

Geometry

OGT Short Answer Journal

Name \_\_\_\_\_

Period \_\_\_\_\_ Date \_\_\_\_\_

- 1) Adam was going to buy a new lawn mower from Lawn Care Depot for \$169, less a 10% discount. He saw the same mower on sale at Tractors-R-Us. Their mower originally cost \$210 and was on sale for  $\frac{1}{3}$  off.

In your **Answer Document**, determine the sale price of the mower at each store. Show your work or provide an explanation to support your answer.

Identify which store would be the most economical place to purchase the mower.

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- 2) Mrs. Foyle told Yolanda that her test had 38 problems worth a total of 100 points. Each test problem is worth either 5 points or 2 points. Yolanda wanted to determine how many 2-point and how many 5-point questions are on the test.

In your **Answer Document**, determine how many questions of each point-value are on the test. Show your work or provide an explanation to support your answer.

- 3) The following table contains math contest scores of two teams in a high school math contest.

**High School Math Contest Scores**

Team A	Team B
90	87
85	100
87	87
83	78
80	78

In your **Answer Document**, calculate the mean and median for each team. Determine which team scored better in the contest by comparing these measures.

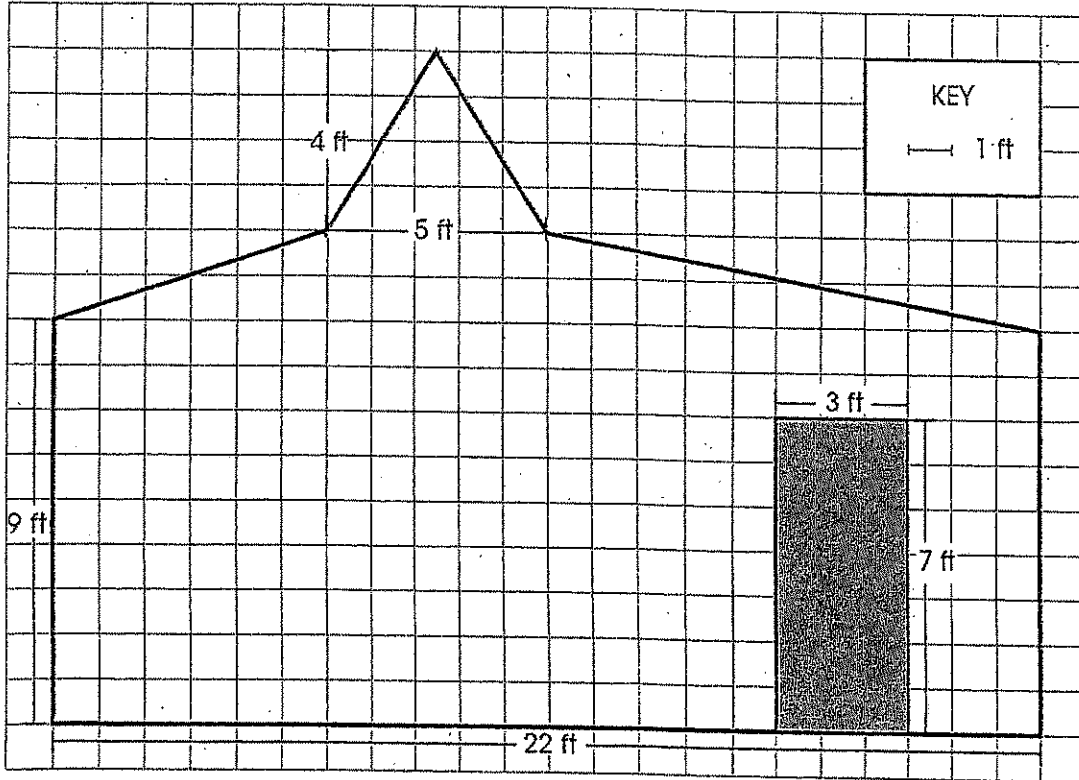
- 4) The maximum heart rate is the highest number of beats per minute recommended for a person while exercising. The rate is dependent upon the age of the person as shown below. The relationship is linear.

Age	Maximum Heart Rate
10	210
15	205
20	
25	
30	
35	
40	
45	
50	

In your **Answer Document**, copy and complete the table.

Write an equation that can be used to find the maximum heart rate for any age. Show your work or provide an explanation for how you determined your equation

- 5) The diagram below shows the dimensions of a wall that needs to be painted. The door represented by the shaded rectangle is **not** to be painted.



In your **Answer Document**, determine the area, to the nearest square foot, of the wall that is to be painted. Show your work or provide an explanation for your answer.



# 2006 OGT Short Answer

## Item

4. Adam was going to buy a new lawn mower from Lawn Care Depot for \$169, less a 10% discount. He saw the same mower on sale at Tractors-R-Us. Their mower originally cost \$210 and was on sale for  $\frac{1}{3}$  off.

In your **Answer Document**, determine the sale price of the mower at each store. Show your work or provide an explanation to support your answer.

Identify which store would be the most economical place to purchase the mower.

For question 4, respond completely in your **Answer Document**. (2 points)

### Sample Response for Item 4 (Short Answer):

Lawn Care

$$\$169 \times .9 = \$152.10 \quad \text{or} \quad 169(.1) = 16.9 \quad 169 - 16.9 = \$152.10$$

Tractors - R- Us

$$\$210 \times \frac{2}{3} = \$140$$

The mower costs less at Tractors - R - Us.

### Scoring Guidelines for Item 4:

Score Point	Description
2 points	The focus of the item is to calculate discounts of original prices. The response states that the sale price of the lawnmower at Lawn Care Depot is \$152.10 and the sale price at Tractors-R-Us is \$140. The student identifies Tractors-R-Us as the most economical place to purchase the mower.
1 point	The response provides evidence of a partially correct answer and/or solution process. The response shows understanding of some key elements of the task but contains gaps or flaws.

For example, the response may:

- Contain a correct calculation for either store and a conclusion that is consistent with the values given for both stores.

- Fail to identify the best buy but provide correct prices for the two stores.
- Contain the correct answers (\$152.10, \$140, Tractors-R-Us) but work is incomplete or missing.

0 points

The response indicates inadequate understanding of the task.

For example, the response may:

- State that Tractors-R-Us is more economical but provide no work or explanation.
- Include unrelated statements or work.

**Item**

10. Mrs. Foyle told Yolanda that her test had 38 problems worth a total of 100 points. Each test problem is worth either 5 points or 2 points. Yolanda wanted to determine how many 2-point and how many 5-point questions are on the test.

In your **Answer Document**, determine how many questions of each point-value are on the test. Show your work or provide an explanation to support your answer.

For question 10, respond completely in your **Answer Document**. (2 points)

**Sample Response for Item 10 (Short Answer):**

Use a system of equations:

$$\begin{aligned}x + y &= 38 \\2x + 5y &= 100 \quad \therefore x = 30 \text{ 2-point questions} \\ & \quad \quad \quad y = 8 \text{ 5-point questions}\end{aligned}$$

$$\begin{array}{r} -2x - 2y = -76 \\ 2x + 5y = 100 \\ \hline 3y = 24 \\ y = 8 \end{array}$$

$x + 8 = 38$   
 $x = 30$

OR

Use a table to guess-and-check:

Number of 2-points	35	32	30
Number of 5-points	3	6	8
Total number of points	85	94	100

There are 8 5-point questions and 30 2-point questions.

**Scoring Guidelines for Item 10:**

Score Point	Description
2 points	The focus of the item is to determine the number of 2-point and 5-point questions on the test. The response indicates that there are 30 two-point and 8 five-point questions with supporting work or explanation.
1 point	The response provides evidence of a partially correct answer and/or solution process. The response shows understanding of some key elements of the task but contains gaps or flaws.

For example, the response may:

- Provide the correct answer with missing or incomplete work.
- Provide an incorrect answer based on slightly flawed equations.
- Provide correct equations or demonstrate a valid process but contain a calculation error in determining the solution.

0 points

The response indicates inadequate understanding of the task.

For example, the response may:

- Contain one answer (8 or 30) with no correct work.
- Include unrelated statements or work.



22. The following table contains math contest scores of two teams in a high school math contest.

72 72 2787 100

**High School Math Contest Scores**

Team A	Team B
90	87
85	100
87	87
83	78
80	78

80 83 85 87 90

Team A  
 mean: 85  
 Median: 85

Team B  
 Mean: 86  
 Median: 87

In your **Answer Document**, calculate the mean and median for each team. Determine which team scored better in the contest by comparing these measures.

For question 22, respond completely in your **Answer Document**. (2 points)

**Sample Response for Item 22 (Short Answer):**

The mean for team B is higher (86 vs. 85) and the median is also higher (87 vs. 85). These two measures of center suggest that team B scored better.

**Scoring Guidelines for Item 22:**

Score Point Description

2 points The focus of the item is to determine the mean and median for each team and make a comparison of these measures. The response contains the mean and median for each team (Team A – mean 85, median 85; Team B – mean 86, median 87) and compares them to determine that Team B scored higher for both measures.

1 point The response provides evidence of a partially correct answer and/or solution process. The response shows understanding of some key elements of the task but contains gaps or flaws.

For example, the response may:

- Contain the correct mean for both teams or median for both teams and makes the comparison based on only one measure of center.
- Contain calculation errors in determining one or two of the measures but make a correct comparison based on the values provided.
- Contain the four correct measures of center with no comparison to determine that Team B scored better.

0 points

The response indicates inadequate understanding of the task.

For example, the response may:

- Contain fewer than four correct measures of center for the two teams with no comparison of the measures.
- State that Team B scored better with no support.
- Include unrelated statements or work.

**Item**

28. The maximum heart rate is the highest number of beats per minute recommended for a person while exercising. The rate is dependent upon the age of the person as shown below. The relationship is linear.

Age	Maximum Heart Rate
10	210
15	205
20	
25	
30	
35	
40	
45	
50	

In your **Answer Document**, copy and complete the table.

Write an equation that can be used to find the maximum heart rate for any age. Show your work or provide an explanation for how you determined your equation

For question 28, respond completely in your **Answer Document**. (2 points).

**Sample Response for Item 28 (Short Response):**

<i>a</i>	<i>R</i>
10	210
15	205
20	200
25	195
30	190
35	185
40	180
45	175
50	170

*R* decreases by 1 for each additional year in age, so the slope is -1.

OR  $m = \frac{210 - 205}{10 - 15} = -1$

$210 = -1(10) + b$ ,  
so the y-intercept is 220

$$R = -A + 220$$

$$y = -x + 220$$

### Sample Equations

$$R = -A + 220 \text{ or } R = 220 - A \text{ or } A = 220 - R \text{ or}$$

$$R - 210 = -1(A-10) \text{ or } R - 210 = -A + 10 \text{ or } R = -A + 220$$

### Scoring Guidelines for Item 28:

Score Point Description

2 points The focus of the item is to complete a table and to determine an equation that models the data in the table. The response contains a completed table and an equation for the relationship shown in the table.

1 point The response provides evidence of a partially correct answer and/or solution process. The response shows understanding of some key elements of the task but contains gaps or flaws.

For example, the response may:

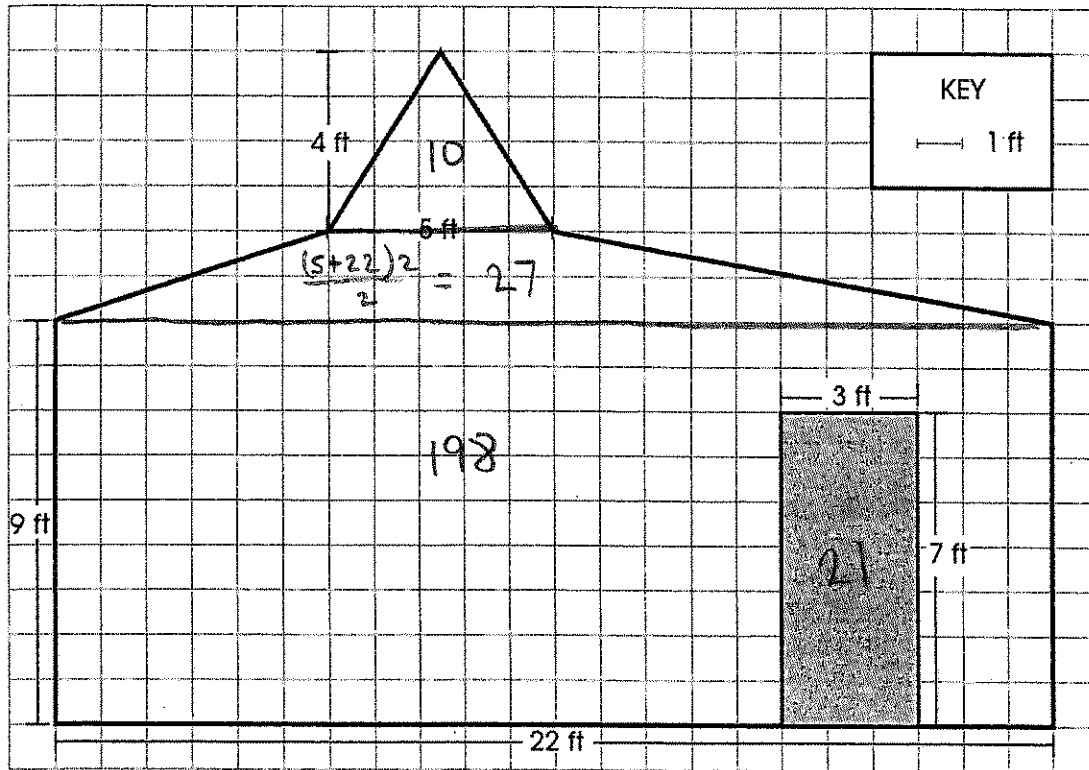
- Contain a completed table, but the equation is incorrect or missing.
- Contain a correct equation, but the table is incorrect, incomplete or missing.
- Identify the correct slope or y-intercept of the equation, with or without the completed table.

0 points The response indicates inadequate understanding of the task.

For example, the response may:

- Contain a partially completed or incorrectly completed table with no additional work.
- Include unrelated statements or work.

34. The diagram below shows the dimensions of a wall that needs to be painted. The door represented by the shaded rectangle is **not** to be painted.



$$\begin{array}{r}
 198 \text{ Rect} \\
 + 10 \Delta \\
 + 27 \text{ trap} \\
 \hline
 235 \\
 - 21 \\
 \hline
 214 \text{ ft}^2
 \end{array}$$

In your **Answer Document**, determine the area, to the nearest square foot, of the wall that is to be painted. Show your work or provide an explanation for your answer.

For question 34, respond completely in your **Answer Document**. (2 points)

**Sample Response for Item 34 (Short Answer):**

$$(9 \times 22) - (7 \times 3) + \left( \frac{1}{2} \times 6 \times 2 \right) + (5 \times 2) + \left( \frac{1}{2} \times 11 \times 2 \right) + \left( \frac{1}{2} \times 5 \times 4 \right) = 214 \text{ ft}^2$$

OR

$$(9 \times 22) - (7 \times 3) + \frac{1}{2}(22 + 5)2 + \left(\frac{1}{2} \times 5 \times 4\right) = 214 \text{ ft}^2$$

OR

A close approximation based on counting squares.

**Scoring Guidelines for Item 34:**

Score point    Directions

2-points        The focus of the item is to determine the area, to the nearest square foot, of the wall to be painted. The response indicates that the area to be painted is approximately 214 ft<sup>2</sup> with supporting work or explanation.

1-point         The response provides evidence of a partially correct answer and/or solution process. The response shows understanding of some key elements of the task but contains gaps or flaws.

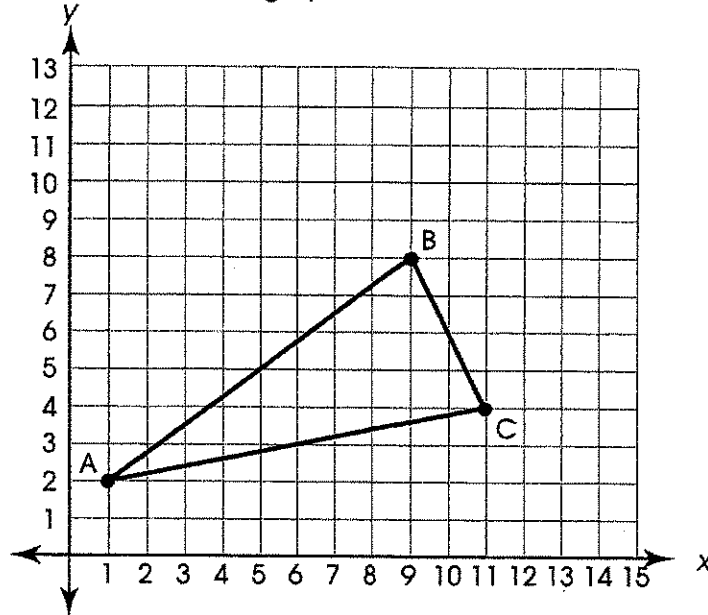
For example, the response may:

- Provide an incorrect area based on a slightly flawed process (e.g., the area of the entire wall but fail to subtract the area of the door.)
- Provide a correct process for finding the area to be painted but contain computational errors.
- Provide a correct area to be painted with missing or incomplete work/explanation.

0 points        The response indicates inadequate understanding of the task.

**Item**

40. Triangle ABC is shown on the graph.



In your **Answer Document**, show that the segment connecting the midpoints of  $\overline{AB}$  and  $\overline{BC}$  is parallel to  $\overline{AC}$  and one-half its length. Show your work or provide an explanation for your answer.

For question 40, respond completely in your **Answer Document**. (4 points)

**Sample Response for Item 40 (Extended Response):**

$$\text{Midpt } \overline{AB} = \left( \frac{9+1}{2}, \frac{8+2}{2} \right) = (5, 5)$$

$$\text{Midpt } \overline{BC} = \left( \frac{11+9}{2}, \frac{8+4}{2} \right) = (10, 6)$$

$$\text{Midsegment: slope} = \frac{6-5}{10-5} = \frac{1}{5}$$

$$\text{Side AC: slope} = \frac{4-2}{11-1} = \frac{1}{5}$$

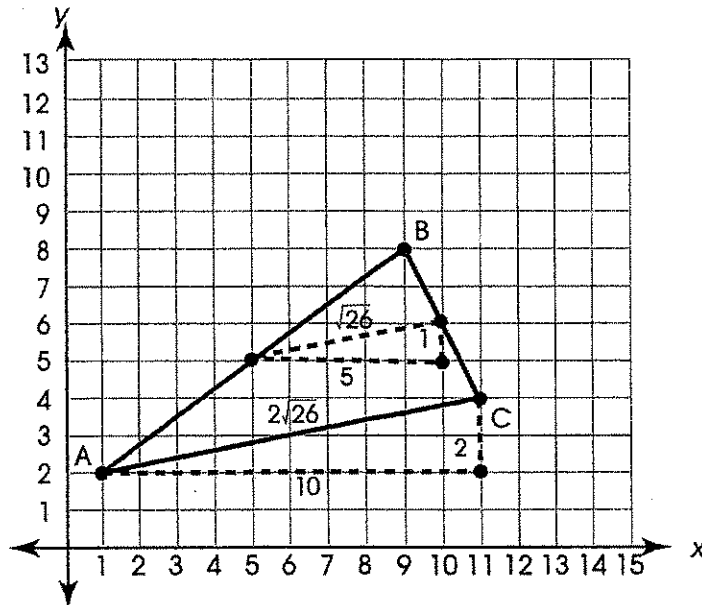
The slopes are equal so they are parallel

$$\text{Midsegment: length} = \sqrt{(10-5)^2 + (6-5)^2} = \sqrt{26}$$

Side: length =  $\sqrt{(11-1)^2 + (4-2)^2} = \sqrt{104} = 2\sqrt{26}$

Midsegment is equal to  $\frac{1}{2} AC$

OR



Student may provide a graphic solution by locating the midpoints and showing that the "rise over run" is the same for both the midpoint segment and the line and demonstrating that length of the midpoint segment is half the length of side AC using the Pythagorean theorem or similar triangles.

OR

There is a geometric theorem which states a segment joining the midpoints of two sides of a triangle is parallel to and equal to  $\frac{1}{2}$  the length of the third side of the triangle.

#### Scoring Guidelines for Item 40

Score Point Directions

4 points The focus of this item is the use of coordinate geometry to demonstrate relationships within a geometric figure. The response provides a demonstration that the mid-segment is parallel to and one-half the length of side  $\overline{AC}$  by finding the midpoints of  $\overline{AB}$  and  $\overline{BC}$  and comparing the slope and length of the segment formed with the slope and length of  $\overline{AC}$  or by completely stating the theorem.



- 3 points      The response clearly addresses the key aspects of the task; however, it includes errors in completing one or two components.
- For example, the response may:
- Correctly locate the midpoints and successfully demonstrate one half of the relationship. For the other part, the response demonstrates a correct procedure but contains computational errors or a minor graphing error (e.g., miscopies initial graph, but correctly demonstrates relationship).
- 2 points      The response provides evidence of a partially correct answer and/or solution process. The response may adequately address some of the components of the task, but contain gaps or flaws in other components.
- For example, the response may:
- Correctly locate the midpoints and demonstrate an attempt to compare both slope and length but contain computational errors in each.
  - Correctly locate the midpoint and correctly compare either the slope or the length algebraically or graphically, but the other is attempted with an incorrect procedure or omitted.
  - Incorrectly locate the midpoints and attempt to compare both values by correctly finding values for both slopes and lengths or making an appropriate graphical comparison for both relationships.
- 1 point      The response omits significant aspects of the task. There is evidence of minimal understanding of the concepts involved in the task and/or solution process; however, the response includes significant errors in most of the components of the task.
- For example, the response may:
- Correctly find both midpoints algebraically or graphically but contain no other correct work.
  - Incorrectly determine the midpoints but correctly determine the slope or length of the midsegment based on those values.
  - Find the slope and/or length of  $\overline{AC}$ .
- 0 points      The response indicates inadequate understanding of the task.
- For example, the response may:
- Include unrelated statements or work.

