

Mathematics Assessment Program *CCR-C2*

College and Career Readiness Mathematics

**Scoring Rubric
(Draft)**

These tests were developed with support from the Bill and Melinda Gates Foundation

Short Tasks		
Q	Answer	Points
1	$3\sqrt{x+2}$	1
2	$x - 5$ is a factor. $x + 2$ is not a factor.	1
3	3.21π	1
4	$x = -6$	1
5	$\frac{2}{27}$	1
6	$f(x) = (x-1)^2 + 2$ Minimum = 2	1
7	$2x + 2y = 10$	1
8	$\cos(x) = 1$	1
9	$c = \frac{6}{5}$ (or 1.2)	1
10	$y = -3x - 2$	1
Total		10

Leaky Faucet		Rubric	
		Points	Section points
1.	<p>Gives correct answer: 302,400</p> <p>Shows correct work such as: $\frac{1 \times 7 \times 24 \times 60 \times 60}{2}$</p> <p><i>Partial credit</i> For partially correct work subtract one point for each error.</p>	<p>2</p> <p>3</p> <p>(2)</p> <p>(1)</p>	5
2.	<p>Gives correct answer: 2734 liters Accept correct answer in milliliters (Accept answers between 2700 and 2750)</p> <p>Shows correct work such as:</p> <p>Shows: answer to question 1 x 52</p> <p>Shows: answer to question 1 ÷ 575</p> <p>Shows ÷ 10</p> <p>Or</p> <p>May show 86400 seconds per day x 365 days</p> <p>31536000 seconds = ÷2</p>	<p>2ft</p> <p>1ft</p> <p>1ft</p> <p>1ft</p>	5
Total Points			10

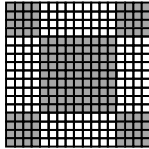
A Golden Crown?		Rubric	
		Points	Section points
1	<p>Shows correct reasoning and correct calculations such as: No because either:</p> <p>Mass of crown is 1.8kg, and 1.8kg of pure gold has volume 90 cm³ not 125 cm³ or Volume of crown is 125 cm³ and this would have mass of 2.5 kg if it was pure gold.</p> <p><i>Partial credit</i> 2 points for reasoning which is correct but incomplete.</p>	<p>3</p> <p>(2)</p>	3
2.	<p>May solve algebraically If there is x kg gold and y kg of silver, then:</p> <p>$x + y = 1.8$ $50x + 100y = 125$</p> <p>Solving these two equations, we find $y = 0.7$ (and $x = 1.1$) 0.7 kg of silver (and 1.1 kg of gold).</p> <p>Alternatively:</p> <p>Any systematic correct method leading to a correct solution (4 points). Systematic correct method leading to incorrect solution (3 points).</p> <p>Trial and error method leading to a correct solution (3 points). Trial and error method leading to incorrect solution (1 points).</p>	<p>1</p> <p>1</p> <p>1</p> <p>4</p> <p>or</p> <p>(7)</p>	7
Total Points			10

Birds' Eggs	Rubric	
	Points	Section points
1. Places point correctly on graph. Accept points within 1 square of correct position.	1	1
2. Gives a correct description such as: Generally, the greater the length of the egg, the greater is its width.	2	2
3. Gives correct answer: 25 mm approximately. Accept values between 22 and 28.	2	2
4. Gives a correct explanation such as: D is longer (but they have the same width). or C is a shorter (and fatter shape).	2 or 2	2
5. Gives a correct answer: E and Gives a correct explanation such as: The line joining E to the origin is the flattest of all the lines joining A, B, C, D, and E to the origin. or Gives all the ratios simplified for comparison.	1 2 or 2	3
Total Points		10

Cubic Graph		Rubric	
		Points	Section points
1. Shows correct work such as: a. $2^3 - 2 - 6 = 0$, so $x = 2$ is a solution to $x^3 - x - 6 = 0$ Gives correct answer such as: (2, 0) b. Gives correct explanation such as: Graph cuts $y = 0$ only once, so there is only one value of x for which $y = 0$.		1 1 1	3
2. Gives correct answer: (0, -6) Translation with vector $\begin{pmatrix} 0 \\ 6 \end{pmatrix}$ (or equivalent correct description) <i>Partial credit</i> For a partially correct response		1 2 (1)	3
3. Draws correct sketch of graph Gives correct answers: $x = 1$, $x = 0$, $x = -1$		2 2	4
Total Points			10

Floor Pattern		Rubric	
		Points	Section points
1. Gives correct answers: 90°, 45°, 112.5°, 112.5° Gives correct explanations such as: <i>(The 90° angle is the corner of a square.)</i> The 45° angle is $360 \div 8$. The other two angles are equal and the angle sum is 360°.	4 x 1		6
2. AB = DC Gives correct explanation showing that ABCD is a parallelogram.. <i>Partial credit</i> Incomplete explanation.	1 3		4
Total Points			10

Fruit Boxes		Rubric																	
		Points	Section points																
1.	<p>The dimensions of the box are (4") x 28" x 14" Award 1 point for each of 28" and 14".</p> <p>The volume is therefore 1568 inches³ (follow-through)</p>	<p>2 x 1</p> <p>1</p>	3																
	<p>Uses a logical, sensible approach such as; Tries 3", then 5", sees that 5" gives a bigger answer, so tries 6", 7" etc.</p> <p><i>Partial credit:</i> if method unclear, but apparently correct.</p> <p>Correct calculations of volume between height = 5" and height = 7"</p> <table style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>height</th> <th>width</th> <th>depth</th> <th>volume</th> </tr> </thead> <tbody> <tr> <td>5</td> <td>26</td> <td>13</td> <td>1690</td> </tr> <tr> <td>6</td> <td>24</td> <td>12</td> <td>1728</td> </tr> <tr> <td>7</td> <td>22</td> <td>11</td> <td>1694</td> </tr> </tbody> </table> <p>This suggests that the maximum volume occurs at or near height = 6" and is 1728 inches³</p> <p>Any attempt to justify why it is exactly 6" (e.g. tries 5.9 and 6.1 or draws a graph)</p> <p><i>Alternative method</i> May find maximum value by differentiation</p>	height	width	depth	volume	5	26	13	1690	6	24	12	1728	7	22	11	1694	<p>2</p> <p>(1)</p> <p>3</p> <p>1</p> <p>1</p> <p>or</p> <p>7</p>	7
height	width	depth	volume																
5	26	13	1690																
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Total Points			10																

Sidewalk Patterns		Rubric																					
		Points	Section points																				
Draws correct pattern:		1	1																				
1. Gives correct answers:	<table border="1" data-bbox="672 659 1232 884"> <thead> <tr> <th>Pattern number, n</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> </tr> </thead> <tbody> <tr> <td>Number of white blocks</td> <td>12</td> <td>40</td> <td>84</td> <td>144</td> </tr> <tr> <td>Number of gray blocks</td> <td>13</td> <td>41</td> <td>85</td> <td>145</td> </tr> <tr> <td>Total number of blocks</td> <td>25</td> <td>81</td> <td>169</td> <td>289</td> </tr> </tbody> </table> <p><i>Partial credit: 5, 6 or 7 correct. Allow follow through in 'totals'.</i></p>	Pattern number, n	1	2	3	4	Number of white blocks	12	40	84	144	Number of gray blocks	13	41	85	145	Total number of blocks	25	81	169	289	2 (1)	2
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Number of white blocks	12	40	84	144																			
Number of gray blocks	13	41	85	145																			
Total number of blocks	25	81	169	289																			
2. Gives a correct answer such as: There is one more gray than white blocks		1	1																				
3.a. Gives correct answers: 9² and 13² b. Gives correct answer: 21² or 441 c. Gives correct answer: (4n + 1)² or equivalent		1 1 2	4																				
4.a. Gives a correct answer such as: Subtract 1 from the total and divide by 2. b. Gives correct answer: 312 and Shows work such as: $(625 - 1) / 2$		1 1	2																				
Total Points			10																				

Pythagorean Triples	Rubric	
	Points	Section points
1. Looks for patterns in the lengths of sides and relationships. Makes statements based on evidence such as: a is always odd. c is always one more than b.	1 2 x 1	3
2. Looks for new values. Decides that the next two values of a are 11 and 13.	2 x 2	4
3. Searches for patterns. Makes generalizations such as: When $a = n$, $b = \frac{1}{2}(n^2 - 1)$, $c = \frac{1}{2}(n^2 + 1)$ Makes generalizations such as: The perimeter is $n^2 + n$ The area is $\frac{1}{4}n(n^2 - 1)$	1 1 1	3
Total Points		10

Circle Pattern		Rubric	
		Points	Section points
<p>1. Gives correct explanation such as: Let radius white circle be r, then area = πr^2 Radius black circle is $2r$, then area = $4 \pi r^2$ Area of two white circles is $2 \pi r^2$</p> <p><i>Partial credit</i> May use numbers rather than variables</p>	<p>2</p> <p>(1)</p>	<p>2</p>	
<p>2. Gives correct answer: 3/4</p>	<p>2</p>	<p>2</p>	
<p>3. Gives correct answers: 3/4, 1/4, 5/8, 3/8, 11/16, 5/16</p> <p><i>Partial credit</i> 4 correct two points 3 correct two points 2 correct one point</p>	<p>4</p> <p>(3)</p> <p>(2)</p> <p>(1)</p>	<p>4</p>	
<p>4. Gives correct explanation such as: Each time a half of the previous fraction is added or subtracted from the black fraction. (The limit of the black fraction is $2/3$.)</p> <p><i>Partial credit</i> For a partially correct explanation that either addresses change by half or the oscillating adding or subtracting.</p>	<p>2</p> <p>(1)</p>	<p>2</p>	
Total Points			10

Fearless Frames	Rubric	
	Points	Section points
<p>Shows that the volume of the prism $V = x^2y$.</p> <p>The perimeter of the prism $P = 8x + 4y = 60$ $y = 15 - 2x$</p> <p>$V = x^2(15 - 2x)$</p> <p>The graph of V against x shows that as x increases from 1 to 5 the volume increases, and then decreases for values of x from 5 to 7.</p> <p>V is max when $x = 5$.</p> <p>Alternatively</p> <p>May make a list showing the values $x = 4$ and volume 112 $x = 6$ and volume 108</p> <p>When $x = 5$, $y = 5$ and $V = 125$</p> <p>States that for $P = 60$ meters, the maximum volume is 125 cubic meters.</p>	<p>3</p> <p>2</p> <p>or</p> <p>2</p>	<p>5</p>
<p>Shows that the height of the equilateral triangle is $\sqrt{3}x/2$.</p> <p>The volume of the prism (V) = $\sqrt{3}x^2y/4$</p> <p>The perimeter of the prism (P) = $6x + 3y = 60$ $y = 20 - 2x$</p> <p>$V = \sqrt{3}x^2(20 - 2x)/4$</p> <p>$V$ is maximum when $x = y = 6^{2/3}$ (accept values 6 – 7)</p> <p>For perimeter 60 meters, the maximum volume is 128 cubic meters. Accept vales 124 - 128</p>	<p>4</p>	<p>4</p>
<p>Advise the customer that, using 60 meters of tubing, a container with a cross section which is an equilateral triangle holds a little more than one which is a square.</p>	<p>1 ft</p>	<p>1</p>
Total Points		10