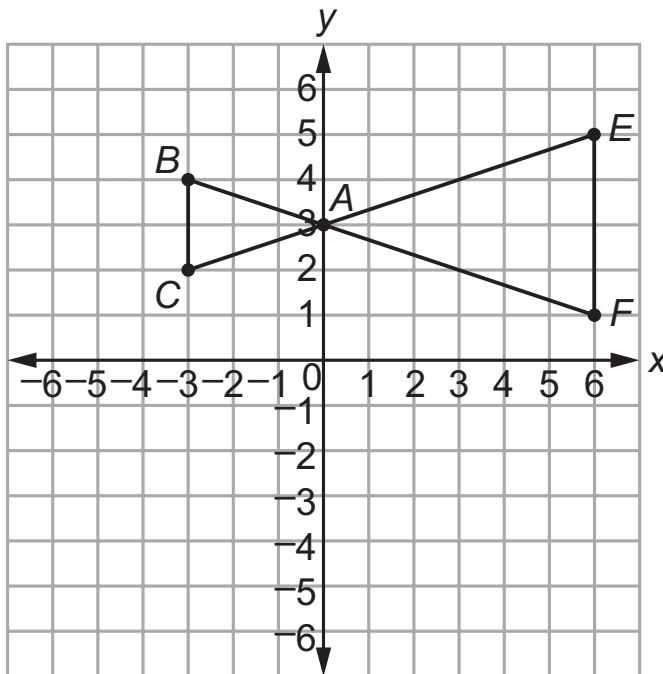
The response demonstrates a complete understanding by providing a series of transformations that will map triangle ABC onto triangle AEF in Part A (dilation with a scale factor of 2 about point A followed by a reflection over the y -axis) and a correct explanation in Part B, though the student confuses "equal" with "congruent".

G.SRT.3

Response Score: 1



1. Consider the two triangles shown.



Part A: What transformation or series of transformations maps triangle ABC onto triangle AEF ? Type your answer in the space provided.

reflect triangle ABC over the y -axis and then have a dilation with the center at point A and a scale factor times 2

Part B: Explain why $\angle ABC$ is congruent to $\angle AEF$ and why $\angle ACB$ is congruent to $\angle AFE$. Type your answer in the space provided.

It looks the same.

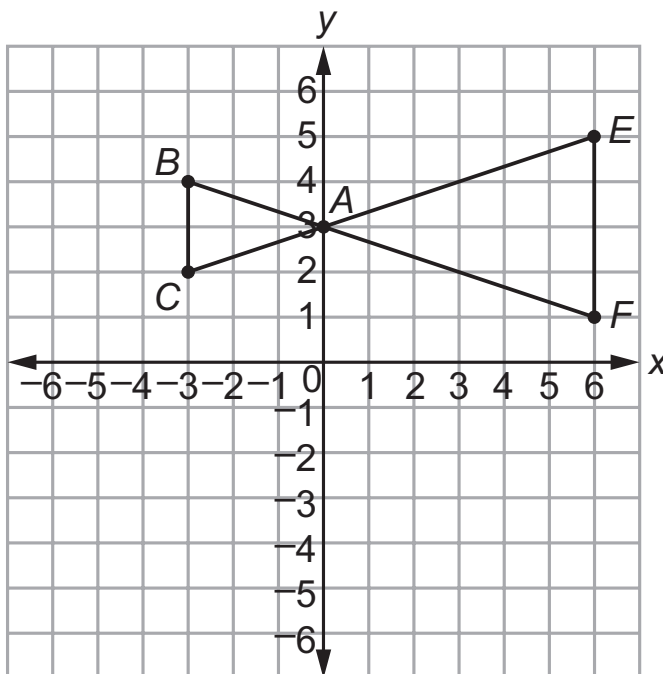
The response demonstrates understanding by providing a series of transformations that will map triangle ABC onto triangle AEF in Part A (reflection over the y -axis followed by dilation with a scale factor 2 about point A). However, the student has given an invalid explanation for Part B. The explanation, "It looks the same" is not enough to show that the two sets of angles are congruent.

G.SRT.3

Response Score: 0



1. Consider the two triangles shown.



Part A: What transformation or series of transformations maps triangle ABC onto triangle AEF ? Type your answer in the space provided.

reflect over the y-axis

Part B: Explain why $\angle ABC$ is congruent to $\angle AEF$ and why $\angle ACB$ is congruent to $\angle AFE$. Type your answer in the space provided.

They aren't congruent. Its two different triangles, one is bigger than the other one.

The response demonstrates inadequate understanding of the concepts being measured. The response in Part A shows a single transformation (reflection over the y-axis) that will not map one triangle onto the other, though it is a step in the correct series of transformations. The explanation in Part B demonstrates limited understanding of the concepts being tested. Though the student has correctly stated that the two triangles are different, the conclusion that the angles are not congruent is incorrect.

EXTENDED CONSTRUCTED-RESPONSE ITEM

F.IF.4



2. Lara owns a company that makes and sells solar powered robots. She has created a new robot and needs to calculate the price to sell the new robot to earn the maximum profit. If she prices the robot too low, she will sell more but earn less profit. If she prices the robot too high, she will sell fewer and earn less profit. To determine the selling price for the maximum profit, Lara uses this equation, where P is the total profit and x is the selling price.

$$P = -50x^2 + 2,500x - 20,000$$

Part A: If the selling price of the new robot is \$5, what would be the total profit? Type your answer in the space provided.

Part B: At what TWO selling prices, would Lara have a profit of \$0? Show your work or explain how you found your answer. Type your answer in the space provided.

Part C: At what price should Lara sell the new robot to earn the maximum profit? Type your answer in the space provided.

#2 Item Information

<p>Standard: F.IF.4 Using tables, graphs, and verbal descriptions, interpret the key characteristics of a function which models the relationship between two quantities. Sketch a graph showing key features including: intercepts; interval where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; and end behavior.</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
4	<p>Response demonstrates a complete understanding of the standard.</p> <p>Give 4 points for correctly identifying the profit when the selling price is \$5 in Part A, correctly identifying the two prices that will result in \$0 profit in Part B and explaining how those values were determined, and correctly identifying the price that maximizes profit in Part C.</p> <p>Exemplar Response: Part A: -8,750 (1 point) Part B: 10 and 40 (1 point) <u>AND</u> I factored the equation into $-50(x-40)(x-10)$. Then I set each binomial equal to zero and solved for x. (1 point) Part C: \$25 (1 point) <u>OR</u> Other valid response</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 interpreting key characteristics of a function which models the relationship between two quantities.</p>

F.IF.4

Response Score: 4



2. Lara owns a company that makes and sells solar powered robots. She has created a new robot and needs to calculate the price to sell the new robot to earn the maximum profit. If she prices the robot too low, she will sell more but earn less profit. If she prices the robot too high, she will sell fewer and earn less profit. To determine the selling price for the maximum profit, Lara uses this equation, where P is the total profit and x is the selling price.

$$P = -50x^2 + 2,500x - 20,000$$

Part A: If the selling price of the new robot is \$5, what would be the total profit? Type your answer in the space provided.

she would lose \$8,750

Part B: At what TWO selling prices, would Lara have a profit of \$0? Show your work or explain how you found your answer. Type your answer in the space provided.

10 and 40, I factored and set $-50x+2000$ and $x-10$ equal to zero

Part C: At what price should Lara sell the new robot to earn the maximum profit? Type your answer in the space provided.

She will make the most money if she charges \$25 for each robot.

The response demonstrates complete understanding by providing correct answers in Parts A (loss of \$8,750), B (10 and 40), and C (\$25) and by providing a correct explanation for how the prices that result in \$0 profit were determined. The student correctly calculates the profit when the price of the robot is set at \$5, though the student calls it a loss of \$8,750 rather than a profit of \$-8,750. The student correctly factors the equation, sets each term equal to zero and solves for the two prices that result in a profit of \$0.

F.IF.4

Response Score: 3

2. Lara owns a company that makes and sells solar powered robots. She has created a new robot and needs to calculate the price to sell the new robot to earn the maximum profit. If she prices the robot too low, she will sell more but earn less profit. If she prices the robot too high, she will sell fewer and earn less profit. To determine the selling price for the maximum profit, Lara uses this equation, where P is the total profit and x is the selling price.

$$P = -50x^2 + 2,500x - 20,000$$

Part A: If the selling price of the new robot is \$5, what would be the total profit? Write your answer in the space provided on your answer document.

-8750 so she loses money

Part B: At what TWO selling prices, would Lara have a profit of \$0? Show your work or explain how you found your answer. Write your answer in the space provided on your answer document.

Set the equation = 0 to get 10 and 40

Part C: At what price should Lara sell the new robot to earn the maximum profit? Write your answer in the space provided on your answer document.

$-b/2a = 25$

The response demonstrates nearly complete understanding by providing correct answers in Parts A (-8,750), B (10 and 40), and C (25). Though the student correctly determines the two prices that result in a profit of \$0 (10 and 40), the explanation (set the equation = 0) is not sufficient to receive credit.

F.IF.4

Response Score: 2



2. Lara owns a company that makes and sells solar powered robots. She has created a new robot and needs to calculate the price to sell the new robot to earn the maximum profit. If she prices the robot too low, she will sell more but earn less profit. If she prices the robot too high, she will sell fewer and earn less profit. To determine the selling price for the maximum profit, Lara uses this equation, where P is the total profit and x is the selling price.

$$P = -50x^2 + 2,500x - 20,000$$

Part A: If the selling price of the new robot is \$5, what would be the total profit? Type your answer in the space provided.

-8,750 is the profit.

Part B: At what TWO selling prices, would Lara have a profit of \$0? Show your work or explain how you found your answer. Type your answer in the space provided.

20,000/50 = 400 and 2500/50 = 50, so \$400 and \$50 will be the prices.

Part C: At what price should Lara sell the new robot to earn the maximum profit? Type your answer in the space provided.

She should charge \$25

The response demonstrates partial understanding by providing correct answers in Parts A (-8,750) and C (25). The student provides an incorrect explanation (dividing the coefficients in the equation) and incorrect answers in Part B.

F.IF.4

Response Score: 1

2. Lara owns a company that makes and sells solar powered robots. She has created a new robot and needs to calculate the price to sell the new robot to earn the maximum profit. If she prices the robot too low, she will sell more but earn less profit. If she prices the robot too high, she will sell fewer and earn less profit. To determine the selling price for the maximum profit, Lara uses this equation, where P is the total profit and x is the selling price.

$$P = -50x^2 + 2,500x - 20,000$$

Part A: If the selling price of the new robot is \$5, what would be the total profit? Write your answer in the space provided on your answer document.

It is a negative number

Part B: At what TWO selling prices, would Lara have a profit of \$0? Show your work or explain how you found your answer. Write your answer in the space provided on your answer document.

Set the equation equal to zero and solve

Part C: At what price should Lara sell the new robot to earn the maximum profit? Write your answer in the space provided on your answer document.

-2500 over 2(-50) is 25.

The response demonstrates minimal understanding by providing correct answer in Part C (25). Though the student correctly states that the profit is a negative number in Part A, the correct value is not provided. The student provides only a partial explanation of how to determine the prices that result in \$0 profit (set the equation equal to zero and solve), and no answers are provided in Part B, which is not enough to demonstrate understanding.

F.IF.4

Response Score: 0



2. Lara owns a company that makes and sells solar powered robots. She has created a new robot and needs to calculate the price to sell the new robot to earn the maximum profit. If she prices the robot too low, she will sell more but earn less profit. If she prices the robot too high, she will sell fewer and earn less profit. To determine the selling price for the maximum profit, Lara uses this equation, where P is the total profit and x is the selling price.

$$P = -50x^2 + 2,500x - 20,000$$

Part A: If the selling price of the new robot is \$5, what would be the total profit? Type your answer in the space provided.

you can plug in 5 for P but I don't know how to solve it.

Part B: At what TWO selling prices, would Lara have a profit of \$0? Show your work or explain how you found your answer. Type your answer in the space provided.

If she charges zero dollars she won't make any profit

Part C: At what price should Lara sell the new robot to earn the maximum profit? Type your answer in the space provided.

She can charge as much as she wants.

The student demonstrates inadequate understanding of using the function as a model. The student incorrectly substitutes the price of \$5 into the variable P , which represents profit. In parts B and C, the student does not use the function to determine when Lara's profit will be \$0 and when it will be at maximum. Instead, the student assumes that at a price of \$0 her profit will be \$0, and that she can set the price as high as she wants to maximize her profit.

END OF SAMPLER
QUESTIONS

END OF SAMPLER
QUESTIONS

