

**Ohio Achievement Test  
Grade 8 Mathematics**

**March 2005**

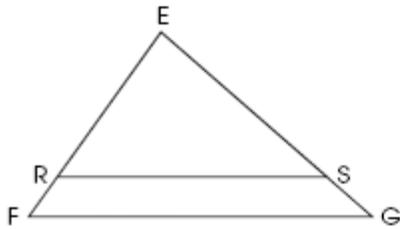
**Answer Key  
and  
Scoring Guidelines**

**Grade 8 Mathematics  
Answer Key  
March 2005**

<b>Item No.</b>	<b>Type</b>	<b>Content Standard</b>	<b>Content Standard Benchmark</b>	<b>Key</b>
1	Multiple Choice	Number, Number Sense and Operations	I	B
2	Multiple Choice	Measurement	B	C
3	Multiple Choice	Data Analysis and Probability	A	C
4	Multiple Choice	Geometry and Spatial Sense	D	C
5	Multiple Choice	Measurement	D	A
6	Short Answer	Geometry and Spatial Sense	B	2 pt rubric
7	Multiple Choice	Data Analysis and Probability	H	D
8	Multiple Choice	Measurement	C	C
9	Multiple Choice	Patterns, Functions and Algebra	C	B
10	Multiple Choice	Patterns, Functions and Algebra	F	A
11	Short Answer	Patterns, Functions and Algebra	H	2 pt rubric
12	Multiple Choice	Number, Number Sense and Operations	G	D
13	Multiple Choice	Data Analysis and Probability	F	B
14	Multiple Choice	Number, Number Sense and Operations	B	D
15	Multiple Choice	Geometry and Spatial Sense	B	D
16	Short Answer	Measurement	E	2 pt rubric
17	Multiple Choice	Geometry and Spatial Sense	E	A
18	Multiple Choice	Number, Number Sense and Operations	H	A
<b>19-24</b>	<b>Field Test questions not used in student score</b>			
25	Multiple Choice	Number, Number Sense and Operations	G	A
26	Extended Response	Data Analysis and Probability	F ; A	4 pt rubric
27	Multiple Choice	Number, Number Sense and Operations	H	C
28	Multiple Choice	Patterns, Functions and Algebra	G	B
29	Multiple Choice	Measurement	D	C
30	Multiple Choice	Geometry and Spatial Sense	H	A
31	Short Answer	Patterns, Functions and Algebra	A	2 pt rubric
32	Multiple Choice	Data Analysis and Probability	J	C
33	Multiple Choice	Patterns, Functions and Algebra	C	A
34	Multiple Choice	Data Analysis and Probability	A ; D	B
35	Multiple Choice	Geometry and Spatial Sense	C	B
36	Short Answer	Number, Number Sense and Operations	G	2 pt rubric
37	Multiple Choice	Number, Number Sense and Operations	A	B
38	Multiple Choice	Measurement	E	B
39	Multiple Choice	Geometry and Spatial Sense	F	A
40	Multiple Choice	Number, Number Sense and Operations	F	D
41	Multiple Choice	Data Analysis and Probability	D	A
42	Multiple Choice	Patterns, Functions and Algebra	B	C
43	Multiple Choice	Patterns, Functions and Algebra	J	D
44	Multiple Choice	Measurement	D	A

Limited = 0-9; Basic = 10-15; Proficient = 16-26; Accelerated = 27-35; Advanced = 36-46  
Multiple Choice = 1 point; Short Answer = 2 points; Extended Response = 4 points

6. Jason constructed the figure shown.



For question 6, respond completely in your **Answer Document**. (2 points)

He knows  $\triangle ERS$  is similar to  $\triangle EFG$  and that  $\overline{RS} \parallel \overline{FG}$ .

Jason claims  $\angle ERS \cong \angle EFG$ .

In your **Answer Document**, identify two geometric properties that can be used to justify Jason's claim.

### Scoring Guidelines

Points	Student Response
2 point	<p><b>Sample Response:</b></p> <ul style="list-style-type: none"> <li>Since the triangles are similar, corresponding angles ERS and EFG are congruent. In addition, angle ERS is congruent to angle EFG, because EF intersects parallel lines (RS and FG) and creates congruent corresponding angles.</li> </ul> <p>The focus of this task is to describe and apply the properties of similar triangles and parallel lines. The response explains that because the two triangles are similar, the corresponding angles of similar triangles are congruent. The response also explains that because the lines are parallel corresponding angles are congruent.</p> <p><b>NOTE:</b> Response does not need to use formal geometric notation.</p>
1 point	<p>The response shows partial evidence of describing and applying the properties of similar triangles or parallel lines; however, the solution may be incomplete or slightly flawed.</p> <p><b>Sample Response:</b> The response may:</p> <ul style="list-style-type: none"> <li>Suggest that angles ERS and EFG are congruent by similar triangles but fails to mention parallel lines.</li> <li>Explain that parallel lines create congruent corresponding angles but fails to use properties of similar triangles.</li> </ul>
0 point	<p>The response shows inadequate evidence of describing and applying the properties of similar triangles and parallel lines. The response provides an explanation with major flaws and errors of reasoning.</p> <p><b>Sample Response:</b> The response may:</p> <ul style="list-style-type: none"> <li>Restate the information provided in the item.</li> <li>Provide irrelevant information.</li> <li>Be blank.</li> </ul>

11. Will plans to buy at least 10, and possibly more, new CDs and is trying to decide between two different CD offers.

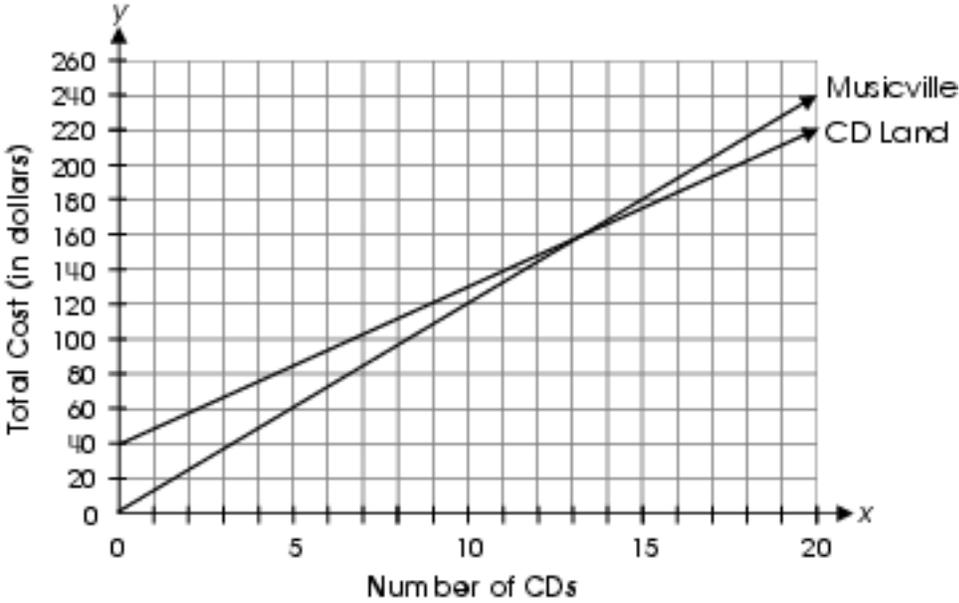
**CD-Land** charges \$40 to become a member of a frequent buyers club and \$9 for each CD you buy.

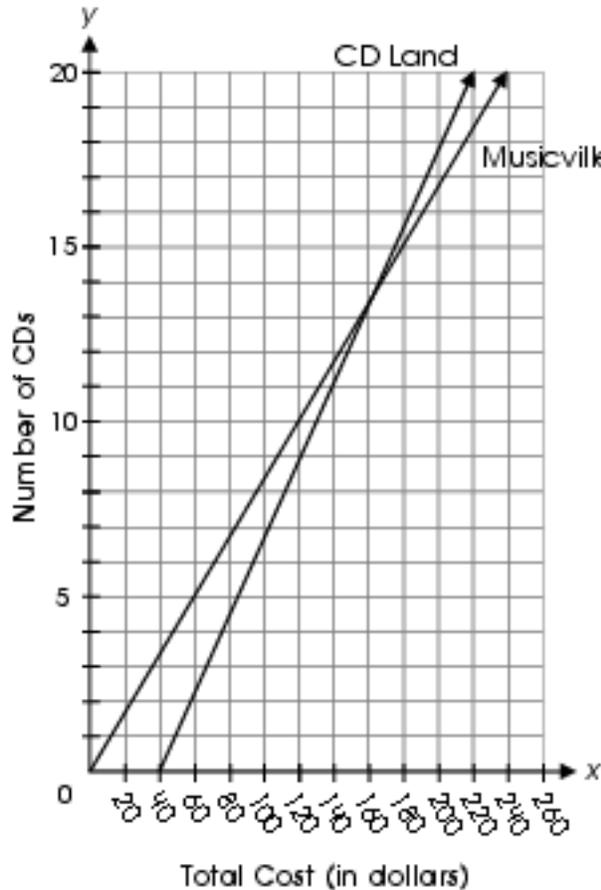
**MUSICVILLE** has no membership fee and charges \$12 for each CD you buy.

For question 11, respond completely in your **Answer Document**. (2 points)

In your **Answer Document**, create and label a double line graph that shows the cost of 1 to 20 CDs for each of the two offers. Explain how Will can use this graph to decide which offer to accept.

### Scoring Guidelines

Points	Student Response
2 point	<p><b>Sample Response:</b></p>  <p>If Will wants to buy only 10 CDs, he should go to Musicville, because 10 CDs will cost him \$120 there and \$130 at CD-Land. If Will wants to buy more than 13 CDs, he should go to CD-Land.</p> <p>I can use the graph to identify where the two plans cost the same by seeing where the lines cross.</p> <p>When one plan costs more or less than the other for a given number of CDs by looking at which line is below the other line.</p>



If Will wants to buy only 10 CDs, he should go to Musicville, because 10 CDs will cost him \$120 there and \$130 at CD-Land. If Will wants to buy more than 13 CDs, he should go to CD-Land.

The focus of this task is to draw a double line graph and draw conclusions from this graph. A correct response will include a graph representing the cost of 1-20 CD's for two situations, then draw accurate conclusions from the graph. The response will include an accurate graph with two lines. CD-Land is represented by the line  $y = 9x + 40$  and Musicville is represented by the line  $y = 12x$ . (Although the equations of the lines do not need to be identified.) The student explains that the Musicville plan is better for 10 CDs, but the CD-Land plan is better for more than 13 CDs or provides an appropriate explanation for how to use the graph.

1 point	<p>The response provides partial evidence of drawing a double line graph and drawing conclusions from this graph; however, the graph and/or conclusions may be incomplete or slightly flawed.</p> <p><b>Sample Response:</b> The response may:</p> <ul style="list-style-type: none"> <li>• Show lines that are graphed correctly, but states that CD-Land is the better value no matter how many CDs Will buys.</li> <li>• Show one line that is graphed incorrectly, and the conclusion is based on the incorrect graph.</li> </ul>
---------	---

	<ul style="list-style-type: none"> <li>• Show a correct graph but does not explain how Will can use the graph to decide which offer to accept.</li> <li>• Show the two lines graphed correctly on two separate grids.</li> </ul>
0 point	<p>The response provides inadequate evidence of drawing a double line graph and drawing conclusions from this graph. The response provides an explanation with major flaws and errors of reasoning.</p> <p><b>Sample Response:</b> The response may:</p> <ul style="list-style-type: none"> <li>• Restate the information provided in the item.</li> <li>• Be blank or provide irrelevant information.</li> <li>• No graph given.</li> </ul>

16. A wooden fence was built around a construction site. The wall is 600 feet long and 8 feet high. Each 12-foot length of the fence has a 2-foot by 2-foot window cut into the wall so people can watch the construction.



The city council asked the construction company to paint the side of the fence facing the street. A gallon of paint will cover approximately 250 square feet.

In your **Answer Document**, determine how many gallons of paint are needed to paint one side of the fence. Show your work to support your answer.

For question 16, respond completely in your **Answer Document**. (2 points)

### Scoring Guidelines

Points	Student Response
2 point	<p><b>Sample Response:</b></p> <ul style="list-style-type: none"> <li>• <math>A(\text{wall}) = 600 \times 8 = 4,800</math> sq ft            Number of windows = <math>600 / 12 = 50</math>  <math>A(\text{windows}) = 50 \times (2 \times 2) = 200</math> sq ft  <math>A(\text{wall-windows}) = 4,800 - 200 = 4,600</math> sq ft            Paint needed: <math>4,600 / 250 = 18.4</math> gallons OR 19 gallons</li> <li>• Area of wall before windows cut out <math>4,800 / 250 = 19.2</math> gallons to paint full wall. Area of windows <math>50(4) = 200</math> so this means almost a gallon is not needed. So between 18 and 19 gallons are needed.</li> </ul> <p>The focus of this task is to use conventional formulas to find area. A correct response will determine the amount of paint required to cover a wall that has a given number of openings. The response shows all work and gives the correct number of gallons.</p> <p><b>NOTE:</b> Students may deal with the partial gallon differently as long as process and computation are accurate. For example, if sample corrected response is rounded to 18 with all work shown.</p>
1 point	<p>The response provides partial evidence of using conventional formulas to find area; however, the solution may be incomplete or slightly flawed.</p> <p><b>Sample Response:</b>            The response may:</p> <ul style="list-style-type: none"> <li>• Show the correct formulas, but an error in calculation results in an incorrect response.</li> <li>• Provide a miscalculation of the number of windows but calculates the rest of the problem correctly.</li> <li>• Use the drawing exactly as shown.</li> <li>• Not consider the windows in the calculation of the area but works the answer down to <math>4,800/250 = 19.2</math> gallons.</li> <li>• State the correct surface area of the wall but forgets to determine how many gallons are needed.</li> </ul>

0 point	<p>The response provides inadequate evidence of using conventional formulas to find area. The response provides an explanation with major flaws and errors of reasoning.</p> <p><b>Sample Response:</b> The response may:</p> <ul style="list-style-type: none"><li>• State <math>600/250 = 2.4</math> gallons are needed.</li><li>• State any number of gallons with no supporting work.</li><li>• Restate the information provided in the item.</li></ul>
---------	---

26. There are 8 homes for sale near Bell Middle School. The chart below shows the square footage and cost of each house.

Square Feet	Cost
1400	\$95,000
4275	\$350,000
2100	\$239,000
1850	\$139,000
2550	\$259,000
3100	\$299,000
1900	\$189,000
2200	\$160,000

For question 26, respond completely in your **Answer Document**. (4 points)

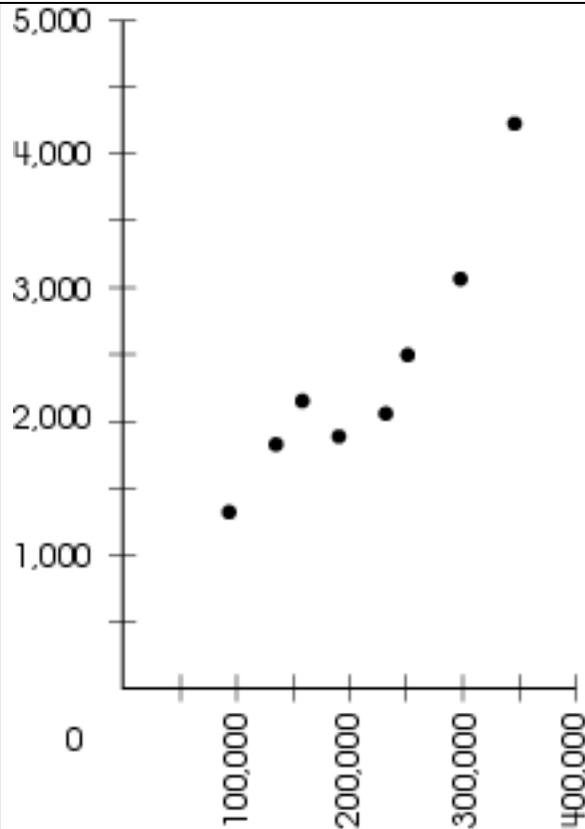
In your **Answer Document**, create a scatter plot that represents the data in the chart. Be sure to label your axes and create appropriate scales.

Use the scatter plot to explain the relationship that exists between the number of square feet and the cost of the 8 houses.

Use the data to predict the approximate cost of a house that has 6,000 square feet. Use mathematics to explain or support your prediction.

### Scoring Guidelines

Points	Student Response
4 point	<p>Sample Correct Responses:</p> <p>The bigger houses have higher prices. A 6,000-square-foot house would cost approximately \$480,000.</p>



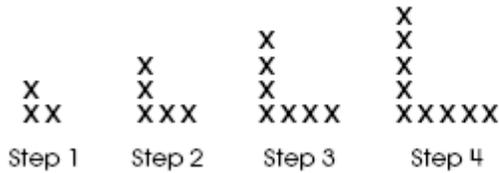
Bigger houses have a higher price. A 6,000-square-foot house would cost approximately \$600,000.

The focus of this task is to construct a scatter plot and make conjectures about possible relationships in a scatter plot. The response correctly describes the increase in prices resulting from the increase in home size, as shown by the points on the graph. The response also predicts that a 6,000-square-foot house would cost between \$400,000 and \$600,000, and provides appropriate support.

3 point	<p>The response provides evidence of constructing a scatter plot and making conjectures about possible relationships in a scatter plot; however, the solution may be incomplete or slightly flawed.</p> <p><b>Sample Response:</b> The response may: Include all three components (graph, description of the relationship between house size and cost, accurate prediction of larger house price with adequate support) but has one or two minor errors; e.g., lack of appropriate scale, omits graphing one or two points.</p>
2 point	<p>The response provides partial evidence of constructing a scatter plot and making conjectures about possible relationships in a scatter plot; however, the solution is incomplete and/or contains flaws.</p> <p><b>Sample Response:</b> The response may: Include only two of the three required components (graph, description of the relationship between house size and cost, accurate prediction of house price with adequate support).</p>

1 point	<p>The response provides minimal evidence of constructing a scatter plot and making conjectures about possible relationships in a scatter plot. The response has major flaws and errors in reasoning.</p> <p><b>Sample Response:</b> The response may:</p> <ul style="list-style-type: none"> <li>• Fail to provide a graph, or show an inaccurate graph, but give an accurate price prediction with adequate support.</li> <li>• Show a graph that is somewhat accurate, but an explanation of the relationship between home size and cost and a predicted price are missing or inaccurate.</li> </ul>
0 point	<p>The response provides inadequate evidence of constructing a scatter plot and making conjectures about possible relationships in a scatter plot.</p> <p><b>Sample Response:</b> The response may:</p> <ul style="list-style-type: none"> <li>• Include no attempt to create a graph or create an inaccurate graph with no explanation or prediction.</li> <li>• Offer explanations or predictions that are wholly inaccurate.</li> <li>• Be blank or state unrelated statements.</li> </ul>

31. The first four steps in a pattern are shown:



For question 31, respond completely in your **Answer Document**. (2 points)

In your **Answer Document**, write an equation or a rule that can be used to find the number of x's in any step of the pattern. Use your equation or rule to find the number of the x's for step 50.

### Scoring Guidelines

Points	Student Response
2 point	<p><b>Sample Response:</b>            Number of x's = <math>2 \times \text{step} + 1</math>            Number of x's (step 50) = <math>2 \times 50 + 1</math>              = <math>100 + 1</math>              = 101</p> <p><math>x = 3 + 2(n - 1)</math>    <math>x = \text{number of x's and } n = \text{step number}</math>  <math>x = 3 + 2(50 - 1)</math>              = <math>3 + 98</math>              = 101</p> <p>To find the number of x's, multiply the step number by 2 and then add 1.  <math>x = 3 + 2(n - 1)</math>    <math>x = \text{number of x's and } n = \text{step number}</math>  <math>50 \times 2 = 100</math>      <math>100 + 1 = 101</math></p> <p>There would be 101 x's for step 50.</p> <p>The focus of this task is to generalize a pattern and create an equation or rule that can be used to find the <math>n</math>th term. Response includes a clear and complete equation or rule that will result in the correct number of x's for any step in the pattern. The equation or rule must result in a correct answer for all steps, including step 1. The response also provides evidence to verify or show that the equation or rule does result in a correct answer (101 x's) when used to find the number of x's in step 50 (101 x's); e.g., substitutes 50 into the equation and/or starts with 50 and performs the actions defined in the rule.</p> <p><b>NOTE:</b> There are a variety of equivalent equations and rules that may be used to generalize the pattern and can be used to find the number of x's for any step in the pattern.</p>
1 point	<p>The response provides partial evidence of generalizing or explaining the pattern; however, the solution may be incomplete or slightly flawed; e.g., may include an equation or rule that can be used to describe, but not generalize, the pattern or an error is made when using an accurate equation or rule to find the number of x's for step 50.</p>

	<p><b>Sample Response:</b> The response may:</p> <ul style="list-style-type: none"> <li>• Provide an incomplete equation or rule that describes how to extend the pattern to find additional steps or an equation or rule that will not work for step 1; e.g., “add 2 to each step” or “the steps are consecutive odd numbers” or “<math>x = 2</math> times the previous step + 1” (does not work for step 1). The response shows how to use the incomplete equation or description to accurately extend the pattern and identifies 101 x’s for step 50.</li> <li>• State an accurate equation or rule; however, includes an incorrect answer for the number of x’s for step 50 due to a computation error in using the equation or rule.</li> <li>• Identify an accurate equation or rule and does not attempt or complete the process for finding the number of x’s for step 50; e.g., substitutes 50 into the equation with no other work or writes “101”, or another number, with no evidence of using the stated equation or rule.</li> <li>• Determine the number of x’s for step 50 (101 x’s) with supporting work that clearly communicates an accurate generalization of the pattern and complete steps that can be used to find the number of x’s for any step, but does not clearly or specifically state a general equation or rule; e.g., number of x’s in step 50 = 2 times 50 + 1 = 101 x’s.</li> </ul>
0 point	<p>The response provides inadequate evidence of using an equation or rule to generalize and explain a pattern. It may include no equation or rule or a highly flawed equation or rule that yields an incorrect number of x’s for many steps in the pattern; e.g., <math>x's = 3</math> times the step number. Finding the number of x’s for step 50 using a highly flawed equation or rule is insufficient to earn one point; e.g., showing work indicating 3 times 50 is 150 based on the example of a highly flawed equation/rule does not demonstrate minimal understanding of generalizing or explaining a pattern.</p> <p><b>Sample Response:</b> The response may:</p> <ul style="list-style-type: none"> <li>• Include the number 101, with no equation, rule or other evidence of generalizing the pattern; e.g., show no work or only extends the pattern by drawing x’s.</li> <li>• Show some work; however, the work shown has very limited or no connection to components of the task; e.g., includes a partial rule, equation and/or work showing little or no understanding of the task; e.g., “the L’s gets bigger each time”, “the answer is an odd number”, step 50 = step 4 plus 46.</li> <li>• Recopy information provided in the item with no work.</li> <li>• Provide unrelated statements or work.</li> <li>• Be blank.</li> </ul>

36. Cheryl is a member of the basketball team. She made 44 out of 50 foul shots last year. Cheryl has made 18 out of 20 foul shots so far this year.

For question 36, respond completely in your **Answer Document**. (2 points)

In your **Answer Document**, write what Cheryl could say to convince her coach that she is shooting foul shots better this year. Use the data to support your answer.

### Scoring Guidelines

Points	Student Response
2 point	<p><b>Sample Response:</b></p> $\frac{44}{50} = 88\%$ <p>Last year Cheryl shot <math>\frac{44}{50} = 88\%</math></p> $\frac{18}{20} = 90\%$ <p>This year Cheryl shot <math>\frac{18}{20} = 90\%</math></p> <p>This year's shooting percentage is 2% higher than last year's.</p> $\frac{18}{20} - \frac{44}{50} = 900 > 880$ <p>This year Cheryl's shooting percentage is higher than last year.</p> $\frac{44}{50} = \frac{88}{100}$ <p>Last year Cheryl shot <math>\frac{44}{50} = \frac{88}{100}</math></p> $\frac{18}{20} = \frac{90}{100}$ <p>This year Cheryl shot <math>\frac{18}{20} = \frac{90}{100}</math></p> <p>This year's shooting percentage is <math>\frac{2}{100}</math> higher than last year's.</p> <p>The focus of this task is to compare ratios. The response should present the two foul-shot ratios as percents, fractions or decimals and conclude that Cheryl is shooting better this year than last year.</p> <p><b>NOTE:</b> Student may compare these ratios as fractions without finding common denominators.</p>
1 point	<p>The response provides partial evidence of comparing ratios; however, information may be incomplete or slightly flawed.</p> <p><b>Sample Response:</b></p> <p>The response may:</p> <ul style="list-style-type: none"> <li>• Provide correct computation in comparing the ratios, but fail to present an argument about which year is better.</li> <li>• Make a computational error in comparing the ratio but make a reasonable argument based on their incorrect computations.</li> </ul>
0 point	<p>The response provides inadequate evidence of comparing ratios.</p> <p><b>Sample Response:</b></p> <p>The response may:</p> <ul style="list-style-type: none"> <li>• State only missed 2 this year vs. 6 last year.</li> <li>• Restate the information provided in the item.</li> <li>• Provide irrelevant information.</li> <li>• Be blank.</li> </ul>