

Ohio Grade 4 Mathematics Achievement Test

March 2006

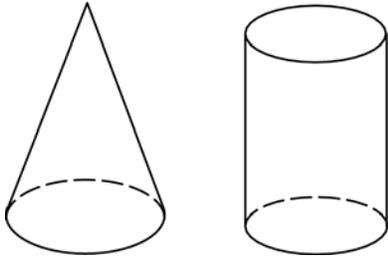
**Answer Key
&
Scoring Guidelines**

**GRADE 4 MATHEMATICS
ANSWER KEY
MARCH 2006**

Question No.	Type	Content Standard	Content Standard Benchmark(s)	Key
1	Multiple Choice	Number, Number Sense and Operations	I	D
2	Multiple Choice	Data Analysis and Probability	A	C
3	Multiple Choice	Patterns, Functions and Algebra	A	C
4	Multiple Choice	Measurement	B	B
5	Short Answer	Geometry and Spatial Sense	A;E	S
6	Multiple Choice	Number, Number Sense and Operations	M	D
7	Multiple Choice	Patterns, Functions and Algebra	B	D
8	Multiple Choice	Data Analysis and Probability	H	C
9	Multiple Choice	Measurement	D	B
10	Short Answer	Number, Number Sense and Operations	B	S
11 – 16	Field test questions not used in student score			
17	Multiple Choice	Number, Number Sense and Operations	A	D
18	Multiple Choice	Geometry and Spatial Sense	G	A
19	Multiple Choice	Patterns, Functions and Algebra	B	B
20	Extended Response	Data Analysis and Probability	E	E
21	Multiple Choice	Geometry and Spatial Sense	B	A
22	Multiple Choice	Measurement	C	C
23	Multiple Choice	Number, Number Sense and Operations	J	B
24	Multiple Choice	Patterns, Functions and Algebra	E	B
25	Short Answer	Measurement	D	S
26	Multiple Choice	Geometry and Spatial Sense	B	B
27	Multiple Choice	Data Analysis and Probability	D	C
28	Multiple Choice	Number, Number Sense and Operations	F	B
29	Short Answer	Patterns, Functions and Algebra	A	S
30	Multiple Choice	Data Analysis and Probability	F	B
31	Multiple Choice	Geometry and Spatial Sense	I	C
32	Multiple Choice	Measurement	D	C
33	Extended Response	Number, Number Sense and Operations	K	E
34	Multiple Choice	Patterns, Functions and Algebra	E	A
35	Multiple Choice	Measurement	A	C
36	Multiple Choice	Number, Number Sense and Operations	E	B
37	Multiple Choice	Data Analysis and Probability	E	B
38	Short Answer	Geometry and Spatial Sense	F	S
39	Multiple Choice	Number, Number Sense and Operations	D	B
40	Multiple Choice	Patterns, Functions and Algebra	D	A
41	Multiple Choice	Measurement	A	A
42	Short Answer	Number, Number Sense and Operations	F	S
43	Multiple Choice	Geometry and Spatial Sense	E	B
44	Multiple Choice	Patterns, Functions and Algebra	G	D
45	Multiple Choice	Number, Number Sense and Operations	A	C
46	Multiple Choice	Data Analysis and Probability	G	B

Limited = 0-16; Basic = 17-24; Proficient = 25-36; Accelerated = 37-42; Advanced = 43-52
Multiple Choice = 1 point; Short Answer = 2 points; Extended Response = 4 points

5. A cone and a cylinder are shown.



Give one way that a cone and a cylinder are alike.

Give one way that a cone and a cylinder are different.

Scoring Guidelines

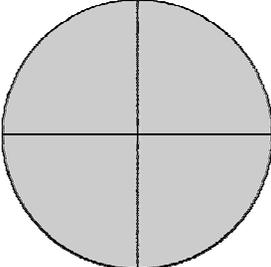
Points	Student Response
2	<p>The focus of the task is describing and comparing three-dimensional objects using their attributes. The response provides at least one mathematically relevant similarity and one mathematically relevant difference between a cone and a cylinder.</p> <p>Sample Correct Responses:</p> <ul style="list-style-type: none"> • A cone and a cylinder are alike because both are 3-dimensional. They are different because the cylinder has circles at both ends and the cone narrows to a point at one end. • They both have a circle for a base. The cone has two faces but the cylinder has three faces.
1	<p>The response shows partial evidence of describing and comparing three-dimensional objects using their attributes; however, the solution may be incomplete or slightly flawed.</p> <p>For example, the response may:</p> <ul style="list-style-type: none"> • State an accurate similarity but not adequately state a difference. • State that the volume of the cone is less than the volume of the cylinder but not adequately state a similarity. • State an adequate difference but state a similarity that is not true for all cones and cylinders. For example, state the figures are the same height. (this is a measurement difference not a geometrical difference)
0	<p>The response provides inadequate evidence of an understanding of describing and comparing three-dimensional objects using their attributes. The response provides an explanation with major flaws and errors of reasoning.</p> <p>For example, the response may:</p> <ul style="list-style-type: none"> • State that the cone could be put on top of the cylinder. • Be blank or state unrelated statements. • Recopy information from the stem.

10. Some fractions are less than one. Some fractions are equal to one. Some fractions are greater than one.

Write a fraction that is equal to one. _____

Use words, pictures or numbers to show or explain why your fraction is equal to one.

Scoring Guidelines

Points	Student Response
2	<p>The focus of this task is identifying and describing equivalent forms of fractions that are equal to one. The response provides a fraction equal to one and provides adequate support to show or explain why the fraction is equal to one.</p> <ul style="list-style-type: none"> • $\frac{4}{4}$. It is equal to one because the numerator is the number of parts and the denominator is the number of parts in all. Since they are both 4 it means you have 4 parts and there are 4 parts in all, so it's equal to one.  <ul style="list-style-type: none"> • $\frac{4}{4}$
1	<p>The response shows partial evidence of identifying and describing equivalent forms of fractions that are equal to one; however, the solution is incomplete or slightly flawed.</p> <p>For example, the response may:</p> <ul style="list-style-type: none"> • Provide a fraction equal to one, but give no or a flawed explanation of why it is equal to one. • State an appropriate explanation but does not indicate a fraction. E.g., a fraction is equal to one when the numerator is equal to the denominator.
0	<p>The response provides inadequate evidence of an understanding of identifying and describing equivalent forms of fractions that are equal to one. The response provides an explanation with major flaws and errors of reasoning.</p> <p>For example, the response may:</p> <ul style="list-style-type: none"> • State a fraction that is not equal to one and does not provide an adequate explanation. E.g., $\frac{4}{4}$ • Be blank or state unrelated statements. • Recopy information from the stem.

20. Reuben recorded the heights of 7 boys and 7 girls in his class in the table shown.

Height (in inches)	
Boys	Girls
47	49
50	50
51	52
53	55
53	56
55	56
58	58

Calculate the range, the median and the mode for the height of the boys and for the height of the girls.

Range:

Boys _____

Girls _____

Median:

Boys _____

Girls _____

Mode:

Boys _____

Girls _____

Use the range, median or mode to compare the heights of the boys and the girls and tell which group you think is taller.

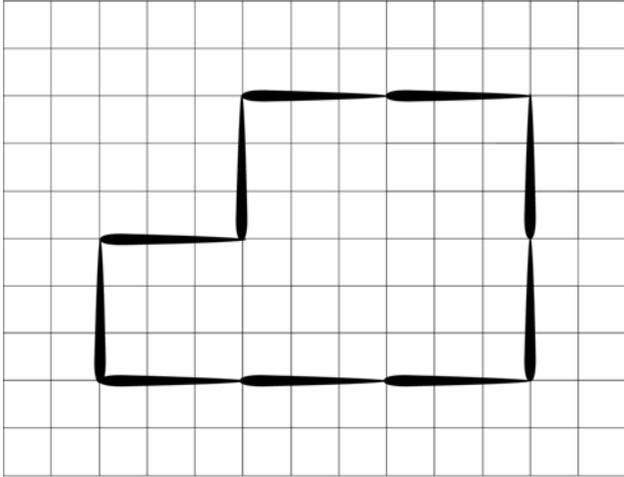
Explain how you made your choice.

Scoring Guidelines

Points	Student Response
4	<p>The focus of the task is calculating relevant statistics for two sets of data and making and explaining a conclusion based on the statistics. The response provides a correct range for the girls and the boys, a correct median for the girls and the boys, a correct mode for the girls and the boys, and an accurate explanation of which group is taller.</p> <p>Sample correct response: Range: boys $58 - 47 = 11$, girls $58 - 49 = 9$ Median: boys = 53, girls = 55 Mode: boys = 53, girls = 56 The girls are taller because the tallest girl is just as tall as the tallest boy and the range is smaller for the girls. OR The median height of the girls is higher, so half of the girls are taller than 55 inches and half of the boys are taller than 53 inches.</p>
3	<p>The response provides evidence of calculating relevant statistics for two sets of data and making and explaining a conclusion based on the statistics; however, the solution may contain a slight error, a flaw or a vague explanation.</p> <p>For example, the response may:</p> <ul style="list-style-type: none">• Provide two out of the three correct statistics and provide an accurate explanation of the tallest group based on the statistics as provided.• The response correctly determines the range, median, and mode, but does not give an explanation, or uses a flawed reasoning to explain which group is taller.
2	<p>The response provides partial evidence of calculating relevant statistics for two sets of data and making and explaining a conclusion based on the statistics; however, the solution is incomplete and/or contains minor flaws.</p> <p>For example, the response may:</p> <ul style="list-style-type: none">• Incorrectly determine two of the statistics but provides a reasonable explanation for which group is taller.• Have multiple calculation errors in determining the range, median and mode but includes an explanation that uses only slightly flawed reasoning.
1	<p>The response provides minimal evidence of calculating relevant statistics for two sets of data and making and explaining a conclusion based on the statistics. The response has major flaws and errors in reasoning.</p> <p>For example, the response may:</p> <ul style="list-style-type: none">• Incorrectly determine 2 out of the 3 statistics and provide an explanation based on flawed reasoning or omit an explanation.

0	<p>The response provides inadequate evidence of calculating relevant statistics for two sets of data and making and explaining a conclusion based on the statistics.</p> <p>For example, the response may:</p> <ul style="list-style-type: none">• Incorrectly determine all of the statistics OR make multiple errors and provide a completely flawed or unrelated explanation.• Provide unrelated statements.
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25. Randy made this shape with toothpicks.



Each  = 1 Toothpick = 3 inches

What is the perimeter of the shape in inches? _____

Describe how you found the length of the perimeter.

Scoring Guidelines

Points	Student Response
2	<p>The focus of this task is developing and using strategies to find the perimeter of an irregular shape. The response provides the correct perimeter and demonstrates a strategy that can be used to find the perimeter.</p> <p>Sample Correct Responses:</p> <ul style="list-style-type: none">• There are 10 toothpicks in the shape and $10 \times 3 = 30$. The perimeter is 30 inches.• 30 inches. I added all the toothpicks. $3 + 3 + 3 + 3 + 3 + 3 + 3 + 3 + 3 + 3 = 30$• Perimeter = 30. I counted all the lines around the shape and got 30. <p>NOTE: The correct answer without correct units is acceptable.</p>

1	<p>The response shows partial evidence of developing and using strategies to find the perimeter of an irregular shape; however, the solution may be incomplete or slightly flawed.</p> <p>For example, the response may:</p> <ul style="list-style-type: none">• State that there are 10 toothpicks around the shape, so the perimeter is 10 inches.• Include a correct perimeter with no explanation or an incomplete explanation of how perimeter was found.• Provide an incorrect perimeter based upon a calculation (or counting) error, but a reasonable process or description of how to find perimeter.
0	<p>The response provides inadequate evidence of developing and using strategies to find the perimeter of an irregular shape. The response provides an explanation with major flaws and errors of reasoning.</p> <p>For example, the response may:</p> <ul style="list-style-type: none">• State 10 only without referring to the toothpicks.• Give an answer of 45, which refers to the area.• Be blank or state unrelated statements.• Recopy information from the stem.

29. Casey made the pattern shown.

8, 19, 30, 41, _____, _____, _____

What are the next three numbers?

Describe the pattern.

Scoring Guidelines

Points	Student Response
2	<p>The focus of this task is analyzing, extending and describing numerical patterns. The response provides the next three numbers in the pattern and describes the pattern.</p> <p>Sample Correct Responses:</p> <ul style="list-style-type: none">• 52, 63, 74. The pattern is to add 11 to the previous number.• 52, 63, 74. Plus 11 each time.
1	<p>The response shows partial evidence of analyzing, extending and describing numerical patterns; however, the solution may be incomplete or slightly flawed. For example, the response may:</p> <ul style="list-style-type: none">• State that the next numbers in the pattern are 52, 63, and 74, but not correctly describe the rule.• Identify an accurate rule, but not correctly find all three of the numbers in the pattern. E.g., 53, 64, 75. The pattern is to add 11 each time.
0	<p>The response provides inadequate evidence of analyzing, extending and describing numerical patterns. The response provides an explanation with major flaws and errors of reasoning. For example, the response may:</p> <ul style="list-style-type: none">• State that the next three numbers in the pattern are 42, 43, 44 and that the numbers get bigger each time.• Be blank or state unrelated statements.• Recopy information from the stem.

33. A store sells rice in 3-pound and 5-pound bags. Jennie is responsible for packing 60 pounds of rice into the 3-pound bags, 5-pound bags or a combination of 3-pound and 5-pound bags. She needs to pack all 60 pounds of rice.

The prices for the bags of rice are shown in the chart.

Bags of Rice

Weight	Price
3 pounds	\$4 a bag
5 pounds	\$6 a bag

Show three ways Jennie can pack the 60 pounds of rice into bags. For each way, show the total number of bags for each weight she will have packed. Show or explain your answer by using pictures, words or numbers.

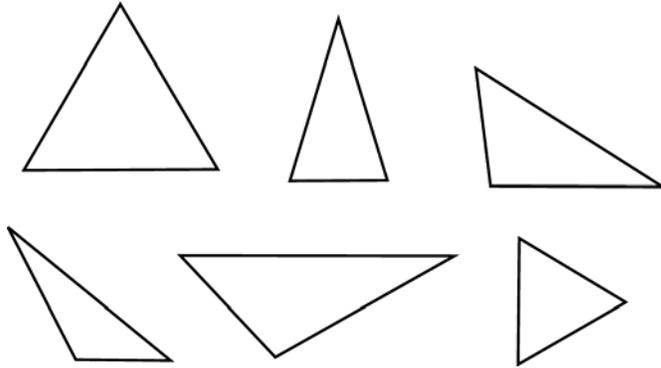
Show which of your three ways will make the most money when all the bags Jennie packs are sold. Explain your answer by using pictures, words or numbers.

Scoring Guidelines

Points	Student Response																		
4 point text	<p>The focus of the task is using appropriate operations with whole numbers to solve a multi-step problem and showing three different solutions. The response provides three correct combinations of 3 and 5 pound bags that result in a total of 60 pounds AND shows which combination makes the most money with a correct strategy or work.</p> <p>Sample response:</p> <ul style="list-style-type: none"> • She can pack: 20 3-pound bags because $3 \times 20 = 60$ OR 12 5-pound bags because $5 \times 12 = 60$ OR 10 3-pound bags and 6 5-pound bags because 10×3 plus $6 \times 5 = 60$. She makes the most money when she puts all the rice into the 3 pound bags since that combination has a value of \$80 and the other two combinations have a value of \$72 and \$76. <p>See table below for other possible combinations and costs.</p> <table border="1" data-bbox="347 1402 1065 1757"> <thead> <tr> <th>Number of 3 lb bags at \$4 each</th> <th>Number of 5 lb bags at \$6 each</th> <th>Amount of money for both</th> </tr> </thead> <tbody> <tr> <td>20</td> <td>0</td> <td>\$80</td> </tr> <tr> <td>15</td> <td>3</td> <td>\$78</td> </tr> <tr> <td>10</td> <td>6</td> <td>\$76</td> </tr> <tr> <td>5</td> <td>9</td> <td>\$74</td> </tr> <tr> <td>0</td> <td>12</td> <td>\$72</td> </tr> </tbody> </table>	Number of 3 lb bags at \$4 each	Number of 5 lb bags at \$6 each	Amount of money for both	20	0	\$80	15	3	\$78	10	6	\$76	5	9	\$74	0	12	\$72
Number of 3 lb bags at \$4 each	Number of 5 lb bags at \$6 each	Amount of money for both																	
20	0	\$80																	
15	3	\$78																	
10	6	\$76																	
5	9	\$74																	
0	12	\$72																	

3	<p>The response provides evidence of using appropriate operations with whole numbers to solve a multi-step problem and showing three different solutions; however, the solution may contain a slight error, a flaw or a vague explanation.</p> <p>For example, the response may:</p> <ul style="list-style-type: none"> • Show three correct combinations of bags, but incorrectly identifies the one of greatest value due to a minor calculation error. • Show three combinations, one of which is incorrect, but correctly finds the one that makes the most based on their combinations.
2	<p>The response provides partial evidence of using appropriate operations with whole numbers to solve a multi-step problem and showing three different solutions; however, the solution is incomplete and/or contains minor flaws.</p> <p>For example, the response may:</p> <ul style="list-style-type: none"> • Only show two correct combinations and show a strategy for finding which has the greatest value with minor flaws or errors.
1	<p>The response provides minimal evidence of using appropriate operations with whole numbers to solve a multi-step problem and showing three different solutions. The response has major flaws and errors in reasoning.</p> <p>For example, the response may:</p> <ul style="list-style-type: none"> • State that the most expensive bag would be \$80. • State at least two combinations of bags equaling 60 pounds correctly.
0	<p>The response provides inadequate evidence of using appropriate operations with whole numbers to solve a multi-step problem and showing three different solutions.</p> <p>For example, the response may:</p> <ul style="list-style-type: none"> • Show one correct combination. • State that the bags will cost any correct amount without showing work or stating if it is the most expensive or not. • Be blank or make unrelated statements. • Recopy information given in the stem.

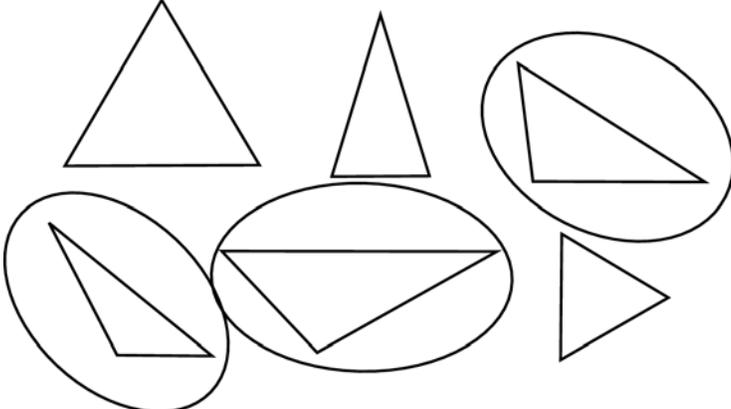
38. Six triangles are shown.



Circle each triangle that appears to be scalene.

Explain how you decided which triangles are scalene.

Scoring Guidelines

Points	Student Response
2	<p>The focus of the task is identifying and defining triangles based on angle measures and side measures. The response provides at least two of the triangles that appear to be scalene and provides an adequate explanation that demonstrates an understanding of the meaning of scalene.</p> <p>Sample Correct Responses:</p>  <ul style="list-style-type: none"> • Circles the three triangles that appear to be scalene. The scalene triangles are the ones that look like all of the sides are different lengths and all of the angles are different measures. • Circles two of the triangles that appear to be scalene. I circled those triangles because it looked like none of the sides are the same length.

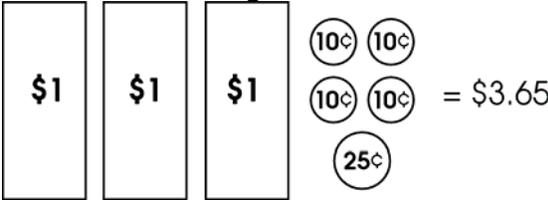
1	<p>The response shows partial evidence of identifying and defining triangles based on angle measures and side measures; however, the solution is incomplete or slightly flawed.</p> <p>For example, the response may:</p> <ul style="list-style-type: none">• Circle two or three of the triangles that appear to be scalene, but the explanation is vague or omitted; e.g., those triangles look different than the other ones.• Circle none or one of the scalene triangles, and/or circle a non-scalene triangle, but gives an appropriate explanation; e.g., the sides of scalene triangles aren't the same length.
0	<p>The response provides inadequate evidence of identifying and defining triangles based on angle measures and side measures. The response provides an explanation with major flaws and errors of reasoning.</p> <p>For example, the response may:</p> <ul style="list-style-type: none">• Circle no scalene triangles or circle triangles that are not scalene and omit or provide support that is inaccurate; e.g., I circled the triangles that looked like they had equal sides.• Be blank or state unrelated statements.• Recopy information from the stem.

42. Gavin bought a puzzle that costs \$6.35. He gave the clerk a \$10 bill.

How much change should Gavin receive? _____

Give an example of the bills and coins Gavin could receive for change. Use numbers, pictures or words to show your work.

Scoring Guidelines

Points	Student Response
2	<p>The focus of the task is solving problems involving counting money and making change. The response provides the amount of change AND provides a correct list of bills and coins with an adequate explanation or work. Sample Correct Responses:</p> <ul style="list-style-type: none"> Gavin gets back \$3.65. He receives three \$1 bills, two quarters, one dime and one nickel, and $10 - 6.35 = 3.65$. $\\$10 - \\$6.35 = 3.65$ is the change that Gavin gets. Gavin gets back three \$1 bills, six dimes and one nickel because this makes \$3.65. \$3.65 is the change  <p>The diagram illustrates the change received: three \$1 bills, four 10-cent coins, and one 25-cent coin. To the right of the coins is the equation $= \\$3.65$.</p>
1	<p>The response shows partial evidence of solving problems involving counting money and making change; however, the solution may be incomplete or slightly flawed.</p> <p>For example, the response may:</p> <ul style="list-style-type: none"> State a correct amount of change, but not list a correct example of the bills and coins he could receive as change. State an incorrect amount of change, but correctly list a combination of bills and coins that total the given amount of change.
0	<p>The response provides inadequate evidence of solving problems involving counting money and making change. The response provides an explanation with major flaws and errors of reasoning.</p> <p>For example, the response may:</p> <ul style="list-style-type: none"> State an incorrect amount of change and show an incorrect amount of bills and coins he could receive as change. Be blank or state unrelated statements. Recopy information from the stem.