The Pennsylvania System of School Assessment

Modified Mathematics Item and Scoring Sampler

2009–2010

Grade 11

MATHEMATICS

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INTRODUCTION

General Introduction
The Department of Education provides districts and schools with tools to assist in delivering focused instructional programs aligned to the state assessment system. These tools include assessment anchor documents, assessment handbooks, and content-based item and scoring samplers. This 2009–2010 Modified Mathematics Item and Scoring Sampler is a useful tool for Pennsylvania educators in the preparation of local instructional programs and the statewide Pennsylvania System of School Assessment Modified test (PSSA-M).

Description of the PSSA Modified Assessment
The PSSA-M is a statewide assessment based on modified achievement standards for students with disabilities. The assessment is intended for students with disabilities functioning above the lowest 1% of the population, but not at a level that allows them to access the general PSSA assessment.

The content curriculum standards are the same for the PSSA-M as they are for the general PSSA assessment. However, modified items may be used to measure the content standards in the PSSA-M. Modifications, such as reduced text, easier vocabulary, simplified tasks, and the addition of hint boxes, create items that are more accessible but still in line with the content standards. The PSSA-M reflects the same emphasis and patterns as the general PSSA assessment, while utilizing a simpler style and format. The PSSA-M also contains fewer items than the general PSSA assessment. These modifications are designed to allow students with disabilities to demonstrate proficiency on the assessment.

What Is Included
The 2009–2010 Modified Mathematics Item and Scoring Samplers contain modified mathematics multiple-choice items and open-ended items that have been written to align to the Assessment Anchor Content Standards (Assessment Anchors). They provide an idea of the types of items that will appear on the operational Spring 2010 PSSA-M. Each item has been through a rigorous review process to ensure alignment with the Assessment Anchors.

Purpose and Uses
The items in this sampler may be used as examples for creating assessment items at the classroom level, and they may also be copied and used as part of a local instructional program.* Classroom teachers may find it beneficial to have students respond to the open-ended items in this sampler. Educators can then use the sampler as a guide to score the responses either independently or together with colleagues within a school or district.

Item Format and Scoring Guidelines
The multiple-choice items have four answer choices. Each correct response to a multiple-choice item is worth one point.

Each open-ended item is designed to take about ten minutes to complete. During an official testing administration, students are given additional time as necessary to complete the test items. Each open-ended item in mathematics is scored using an item-specific scoring guideline based on a 0–4 point scale. In this sampler, every item-specific scoring guideline is combined with examples of student responses representing each score point to form a practical item-specific scoring guide.

The sampler also includes the General Description of Mathematics Scoring Guidelines used to develop the item-specific guidelines and guides. These General Description Scoring Guidelines should be used if any additional item-specific scoring guidelines are created for use within local instructional programs.*

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Item Alignment

All PSSA-M items are aligned to statements and specifications included in the Assessment Anchor Content Standards documents. The mathematics content included in the PSSA-M mathematics multiple-choice items will align with the Assessment Anchors as defined by the Eligible Content statements. The process skills, directives, and action statements will also specifically align with the Assessment Anchors as defined by Eligible Content statements.

The mathematics content included in the PSSA-M mathematics open-ended items will align with content included in Eligible Content statements. The process skills, directives, and action statements included in the performance demands of the PSSA-M mathematics open-ended items will align with specifications included in the Assessment Anchor statements, the Descriptor statements, and/or the Eligible Content statements. In other words, the verbs or action statements used in the open-ended questions or stems can come from the Eligible Content, Descriptor, or Anchor.

GENERAL DESCRIPTION OF MATHEMATICS SCORING GUIDELINES

4 – The response demonstrates a *thorough* understanding of the mathematical concepts and procedures required by the task.

The response provides correct answer(s) with clear and complete mathematical procedures shown and a correct explanation, as required by the task. Response may contain a minor "blemish" or omission in work or explanation that does not detract from demonstrating a *thorough* understanding.

3 – The response demonstrates a *general* understanding of the mathematical concepts and procedures required by the task.

The response and explanation (as required by the task) are mostly complete and correct. The response may have minor errors or omissions that do not detract from demonstrating a *general* understanding.

2 – The response demonstrates a *partial* understanding of the mathematical concepts and procedures required by the task.

The response is somewhat correct with *partial* understanding of the required mathematical concepts and/or procedures demonstrated and/or explained. The response may contain some work that is incomplete or unclear.

1 – The response demonstrates a *minimal* understanding of the mathematical concepts and procedures required by the task.

0 – The response has no correct answer and *insufficient* evidence to demonstrate any understanding of the mathematical concepts and procedures required by the task for that grade level.

Response may show only information copied from the question.

Special Categories within zero reported separately:

BLK (blank)...........Blank, entirely erased, or written refusal to respond
OT.........................Off task
IL ....Illegible
LOE ....Response in a language other than English

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MATHEMATICS REPORTING CATEGORIES

Mathematics scores are reported in five categories:

A – Numbers and Operations

B – Measurement

C – Geometry

D – Algebraic Concepts

E – Data Analysis and Probability

Examples of multiple-choice and open-ended items assessing these categories are included in this booklet.

DESCRIPTION OF SAMPLE ITEMS

The modified mathematics multiple-choice items begin on page 5. Each item is preceded by the Assessment Anchor and Eligible Content coding. The majority of answer options are followed by a brief analysis or rationale. The correct answer is indicated by an asterisk (∗).

Two open-ended items follow the multiple-choice items. Each of these is displayed with an item-specific scoring guideline and examples of responses with scores and annotations.

Each item in this sampler has been modified from an existing item in the 2008–2009 PSSA Mathematics Item and Scoring Sampler. The text box below each modified item provides the sequence number for the source item and a description that explains how the item was modified. Some examples of modifications include simplified or reduced text, extra spacing, reduced steps or tasks, simplified graphics, the addition of hint boxes, enlarged font sizes, and the use of boldfaced text and underlining.

A calculator is permitted for use in solving items in this sampler. Scratch paper may be used in solving all items.
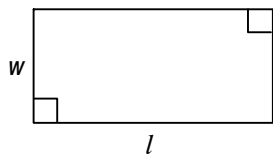
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FORMULA SHEET

$P = 2l + 2w$
$A = lw$

$SA = 2lw + 2lh + 2wh$
$V = lwh$

$A = bh$
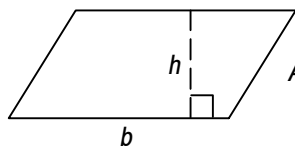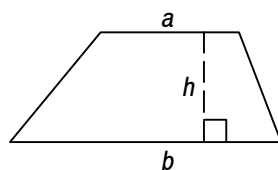
$SA = 4\pi r^2$
$V = \frac{4}{3}\pi r^3$

$A = \frac{1}{2}h(a + b)$
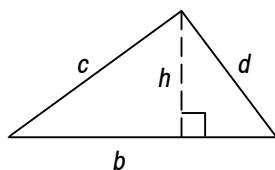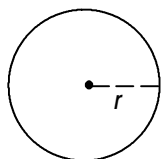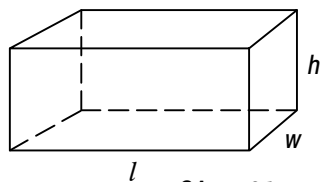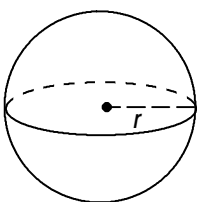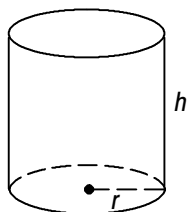
$SA = 2\pi r^2 + 2\pi rh$
$V = \pi r^2 h$

$P = b + c + d$
$A = \frac{1}{2}bh$

$SA = \pi r^2 + \pi r\sqrt{r^2 + h^2}$
$V = \frac{1}{3}\pi r^2 h$

$C = 2\pi r$
$A = \pi r^2$
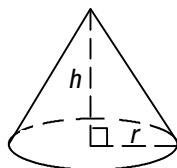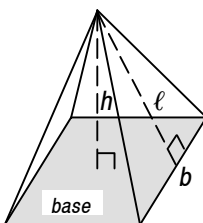
$SA = $ (Area of the base) $+$
$\frac{1}{2}\ell$ (number of base sides)(b)

$V = \frac{1}{3}$ (Area of the base) $\times h$
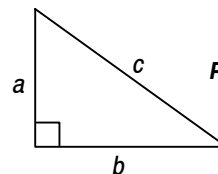
Pythagorean Theorem :
$a^2 + b^2 = c^2$

Permutations : $P(n, r) = \dfrac{n!}{(n - r)!}$

Combinations : $C(n, r) = \dfrac{n!}{r!(n - r)!}$

Distance Formula :
$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Midpoint : $\left(\dfrac{x_1 + x_2}{2}, \dfrac{y_1 + y_2}{2}\right)$

Slope : $m = \dfrac{y_2 - y_1}{x_2 - x_1}$

Point-Slope Formula :
$(y - y_1) = m(x - x_1)$

Slope-Intercept Formula :
$y = mx + b$

Standard Equation of a Line :
$Ax + By = C$

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MULTIPLE-CHOICE ITEMS

A.1.2.1

1 Two monomials are shown below.

$$18x^3y \quad 30x^2y^2$$

What is the greatest common factor (GCF) of these monomials?

○ $2xy$ | *a common factor, but not the greatest* |

○ $6x^2y$ *

○ $15x^2y^2$ | *15 is not a factor of the numbers; y^2 is not a factor of y* |

○ $90x^3y^2$ | *least common multiple* |

Modified from Item 8, Grade 11 PSSA Mathematics Sampler 2008 – 2009
Modifications: The lead-in statement has been changed from a directive to a descriptive statement. The number of monomials has been reduced to lower the difficulty of the task. The values for the monomials have also been reduced to lower the difficulty.

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2 A protractor is pictured below.

What is the measure of ∠XYZ?

○ 57° $\boxed{\textit{measure of supplementary angle}}$

○ 63° $\boxed{\textit{wrong scale; counted up from 60}}$

○ 123° *

○ 137° $\boxed{\textit{counted up from 130}}$

Modified from Item 13, Grade 11 PSSA Mathematics Sampler 2008 – 2009
Modifications: The lead-in statement has been changed from a directive to a descriptive statement. The graphic has been enlarged for easier viewing.

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B.2.2.1

3   A cone is shown below.

5 centimeters (*s*)

3 centimeters (*r*)

What is the approximate **surface area** (*SA*) of the cone?

> **Helpful Hints**
>
> - Hint: $SA = \pi r^2 + \pi rs$
>
> - Use $\pi = 3.14$

○   65.94 square centimeters r^2 as 6 instead of 9

○   75.36 square centimeters   *

○   169.56 square centimeters πrs as $\pi \cdot 9 \cdot 5$

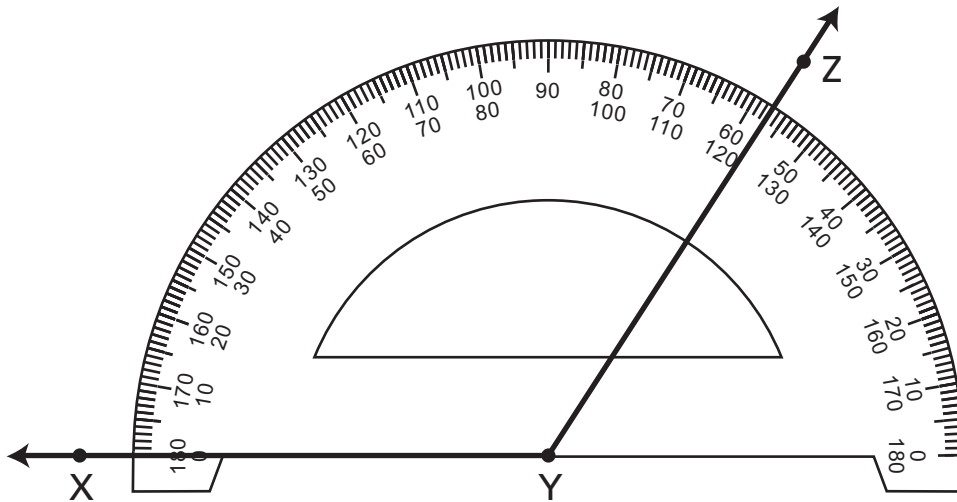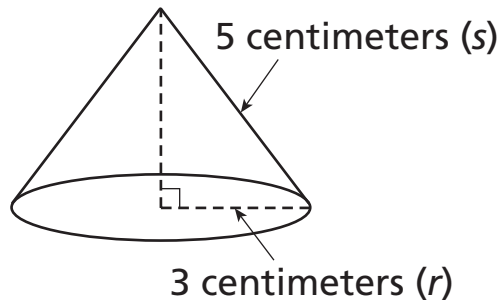○   423.90 square centimeters $\pi \cdot 9 \cdot 3 \cdot 5$

Modified from Item 15, Grade 11 PSSA Mathematics Sampler 2008 – 2009

Modifications: The lead-in statement has been changed from a directive to a short, descriptive statement. A formula hint and a conversion hint have been added below the stem to guide the students in the task. The formula is a simplified version of the one used in the PSSA. The dimension units for the stimulus have been spelled out and linked to their own mathematical notation letters for easier processing of the formula hint. The task has been changed to reduce the difficulty of the item. Boldfaced text has been added to the stem for emphasis on the task.

B.2.2.4

4 A cylinder has an approximate volume (*V*) of 188.4 cubic inches.

The radius (*r*) of the cylinder is 4 inches.

What is the **height** (*h*) of the cylinder?

Helpful Hints

- $V = \pi r^2 h$

- Use $\pi = 3.14$

○ 3.75 inches   *

○ 3.87 inches | *height as 4 inches; solves for r* |

○ 7.50 inches | r^2 *as 8 instead of 16* |

○ 11.78 inches | *omitted division by* π |

Modified from Item 17, Grade 11 PSSA Mathematics Sampler 2008 – 2009
Modifications: A formula hint and a conversion hint have been added below the stem to guide the students. Mathematical notation letters have been supplied to facilitate processing the formula hint. The blocks of text have been separated with line spacing to emphasize key pieces of information. The stem has been worded to be more precise. Boldfaced text has been added to the stem for emphasis on the task. The units are now spelled out in the answer options.

B.2.3.1

5 The diagram below shows two cubes.
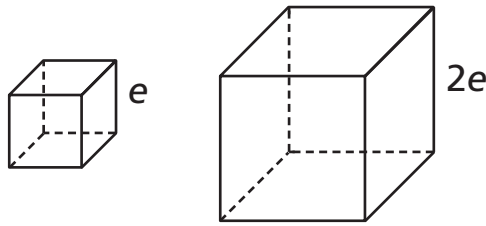
The length of each edge (*e*) of the small cube is changed by a factor of 2 to make the large cube.

By what factor is the **volume** of the small cube changed?

(Hint: $V = lwh$)

○ 2 | *double edge, double volume* |

○ 4 | *only two dimensions doubled* |

○ 6 | *3 dimensions × 2 (for factor of 2)* |

○ 8   *

Modified from Item 18, Grade 11 PSSA Mathematics Sampler 2008 – 2009
Modifications: A diagram has been added with a short, simple lead-in statement that introduces the graphic. The blocks of text have been separated with line spacing to emphasize key pieces of information. The wording of the stem has been revised to emphasize a key concept. Boldfaced text has been added to the stem for emphasis on the task. A formula hint has also been added below the stem.

C.1.2.1

6 Which set of measurements could be the lengths of the sides
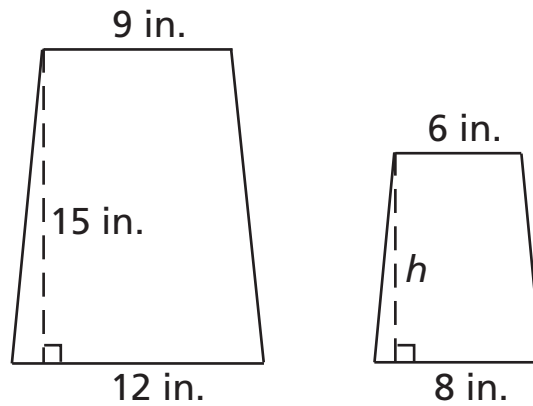of a triangle?

○ 2 cm, 3 cm, 5 cm

○ 3 cm, 4 cm, 7 cm

○ 4 cm, 5 cm, 10 cm

○ 5 cm, 7 cm, 11 cm   *

Modified from Item 21, Grade 11 PSSA Mathematics Sampler 2008 – 2009
Modifications: The stem has been reworded for easier understanding.

C.1.3.1

7   The two trapezoids shown below are similar.

9 in.

15 in.

12 in.

6 in.

h

8 in.

What is the **height** (h) of the smaller trapezoid?

○   9 in.   *given measure*

○   10 in.   *

○   11 in. $15 - 4$

○   12 in. $15 - 3$

Modified from Item 23, Grade 11 PSSA Mathematics Sampler 2008 – 2009
Modifications: The lead-in statement has been changed from a directive to a descriptive statement. The word "height" has been added to the stem in boldfaced type for emphasis. The graphic has been enlarged. The question in the stem has been reworded for easier understanding.

C.3.1.2

8   Each equation shown below describes a line.

$$y = \frac{2}{3}x - 9$$

$$y = \frac{2}{3}x + 3$$

Which statement about the lines described by the equations is true?

○   The lines are parallel lines.   *

○   The lines are the same line. | y-intercepts are different |

○   The lines are perpendicular lines. | not perpendicular because slopes are equal |

○   The lines intersect, but are not perpendicular lines. | not intersecting because slopes are equal |

Modified from Item 26, Grade 11 PSSA Mathematics Sampler 2008 – 2009
Modifications: The lead-in statement has been changed from a directive to a descriptive statement to introduce the two equations. The question in the stem has been reworded and changed from an open stem to a closed stem for better understanding. The answer options are now complete sentences to match the revised stem.

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D.1.1.1

9 The values of *x* and *y* shown in the table below follow a pattern.

x	y
0	−3
2	7
4	17
6	27
8	37

The pattern continues. Which equation describes the pattern?

○ $y = x - 3$ | *works for first pair in table* |

○ $y = x + 5$ | $\frac{1}{2}$ *change in x-values as coefficient of x and* $\frac{1}{2}$ *change in y-values as constant* |

○ $y = 2x + 10$ | *change in x-values as coefficient of x and change in y-values as constant* |

○ $y = 5x - 3$ *

Modified from Item 27, Grade 11 PSSA Mathematics Sampler 2008 – 2009
Modifications: The lead-in statement has been enhanced to introduce and describe the table. The values shown in the table have been changed to reduce task complexity. The question in the stem has been reworded for easier understanding.

D.1.1.2

10 Which relation is a function?

○ {(−1, 2), (1, 4), (4, 8), (8, 8)}   *

○ {(1, 5), (2, 6), (3, 7), (2, 7)}

○ {(−1, 2), (−1, 3), (−1, 4), (−1, 5)}

○ {(1, 2), (−1, 3), (1, 4), (−1, 5)}

Modified from Item 28, Grade 11 PSSA Mathematics Sampler 2008 – 2009
Modifications: The correct answer has now been expressed in an ordered way to lower the difficulty of the task.

D.1.1.3

11 A relation is shown in the table below.

x	y
0	0
2	4
−2	4
3	9

What is the range of the relation?

○ {−2, 0, 2, 3} | *domain* |

○ {0, 4, 9}   *

○ {6} | *difference between greatest x- and greatest y-values* |

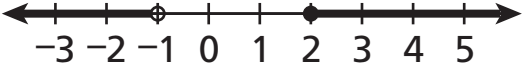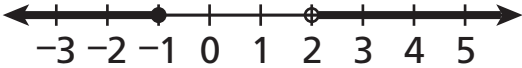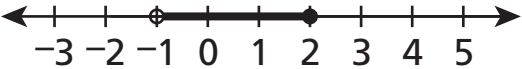○ {9} | *difference between greatest and least y-values* |

| Modified from Item 29, Grade 11 PSSA Mathematics Sampler 2008 – 2009 |
| Modifications: The lead-in statement has been changed from a directive to a descriptive statement to introduce the table. The question in the stem has been reworded for better understanding. |

D.2.1.1

12   Which graph represents the solution set of $-1 < x \le 2$?

○
-3 -2 -1 0 1 2 3 4 5

shaded incorrect direction

○
-3 -2 -1 0 1 2 3 4 5

incorrect circles and shaded incorrect direction

○
-3 -2 -1 0 1 2 3 4 5

*

○
-3 -2 -1 0 1 2 3 4 5

transposed circles

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D.2.1.4

13 A system of equations is shown below.

$$\begin{cases} y = 2x \\ y = -6x + 4 \end{cases}$$

What is the solution of the system of equations?

○ (−2, −1)

○ $\left(-\dfrac{1}{2}, 1\right)$

○ $\left(\dfrac{1}{2}, 1\right)$ *

○ (2, −2)

Modified from Item 33, Grade 11 PSSA Mathematics Sampler 2008 – 2009
Modifications: The lead-in statement has been changed from a directive to a descriptive statement in order to introduce the system of equations. The question in the stem has been reworded to be more direct to the task. The values in the equations and the answer options have been changed to reduce the difficulty of the item.

D.2.1.5

14 Solve:

$$x^2 + 4x - 12 = 0$$

○ $x = 0$ or $x = -8$ *uses 0 from right side of equation and adds 4 + −12*

○ $x = 1$ or $x = -12$ *wrong factors of −12*

○ $x = 2$ or $x = -6$ *

○ $x = 3$ or $x = -4$ *wrong factors of −12*

Modified from Item 34, Grade 11 PSSA Mathematics Sampler 2008 – 2009
Modifications: The values in the polynomial equation have been reduced to lower task complexity, and the answer options have been modified to reflect the changes to the equation.

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15 Multiply:

$$(-3x^2 + 4x)\,(-2x - 8)$$

○ $-3x^2 + 2x - 8$ | *added like terms* |

○ $-3x^2 - 8x - 32$ | *no multiplication by 1st term and various errors on products of other terms* |

○ $6x^3 - 32x$ | *multiplied first terms and last terms only* |

○ $6x^3 + 16x^2 - 32x$ *

Modified from Item 35, Grade 11 PSSA Mathematics Sampler 2008 – 2009
Modifications: One of the polynomials in the stem has been simplified, and the answer options have been modified to reflect the changes to the stem.

16 An equation is shown below.

$$y = 2(x^2)$$

When the value of *x* is multiplied by 3, the value of *y* is multiplied by what number?

○ 3 | $3x \rightarrow 3y$ |

○ 6 | $2 \cdot 3$ |

○ 9   *

○ 18 | $2(3^2)$ |

Modified from Item 38, Grade 11 PSSA Mathematics Sampler 2008 – 2009
Modifications: The lead-in statement has been changed from a directive to a descriptive statement. The stimulus equation has been simplified to reduce processing. The question in the stem has been reworded to improve focus on the key concept and the task. The answer options have been changed to reflect the changes in the stem.

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D.3.2.1

17 What is the slope of the line that passes through the points (5, −1) and (−3, 3)?

Helpful Hint

- Slope = $\dfrac{y_2 - y_1}{x_2 - x_1}$

○ −1 $\dfrac{3-(-3)}{-1-5}$

○ $-\dfrac{1}{2}$ *

○ $\dfrac{1}{2}$ *absolute value of slope*

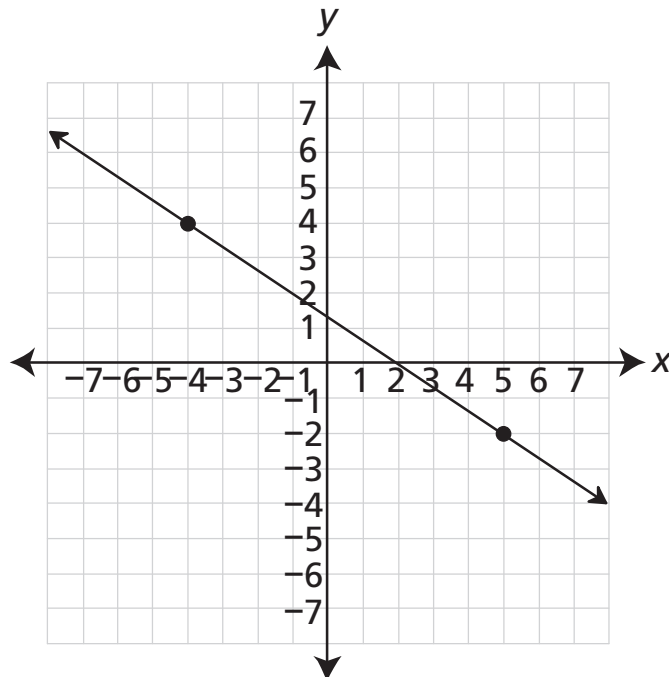○ 2 *absolute value of reciprocal of slope*

Modified from Item 39, Grade 11 PSSA Mathematics Sampler 2008 – 2009

Modifications: A formula hint has been added below the stem to guide the students in the task. The first answer option has been changed to eliminate a close distractor.

D.3.2.3

18 A line is graphed on the coordinate plane below.

What is the slope of the line?

○ $-\dfrac{3}{2}$ | *reciprocal of slope* |

○ $-\dfrac{2}{3}$ *

○ $\dfrac{2}{3}$ | *opposite of slope* |

○ $\dfrac{3}{2}$ | *opposite reciprocal of slope* |

| Modified from Item 41, Grade 11 PSSA Mathematics Sampler 2008 – 2009 |
| Modifications: The integers on both axes have been set in boldfaced type for easier viewing. |

E.2.1.1

19 The stem-and-leaf plot below shows the numbers of students buying lunch on 9 different school days.

Students Buying Lunch

8	9
9	6
10	5 5
11	
12	6 8 9
13	7 8

Key
3 │ 4 = 34

What is the **median** number of the numbers of students buying lunch?

○ 105 students | *mode* |

○ 117 students | *mean* |

○ 126 students   *

○ 138 students | *maximum* |

Modified from Item 44, Grade 11 PSSA Mathematics Sampler 2008 – 2009
Modifications: The lead-in statement has been reworded to introduce the stem-and-leaf plot. The plot now has an odd number of stimulus values, which reduces the difficulty of the item.

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E.3.1.1

20 The 15 markers listed below are in a box.

- 5 blue markers
- 3 green markers
- 7 red markers

Paul will randomly select 1 marker from the box.

Paul will **not** return the marker to the box before Kim randomly selects 1 marker from the box.

What is the probability that Paul randomly selects a green marker **and** Kim randomly selects a red marker?

○ $\dfrac{1}{10}$ *

○ $\dfrac{2}{15}$ 2 of 15 markers

○ $\dfrac{2}{3}$ $\dfrac{3}{15} + \dfrac{7}{15}$

○ $\dfrac{7}{10}$ $\dfrac{3}{15} + \dfrac{7}{14}$

Modified from Item 45, Grade 11 PSSA Mathematics Sampler 2008 – 2009

Modifications: Some context has been changed and simplified to reduce processing. The blocks of text have been separated with line spacing to emphasize key pieces of information. More common objects have been used in the scenario, and additional relevant and precise information has been added to the stem to clarify the task. Key information in the stem has been placed in a bulleted list for emphasis. Boldfaced text has also been added to the stem for emphasis.

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21 Oscar has a set of 18 cards.

- 8 cards show the letter "A"
- 10 cards show the letter "B"

Oscar randomly selects 1 card from the set.

What are the **odds** that the card Oscar selects shows the letter "A"?

○　1 : 18　　| *1 of 18 cards* |

○　4 : 9　　| *probability* |

○　4 : 5　　*

○　10 : 8　　| *odds against, and not simplified* |

Modified from Item 46, Grade 11 PSSA Mathematics Sampler 2008 – 2009
Modifications: Some context has been removed to reduce processing. The blocks of text have been separated with line spacing to emphasize key pieces of information. Bullets have been added in front of relevant information, and a key concept term in the stem has been set in boldfaced type for emphasis. The question in the stem has been reworded for better understanding.

22 There are 5 dancers forming a line on a stage.

In how many different orders could the 5 dancers form the line?

○　5　　| *5 dancers* |

○　25　　| *5 squared* |

○　120　　*

○　125　　| *5 cubed* |

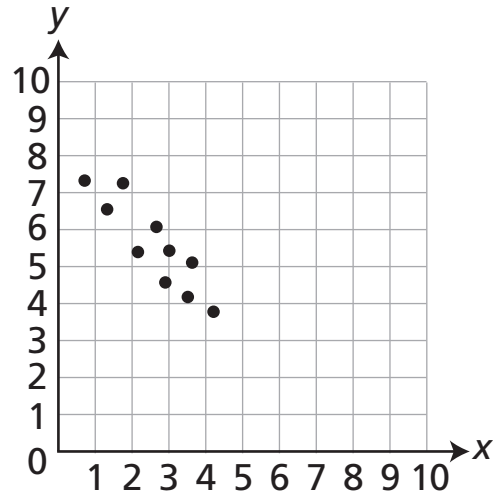| Modified from Item 47, Grade 11 PSSA Mathematics Sampler 2008 – 2009 |
|---|
| Modifications: Some context has been removed to reduce processing. The blocks of text have been separated with line spacing to emphasize key pieces of information. The question in the stem has been reworded more precisely for better understanding. |

E.4.2.1

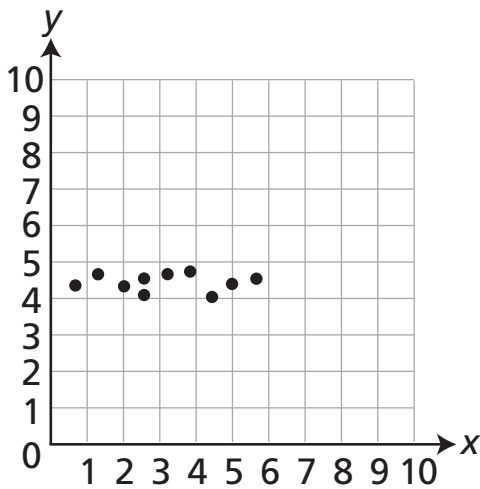**23** For which scatter plot would a line of best fit be described by the equation $y = \frac{1}{2}x + 2$?

○   *
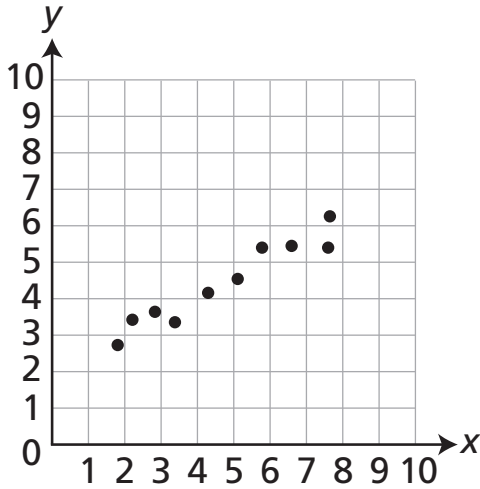
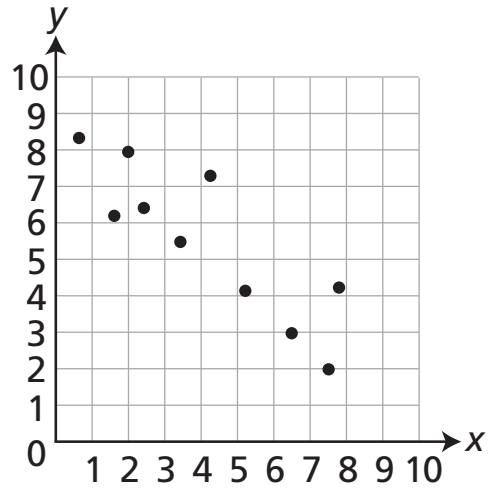
○   *negative slope*

○   *slope = 0*

○   *negative slope*

Modified from Item 50, Grade 11 PSSA Mathematics Sampler 2008 – 2009
Modifications: The lead-in statement has been reworded using a more common action verb. The integers on the axes are now set in boldfaced type for emphasis.

FIRST OPEN-ENDED ITEM

A.2

24   Karla takes care of cats for their owners.

The table below shows the amounts Karla charges for each night a cat stays at her house and for each meal she feeds the cat.

Cat Care Charges

Each Overnight Stay	Each Meal
$6.25	$1.85

A. Mr. Owen's cat stayed at Karla's house for 9 nights and ate 21 meals.

What is the total amount Karla charged Mr. Owen?
Show or explain all your work.

Work:

Total amount Karla charged: $ _____

B. Karla uses 1 can of food to feed 3 cats.

Exactly how many cans of food will Karla use to feed 24 cats? Show or explain all your work.

Work:
Number of cans of food: _____

C. Karla has helpers when she takes care of many cats at the same time.

It takes 2 people 24 minutes to feed 18 cats.

Working at the same rate, how many minutes should it take 3 people to feed 18 cats? Show or explain all your work.

Work:
Number of minutes: _____

Modified from Item 51, Grade 11 PSSA Mathematics Sampler 2008 – 2009

Modifications: The stem has been simplified and context removed to reduce processing. The task has been reduced by removing a column from the table. The blocks of text have been separated with line spacing to emphasize key pieces of information. The table has a new title and format and has been enlarged for emphasis. All three response boxes now have direction labels and sentence completion lines to direct the students in the task.

MATHEMATICS

ITEM-SPECIFIC SCORING GUIDELINE

Item #24

This item will be reported under Category A, Numbers and Operations.

Assessment Anchor:

A.2– Understand the meanings of operations, use operations, and understand how they relate to each other.

Specific Eligible Content addressed by this item:

A.2.1.1– Solve problems using operations with rational numbers including rates and percents (single and multi-step and multiple procedure operations) (e.g., distance, work, and mixture problems, etc.).

A.2.1.2– Solve problems using direct and inverse proportions.

A.2.1.3– Identify and/or use proportional relationships in problem solving settings.

Scoring Guide:

Score	In response to this item, the student—
4	demonstrates a *thorough* understanding of how to solve problems using operations with rational numbers including rates and using direct and inverse proportions by correctly solving problems and clearly explaining procedures.
3	demonstrates a *general* understanding of how to solve problems using operations with rational numbers including rates and using direct and inverse proportions by correctly solving problems and clearly explaining procedures with only minor errors or omissions.
2	demonstrates a *partial* understanding of how to solve problems using operations with rational numbers including rates and using direct and inverse proportions by correctly performing a significant portion of the required task.
1	demonstrates a *minimal* understanding of how to solve problems using operations with rational numbers including rates and using direct and inverse proportions.
0	The response has no correct answer and *insufficient* evidence to demonstrate any understanding of the mathematical concepts and procedures as required by the task. Response may show only information copied from the question.
Non-scorable	BLK.......Blank, entirely erased, or written refusal to respond OT ....Off task IL ....Illegible LOE.......Response in a language other than English

MATHEMATICS

Item #24

Top Scoring Response:

Part A Answer	Support
$95.10	6.25 • 9 = 56.25 1.85 • 21 = 38.85 56.25 + 38.85 = 95.10 **OR equivalent**

(1 score point)

    ½ point for correct answer
    ½ point for complete support

Part B Answer	Support
8 (cans)	$\dfrac{1}{3} = \dfrac{x}{24}$ $24 = 3x$ $8 = x$ **OR equivalent**

(1½ score points)

    ½ point for correct answer
    1 point for complete support (½ point for correct but incomplete support)

Part C Answer	Support
16 (minutes)	2 • 24 = 48 48 = 3m 16 = m **OR equivalent**

(1½ score points)

    ½ point for correct answer
    1 point for complete support (½ point for correct but incomplete support)

MATHEMATICS

OPEN-ENDED ITEM RESPONSES

A.2 Response Score: 4 points

24 Karla takes care of cats for their owners.

The table below shows the amounts Karla charges for each night a cat stays at her house and for each meal she feeds the cat.

Cat Care Charges

Each Overnight Stay	Each Meal
$6.25	$1.85

A. Mr. Owen's cat stayed at Karla's house for 9 nights and ate 21 meals.

What is the total amount Karla charged Mr. Owen?
Show or explain all your work.

Work:

$9 \times \$6.25 = \$56.25$

$21 \times \$1.85 = \$38.85$

$\$56.25 + \$38.85 = \$95.10$

Total amount Karla charged: $ __95.10__

> The student has given a correct answer.
> The student has shown complete support.

B. Karla uses 1 can of food to feed 3 cats.

Exactly how many cans of food will Karla use to feed 24 cats? Show or explain all your work.

Work:

1 can –
3 cats

2 cans –
6 cats

3 cans –
9 cats

4 cans –
12 cats

5 cans –
15 cats

6 cans –
18 cats

7 cans –
21 cats

8 cans –
24 cats

Number of cans of food: ____8____

The student has given a correct answer.
The student has shown complete support.

C. Karla has helpers when she takes care of many cats at the same time.

It takes 2 people 24 minutes to feed 18 cats.

Working at the same rate, how many minutes should it take 3 people to feed 18 cats? Show or explain all your work.

Work:

2 people take 24 minutes, so 1 person takes 48 minutes (24 × 2)

$\frac{48}{18}$ = 2.67 minuts per cat

18 cats × 2.67 minutes per cat = 48 minutes

$\frac{48\ minutes}{3\ people}$ = 16 minutes per person

Number of minutes: ____16____

The student has given a correct answer.
The student has shown complete support.

A.2   Response Score: 3 points

24   Karla takes care of cats for their owners.

The table below shows the amounts Karla charges for each night a cat stays at her house and for each meal she feeds the cat.

Cat Care Charges

Each Overnight Stay	Each Meal
$6.25	$1.85

A. Mr. Owen's cat stayed at Karla's house for 9 nights and ate 21 meals.

What is the total amount Karla charged Mr. Owen?
Show or explain all your work.

Work:

9 nights
21 meals

6.25
1.85

95.10

Total amount Karla charged: $ ___95.10___

> The student has given a correct answer.
> The student has shown no support.

B. Karla uses 1 can of food to feed 3 cats.

Exactly how many cans of food will Karla use to feed 24 cats? Show or explain all your work.

Work:

$$\frac{1}{3} = \frac{x}{24}$$

Number of cans of food: _____8_____

C. Karla has helpers when she takes care of many cats at the same time.

It takes 2 people 24 minutes to feed 18 cats.

Working at the same rate, how many minutes should it take 3 people to feed 18 cats? Show or explain all your work.

Work:

$$2 \times 24 = 48$$

$$48 \div 3 = 16$$

Number of minutes: _____16_____

A.2   Response Score: 3 points

24   Karla takes care of cats for their owners.

The table below shows the amounts Karla charges for each night a cat stays at her house and for each meal she feeds the cat.

Cat Care Charges

Each Overnight Stay	Each Meal
$6.25	$1.85

A. Mr. Owen's cat stayed at Karla's house for 9 nights and ate 21 meals.

What is the total amount Karla charged Mr. Owen?
Show or explain all your work.

Work: $(9 \cdot \$6.25) + (21 \cdot \$1.85) = \$95.10$

Total amount Karla charged: $ ___95.10___

The student has given a correct answer.
The student has shown complete support.

B. Karla uses 1 can of food to feed 3 cats.

Exactly how many cans of food will Karla use to feed 24 cats? Show or explain all your work.

Work:

$24 \div 3 = 7$

7 Cans

Number of cans of food: ____7____

> The student has given an incorrect answer due to a calculation error. The student has shown complete support.

C. Karla has helpers when she takes care of many cats at the same time.

It takes 2 people 24 minutes to feed 18 cats.

Working at the same rate, how many minutes should it take 3 people to feed 18 cats? Show or explain all your work.

Work:

$2 \cdot 24 = 48$

$48 \div 3 = 18$

18 mins

Number of minutes: ____18____

> The student has given an incorrect answer due to a calculation error. The student has shown complete support.

A.2   Response Score: 2 points

24   Karla takes care of cats for their owners.

The table below shows the amounts Karla charges for each night a cat stays at her house and for each meal she feeds the cat.

Cat Care Charges

Each Overnight Stay	Each Meal
$6.25	$1.85

A. Mr. Owen's cat stayed at Karla's house for 9 nights and ate 21 meals.

What is the total amount Karla charged Mr. Owen?
Show or explain all your work.

Work:

9×6.25 = 56.52

21×1.85 = 38.85

56.52 + 38.85 = $95.37

Total amount Karla charged: $ __95.37__

> The student has given an incorrect answer due to a calculation error.
> The student has shown complete support.

MATHEMATICS

B. Karla uses 1 can of food to feed 3 cats.

Exactly how many cans of food will Karla use to feed 24 cats? Show or explain all your work.

Work:

$$24 \div 3 - 8$$

Number of cans of food: _8 cans_

> The student has given a correct answer.
> The student has shown complete support.

C. Karla has helpers when she takes care of many cats at the same time.

It takes 2 people 24 minutes to feed 18 cats.

Working at the same rate, how many minutes should it take 3 people to feed 18 cats? Show or explain all your work.

Work:

Number of minutes: _16 minutes_

> The student has given a correct answer.
> The student has shown no support.
> Based on PSSA-M scoring rules, 2½ points count as 2 points.

A.2 **Response Score: 2 points**

24 Karla takes care of cats for their owners.

The table below shows the amounts Karla charges for each night a cat stays at her house and for each meal she feeds the cat.

Cat Care Charges

Each Overnight Stay	Each Meal
$6.25	$1.85

A. Mr. Owen's cat stayed at Karla's house for 9 nights and ate 21 meals.

What is the total amount Karla charged Mr. Owen?
Show or explain all your work.

Work:

$9 \times 1.85 = 16.65$

$21 \times 6.25 = 131.25$

$16.65 + 131.25 = \$147.90$

Total amount Karla charged: $ __147.90__

The student has given an incorrect answer.
The student has shown incorrect support.

MATHEMATICS

B. Karla uses 1 can of food to feed 3 cats.

Exactly how many cans of food will Karla use to feed 24 cats? Show or explain all your work.

Work:

I created the model above with the "/" representing each cat and the square representing each can of food. Since there are 7 squares she will need 7 cans.

Number of cans of food: ___7 cans___

> The student has given an incorrect answer (based on a counting error). The student has shown full support.

C. Karla has helpers when she takes care of many cats at the same time.

It takes 2 people 24 minutes to feed 18 cats.

Working at the same rate, how many minutes should it take 3 people to feed 18 cats? Show or explain all your work.

Work:

$2 \times 24 = 48$ minutes for 1 person

Number of minutes: ___16 minutes___

> The student has given a correct answer.
> The student has shown correct but incomplete support, receiving ½ a point.

MATHEMATICS

A.2   Response Score: 1 point

24   Karla takes care of cats for their owners.

The table below shows the amounts Karla charges for each night a cat stays at her house and for each meal she feeds the cat.

Cat Care Charges

Each Overnight Stay	Each Meal
$6.25	$1.85

A. Mr. Owen's cat stayed at Karla's house for 9 nights and ate 21 meals.

What is the total amount Karla charged Mr. Owen?
Show or explain all your work.

Work:

9 • 6.25

Total amount Karla charged: $ _____

The student has given no answer.
The student has shown incorrect support.

B. Karla uses 1 can of food to feed 3 cats.

Exactly how many cans of food will Karla use to feed 24 cats? Show or explain all your work.

Work:

8 cans

Number of cans of food: ___8___

> The student has given a correct answer.
> The student has shown no support.

C. Karla has helpers when she takes care of many cats at the same time.

It takes 2 people 24 minutes to feed 18 cats.

Working at the same rate, how many minutes should it take 3 people to feed 18 cats? Show or explain all your work.

Work:

24 − 18 = 6

6 • 3 − 2 = 16

Number of minutes: _16 minutes_

> The student has given a correct answer.
> The student has shown incorrect support.

A.2   Response Score: 1 point

24   Karla takes care of cats for their owners.

The table below shows the amounts Karla charges for each night a cat stays at her house and for each meal she feeds the cat.

Cat Care Charges

Each Overnight Stay	Each Meal
$6.25	$1.85

A. Mr. Owen's cat stayed at Karla's house for 9 nights and ate 21 meals.

What is the total amount Karla charged Mr. Owen?
Show or explain all your work.

Work:

95.10

Total amount Karla charged: $ ___95.10___

The student has given a correct answer.
The student has shown no support.

B. Karla uses 1 can of food to feed 3 cats.

Exactly how many cans of food will Karla use to feed 24 cats? Show or explain all your work.

Work:

kan for 3cats
8cars for 24cats

Number of cans of food: _____

> The student has given a correct answer.
> The student has shown no support.

C. Karla has helpers when she takes care of many cats at the same time.

It takes 2 people 24 minutes to feed 18 cats.

Working at the same rate, how many minutes should it take 3 people to feed 18 cats? Show or explain all your work.

Work:

$$\frac{24}{2} = 12$$

$$\frac{24}{3} = 8$$

8

Number of minutes: _____

> The student has given an incorrect answer.
> The student has shown incorrect support.

A.2   Response Score: 0

24   Karla takes care of cats for their owners.

The table below shows the amounts Karla charges for each night a cat stays at her house and for each meal she feeds the cat.

Cat Care Charges

Each Overnight Stay	Each Meal
$6.25	$1.85

A. Mr. Owen's cat stayed at Karla's house for 9 nights and ate 21 meals.

What is the total amount Karla charged Mr. Owen?
Show or explain all your work.

Work:

$$9 + 21 = 30$$

$$6.25 + 1.85 = 8.1$$

$$8.1(30) = \$243$$

Total amount Karla charged: $ ___243___

The student has given an incorrect answer.
The student has shown incorrect support.

B. Karla uses 1 can of food to feed 3 cats.

Exactly how many cans of food will Karla use to feed 24 cats? Show or explain all your work.

Work:

$$\frac{1}{3} = \frac{24}{X}$$

$$X = 72$$

Number of cans of food: ___72 cans___

> The student has given an incorrect answer.
> The student has shown incorrect support.

C. Karla has helpers when she takes care of many cats at the same time.

It takes 2 people 24 minutes to feed 18 cats.

Working at the same rate, how many minutes should it take 3 people to feed 18 cats? Show or explain all your work.

Work:

2 times 24 = 48 minutes

48 divided by 18 cats = 2.67

2.67 times 3 people = 8

Number of minutes: ___8 minutes___

> The student has given an incorrect answer.
> The student has shown incorrect support.

MATHEMATICS

SECOND OPEN-ENDED ITEM

C.3

25 The coordinate grid below shows the locations of Julia's house and Carol's house.

Julia's house is located at (155, 102).

Carol's house is located at (493, 388).
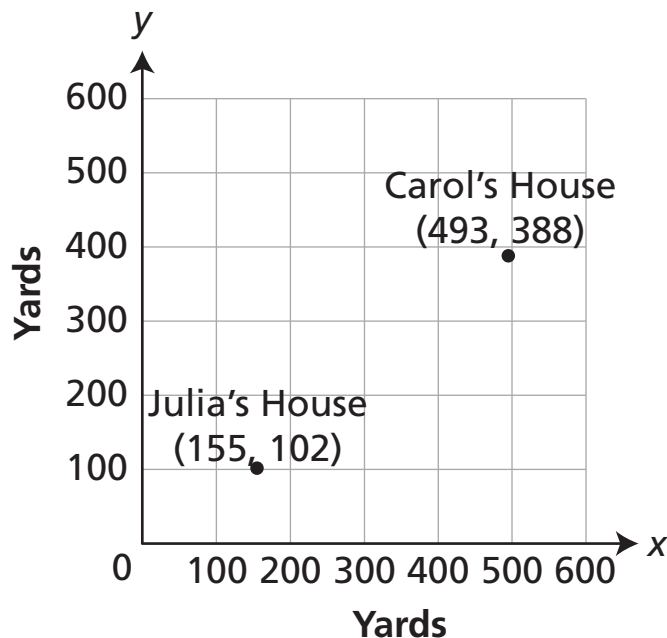
A. What is the location of the midpoint between the girls' houses? Show all your work.
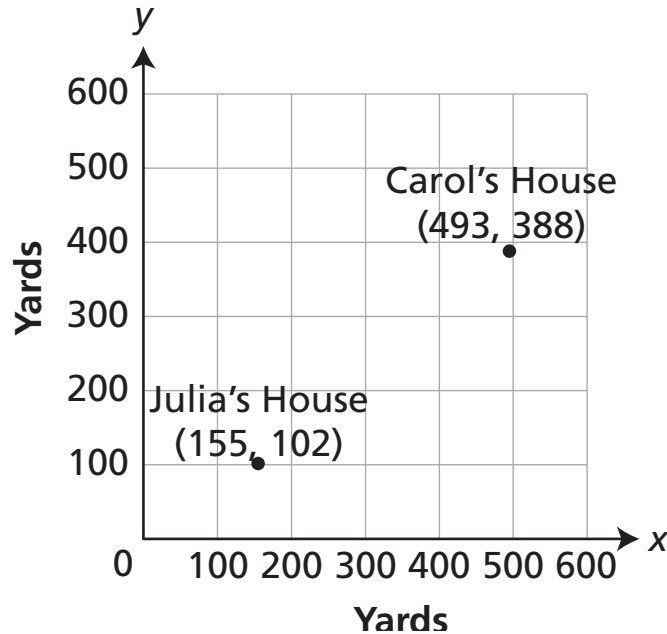
> Helpful Hint
> - Midpoint $\left(\dfrac{x_1 + x_2}{2}, \dfrac{y_1 + y_2}{2} \right)$

Work:

Midpoint: (_____ , _____)

The same coordinate grid below shows the locations of Julia's house, Carol's house, and also the scale used to create the coordinate grid.

B. Use the answer from part A to find the distance, in yards, from each girl's house to the midpoint between the girls' houses.

Round the answer to the nearest yard. Show all your work.

Helpful Hint

• Distance Formula: $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Work:

Distance: _____ yards

Modified from Item 52, Grade 11 PSSA Mathematics Sampler 2008 – 2009

Modifications: The language has been simplified to reduce the processing, and the blocks of text have been separated with line spacing to emphasize key pieces of information. The coordinate grid has been enlarged and the text for the grid set in boldfaced type. A separate dimension reference within the grid has been removed to reduce ambiguity. Hint boxes with formulas have been added to the lines below the stems to facilitate processing. Both response boxes now have direction labels and sentence completion lines to direct the students in the task.

MATHEMATICS

ITEM-SPECIFIC SCORING GUIDELINE

Item #25

This item will be reported under Category C, Geometry.

Assessment Anchor:

    C.3– Locate points or describe relationships using the coordinate plane.

Specific Eligible Content addressed by this item:

    C.3.1.1– Calculate the distance and/or midpoint between 2 points on a number line or on a coordinate plane (formula provided on the reference sheet).

Scoring Guide:

Score	In response to this item, the student—
4	demonstrates a *thorough* understanding of how to calculate the distance and midpoint between 2 points on a coordinate plane by correctly solving problems and clearly explaining procedures.
3	demonstrates a *general* understanding of how to calculate the distance and midpoint between 2 points on a coordinate plane by correctly solving problems and clearly explaining procedures with only minor errors or omissions.
2	demonstrates a *partial* understanding of how to calculate the distance and midpoint between 2 points on a coordinate plane by correctly performing a significant portion of the required task.
1	demonstrates a *minimal* understanding of how to calculate the distance and midpoint between 2 points on a coordinate plane.
0	The response has no correct answer and *insufficient* evidence to demonstrate any understanding of the mathematical concepts and procedures as required by the task. Response may show only information copied from the question.
Non-scorable	BLK.......Blank, entirely erased, or written refusal to respond OT ....Off task IL...........Illegible LOE.......Response in a language other than English

MATHEMATICS

Item #25

Top Scoring Response:

Part A Answer	Support
(324, 245) **OR equivalent**	$x : \left(\dfrac{155 + 493}{2} \right) = \dfrac{648}{2} = 324$ $y : \left(\dfrac{102 + 388}{2} \right) = \dfrac{490}{2} = 245$ **OR equivalent**

(2 score points)

    1 point for correct answer
   1 point for correct and complete support (½ point for correct but incomplete support)

Part B Answer	Support
221 (yards) **OR equivalent**	$d = \sqrt{(493 - 324)^2 + (388 - 245)^2}$ $d = \sqrt{169^2 + 143^2}$ $d = \sqrt{49010}$ ≈ 221 **OR equivalent**

(2 score points)

    1 point for correct answer
    1 point for correct and complete support (½ point for correct but incomplete support)

OPEN-ENDED ITEM RESPONSES

C.3   **Response Score: 4 points**

25   The coordinate grid below shows the locations of Julia's house and Carol's house.

Julia's house is located at (155, 102).

Carol's house is located at (493, 388).
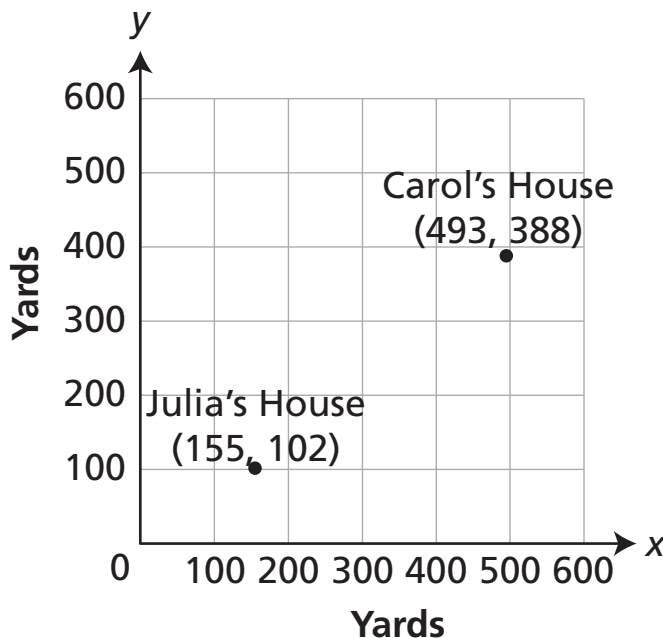
A. What is the location of the midpoint between the girls' houses? Show all your work.

Helpful Hint
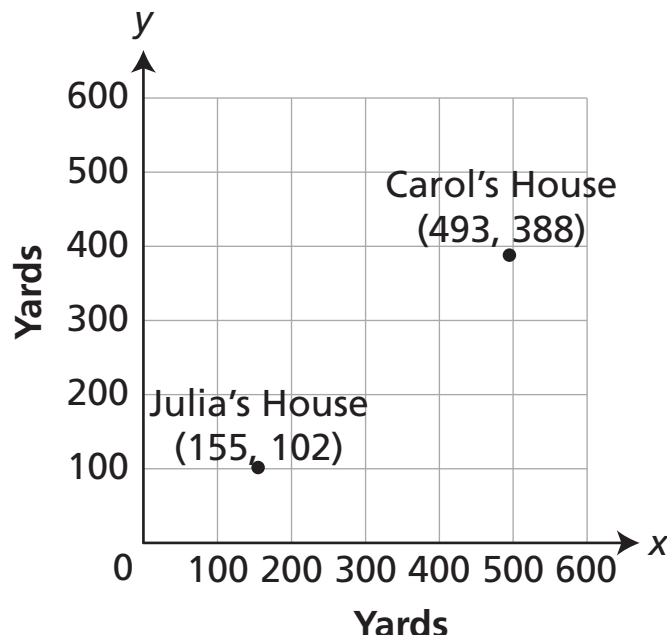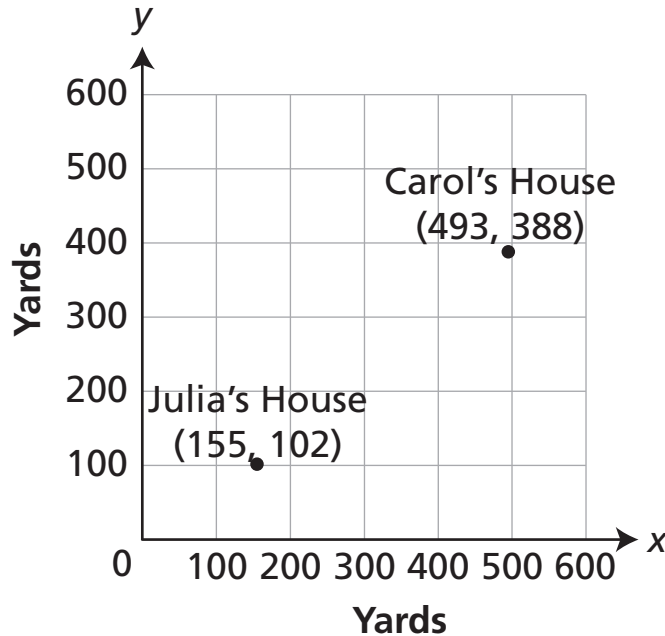- Midpoint $\left(\dfrac{x_1 + x_2}{2} , \dfrac{y_1 + y_2}{2} \right)$

Work: $\left(\dfrac{155 + 493}{2} , \dfrac{102 + 388}{2} \right) \rightarrow \left(\dfrac{648}{2} , \dfrac{490}{2} \right)$

Midpoint: (324 **,** 245 **)**

The student has given a correct answer.
The student has shown complete support.

MATHEMATICS

The same coordinate grid below shows the locations of Julia's house, Carol's house, and also the scale used to create the coordinate grid.

B. Use the answer from part A to find the distance, in yards, from each girl's house to the midpoint between the girls' houses.

Round the answer to the nearest yard. Show all your work.

> **Helpful Hint**
> - Distance Formula: $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Work:

$$\sqrt{(324-155)^2 + (245-102)^2}$$
$$\sqrt{(169)^2 + (143)^2}$$
$$\sqrt{28,561 + 20449} \rightarrow \sqrt{49,010} = 221.4$$

then I rounded to 221

Distance: ___221___ yards

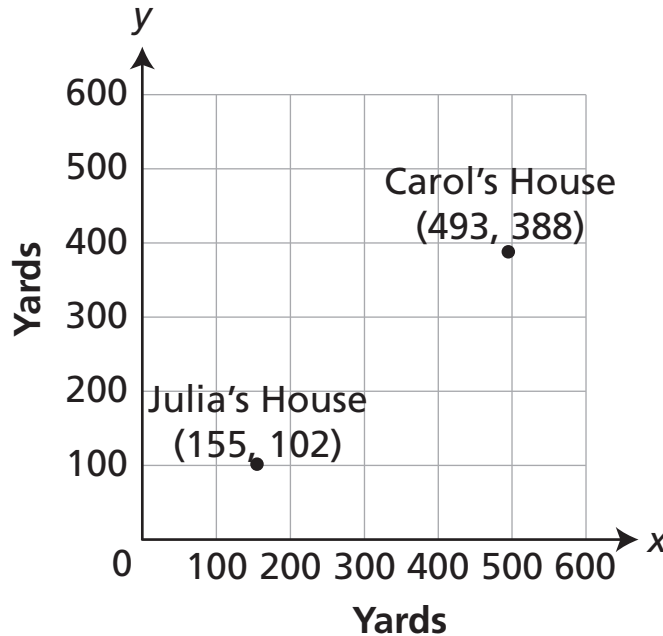The student has given a correct answer.
The student has shown complete support.

MATHEMATICS

25   The coordinate grid below shows the locations of Julia's house and Carol's house.

Julia's house is located at (155, 102).

Carol's house is located at (493, 388).

A. What is the location of the midpoint between the girls' houses? Show all your work.

> **Helpful Hint**
> • Midpoint $\left(\dfrac{x_1 + x_2}{2} , \dfrac{y_1 + y_2}{2} \right)$

Work: $\left(\dfrac{155 + 493}{2} , \dfrac{102 + 338}{2} \right)$

$\left(\dfrac{648}{2} , \dfrac{440}{2} \right) \rightarrow (324, 220)$

Midpoint: (_____ , _____)

> The student has given a partially correct answer (due to an incorrectly copied coordinate value). The partially correct answer receives ½ a point. The student has shown complete support.

The same coordinate grid below shows the locations of Julia's house, Carol's house, and also the scale used to create the coordinate grid.
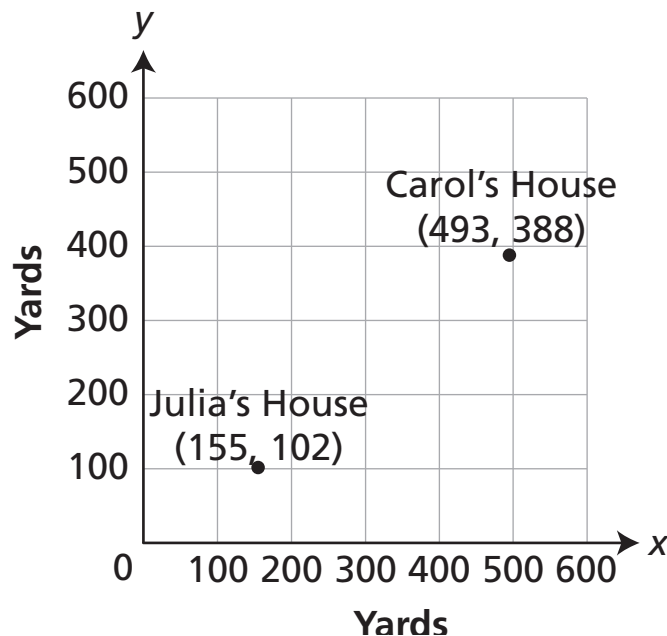
B. Use the answer from part A to find the distance, in yards, from each girl's house to the midpoint between the girls' houses.

Round the answer to the nearest yard. Show all your work.

Helpful Hint
- Distance Formula: $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Work: Midpoint from Part A: (324, 220)

$\sqrt{(324-155)^2 + (220-102)^2}$

$\sqrt{(169)^2 + (118)^2}$

$\sqrt{28561 + 13924}$

$\sqrt{42485}$ is about 206 yards

Distance: ___206___ yards

> The student has given a correct answer (based on carry-through error).
> The student has shown complete support.
> Based on PSSA-M scoring rules, 3½ points count as 3 points.

MATHEMATICS

C.3 **Response Score: 3 points**

25 The coordinate grid below shows the locations of Julia's house and Carol's house.

Julia's house is located at (155, 102).

Carol's house is located at (493, 388).

A. What is the location of the midpoint between the girls' houses? Show all your work.
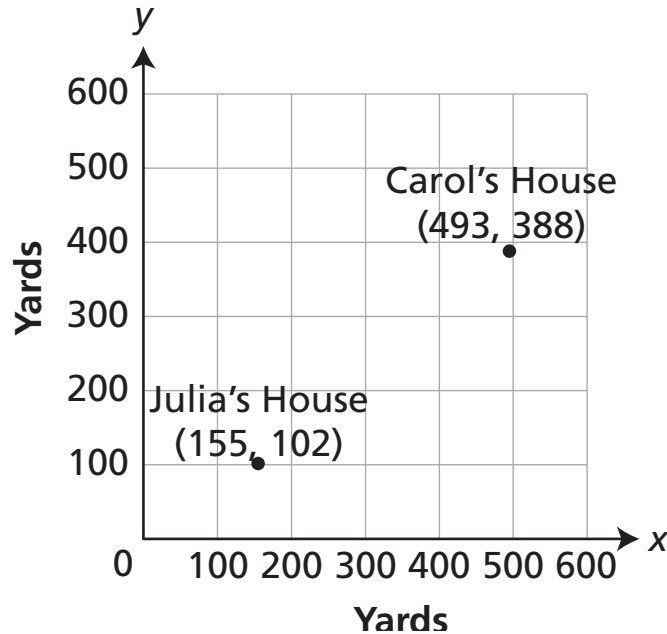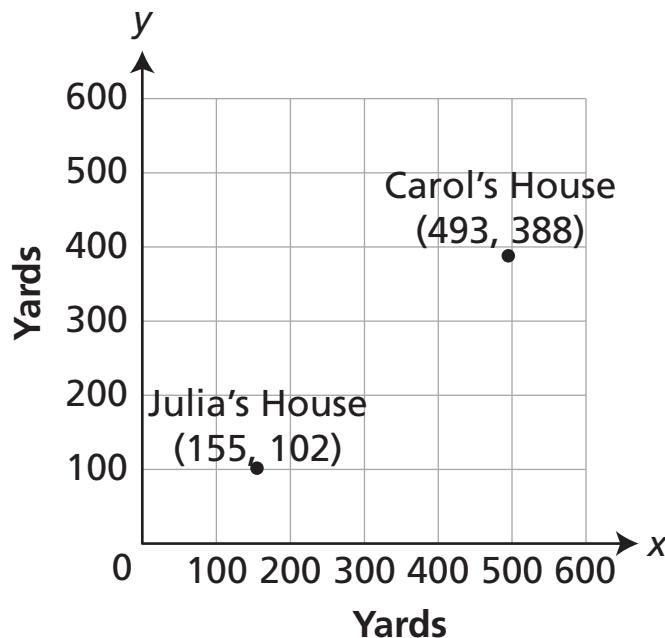
Helpful Hint
- Midpoint $\left(\dfrac{x_1 + x_2}{2}, \dfrac{y_1 + y_2}{2} \right)$

Work: $X: \dfrac{493 - 155}{2} = 169$ $Y: \dfrac{388 - 102}{2} = 143$

Then, add 169 + 155 to get 324 for X value of midpoint
Add 143 + 102 to get 245 for Y-value of midpoint

Midpoint: (__324__, __245__)

> The student has given a correct answer.
> The student has shown complete support.

MATHEMATICS

The same coordinate grid below shows the locations of Julia's house, Carol's house, and also the scale used to create the coordinate grid.

B. Use the answer from part A to find the distance, in yards, from each girl's house to the midpoint between the girls' houses.

Round the answer to the nearest yard. Show all your work.

Helpful Hint
- Distance Formula: $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Work:

$\sqrt{(493 - 324)^2 + (388 - 245)^2}$

$\sqrt{(169)^2 + (143)^2}$ $\sqrt{28561 + 20449}$

$\sqrt{48010}$

≈ 219

Distance: ____219____ yards

The student has given an incorrect answer due to a calculation error. The student has shown complete support.

MATHEMATICS

C.3   Response Score: 2 points

25   The coordinate grid below shows the locations of Julia's house and
Carol's house.

Julia's house is located at (155, 102).

Carol's house is located at (493, 388).

A. What is the location of the midpoint between the girls' houses?
Show all your work.

Helpful Hint
- Midpoint $\left(\dfrac{x_1 + x_2}{2}, \dfrac{y_1 + y_2}{2} \right)$

Work: To find the midpoint, you must use the given midpoint formula where $x_1 = 155$ and $x_2 = 493$ for the x-value of the midpoint and $y_1 = 102$ and $y_2 = 388$ for the y-value of the midpoint. I did this and came up with (324, 245) for the midpoint between the girls houses.

Midpoint: (_____, _____)

The student has given a correct answer.
The student has shown correct but incomplete support, receiving ½ a point.

The same coordinate grid below shows the locations of Julia's house, Carol's house, and also the scale used to create the coordinate grid.
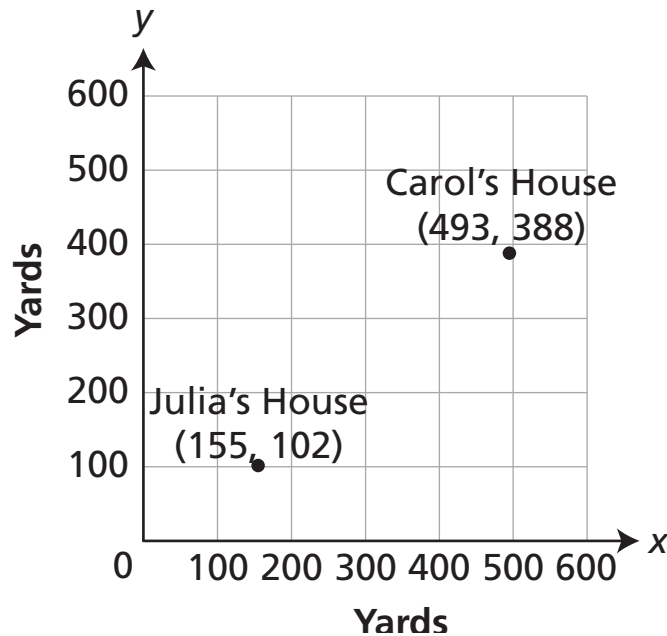
B. Use the answer from part A to find the distance, in yards, from each girl's house to the midpoint between the girls' houses.

Round the answer to the nearest yard. Show all your work.

Helpful Hint
- Distance Formula: $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Work:

Distance: _____221_____ yards

The student has given a correct answer.
The student has shown no support.
Based on PSSA-M scoring rules, 2½ points count as 2 points.

C.3   Response Score: 2 points

25 The coordinate grid below shows the locations of Julia's house and
Carol's house.

Julia's house is located at (155, 102).

Carol's house is located at (493, 388).
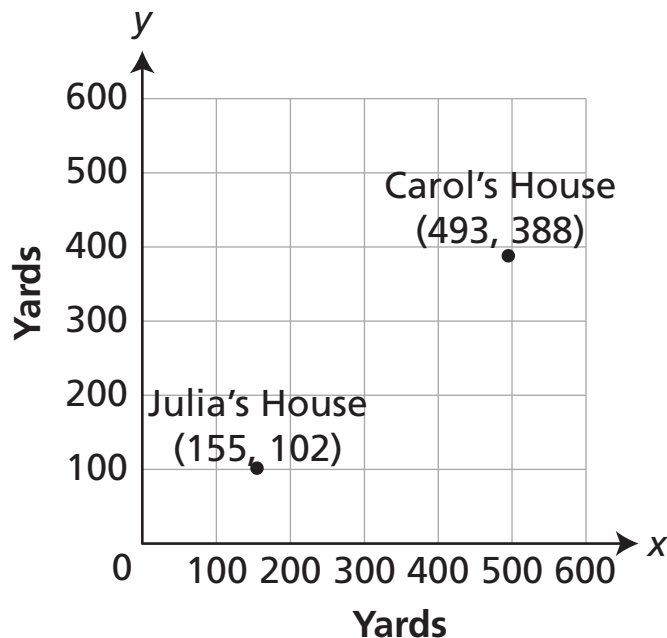
A. What is the location of the midpoint between the girls' houses?
Show all your work.

Helpful Hint
- Midpoint $\left(\dfrac{x_1 + x_2}{2}, \dfrac{y_1 + y_2}{2} \right)$

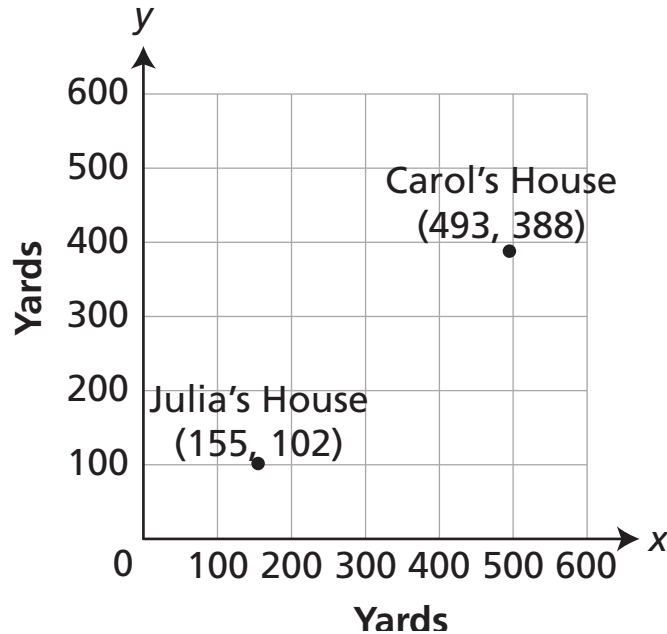**Work:** $\dfrac{493 + 155}{2} = \dfrac{648}{2} = 324$

Midpoint: (324 , 245 **)**

The student has given a correct answer.
The student has shown correct but incomplete support, receiving ½ a point.

MATHEMATICS

The same coordinate grid below shows the locations of Julia's house, Carol's house, and also the scale used to create the coordinate grid.

B. Use the answer from part A to find the distance, in yards, from each girl's house to the midpoint between the girls' houses.

Round the answer to the nearest yard. Show all your work.

Helpful Hint

- Distance Formula: $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Work:

$$\sqrt{(493 - 324)^2 + (388 - 245)^2}$$

$$= \sqrt{(169)^2 + (143)^2}$$

$$= \sqrt{28561 + 20449}$$

Distance: _____ yards

The student has given no answer.
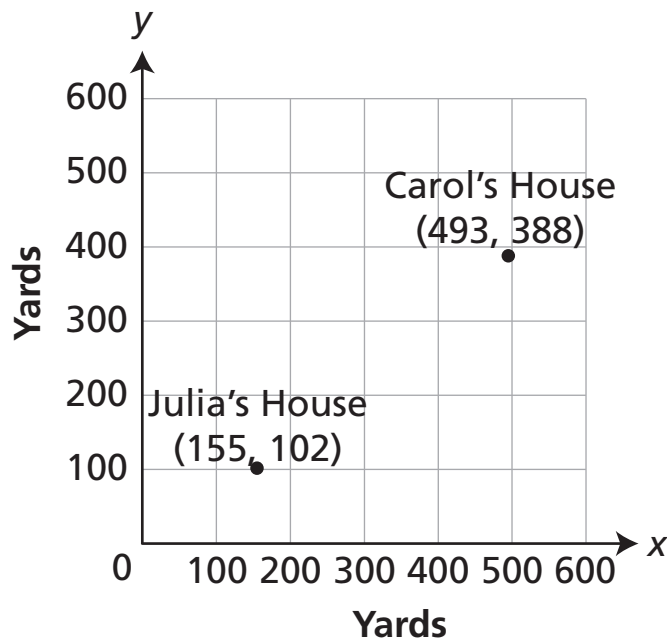The student has shown correct but incomplete support, receiving ½ a point.

C.3 **Response Score: 1 point**

25 The coordinate grid below shows the locations of Julia's house and Carol's house.

Julia's house is located at (155, 102).

Carol's house is located at (493, 388).

A. What is the location of the midpoint between the girls' houses? Show all your work.

Helpful Hint
- Midpoint $\left(\dfrac{x_1 + x_2}{2}, \dfrac{y_1 + y_2}{2} \right)$

Work: I added the x-value for Julia's house (155) and the x-value for Carol's house (493) to get 648. Then I divided 648 by 2 to get 324 for the x-value of the midpoint.

Midpoint: (_____ , _____)

The student has given a partially correct answer, receiving ½ a point.
The student has shown correct but incomplete support, receiving ½ a point.

The same coordinate grid below shows the locations of Julia's house, Carol's house, and also the scale used to create the coordinate grid.
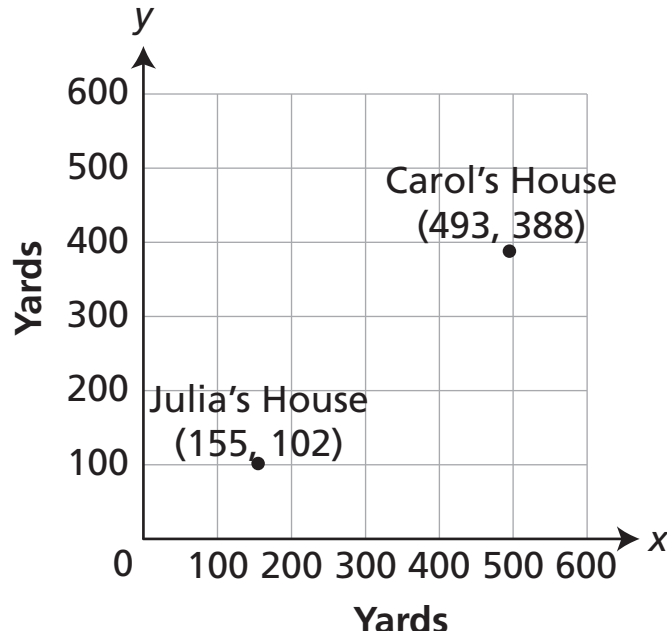
B. Use the answer from part A to find the distance, in yards, from each girl's house to the midpoint between the girls' houses.

Round the answer to the nearest yard. Show all your work.

Helpful Hint
• Distance Formula: $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Work:

$\sqrt{(493-155)^2 + (388-102)^2}$

$\sqrt{(338)^2 + (286)^2}$

$\sqrt{114244 + 81796}$

$\sqrt{196040}$

$442.76405 \longrightarrow$ Rounded to the nearest yard is 443 yards

Distance: _____443_____ yards

The student has given an incorrect answer.
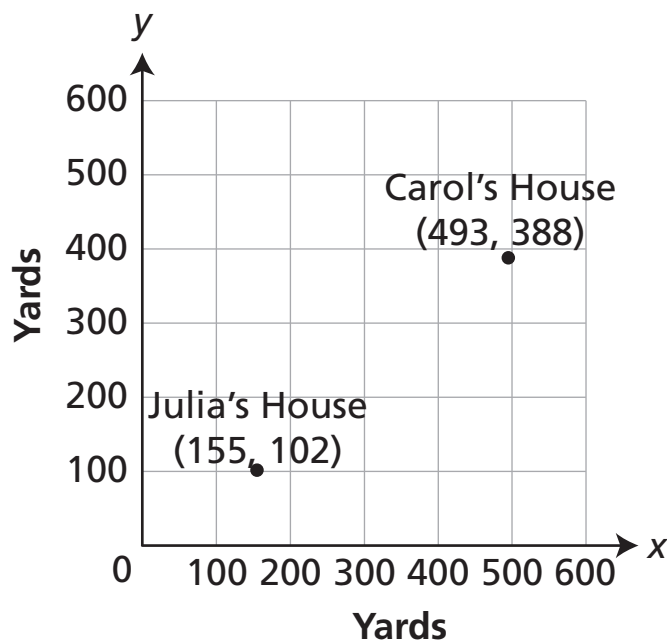The student has shown incorrect support.

C.3 Response Score: 1 point

25 The coordinate grid below shows the locations of Julia's house and Carol's house.

Julia's house is located at (155, 102).

Carol's house is located at (493, 388).

A. What is the location of the midpoint between the girls' houses? Show all your work.

Helpful Hint
- Midpoint $\left(\dfrac{x_1 + x_2}{2}, \dfrac{y_1 + y_2}{2} \right)$

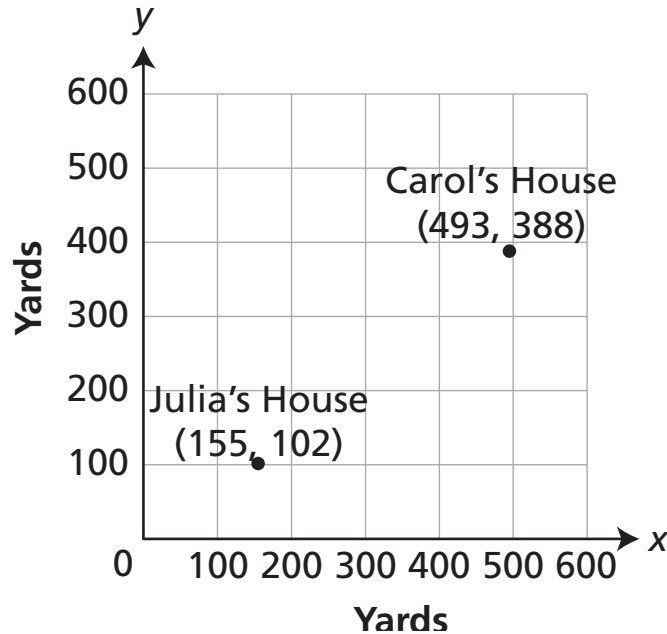Work: $\left(\dfrac{102+388}{2}, \dfrac{155+493}{2} \right)$

$\left(\dfrac{490}{2}, \dfrac{648}{2} \right)$

Midpoint: (245 , 324)

The student has given an incorrect answer (due to reversing the *x*- and *y*-values). The student has shown correct but incomplete support, receiving ½ a point.

The same coordinate grid below shows the locations of Julia's house, Carol's house, and also the scale used to create the coordinate grid.

B. Use the answer from part A to find the distance, in yards, from each girl's house to the midpoint between the girls' houses.

Round the answer to the nearest yard. Show all your work.

Helpful Hint
- Distance Formula: $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Work:

$\sqrt{(155-102)^2 + (493-388)^2}$

$\sqrt{(53)^2 + (105)^2}$

$\sqrt{2809 + 11025}$

$\sqrt{13834}$

117.61803

Rounds to 118

Distance: _____118_____ yards

> The student has given an incorrect answer.
> The student has shown incorrect support.
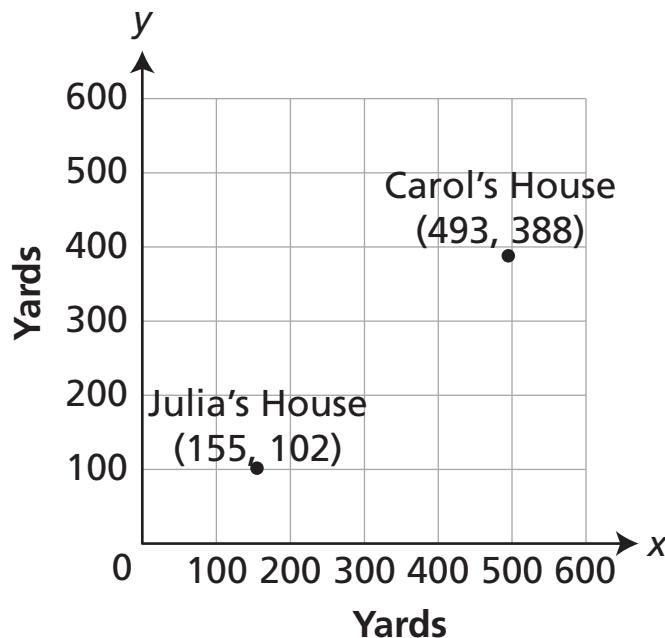> Based on PSSA-M scoring rules, ½ a point counts as 1 point.

C.3 **Response Score: 0**

25 The coordinate grid below shows the locations of Julia's house and Carol's house.

Julia's house is located at (155, 102).

Carol's house is located at (493, 388).

A. What is the location of the midpoint between the girls' houses? Show all your work.

> **Helpful Hint**
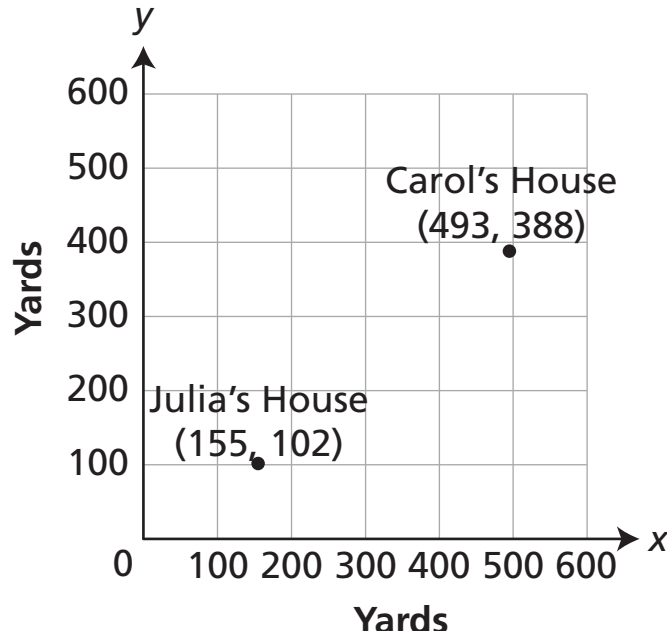> • Midpoint $\left(\dfrac{x_1 + x_2}{2}, \dfrac{y_1 + y_2}{2} \right)$

Work:

The midpoint is between (155,102) and (493,388)

Midpoint: (_____ , _____)

The student has given an incorrect answer.
The student has shown no support.

MATHEMATICS

The same coordinate grid below shows the locations of Julia's house, Carol's house, and also the scale used to create the coordinate grid.

B. Use the answer from part A to find the distance, in yards, from each girl's house to the midpoint between the girls' houses.

Round the answer to the nearest yard. Show all your work.

> **Helpful Hint**
> - Distance Formula: $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Work:

$$\sqrt{(155-102) + (493-388)}$$
$$\sqrt{53+105}$$
$$\sqrt{158}$$
$$12.57$$

Distance: ___13___ yards

> The student has given an incorrect answer.
> The student has shown incorrect support.

Modified Mathematics
Grade 11
Item and Scoring Sampler