

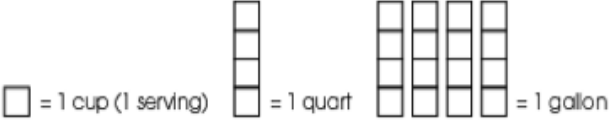
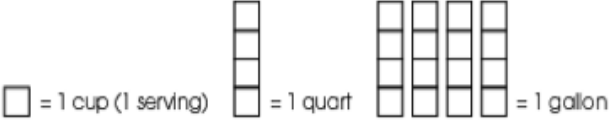
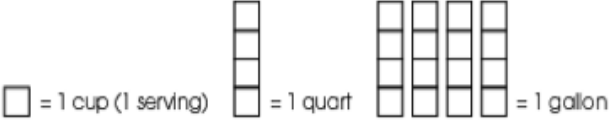
**7th Mathematics Achievement Test
Measurement Standard**

Benchmark A

Question 3	Spring 2010		A								
Question 31	Spring 2009	<p>Scoring Guidelines</p> <table border="1"> <thead> <tr> <th>Points</th> <th>Student Response</th> </tr> </thead> <tbody> <tr> <td>2 point</td> <td> <p>The focus of the task is to provide evidence of selecting appropriate measurements while solving problems involving proportional relationships. The response states that the students' heart rates should be compared by heartbeats per minute or half-minute, heartbeats per second, or seconds per heartbeat. The response also identifies Marit as having the faster heartbeat and includes supporting work or an adequate explanation.</p> <p>Sample response:</p> <ul style="list-style-type: none"> Heartbeats per minute can be used. Marit's heartbeat ($13 \times 6 = 78$ beats/minute) is faster than Coleman's heartbeat ($18 \times 4 = 72$ beats/minute). Heartbeats per second can be used. Marit: 1.3 beats per sec; Coleman: 1.2 beats per sec. Marit's heartbeat is faster. Heartbeats per half-minute can be used. Marit: 39 beats in 30 seconds; Coleman: 36 beats in 30 seconds. Marit's heartbeat is faster. </td> </tr> <tr> <td>1 point</td> <td> <p>The response provides partial evidence of selecting appropriate measurements while solving problems involving proportional relationships; however, the solution is incomplete or slightly flawed.</p> <p>Sample response:</p> <ul style="list-style-type: none"> State that Marit's heartbeat was 1.3 and Coleman's heartbeat was 1.2, without making a comparison. Show a correct comparison without mentioning units AND identify the person with the faster heartbeat. </td> </tr> <tr> <td>0 point</td> <td> <p>The response provides inadequate evidence of selecting appropriate measurements while solving problems involving proportional relationships. The response shows major flaws in reasoning or irrelevant information.</p> <p>Sample response:</p> <ul style="list-style-type: none"> State that Coleman's heartbeat was faster since it beat 18 times. State "Marit's heartbeat was faster" without showing numbers. Copy information from the stem. </td> </tr> </tbody> </table>	Points	Student Response	2 point	<p>The focus of the task is to provide evidence of selecting appropriate measurements while solving problems involving proportional relationships. The response states that the students' heart rates should be compared by heartbeats per minute or half-minute, heartbeats per second, or seconds per heartbeat. The response also identifies Marit as having the faster heartbeat and includes supporting work or an adequate explanation.</p> <p>Sample response:</p> <ul style="list-style-type: none"> Heartbeats per minute can be used. Marit's heartbeat ($13 \times 6 = 78$ beats/minute) is faster than Coleman's heartbeat ($18 \times 4 = 72$ beats/minute). Heartbeats per second can be used. Marit: 1.3 beats per sec; Coleman: 1.2 beats per sec. Marit's heartbeat is faster. Heartbeats per half-minute can be used. Marit: 39 beats in 30 seconds; Coleman: 36 beats in 30 seconds. Marit's heartbeat is faster. 	1 point	<p>The response provides partial evidence of selecting appropriate measurements while solving problems involving proportional relationships; however, the solution is incomplete or slightly flawed.</p> <p>Sample response:</p> <ul style="list-style-type: none"> State that Marit's heartbeat was 1.3 and Coleman's heartbeat was 1.2, without making a comparison. Show a correct comparison without mentioning units AND identify the person with the faster heartbeat. 	0 point	<p>The response provides inadequate evidence of selecting appropriate measurements while solving problems involving proportional relationships. The response shows major flaws in reasoning or irrelevant information.</p> <p>Sample response:</p> <ul style="list-style-type: none"> State that Coleman's heartbeat was faster since it beat 18 times. State "Marit's heartbeat was faster" without showing numbers. Copy information from the stem. 	
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Question 38	March 2008		B								
Question 13	March 2005		A								
Question 30	Spring 2007		C								

Benchmark B

Question 4	Fall 2005		C
Question 17	March 2005		D

Question 36	March 2006	<p>Scoring Guidelines</p> <p>Other Correct Response(s):</p> <p>.</p> <table border="1"> <thead> <tr> <th data-bbox="621 275 695 296">Points</th> <th data-bbox="967 275 1143 296">Student Response</th> </tr> </thead> <tbody> <tr> <td data-bbox="621 306 695 1058">2</td> <td data-bbox="703 306 1421 1058"> <p>The focus of the task is to provide evidence of converting units within the same measurement system to figure out the number of 8-ounce servings. The response indicates the correct number of servings/cups AND provides work showing the correct conversion of units.</p> <p>1 quart = 32 ounces and 1 gallon = 128 ounces, so Coach Larson has a total of 160 ounces of punch. At 8 ounces per serving/cup ($160 \text{ oz} \div 8 \text{ oz} = 20$), she can make 20 servings/cups.</p> <p>Sample correct responses:</p> <div style="text-align: center;">  </div> <ul style="list-style-type: none"> 4 servings + 16 servings = 20 servings. There would be 20 servings in all. 1 quart = 32 ounces = 4 cups. 1 gallon = 4 quarts. $4 \times 4 = 16$. $16 + 4 = 20$. She can make 20 cups (servings). NOTE: Other conversion methods are acceptable (e.g., gallons to cups, quarts to cups). </td> </tr> <tr> <td data-bbox="621 1068 695 1184">1</td> <td data-bbox="703 1068 1421 1184"> <p>The response indicates partial evidence of how to convert units of measure; however, the solution is incomplete or slightly flawed.</p> <p>For example, the response may:</p> <ul style="list-style-type: none"> Make one correct conversion and one incorrect conversion. Indicate that one quart is 32 ounces and one gallon is the same as 128 ounces, and state that Coach Larson has 160 ounces of punch. State the correct answer without providing work (e.g., 20 cups can be made with this recipe). Use an inaccurate conversion but show an appropriate process. </td> </tr> <tr> <td data-bbox="621 1194 695 1205">0</td> <td data-bbox="703 1194 1421 1205"> <p>The response indicates inadequate evidence of how to convert units of measure. The response may have major flaws or be completely incorrect.</p> <p>For example, the response may:</p> <ul style="list-style-type: none"> State that a gallon is larger than a quart. Copy information that is stated in the stem. </td> </tr> </tbody> </table>	Points	Student Response	2	<p>The focus of the task is to provide evidence of converting units within the same measurement system to figure out the number of 8-ounce servings. The response indicates the correct number of servings/cups AND provides work showing the correct conversion of units.</p> <p>1 quart = 32 ounces and 1 gallon = 128 ounces, so Coach Larson has a total of 160 ounces of punch. At 8 ounces per serving/cup ($160 \text{ oz} \div 8 \text{ oz} = 20$), she can make 20 servings/cups.</p> <p>Sample correct responses:</p> <div style="text-align: center;">  </div> <ul style="list-style-type: none"> 4 servings + 16 servings = 20 servings. There would be 20 servings in all. 1 quart = 32 ounces = 4 cups. 1 gallon = 4 quarts. $4 \times 4 = 16$. $16 + 4 = 20$. She can make 20 cups (servings). NOTE: Other conversion methods are acceptable (e.g., gallons to cups, quarts to cups). 	1	<p>The response indicates partial evidence of how to convert units of measure; however, the solution is incomplete or slightly flawed.</p> <p>For example, the response may:</p> <ul style="list-style-type: none"> Make one correct conversion and one incorrect conversion. Indicate that one quart is 32 ounces and one gallon is the same as 128 ounces, and state that Coach Larson has 160 ounces of punch. State the correct answer without providing work (e.g., 20 cups can be made with this recipe). Use an inaccurate conversion but show an appropriate process. 	0	<p>The response indicates inadequate evidence of how to convert units of measure. The response may have major flaws or be completely incorrect.</p> <p>For example, the response may:</p> <ul style="list-style-type: none"> State that a gallon is larger than a quart. Copy information that is stated in the stem.
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Benchmark C

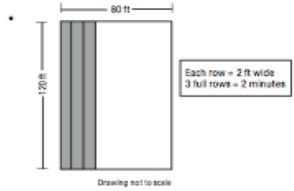
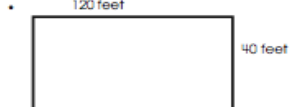
Question 18	Spring 2010	B
Question 29	March 2008	C
Question 17	Fall 2005	C
Question 32	March 2005	B
Question 44	March 2006	A
Question 43	Spring 2007	B

Benchmark D

Question 10	Spring 2010			C
Question 41	Spring 2010	Points	Student Response	
		2 point	<p>Exemplar Response:</p> <ul style="list-style-type: none"> It is about 550mL because 500 is halfway between 400 and 600 and the water line is about halfway between 500 and 600. The water line is about three-fourths of the way to 600 and each quarter is about 50 mL, so 3×50 is 150 and $150 + 400$ is about 550 mL. <p>The focus of this task is estimating a measurement to a greater degree of precision than the tool provides. The response provides an estimate for the amount of water and a written explanation.</p>	
		1 point	<p>The response provides partial evidence of estimating a measurement to a greater degree of precision than the tool provides; however, the solution may be incomplete or slightly flawed.</p> <p>1 point sample answer: For example, the response may:</p> <ul style="list-style-type: none"> Provide a correct estimate, but the explanation is incomplete or missing. 	
		0 point	<p>0 point sample answer: For example, the response may:</p> <ul style="list-style-type: none"> Provide an unreasonable estimate; Restate the information provided in the item; Be blank or give irrelevant information. 	<ul style="list-style-type: none"> Provide a written explanation that is appropriate but does not identify an acceptable estimation. <p>The response provides inadequate evidence of estimating a measurement to a greater degree of precision than the tool provides. The response provides an explanation with major flaws and errors of reasoning.</p>
Question 33	Spring 2009			C
Question 30	March 2006			A
Question 38	March 2005			C

Benchmark E

Question 32	Spring 2010			D
Question 43	March 2008			D
Question 10	Fall 2005	Points 4	Student Response <p>The focus of the task is analyzing problem situations involving measurement concepts, selecting appropriate strategies, and using an organized approach to solve narrative and increasingly complex problems. The response provides an estimate for how long it will take Rachel to mow the lawn AND an appropriate sketch of the lawn with supporting work or an adequate explanation. The response also provides the approximate time Rachel will finish mowing the lawn.</p>	

Points	4	(cont'd)	Student Response
			<p>Sample correct responses:</p>
			<p>• </p>
			<p>I put the width as 40 feet because Rachel's mower cuts a path 2 feet wide so that cuts the width in half.</p>
			<p>120 feet x 40 feet = 4,800 sq. ft.</p>
			<p>4,800/180 = 26.7 minutes to mow the lawn.</p>
			<p>After 10 minutes of mowing, Rachel will have mowed 10 x 180 = 1,800 feet of lawn.</p>
			<p>She still has 3,000 feet left to mow at a rate of 200 ft/min. 3000/200 = 15 minutes. 15 + 10 = 25 minutes to mow the lawn. Rachel will finish at about 3:25 p.m.</p>
			<p>• </p>
			<p>I cut the lawn into 40 equal strips that are 120 ft. x 2 ft, because the mower cuts a path 2 feet wide. So, 120/180 = .67 minutes to cut one strip. This means that 40 x .67 = 26.8 minutes to cut the lawn. After 10 minutes of mowing, Rachel would have cut 10 x 180 = 1800 feet. Her total square feet she needs to cut is 120 x 40 = 4800. This leaves her with 3000 more to cut. After the first 10 minutes, Rachel goes 200 ft/min. So, 3000/200 = 15 minutes. It will take Rachel a total of 25 minutes to mow the lawn. She will finish at 3:25 p.m.</p>
			<p>3</p>
			<p>The response provides clear evidence of estimating how long it will take Rachel to mow the lawn AND an appropriate sketch of the lawn with supporting work or an adequate explanation. The response also provides the approximate time Rachel will finish mowing the lawn; however, the response is slightly flawed.</p>
			<p>For example, the response may:</p>
			<ul style="list-style-type: none"> • Provide a correct strategy and sketch without considering the two foot wide path, but all calculations are correct based on this error (results in a time of 3:49 p.m.).
			<ul style="list-style-type: none"> • State that it takes Rachel about 27 minutes to cut 4800 feet. After 10 minutes, it will take Rachel less time to cut the grass. It will only take her 15 minutes longer (25 minutes total). She should finish at about 3:25 p.m. (no sketch or calculations).

Benchmark E (continued)

<p>Question 10 (continued)</p>	<p>Fall 2005</p>	<p>2</p> <p>The response provides partial evidence of estimating how long it will take Rachel to mow the lawn AND a sketch of the lawn with supporting work or an explanation; however, the solution is incomplete or flawed.</p> <p>For example, the response may:</p> <ul style="list-style-type: none"> • Provide an adequate explanation of the approximate time Rachel will finish mowing the lawn and provide a sketch of the lawn. Does not provide work. • Provide an adequate explanation of how long it will take to mow the lawn and what time she will be done; but, the response has multiple errors in computation and no sketch is provided. <p>1</p> <p>The response provides minimal evidence of estimating how long it will take Rachel to mow the lawn OR a sketch of the lawn; however, the solution is incomplete or flawed.</p> <p>For example, the response may:</p> <ul style="list-style-type: none"> • Provide an inadequate explanation of the approximate time Rachel will finish mowing the lawn. • Provide a complete and accurate sketch of the lawn. • Provide a complete and accurate sketch of the lawn and finds the area of the lawn. <p>0</p> <p>The response provides inadequate evidence of analyzing problem situations involving measurement concepts, selecting appropriate strategies, and using an organized approach to solve narrative and increasingly complex problems. The response provides major flaws in reasoning or irrelevant information.</p> <p>For example, the response may:</p> <ul style="list-style-type: none"> • State "Sometime after 3 p.m." • Be blank or state unrelated statements. • Recopy information from the stem. 								
<p>Question 6</p>	<p>March 2005</p>	<p>Scoring Guidelines</p> <table border="1" data-bbox="706 814 1518 1386"> <thead> <tr> <th data-bbox="706 814 792 842">Points</th> <th data-bbox="792 814 1518 842">Student Response</th> </tr> </thead> <tbody> <tr> <td data-bbox="706 842 792 1386"> <p>2</p> </td> <td data-bbox="792 842 1518 1386"> <p>Sample Correct Responses:</p> <ul style="list-style-type: none"> • $\frac{1}{4}$ inch = 1 foot, therefore 1 inch = 4 feet, so $4 \times 2 = 8$, and $4 \times 4 = 16$. Dimension of kitchen is 8 feet by 16 feet. • $\frac{1}{4}$ inch = 1 foot; $\frac{1}{2}$ inch = 2 feet, $\frac{3}{4}$ inch = 3 feet, 1 inch = 4 feet. So length = $4 \times 4 = 16$ feet and width = $2 \times 4 = 8$ feet • $\frac{1}{4}$ inch = 1 foot; $\frac{1}{4}$ inch = 12 inches; 1 inch = 48 inches; length = $48 \times 4 = 192$ inches; width = $48 \times 2 = 96$ inches. • $\frac{1}{4} = \frac{x}{1}$ so $x = 8$ feet = width AND $\frac{1}{4} = \frac{4}{y}$ so $y = 16$ feet = length <p>The focus of the task is solving problems involving scale factors. The response includes the correct dimensions of the kitchen AND includes work or an explanation that shows how to find the length and width. Answers are labeled with the appropriate units.</p> </td> </tr> <tr> <td data-bbox="706 1386 792 1696"> <p>1</p> </td> <td data-bbox="792 1386 1518 1696"> <p>The response provides partial evidence of solving problems involving scale factors; however, the solution is incomplete or slightly flawed.</p> <p>For example, the response may:</p> <ul style="list-style-type: none"> • Provide a calculation error with correct set up: $4 + \frac{1}{4} = 1$. • Provide an incorrect set up, but correct follow through: $\frac{1}{4} + 4 = 16$. • Provide the correct answer with insufficient or no supporting work or explanation. </td> </tr> <tr> <td data-bbox="706 1696 792 1831"> <p>0</p> </td> <td data-bbox="792 1696 1518 1831"> <p>The response provides inadequate evidence of solving problems involving scale factors. The response will provide major flaws in reasoning or irrelevant information.</p> </td> </tr> </tbody> </table>	Points	Student Response	<p>2</p>	<p>Sample Correct Responses:</p> <ul style="list-style-type: none"> • $\frac{1}{4}$ inch = 1 foot, therefore 1 inch = 4 feet, so $4 \times 2 = 8$, and $4 \times 4 = 16$. Dimension of kitchen is 8 feet by 16 feet. • $\frac{1}{4}$ inch = 1 foot; $\frac{1}{2}$ inch = 2 feet, $\frac{3}{4}$ inch = 3 feet, 1 inch = 4 feet. So length = $4 \times 4 = 16$ feet and width = $2 \times 4 = 8$ feet • $\frac{1}{4}$ inch = 1 foot; $\frac{1}{4}$ inch = 12 inches; 1 inch = 48 inches; length = $48 \times 4 = 192$ inches; width = $48 \times 2 = 96$ inches. • $\frac{1}{4} = \frac{x}{1}$ so $x = 8$ feet = width AND $\frac{1}{4} = \frac{4}{y}$ so $y = 16$ feet = length <p>The focus of the task is solving problems involving scale factors. The response includes the correct dimensions of the kitchen AND includes work or an explanation that shows how to find the length and width. Answers are labeled with the appropriate units.</p>	<p>1</p>	<p>The response provides partial evidence of solving problems involving scale factors; however, the solution is incomplete or slightly flawed.</p> <p>For example, the response may:</p> <ul style="list-style-type: none"> • Provide a calculation error with correct set up: $4 + \frac{1}{4} = 1$. • Provide an incorrect set up, but correct follow through: $\frac{1}{4} + 4 = 16$. • Provide the correct answer with insufficient or no supporting work or explanation. 	<p>0</p>	<p>The response provides inadequate evidence of solving problems involving scale factors. The response will provide major flaws in reasoning or irrelevant information.</p>
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Question 31	Spring 2007	<p>Scoring Guidelines</p> <table border="1"> <thead> <tr> <th data-bbox="526 338 630 365">Points</th> <th data-bbox="630 338 1536 365">Student Response</th> </tr> </thead> <tbody> <tr> <td data-bbox="526 365 630 940">2 point text</td> <td data-bbox="630 365 1536 940"> <p>The focus of this task is solving problems involving proportional relationships and scale factors. The response provides the scale factor for the two pools and work showing how it was found. It gives the length of Troy's pool, with supporting work.</p> <p>Exemplar Response:</p> <ul style="list-style-type: none"> The scale factor used to build Troy's pool is $\frac{1}{4}$. I found it by comparing the width of Troy's pool (625 cm = 6.25 m) to the width of the Olympic-size pool: $\frac{6.25}{25} = \frac{1}{4}$. To find the length of Troy's pool, I divided the length of the Olympic-size pool by 4: $50 \div 4 = 12.5$. Troy's pool is 12.5 meters long. The width of Troy's pool compared to the width of the larger pool is 625:2500 or 1:4. To find the length of Troy's pool: $\frac{625}{2500} = \frac{x}{5000}$, $x = 1250$ cm. The length of Troy's pool is 1250 centimeters. 625 cm = 6.25 m. The scale factor of Troy's pool to the Olympic-size pool is $\frac{6.25}{25}$ or $\frac{1}{4}$. The length and width of Troy's pool are $\frac{1}{4}$ the length and width of the larger pool. $\frac{1}{4}$ of 50 is 12.5, so the length of Troy's pool is 12.5 meters. <p>NOTE: A scale factor of 4:1 or 4 is acceptable, provided the response shows or states the relationship correctly.</p> </td> </tr> <tr> <td data-bbox="526 940 630 1115">1 point</td> <td data-bbox="630 940 1536 1115"> <p>The response shows partial evidence of solving problems involving proportional relationships and scale factors; however, the solution may be incomplete or slightly flawed.</p> <p>For example, the response may:</p> <ul style="list-style-type: none"> Provide only the length of Troy's pool, with supporting work but no scale factor. Provide only the scale factor, with supporting work. Provide the scale factor and length but show no work. Find an incorrect scale factor but use it correctly to arrive at a length for Troy's pool. </td> </tr> <tr> <td data-bbox="526 1115 630 1310">0 point</td> <td data-bbox="630 1115 1536 1310"> <p>The response provides inadequate evidence of solving problems involving proportional relationships and scale factors. The response provides major flaws in explanations, or irrelevant information.</p> <p>For example, the response may:</p> <ul style="list-style-type: none"> State an incorrect length. Restate the information provided in the item. Be blank or give irrelevant information. </td> </tr> </tbody> </table>	Points	Student Response	2 point text	<p>The focus of this task is solving problems involving proportional relationships and scale factors. The response provides the scale factor for the two pools and work showing how it was found. It gives the length of Troy's pool, with supporting work.</p> <p>Exemplar Response:</p> <ul style="list-style-type: none"> The scale factor used to build Troy's pool is $\frac{1}{4}$. I found it by comparing the width of Troy's pool (625 cm = 6.25 m) to the width of the Olympic-size pool: $\frac{6.25}{25} = \frac{1}{4}$. To find the length of Troy's pool, I divided the length of the Olympic-size pool by 4: $50 \div 4 = 12.5$. Troy's pool is 12.5 meters long. The width of Troy's pool compared to the width of the larger pool is 625:2500 or 1:4. To find the length of Troy's pool: $\frac{625}{2500} = \frac{x}{5000}$, $x = 1250$ cm. The length of Troy's pool is 1250 centimeters. 625 cm = 6.25 m. The scale factor of Troy's pool to the Olympic-size pool is $\frac{6.25}{25}$ or $\frac{1}{4}$. The length and width of Troy's pool are $\frac{1}{4}$ the length and width of the larger pool. $\frac{1}{4}$ of 50 is 12.5, so the length of Troy's pool is 12.5 meters. <p>NOTE: A scale factor of 4:1 or 4 is acceptable, provided the response shows or states the relationship correctly.</p>	1 point	<p>The response shows partial evidence of solving problems involving proportional relationships and scale factors; however, the solution may be incomplete or slightly flawed.</p> <p>For example, the response may:</p> <ul style="list-style-type: none"> Provide only the length of Troy's pool, with supporting work but no scale factor. Provide only the scale factor, with supporting work. Provide the scale factor and length but show no work. Find an incorrect scale factor but use it correctly to arrive at a length for Troy's pool. 	0 point	<p>The response provides inadequate evidence of solving problems involving proportional relationships and scale factors. The response provides major flaws in explanations, or irrelevant information.</p> <p>For example, the response may:</p> <ul style="list-style-type: none"> State an incorrect length. Restate the information provided in the item. Be blank or give irrelevant information.
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Benchmark F

Question 38	Spring 2010		B						
Question 45	Spring 2009		C						
Question 26	March 2008	<p>Scoring Guidelines</p> <table border="1"> <thead> <tr> <th data-bbox="483 506 574 533">Points</th> <th data-bbox="894 506 1078 533">Student Response</th> </tr> </thead> <tbody> <tr> <td data-bbox="493 533 565 554">4 point</td> <td data-bbox="574 533 1398 1178"> <p>The focus of the task is finding the volume of a three-dimensional cylindrical object and describing changes in the volume of a three-dimensional object when the measurements of the object are changed. The response provides a correct strategy to find the number of cubic inches of stuffing Carson will need to make the pillow AND a comparison of the amount of stuffing needed when Carson doubles the length to the amount of stuffing needed when he doubles the diameter. The response also shows or explains all calculations.</p> <p>Sample Correct Responses:</p> <p>Work for 6-inch diameter pillow:</p> $V = r^2h$ $V = x^3 \times 15$ $V = 424.12 \text{ in}^3$ <p>Carson needs 424.12 in³ of stuffing for the 6-inch diameter pillow</p> <p>Work for 12-inch diameter pillow (doubles diameter):</p> $V = r^2h$ $V = x^6 \times 15$ $V = 1696.46 \text{ in}^3$ <p>Carson needs 1696.46 in³ of stuffing for the 12-inch diameter pillow</p> <p>Work for the 30-inch long pillow (doubles the length):</p> $V = r^2h$ $V = x^3 \times 30$ $V = 848.23 \text{ in}^3$ $1696.46 / 848.23 = 2$ <p>Carson would only need $\frac{1}{2}$ the amount of stuffing if he doubles the length compared to if he doubles the diameter OR The amount of stuffing needed for the larger pillow is more than the amount needed for the smaller pillow.</p> </td> </tr> <tr> <td data-bbox="493 1178 565 1199">3 point</td> <td data-bbox="574 1178 1398 1520"> <p>The response provides clear evidence of finding the volume of a three dimensional cylindrical object and describing changes in the volume of a three-dimensional object when the measurements of the object are changed; however, the solution is incomplete, slightly flawed with a minor calculation error.</p> <p>For example, the response may:</p> <ul style="list-style-type: none"> • Finds all three volumes correctly but makes no comparisons. • Makes a calculation error when finding volume (the same error may be carried out through all three volume calculations), and makes an accurate comparison based on those errors. <p>Calculation errors include:</p> <ul style="list-style-type: none"> • Not properly squaring the radius • Using the diameter instead of the radius but squares correctly. • Using $\pi \cdot d \cdot h$ or $2 \cdot \pi \cdot r \cdot h$ to find volume. <p>Doubling the diameter.</p> </td> </tr> </tbody> </table>	Points	Student Response	4 point	<p>The focus of the task is finding the volume of a three-dimensional cylindrical object and describing changes in the volume of a three-dimensional object when the measurements of the object are changed. The response provides a correct strategy to find the number of cubic inches of stuffing Carson will need to make the pillow AND a comparison of the amount of stuffing needed when Carson doubles the length to the amount of stuffing needed when he doubles the diameter. The response also shows or explains all calculations.</p> <p>Sample Correct Responses:</p> <p>Work for 6-inch diameter pillow:</p> $V = r^2h$ $V = x^3 \times 15$ $V = 424.12 \text{ in}^3$ <p>Carson needs 424.12 in³ of stuffing for the 6-inch diameter pillow</p> <p>Work for 12-inch diameter pillow (doubles diameter):</p> $V = r^2h$ $V = x^6 \times 15$ $V = 1696.46 \text{ in}^3$ <p>Carson needs 1696.46 in³ of stuffing for the 12-inch diameter pillow</p> <p>Work for the 30-inch long pillow (doubles the length):</p> $V = r^2h$ $V = x^3 \times 30$ $V = 848.23 \text{ in}^3$ $1696.46 / 848.23 = 2$ <p>Carson would only need $\frac{1}{2}$ the amount of stuffing if he doubles the length compared to if he doubles the diameter OR The amount of stuffing needed for the larger pillow is more than the amount needed for the smaller pillow.</p>	3 point	<p>The response provides clear evidence of finding the volume of a three dimensional cylindrical object and describing changes in the volume of a three-dimensional object when the measurements of the object are changed; however, the solution is incomplete, slightly flawed with a minor calculation error.</p> <p>For example, the response may:</p> <ul style="list-style-type: none"> • Finds all three volumes correctly but makes no comparisons. • Makes a calculation error when finding volume (the same error may be carried out through all three volume calculations), and makes an accurate comparison based on those errors. <p>Calculation errors include:</p> <ul style="list-style-type: none"> • Not properly squaring the radius • Using the diameter instead of the radius but squares correctly. • Using $\pi \cdot d \cdot h$ or $2 \cdot \pi \cdot r \cdot h$ to find volume. <p>Doubling the diameter.</p>	Continued
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		<p>2 point</p> <p>The response provides partial evidence of finding the volume of a three-dimensional cylindrical object and describing changes in the volume of a three-dimensional object when the measurements of the object are changed; however, the solution is incomplete or slightly flawed.</p> <p>For example, the response may:</p> <ul style="list-style-type: none"> Provides a correct strategy to find the number of cubic inches of stuffing Carson will need to make the original pillow, showing or explaining most calculations. Provide a correct comparison of the amount of stuffing needed when Carson doubles the length to the amount of stuffing needed when he doubles the diameter, based on flawed calculations. Provide a strategy to find the number of cubic inches of stuffing Carson will need to make the pillow AND a comparison of the amount of stuffing needed when Carson doubles the length to the amount of stuffing needed when he doubles the diameter; but, contains multiple calculation errors. State for 12-inch-diameter pillow (doubled the diameter) $V = dh$ $V = x12x15$ $V = 565.49 \text{ in}^3$ <p>For 30-inch-long pillow (doubles the length):</p> $V = dh$ $V = x6x30$ $V = 565.49 \text{ in}^3$ $565.49 / 565.49 = 1$ <p>Carson would need the same amount of stuffing if he doubles the length instead of doubling the diameter.</p>	
		<p>1 point</p> <p>The response provides minimal evidence of finding the volume of a three-dimensional cylindrical object and describing changes in the volume of a three-dimensional object when the measurements of the object are changed; however, the solution is incomplete or flawed.</p> <p>For example, the response may:</p> <ul style="list-style-type: none"> Provide a partially correct strategy to find the number of cubic inches of stuffing Carson will need to make the pillow with multiple calculation errors and no comparison. <p>Provide an inadequate comparison of the amount of stuffing needed when Carson doubles the length to the amount of stuffing needed when he doubles the diameter with multiple calculation errors.</p>	
		<p>0 point</p> <p>The response provides inadequate evidence of finding the volume of a three-dimensional cylindrical object and describing changes in the volume of a three-dimensional object when the measurements of the object are changed. The response provides irrelevant information or major flaws in reasoning.</p> <p>For example, the response may:</p> <ul style="list-style-type: none"> State that doubling the length is definitely going to be much larger than doubling the diameter because the length is a bigger number to begin with. Be blank or make unrelated statements. <p>Copy information from the stem.</p>	
Question 22	March 2006		D
Question 44	March 2005		B

Benchmark G

Question 26	March 2005		
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		Scoring Guidelines
		Points
		Student Response
		<p>Sample Correct Responses:</p> <ul style="list-style-type: none"> The box is a rectangular prism with length 4, width 6 and height 9. Volume $4 \times 6 \times 9 = 216$ cubic in. Surface area: $2(4)(9) + 2(4)(6) + 2(9)(6) = 228$ sq in. This is less than the surface area of Box A, which is: $2(3)(9) + 2(3)(8) + 2(9)(8) = 246$ sq in. The box is a cube with height, length and width all equal to 6 inches. The volume of this cube will be 216 cubic inches ($6 \times 6 \times 6$) and the surface area is $2(6 \times 6) + 2(6 \times 6) + 2(6 \times 6) = 216$ square inches. This is less than the surface area of Box A, which is: $2(3)(9) + 2(3)(8) + 2(9)(8) = 246$ sq in. <p>The focus of the task is to understand the difference between surface area and volume and that objects may have the same volume but different surface areas. The response includes an appropriate sketch or description of a different box that has the same volume, 216 cubic inches, but a smaller surface area than Box A. The response shows work or provides an adequate explanation to verify that the box has the same volume but a smaller surface area. A sketch and dimensions may or may not be provided.</p>
		<p>2</p>
		<p>1</p> <p>The response provides partial evidence of understanding the difference between surface area and volume and that objects may have the same volume but different surface areas; however, the solution may be incomplete or slightly flawed.</p> <p>For example, the response may:</p> <ul style="list-style-type: none"> Include an appropriate drawing or description of a different box with dimensions that result in the same volume with greater surface area or without stating surface area. Provide an adequate explanation but minor calculation errors contribute to a volume that is not equal to 216 or a surface area that is not less than 246.
		<p>0</p> <p>The response provides inadequate evidence of understanding the difference between surface area and volume and that objects may have the same volume but different surface areas. The response provides major flaws in reasoning or irrelevant information.</p> <p>For example, the response may:</p> <ul style="list-style-type: none"> Draw a box with length 200, height 8 and width 8. $200 + 8 + 8 = 216$. Draw the box from the problem. Draw a figure that is not three-dimensional. Be blank or make unrelated statements. Recopy information from the stem.
Question 28	Spring 2007	A