ISTEP+: Algebra I

End of Course Assessment

Released Items and Scoring Notes

Introduction

The *Algebra I Graduation Examination* End of Course Assessment (ECA) consists of four item types which contribute to a student's scale score: multiple-choice, constructed-response, gridded-response and graphing items. It is important to keep in mind that a significant portion of a student's score is calculated from the multiple-choice items on the assessment, which are not addressed within this document.

This document consists of constructed-response and graphing items from the Spring 2014 administration and includes:

- Sample released open-ended questions
- Rubrics used by trained evaluators to score student responses
- Sample papers used by trained evaluators to distinguish between rubric score point values
- Notes describing the rationale for scoring student responses

The purpose of this guide is to provide additional Algebra I ECA sample items and to model the types of items on the ECA that are scored using rubrics.

Reporting Category 1: Solving Linear Equations and Inequalities

Question 1

Solve: $4x + 11 < 10x - 1$

<div>
Answer_____
</div>

Explain in words how the solution of $4x + 11 < 10x - 1$ is different than the solution of $4x + 11 = 10x - 1$.

Exemplary Response:

- $x > 2$

And

- The solution of $4x + 11 < 10x - 1$ is an infinite set of numbers (all numbers greater than 2). The solution of $4x + 11 = 10x - 1$ is a single number (2).

Rubric:

2 points: Exemplary response. Correct answer in Part A and a correct and thorough explanation in Part B.

1 point: One key element. Correct answer in Part A. Or, a correct and thorough explanation in Part B.

0 points: Other

Question 1, Sample A – 2 points

> **Part A:** $2 < x$
> **Part B:** The two solutions are different, because $4x + 11 = 10x - 1$ has one exact solution while $4x + 11 < 10x - 1$ has many solutions.
>
> *Notes: This response is equivalent to the exemplary response.*

Question 1, Sample B – 1 point

> **Part A:** $6 < x$
> **Part B:** In $4x + 11 < 10x - 1$, the answer is anything greater than 6. In $4x + 11 = 10x - 1$, the answer is equal to 6.
>
> *Notes: The response in Part A is incorrect; however, the explanation in Part B is correct based on the incorrect answer in part A.*

Question 1, Sample C – 1 point

> **Part A:** $x > 2$
> **Part B:** The difference is that one is an inequality and the other isn't.
>
> *Notes: The response in Part A is correct; however, the explanation in Part B is not a thorough explanation of the difference between the solution of the inequality and equation.*

Question 1, Sample D – 0 points

> **Part A:** $x < -2$
> **Part B:** If you use the $=$ sign you are talking about an equation. If you use the $<$ sign you are talking about a graph.
>
> *Notes: Part A and B are both incorrect.*

Question 2

Jaime bought 8 bags of dog food and 2 boxes of dog treats for a total of $135.
Pat bought 6 bags of dog food and 4 boxes of dog treats for a total of $110.

Each bag of dog food costs the same amount. Each box of dog treats costs the same amount.

Write a system of linear equations that can be used to find the cost, in dollars, of one bag of dog food (x) and one box of dog treats (y).

Answer_____

What is the cost, in dollars, of one bag of dog food?

Answer_____

Exemplary Response:

- $8x + 2y = 135$
  $6x + 4y = 110$

  (Or other equivalent system of equations.)

And

- $16

Rubric:

2 points: Exemplary response. Correct system in Part A and correct answer in Part B.

1 point: One key element. Correct system in Part A. Or, correct answer in Part B.
Or, a correct answer in Part B based on an incorrect system of equations in Part A.

0 points: Other

Question 2, Sample A – 2 points

Part A: $8x + 2y = 135$; $6x + 4y = 110$
Part B: $16.00

Notes: This response is equivalent to the exemplary response.

Question 2, Sample B – 1 point

Part A: $8x + 2y = 135$; $6x + 4y = 110$
Part B: $7.81

Notes: The response in Part A is correct; however, the solution in Part B is incorrect.

Question 2, Sample C – 1 point

Part A: $8x + 2y = 135$
Part B: $16

Notes: The response in Part B is correct; however, Part A only gives one of the two correct equations and is therefore incorrect.

Question 2, Sample D – 0 points

Part A: $8x + 2y$; $6x + 4y$
Part B: $13.50

Notes: Part A and B are both incorrect.

Reporting Category 1: Solving Linear Equations and Inequalities

Question 3

**Carlos went to an amusement park and a water park during his vacation.
The amusement park has 43 rides, which is 4 more than 3 times the number of rides at the water park.**

Write an equation that can be used to find the number of rides (x) at the water park.

Answer_____

How many rides are at the water park?

Answer_____

Exemplary Response:

- $43 = 3x + 4$ (Or other equivalent equation.)

And

- 13

Rubric:

2 points: Exemplary response. Correct equation in Part A and correct answer in Part B.

1 point: One key element. Correct equation in Part A. Or, correct answer in Part B. Or, a correct answer in Part B based on an incorrect linear equation in Part A that shows a partial understanding of the problem.

0 points: Other

Question 3, Sample A – 2 points

Part A: $4 + 3x = 43$
Part B: 13

Notes: This response is equivalent to the exemplary response.

Question 3, Sample B – 1 point

Part A: $3x + 4 = 43$
Part B: 39 rides

Notes: The response for Part A is correct; however, the response for Part B is incorrect.

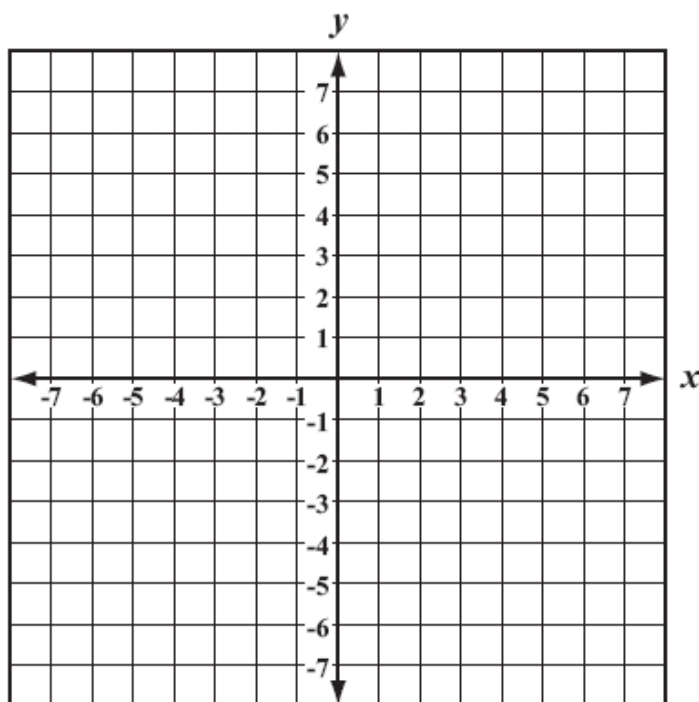## Question 3, Sample C – 1 point

Part A: $4x + 3 = 43$
Part B: 13 rides

Notes: The response for Part B is correct; however, the response for Part A is incorrect.

Question 3, Sample D – 0 points

Part A: $4(3 + 43) = x$
Part B: 55

Notes: Part A and B are both incorrect.

Reporting Category 2: Graphing and Interpreting Linear and Non-Linear Relations

Question 4

Graph: $y = \frac{1}{3}x + 4$

Exemplary Response:
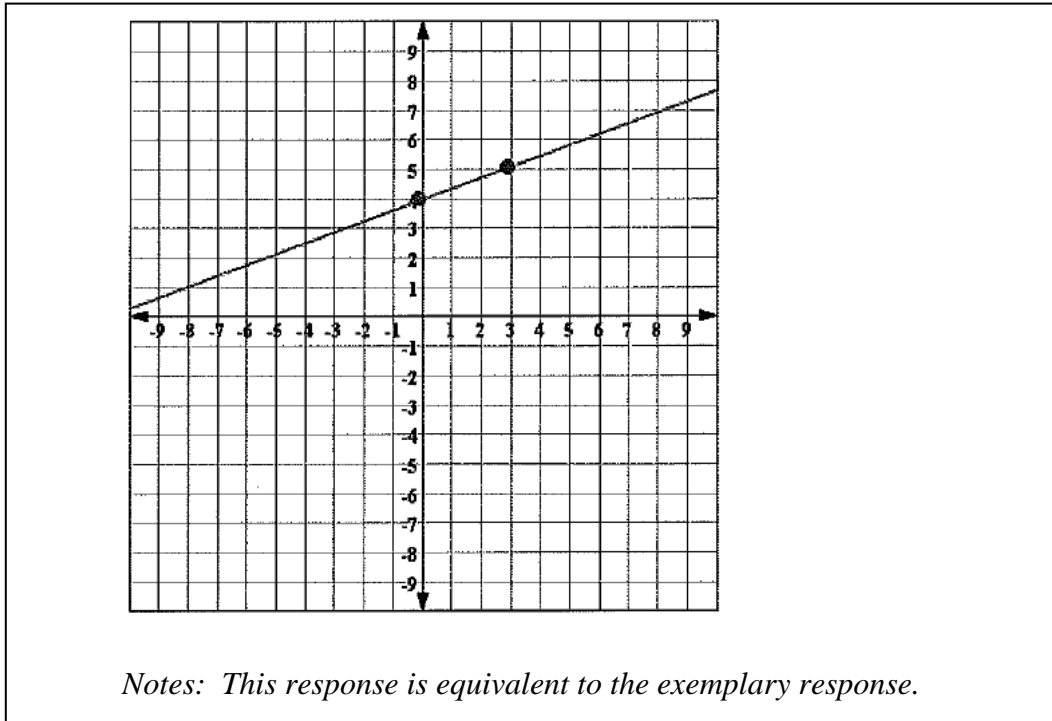
- The graph of $y = \frac{1}{3}x + 4$.
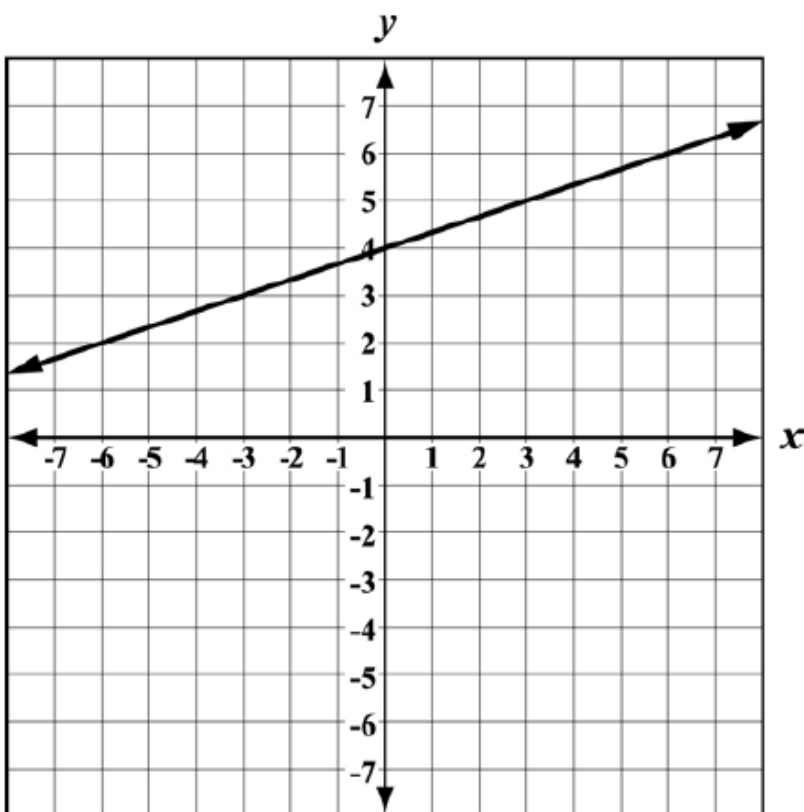
Rubric:

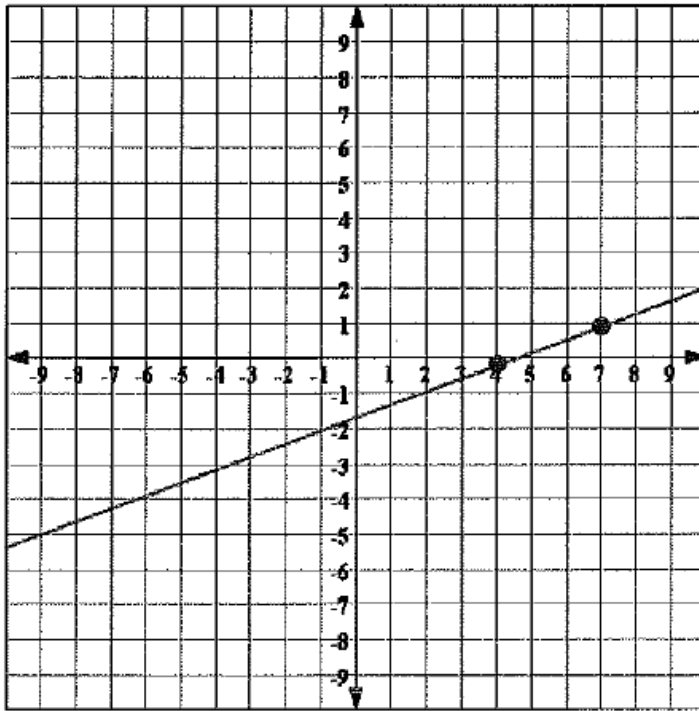**1 point:** Exemplary response.

0 points: Other

Note: If more than one line is graphed or additional incorrect points are plotted, no points will be awarded.

Question 4, Sample A – 1 point

Notes: This response is equivalent to the exemplary response.

Question 4, Sample B – 0 points

Notes: This response shows a line with the correct slope (1/3); however, the y-intercept of 4 is plotted on the x-axis rather than on the y-axis.

Question 5

A square has a side length of (4x + 5) units.

Write an expression that represents the area of the square in terms of x.

Write your answer in ax^2 + bx + c form.

Answer_____

Exemplary Response:

- $16x^2 + 40x + 25$

Note: If the response is given as an equation with the correct expression, such as A = $16x^2 + 40x$ + 25, then award full credit.

Rubric:

1 point: Exemplary response.

0 points: Other

Question 5, Sample A – 1 point

Answer: $16x^2 + 40x + 25$

Notes: This response is equivalent to the exemplary response.

Question 5, Sample B – 1 point

Answer: $16x^2 + 40x + 25 = A$

Notes: This response is equivalent to the exemplary response.
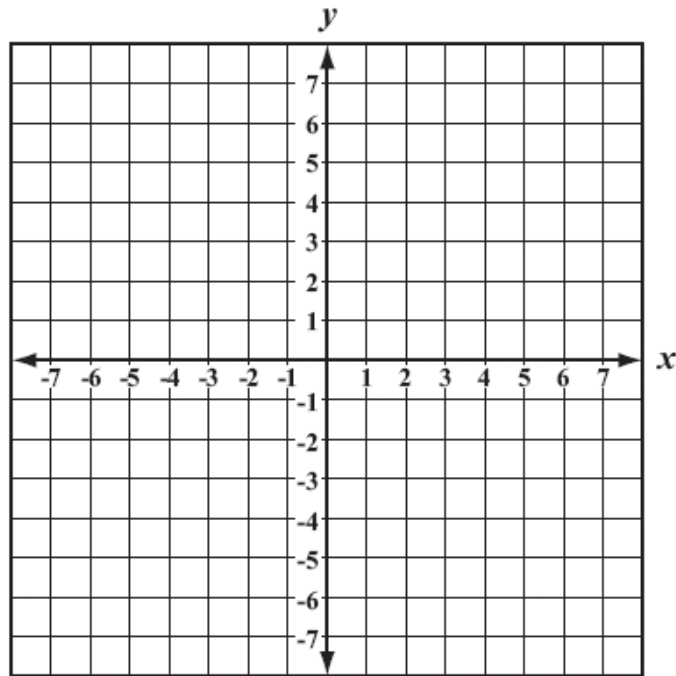
Question 5, Sample C – 0 points

Answer: $8x^2 + 40x + 25$

Notes: This response is incorrect.

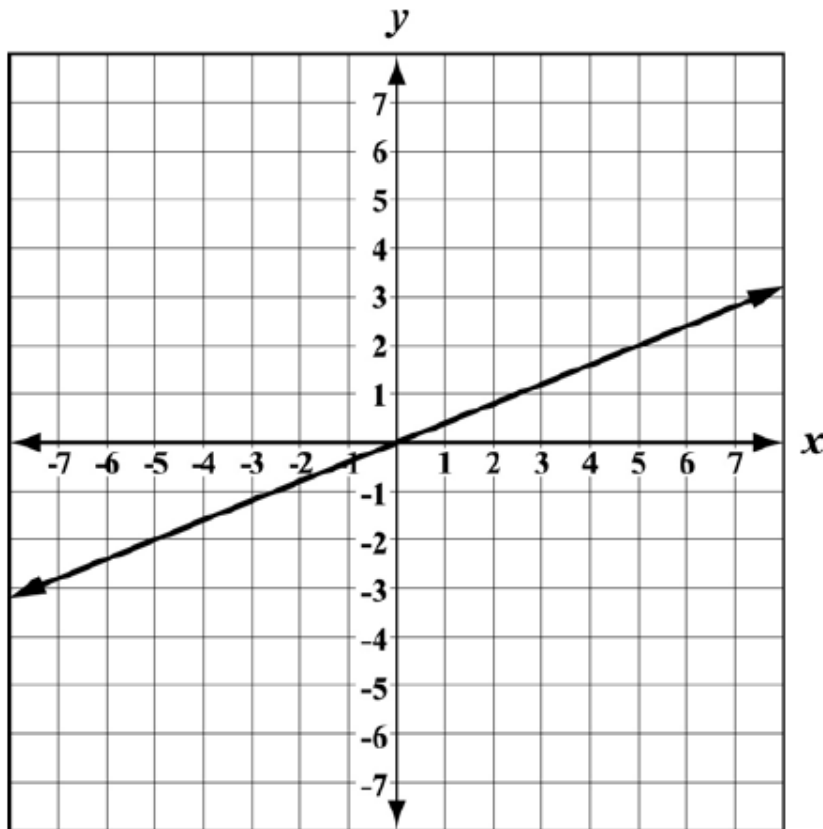**Reporting Category 2: Graphing and Interpreting Linear and Non-Linear Relations**

Question 6

Graph: $5y - 2x = 0$

Exemplary Response:
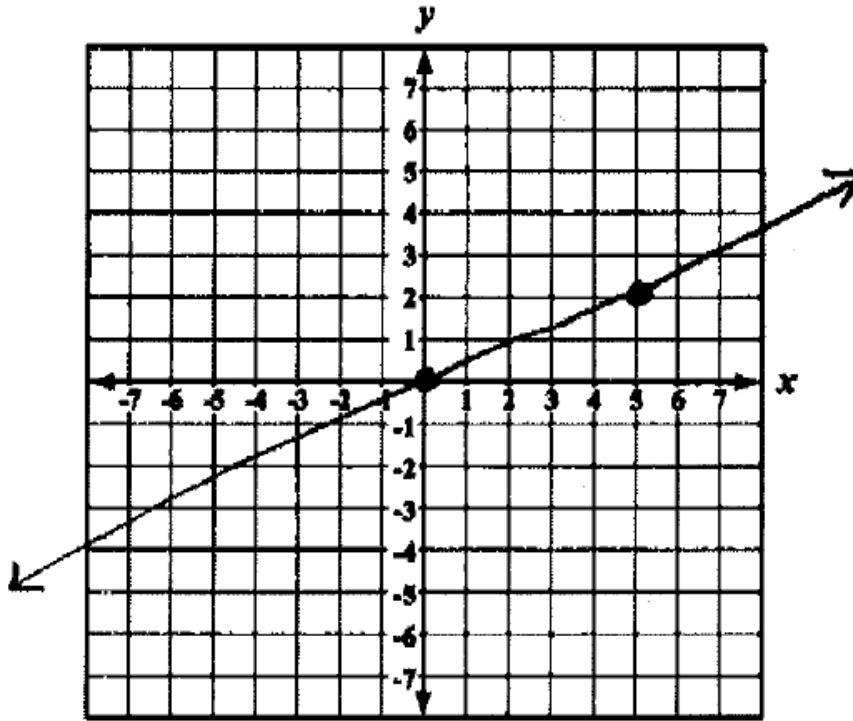
- The graph of $5y - 2x = 0$.

Rubric:

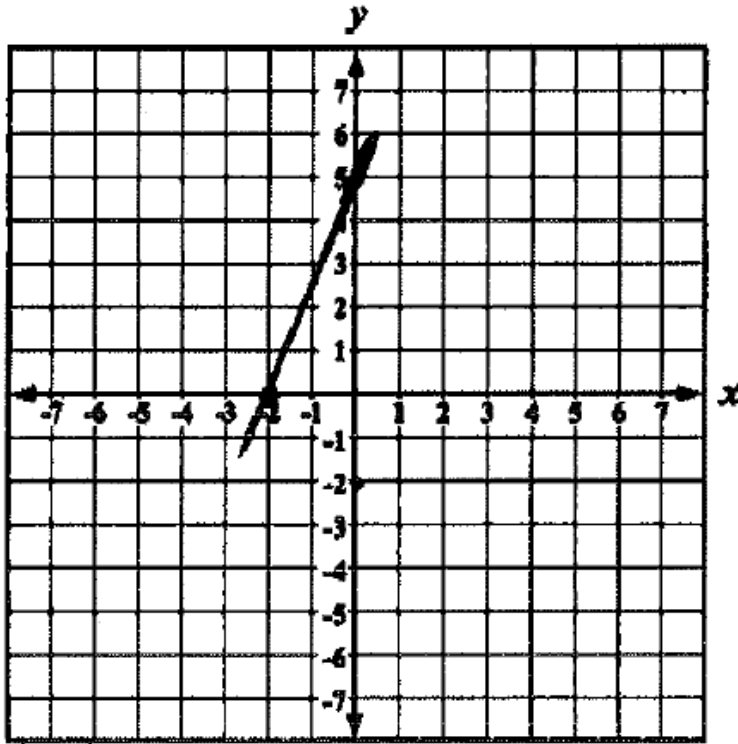**1 point:** Exemplary response.

0 points: Other

Note: If more than one line is graphed or additional incorrect points are plotted, no points will be awarded.

Question 6, Sample A – 1 point

Notes: This response is equivalent to the exemplary response.

Question 6, Sample B – 0 points

Notes: This response is incorrect.

Question 7

Amy tried to solve the equation $x^2 - x = 2$. She made an error. Her work is shown below.

$$x^2 - x = 2$$

$$x^2 - x - 2 = 0$$

$$x = \frac{1 \pm \sqrt{(-1^2) - 4(1)(-2)}}{2(1)}$$

$$x = \frac{1 \pm \sqrt{7}}{2}$$

Describe the error Amy made.

_____

_____

Solve: $x^2 - x = 2$

Answer_____

Exemplary Response:

- Amy found the discriminant to be 7 instead of 9.

  Or other acceptable description of the error. Note: The student's response may reference what was done incorrectly, describe what should have been done, or describe how to correct Amy's work.

And

- $x = -1, 2$

Rubric:

3 points: Exemplary response. Provides an acceptable description of the error made in Part A and provides two correct solutions in Part B.

2 points: Provides an acceptable description of the error made in Part A and provides one correct solution (or both solutions with signs switched) in Part B. Or, provides two correct solutions in Part B. Or, provides an acceptable description of the error in Part A and an answer left unsimplified in Part B, such as, $x = \frac{1 \pm \sqrt{9}}{2}$.

1 point: Provides an acceptable description of the error made in Part A. Or, provides one correct solution in Part B. Or, provides the solutions with signs switched in Part B (x = 1, -2). Or, provides an answer left unsimplified in Part B, such as, $x = \frac{1 \pm \sqrt{9}}{2}$.

0 points: Other

Question 7, Sample A – 3 points

> **Part A:** She multiplied/added wrong in the radical sign. It should come out to be 9, not 7.
>
> **Part B:** x = 2, -1
>
> *Notes: This response is equivalent to the exemplary response.*

Question 7, Sample B – 2 points

> **Part A:** When you multiply two negative numbers you get a positive number. When you multiply the 1 and -2 you get a -2. When you multiply the -2 with the -4 you get a positive 8, plus your one and that is 9. The square root of 9 is 3. Then you have fixed her mistake.
>
> **Part B:** x = 2, 1
>
> *Notes: Part A is correct. In Part B, only one of the solutions is correct.*

Question 7, Sample C – 1 point

> **Part A:** She made the error of multiplying -4(1)(-2) wrong she got 7 she added the numbers together instead of multiplying them
>
> **Part B:** x = 6, 2
>
> *Notes: Part A is incorrect. In Part B, only one of the solutions is correct.*

Question 7, Sample D – 0 points

> **Part A:** She didn't multiply right inside the square root.
>
> **Part B:** x = -4
>
> *Notes: Both parts of this response are incorrect.*

Reporting Category 2: Graphing and Interpreting Linear and Non-Linear Relations

Question 8

A car is traveling at a non-zero constant speed. Which graph best represents the distance traveled by the car over time? Explain your answer.

Graph A	Graph B	Graph C
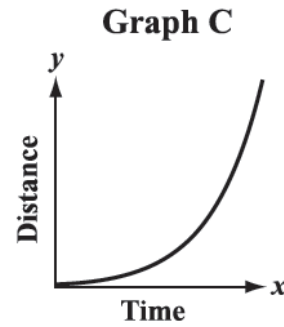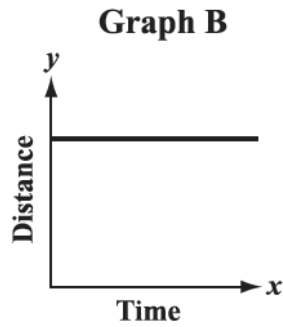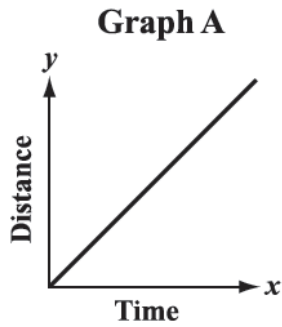
Exemplary Response:

- Graph A because the distance traveled by the car will increase at a constant rate, therefore, the graph will be linear with a positive slope. Or, Graph A because it shows a line with a positive slope. Or, Graph A because it shows that as time increases, the distance traveled increases at a constant rate. Or, other valid explanation.

Rubric:

2 points: Exemplary response. Chooses graph A and gives a thorough explanation of the relationship between the verbal description and graph.

1 point: Chooses graph A and gives a partially correct explanation. Or, chooses Graph B or C correctly describes a car traveling at a constant rate with references to distance and time.

0 points: Other

Note: If the response given is Graph A without a partially correct explanation, then no points are awarded.

Question 8, Sample A – 2 points

> **Answer:** Graph A because it is the only graph that gradually gains distance at a constant rate.
>
> *Notes: This response is equivalent to the exemplary response.*

Question 8, Sample B – 1 point

> **Answer:** Graph C because the car is traveling at a steady pace, then it starts increasing in speed as time goes by.
>
> *Notes: This response does not choose the correct graph to model this situation; however, the description of Graph C is valid which results in receiving 1 point.*

Question 8, Sample C – 0 points

> **Answer:** Graph A because it shows that as time goes on the speed gradually increases.
>
> *Notes: This response chooses the correct graph to model this situation; however, the description of the graph is not correct.*
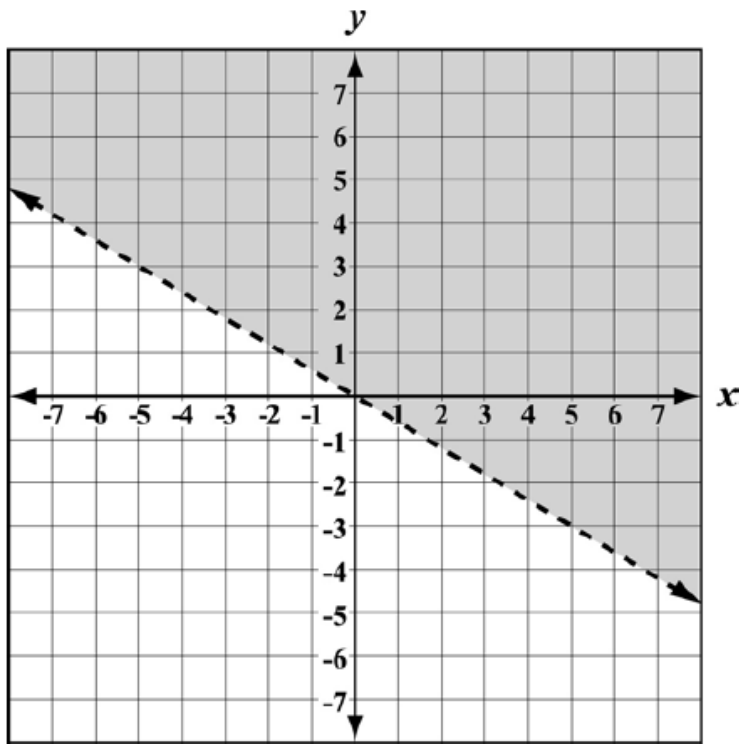
Question 9

Graph: $3x + 5y > 0$
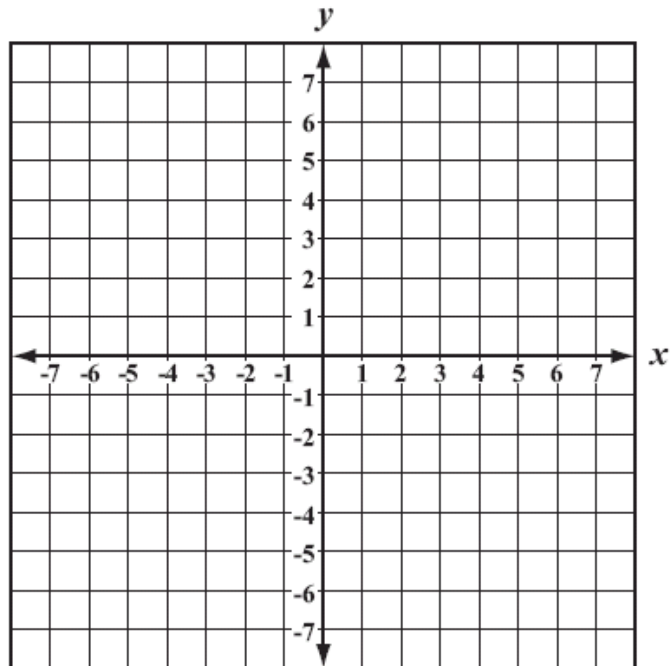
Exemplary Response:
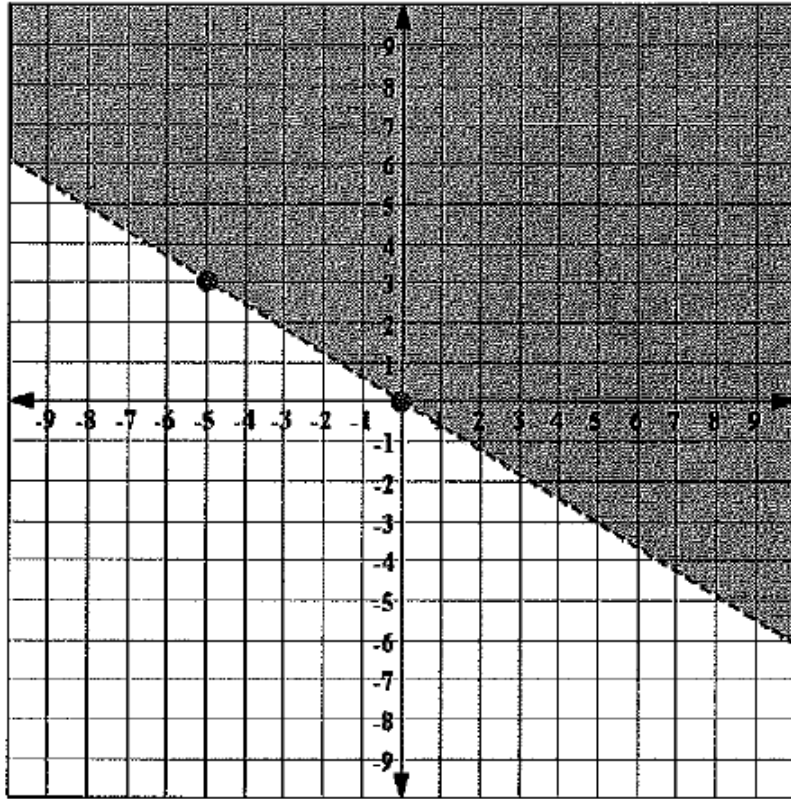
- The graph of $3x + 5y > 0$.

Rubric:

2 points: Exemplary response.

1 point: Graph of $y = -\frac{3}{5}x$ using a solid or dashed line with incorrect or no shading. Or, an incorrect dashed line shaded correctly.
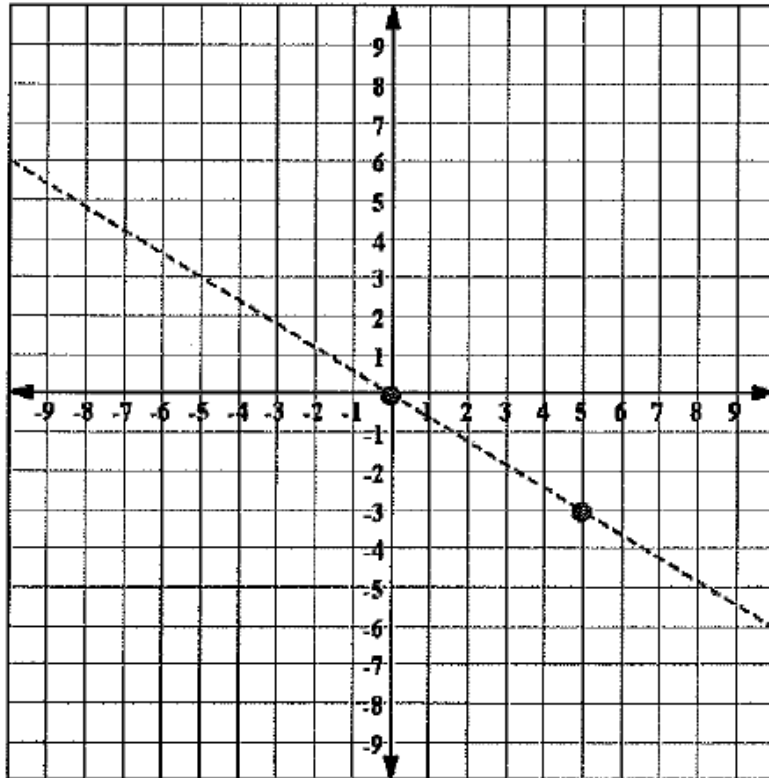
0 points: Other

Note: If more than one line is graphed or additional incorrect points are plotted, no points will be awarded.
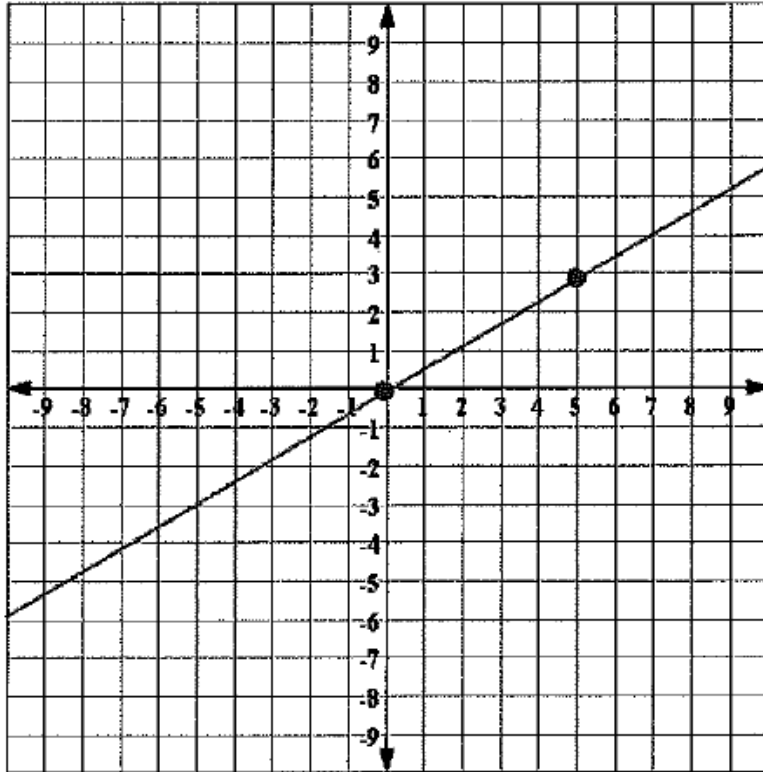
Question 9, Sample A – 2 points

Notes: This response is equivalent to the exemplary response.

Question 9, Sample B – 1 point

Notes: This response shows the correct boundary line; however, the graph is not shaded to represent the solution set which results in receiving 1 point.

Question 9, Sample C – 0 points

Notes: This response is incorrect.