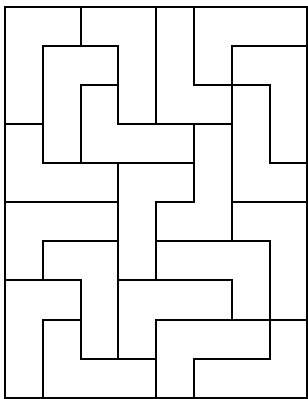


Challenge '10 Solutions

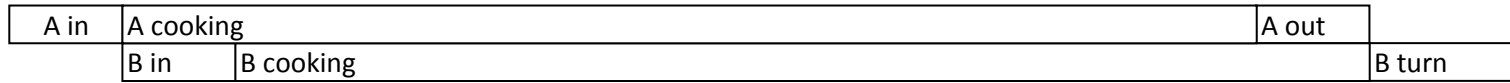
Q	Solution	Marks																						
1	<p>Start with a list of 4 digit cubes:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 2px;">1000</td> <td style="padding: 2px;">1331</td> <td style="padding: 2px;">1728</td> <td style="padding: 2px;">2197</td> <td style="padding: 2px;">2744</td> <td style="padding: 2px;">3375</td> <td style="padding: 2px;">4096</td> <td style="padding: 2px;">4913</td> <td style="padding: 2px;">5832</td> <td style="padding: 2px;">6859</td> <td style="padding: 2px;">8000</td> <td style="padding: 2px;">9261</td> </tr> </table> <p>Eliminate odd numbers:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 2px;">1000</td> <td style="padding: 2px;">1728</td> <td style="padding: 2px;">2744</td> <td style="padding: 2px;">4096</td> <td style="padding: 2px;">5832</td> <td style="padding: 2px;">8000</td> </tr> </table> <p>Eliminate multiples of 3:</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 2px;">1000</td> <td style="padding: 2px;">2744</td> <td style="padding: 2px;">4096</td> <td style="padding: 2px;">8000</td> </tr> </table> <p>Eliminate those with a repeated digit: 4096</p>	1000	1331	1728	2197	2744	3375	4096	4913	5832	6859	8000	9261	1000	1728	2744	4096	5832	8000	1000	2744	4096	8000	<p>3</p> <p>1 for correct answer, 2 for systematic approach</p>
1000	1331	1728	2197	2744	3375	4096	4913	5832	6859	8000	9261													
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2	<p>There are 27 triangles in total:</p> <p>10 pointing up with 3 balls, 6 pointing up with 6 balls, 3 pointing up with 10 balls, 1 pointing up with 15 balls,</p> <p>6 pointing down with 3 balls, & 1 pointing down with 1 ball.</p>	<p>4</p> <p>1 for correct answer, 1 for all up triangles, 1 for all down triangles, 1 systematic approach</p>																						
3	<p>15cm</p> <p>The worm travels through 3 volumes, as the front cover of volume 1 is next to volume 2, and the back cover of volume 5 is next to volume 4.</p>	<p>3</p> <p>1 for correct answer, 2 for explanation</p>																						
4	<p>144 bars</p> <p>$6 \times 4 \times 6 = 144$</p>	<p>2</p> <p>1 for correct answer, 1 for explanation</p>																						
5	<p>One possible solution</p> 	<p>4</p> <p>1 for correct solution, 3 for systematic approach</p>																						

6	113 seconds, see page 3 for details	4 1 for correct answer, 1 for taking a slice out 2 for systematic approach
7	5040 ways ———— ————	4 1 for correct answer, 2 for getting 8!, 1 for systematic approach
8	The menu repeats after 420 days. $3 \times 5 \times 7 \times 4 = 420$, this being the LCM since the numbers have no common factors. After the addition of the extras, the LCM drops to 24 as the numbers now have common factors. The assistant is sacked because the menu repeats too quickly.	5 1 for 420 days, 1 for explanation, 1 for 24 days, 1 for explanation, 1 for explaining sacking
9	The guilty parties are the ones not mentioned in the other questions, i.e. Rev Green in the Study with the Rope	1 1 for everything

Total = 30 marks

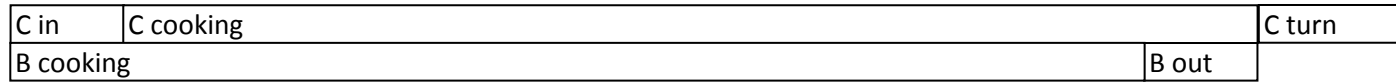
0 sec 3 sec 6 sec

33 sec 36 sec 40 sec



40 sec 43 sec

70 sec 73 sec 77 sec



77 sec 80 sec

107 s 110 s 113 s

