

**GCE**

**Mathematics**

Advanced Subsidiary GCE

Unit **4736**: Decision Mathematics 1

**Mark Scheme for January 2013**

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.

All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

OCR will not enter into any discussion or correspondence in connection with this mark scheme.

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## Annotations and abbreviations

| Annotation in scoris | Meaning                       |
|----------------------|-------------------------------|
| ✓ and ✕              |                               |
| BOD                  | Benefit of doubt              |
| FT                   | Follow through                |
| ISW                  | Ignore subsequent working     |
| M0, M1               | Method mark awarded 0, 1      |
| A0, A1               | Accuracy mark awarded 0, 1    |
| B0, B1               | Independent mark awarded 0, 1 |
| SC                   | Special case                  |
| ^                    | Omission sign                 |
| MR                   | Misread                       |
| Highlighting         |                               |

| Other abbreviations in mark scheme | Meaning  |
|------------------------------------|--|
| M1 dep*                            | Method mark dependent on a previous mark, indicated by * |
| cao                                | Correct answer only                                      |
| oe                                 | Or equivalent  |
| rot                                | Rounded or truncated                                     |
| soi                                | Seen or implied  |
| www                                | Without wrong working                                    |

**Subject-specific Marking Instructions for GCE Mathematics (OCR) Decision strand**

- a. Annotations should be used whenever appropriate during your marking.

**The A, M and B annotations must be used on your standardisation scripts for responses that are not awarded marks.** It is vital that you annotate standardisation scripts fully to show how the marks have been awarded.

For subsequent marking you must make it clear how you have arrived at the mark you have awarded.

- b. An element of professional judgement is required in the marking of any written paper. Remember that the mark scheme assists in marking incorrect solutions. Correct *solutions* leading to correct answers are awarded full marks but work must be the answer alone, and answers that are given in the question, especially, must be validly obtained; key steps in the work must be looked at and anything unfamiliar must be investigated thoroughly.

Correct but unfamiliar or unexpected methods are often signalled by a correct result following an *apparently* incorrect method. Such methods must be carefully assessed. When a candidate adopts a method which does not correspond to the mark scheme, award marks in the spirit of the basic scheme; if you are in any doubt whatsoever (especially if several marks or candidates are involved) contact your Team Leader.

- c. The following types of marks are available.

**M**

A suitable method has been selected and *applied* in a manner which shows that the method is essentially understood. Marks are not usually lost for numerical errors, algebraic slips or errors in units. However, it is not usually sufficient for a candidate to state an intention of using some method or just to quote a formula; the formula or idea must be applied to the specific problem by substituting the relevant quantities into the formula. In some cases the nature of the errors allowed for the award of an accuracy mark is specified.

**A**

Accuracy mark, awarded for a correct answer or intermediate step correctly obtained. Accuracy marks cannot be given unless the associated Method mark is earned (or implied). Therefore M0 A1 cannot ever be awarded.

**B**

Mark for a correct result or statement independent of Method marks.

- d. When a part of a question has two or more 'method' steps, the M marks are in principle independent unless otherwise stated; and similarly where there are several B marks allocated. (The notation 'dep \*' is used to indicate dependent on an earlier, asterisked, mark in the scheme.) Of course, in practice it may happen that when a candidate is wrong in a part of a question, the work from there on is worthless so that no more marks can sensibly be given. If two or more steps are successfully run together by the candidate, the earlier marks are implied and full credit must be given.
- e. The abbreviation ft implies that the A or B mark indicated is allowed for work correctly following on from previously incorrect work. Otherwise, A and B marks are given for correct work only – differences in notation are of course permitted. A (accuracy) mark is given for answers obtained from incorrect working. When A or B marks are awarded for work at an intermediate stage there may be various alternatives that are equally acceptable. In such cases, exactly what is acceptable will be detailed in the mark scheme rationale. If this is not the case please consult your Team Leader.

Sometimes the answer to one part of a question is used in a later part of the same question. In this case, A marks will be given for 'following through'. In such cases you must ensure that you refer back to the answer of the previous part question even if this is not in the image zone. You may find it easier to mark follow through questions candidate-by-candidate rather than question-by-question.

- f. Wrong or missing units in an answer should not lead to the loss of a mark unless the scheme specifically indicates otherwise. Candidates are expected to give numerical answers to an appropriate degree of accuracy, with 3 significant figures often being the expected standard. Variations in the degree of accuracy to which an answer is given (eg 2 or 4 significant figures where 3 is expected) should not be penalised, while answers which are grossly over- or under-specified should normally result in the loss of a mark. The scheme should be consulted in any particular cases where the accuracy of the answer may be a marking issue should be detailed in the mark scheme rationale. In doubt, contact your Team Leader.
- g. Rules for replaced work. NB Follow these maths-specific instructions rather than those in the assessor handbook.

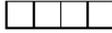
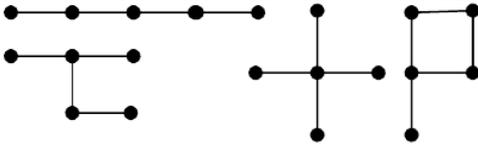
If a candidate attempts a question more than once, and indicates which attempt he/she wishes to be marked, then examine the candidate requests.

If there are two or more attempts at a question which have not been crossed out, examiners should mark what appears to be the (complete) attempt and ignore the others.

- h. For a *genuine* misreading (of numbers or symbols) which is such that the object and the difficulty of the question remain the same, marks should be awarded according to the scheme but following through from the candidate's data. A penalty is then applied; 1 mark is generally withheld. This may differ for some units. This is achieved by withholding one A mark in the question.

Note that a miscopy of the candidate's own working is not a misread but an accuracy error.

| Question |       | Answer  | Marks      | Guidance  |   |
|----------|-------|---|------------|---|---|
| 1        | (i)   |   |            | Condone values not involved in passes omitted (values not involved in passes omitted) |   |
|          |       | 1 <sup>st</sup> pass: 18 7 9 20 15 21 6 10 22 | C S<br>1 0 | M1  | List correct at end of 2 <sup>nd</sup> pass (even if labelled as 1 <sup>st</sup> or 2 <sup>nd</sup> )   |
|          |       | 2 <sup>nd</sup> pass: 18 9 7 20 15 21 6 10 22 | 2 1        | M1  | List correct at end of 4 <sup>th</sup> pass (follow through earlier errors in passes)<br>Sorting into increasing order or from RHS could earn this mark |
|          |       | 3 <sup>rd</sup> pass: 20 18 9 7 15 21 6 10 22 | 3 3        | A1  | All passes correct<br>Condone omission of passes where no swaps occur   |
|          |       | 4 <sup>th</sup> pass: 20 18 15 9 7 21 6 10 22 | 3 2        | M1  | Values given for number of swaps for each pass, S values are correct<br>(need not be correct, could be tallies)   |
|          |       | 5 <sup>th</sup> pass: 21 20 18 15 9 7 6 10 22 | 5 5        | A1  | Correct numbers of comparisons and swaps written down (not necessarily correct)   |
|          |       | 6 <sup>th</sup> pass: 21 20 18 15 9 7 6 10 22 | 1 0        | M1  | (cao, not ft)   |
|          |       | 7 <sup>th</sup> pass: 21 20 18 15 10 9 7 6 22 | 4 3        | A1  |   |
|          |       | 8 <sup>th</sup> pass: 22 21 20 18 15 10 9 7 6 | 8 8        |   |   |
|          |       |   | [5]        |   |   |
| 1        | (ii)  | Box 1: 22 7                                   |            | M1  | Exactly five boxes used with 22, 21, 20, 18, 15 in separate boxes   |
|          |       | Box 2: 21 9                                   |            | A1  | All correct and in correct order  |
|          |       | Box 3: 20 10                                  |            |   |   |
|          |       | Box 4: 18 6                                   |            |   |   |
|          |       | Box 5: 15                                     |            |   |   |
|          |       |   | [2]        |   |   |
| 1        | (iii) | 33 kg   |            | M1  | 33 (may be implied from packing, ignore $128 \div 4 = 32$ if seen)  |
|          |       | eg Box 1: $22+10 = 32$                        |            | A1  | A valid packing of the nine sacks using four boxes, with $W = 33$   |
|          |       | Box 2: $21+9 = 30$                            |            |   |   |
|          |       | Box 3: $20+7+6 = 33$                          |            |   |   |
|          |       | Box 4: $18+15 = 33$                           |            |   |   |
|          |       |   | [2]        |   |   |

| Question | Answer  | Marks                 | Guidance   |
|----------|---|-----------------------|--|
| 2 (i)    | (A)  (B) <br>(C)  (D)   | M1<br>A1<br>[2]       | Or topologically equivalent graphs<br>Any two correct graphs<br>All four correct   |
| 2 (ii)   | (1) <br>(2) <br>(3) - Not possible, square corresponding to node of order 3 must be adjacent to each of the other three squares AND two of the others must be adjacent to each other. Cannot have three squares each adjacent to the other two.<br>(4) <br>(5) and (6) - Not possible, as in (3). Or contain graph from (3) as a subgraph, or contain $K_3$ (a triangle) as a subgraph, or equivalent. | M1<br>A1<br>B1<br>[3] | Or  or  or rotations or reflections<br>Correct diagrams for any two of (1), (2), (4)<br>(Allow "A" or "D" for (1), "B" for (2), "C" for (4))<br>(1), (2), (4) identified as possible and (3), (5), (6) as not possible<br>Explaining what the problem is with any one of those that are not possible<br>Need only give evidence of having understood the issue.<br>Could say that there cannot be more than one square joined to a vertex (or that a vertex cannot have 2 vertices of order 3) for (5) or (6)<br>Allow recognition that there cannot have a triangle of arcs<br>Do not allow claims about the graphs being non-planar (which is true) |
| 2 (iii)  | (a) Shape C<br>(b) Shapes A and D   | B1<br>B1<br>[2]       | C, or this tetromino drawn<br>Both A and D, or these two drawn, but not just the tree (1)  |
| 2 (iv)   |    | M1<br>A1<br>A1<br>[3] | Any two correct graphs<br>A third correct graph<br>All four correct, and no extras. Allow graphs drawn over pentominoes (but not just pentominoes without graphs)<br>[If score 0, then SC1 available for identifying orders correctly]   |

| Question | Answer  | Marks  | Guidance  |  |  |   |    |    |  |   |    |    |  |  |  |    |  |   |   |
|----------|---|--|---|--|--|---|----|----|--|---|----|----|--|--|--|----|--|---|---|
| 3 (i)    | <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <math>A</math><br/> <table border="1" style="border-collapse: collapse; margin: 5px;"> <tr><td>1</td><td>0</td></tr> <tr><td> </td><td> </td></tr> </table> <math>B</math> </div> <div style="text-align: center;"> <math>C</math><br/> <table border="1" style="border-collapse: collapse; margin: 5px;"> <tr><td>3</td><td>13</td></tr> <tr><td>13</td><td> </td></tr> </table> <math>D</math> </div> <div style="text-align: center;"> <math>E</math><br/> <table border="1" style="border-collapse: collapse; margin: 5px;"> <tr><td>5</td><td>27</td></tr> <tr><td>27</td><td> </td></tr> </table> <math>F</math> </div> <div style="text-align: center;"> <math>G</math><br/> <table border="1" style="border-collapse: collapse; margin: 5px;"> <tr><td> </td><td> </td></tr> <tr><td>41</td><td> </td></tr> </table> <math>H</math> </div> </div> <p style="margin-top: 20px;">Route <math>A-C-F-H</math></p> <p>Weight 40</p> | 1  | 0   |  |  | 3 | 13 | 13 |  | 5 | 27 | 27 |  |  |  | 41 |  | <p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p> <p>B1</p> <p>B1</p> <p><b>[6]</b></p> | <p>Updating from 31 to 28 at <math>F</math></p> <p>All temporary labels correct, with no extra values seen.</p> <p>All permanent labels correct. May be consistently interchanging labelling boxes. Condone blank at <math>A</math>. ISW <math>G</math> if given permanent labels.</p> <p>All order of labelling values correct, condone blank at <math>A</math> and <math>G</math> may be blank or have labels 8 41</p> <p><math>ACFH</math> (cao)</p> <p>40 (cao)</p> |
| 1        | 0   |  |   |  |  |   |    |    |  |   |    |    |  |  |  |    |  |   |   |
|          |   |  |   |  |  |   |    |    |  |   |    |    |  |  |  |    |  |   |   |
| 3        | 13  |  |   |  |  |   |    |    |  |   |    |    |  |  |  |    |  |   |   |
| 13       |   |  |   |  |  |   |    |    |  |   |    |    |  |  |  |    |  |   |   |
| 5        | 27  |  |   |  |  |   |    |    |  |   |    |    |  |  |  |    |  |   |   |
| 27       |   |  |   |  |  |   |    |    |  |   |    |    |  |  |  |    |  |   |   |
|          |   |  |   |  |  |   |    |    |  |   |    |    |  |  |  |    |  |   |   |
| 41       |   |  |   |  |  |   |    |    |  |   |    |    |  |  |  |    |  |   |   |
| 3 (ii)   | <p>Without <math>AD</math>, the only odd nodes are <math>A</math> and <math>G</math></p> <p>Repeat shortest path from <math>A</math> to <math>G</math><br/>Weight = 41</p> <p>Weight of all arcs minus <math>AD = 212</math></p> <p><math>212 + 41 = 253</math></p>   | <p>M1</p> <p>A1 ft</p> <p>M1</p> <p>A1</p> <p><b>[4]</b></p> | <p><math>A, G</math></p> <p>41, or follow through from part (i)</p> <p>212 seen or implied from final weight (<math>230 - 18</math>)</p> <p>Calculation of <math>212 +</math> (their) 41</p>  |  |  |   |    |    |  |   |    |    |  |  |  |    |  |   |   |
| 3 (iii)  | <p><math>A</math> and <math>G</math> are still the only odd nodes<br/>Without <math>AC</math> and <math>CD</math>, shortest paths are:<br/><math>A</math> to <math>D = 18</math> and <math>D</math> to <math>G = 31 \Rightarrow 49</math><br/><math>A</math> to <math>F = 31</math> and <math>F</math> to <math>G = 16 \Rightarrow 47</math></p> <p>Repeat <math>AFG = 47</math></p> <p>Weight of all arcs minus <math>AC</math> and <math>CD = 205</math></p> <p><math>205 + 47 = 252</math></p>   | <p>M1</p> <p>A1</p> <p>M1</p> <p>A1</p> <p><b>[4]</b></p>    | <p>Shortest path from <math>A</math> to <math>G</math> previously used arc <math>AC</math>, so need to consider <math>AG</math>.</p> <p>Considering a valid route from <math>A</math> to <math>G</math>, with weight correct, or (or <math>AG</math>) = 47</p> <p>47</p> <p>205 (<math>230 - 13 - 12</math>) or (their) <math>212 - 7</math></p> <p>Calculation of (their) <math>205 + 47</math> with working shown</p> |  |  |   |    |    |  |   |    |    |  |  |  |    |  |   |   |



| Question |       | Answer  | Marks     | Guidance  |
|----------|-------|---|-----------|---|
| 4        | (iii) | Two least weight arcs from G = $7+9 = 16$                     | B1        | 7 and 9 or 7+9 or 16 (must see some evidence of)  |
|          |       | Weight of MST without G = $60 - 7 = 53$                       | M1        | 53, follow through their tree if possible (may be implied)                              |
|          |       | Lower bound = $53 + 16 = 69$                                  | A1<br>[3] | 69 (cao)  |
| 4        | (iv)  | Team 1: Alan, Bob and Ella<br>Team 2: Caz, Dan, Fred and Gita | B1        | {A, B, E}, {C, D, F, G} in any order (cao)  |
|          |       | $PC + CD + CG + CF = 40$<br>$PC + PB + BA + BE = 28$          | M1        | Evidence that candidate knows that P must contact C first (may be implied in answer 40) |
|          |       | So it takes 40 minutes  | A1<br>[3] | 40 (cao)  |

| Question |       | Answer  | Marks               | Guidance  |     |      |     |     |     |   |    |    |    |   |   |   |   |    |    |    |   |   |      |   |   |   |   |   |   |     |                               |   |
|----------|-------|---|---------------------|---|-----|------|-----|-----|-----|---|----|----|----|---|---|---|---|----|----|----|---|---|------|---|---|---|---|---|---|-----|-------------------------------|---|
| 5        | (i)   | $P = x + y + z$   | B1<br>[1]           | $x + y + z$ or $kx + ky + kz$ for any $k > 0$   |     |      |     |     |     |   |    |    |    |   |   |   |   |    |    |    |   |   |      |   |   |   |   |   |   |     |                               |   |
| 5        | (ii)  | <p>Each box of miniature cupcakes uses <math>24 \times 3 = 72</math> units of topping,<br/>           each box of small cupcakes uses <math>20 \times 5 = 100</math> units<br/>           and each box of standard cupcakes uses <math>12 \times 7 = 84</math> units.</p> <p>So the total <math>72x + 100y + 84z</math> units.</p> <p>Hence, <math>72x + 100y + 84z \leq 5000</math><br/> <math>\Rightarrow 18x + 25y + 21z \leq 1250</math> (as given)</p>   | M1<br><br>A1<br>[2] | Any one of $24 \times 3$ or $20 \times 5$ or $12 \times 7$ (or 72 or 100 or 84)<br><br>$72x + 100y + 84z \leq 5000$ |     |      |     |     |     |   |    |    |    |   |   |   |   |    |    |    |   |   |      |   |   |   |   |   |   |     |                               |   |
| 5        | (iii) | <p><math>24 \times 2 = 48, 20 \times 3 = 60, 12 \times 4 = 48</math></p> <p><math>\Rightarrow 48x + 60y + 48z \leq 3000</math></p> <p><math>\Rightarrow 4x + 5y + 4z \leq 250</math></p>  | M1<br><br>A1<br>[2] | $48x + 60y + 48z \leq 3000$ (or any positive multiple of $4x + 5y + 4z$ )<br><br>$4x + 5y + 4z \leq 250$            |     |      |     |     |     |   |    |    |    |   |   |   |   |    |    |    |   |   |      |   |   |   |   |   |   |     |                               |   |
| 5        | (iv)  | <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th><math>P</math></th> <th><math>x</math></th> <th><math>y</math></th> <th><math>z</math></th> <th><math>s</math></th> <th><math>t</math></th> <th>RHS</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>-1</td> <td>-1</td> <td>-1</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>0</td> <td>18</td> <td>25</td> <td>21</td> <td>1</td> <td>0</td> <td>1250</td> </tr> <tr> <td>0</td> <td>4</td> <td>5</td> <td>4</td> <td>0</td> <td>1</td> <td>250</td> </tr> </tbody> </table> | $P$                 | $x$   | $y$ | $z$  | $s$ | $t$ | RHS | 1 | -1 | -1 | -1 | 0 | 0 | 0 | 0 | 18 | 25 | 21 | 1 | 0 | 1250 | 0 | 4 | 5 | 4 | 0 | 1 | 250 | B1<br><br>M1<br><br>A1<br>[3] | A $3 \times 7$ table of numbers with three basis columns ( $P$ and slack variables)<br><br>Constraint rows correct for the $x, y, z$ and RHS columns, following the given constraints, or given and their (iii)<br><br>Objective row has -1 -1 -1 in columns for $x, y$ and $z$ (or equal to 0) |
| $P$      | $x$   | $y$   | $z$                 | $s$   | $t$ | RHS  |     |     |     |   |    |    |    |   |   |   |   |    |    |    |   |   |      |   |   |   |   |   |   |     |                               |   |
| 1        | -1    | -1  | -1                  | 0   | 0   | 0    |     |     |     |   |    |    |    |   |   |   |   |    |    |    |   |   |      |   |   |   |   |   |   |     |                               |   |
| 0        | 18    | 25  | 21                  | 1   | 0   | 1250 |     |     |     |   |    |    |    |   |   |   |   |    |    |    |   |   |      |   |   |   |   |   |   |     |                               |   |
| 0        | 4     | 5   | 4                   | 0   | 1   | 250  |     |     |     |   |    |    |    |   |   |   |   |    |    |    |   |   |      |   |   |   |   |   |   |     |                               |   |

| Question |       | Answer   | Marks  | Guidance   |      |      |   |   |     |   |   |      |   |   |      |      |   |   |     |   |   |      |     |   |   |      |   |   |      |      |  |  |
|----------|-------|--|--|--|------|------|---|---|-----|---|---|------|---|---|------|------|---|---|-----|---|---|------|-----|---|---|------|---|---|------|------|--|--|
| 5        | (v)   | $1250 \div 18 = 69.4$ , $250 \div 4 = 62.5$<br>$250 \div 4$ is the least positive ratio<br>new R3 = R3 $\div$ 4<br>new R1 = R1 + new pivot row<br>new R2 = R2 - 18 $\times$ new pivot row<br><table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>P</th> <th>x</th> <th>y</th> <th>z</th> <th>s</th> <th>t</th> <th>RHS</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>0</td> <td>0.25</td> <td>0</td> <td>0</td> <td>0.25</td> <td>62.5</td> </tr> <tr> <td>0</td> <td>0</td> <td>2.5</td> <td>3</td> <td>1</td> <td>-4.5</td> <td>125</td> </tr> <tr> <td>0</td> <td>1</td> <td>1.25</td> <td>1</td> <td>0</td> <td>0.25</td> <td>62.5</td> </tr> </tbody> </table> | P  | x  | y    | z    | s | t | RHS | 1 | 0 | 0.25 | 0 | 0 | 0.25 | 62.5 | 0 | 0 | 2.5 | 3 | 1 | -4.5 | 125 | 0 | 1 | 1.25 | 1 | 0 | 0.25 | 62.5 | B1<br>B1<br>B1<br>M1<br>A1<br><br><b>[5]</b> | Follow through their tableau if possible, except to<br>$250 \div 4$ or 62.5 seen and chosen (showing their least positive<br>column). May find working in (iv)<br>Correct calculation shown for pivot row (provided pivot value)<br>May find working in (iv)<br>Correct calculations for other rows (accept reasonable abbreviations)<br>(Their) pivot row correct<br>A correct tableau (cao) rows and columns may be interchanged<br>of P column<br>(*) Watch out for correct but scaled second constraint leading<br>If correct, this gets all the marks |
| P        | x     | y  | z  | s  | t    | RHS  |   |   |     |   |   |      |   |   |      |      |   |   |     |   |   |      |     |   |   |      |   |   |      |      |  |  |
| 1        | 0     | 0.25   | 0  | 0  | 0.25 | 62.5 |   |   |     |   |   |      |   |   |      |      |   |   |     |   |   |      |     |   |   |      |   |   |      |      |  |  |
| 0        | 0     | 2.5  | 3  | 1  | -4.5 | 125  |   |   |     |   |   |      |   |   |      |      |   |   |     |   |   |      |     |   |   |      |   |   |      |      |  |  |
| 0        | 1     | 1.25   | 1  | 0  | 0.25 | 62.5 |   |   |     |   |   |      |   |   |      |      |   |   |     |   |   |      |     |   |   |      |   |   |      |      |  |  |
| 5        | (vi)  | $x = 62.5$ , $y = 0$ , $z = 0$<br>No decimals, so optimal profit is £62<br>$72 \times 62 = 4464 \Rightarrow 536$ units of topping<br>$48 \times 62 = 2976 \Rightarrow 24$ decorations left over  | M1<br>A1<br>M1<br>A1<br><b>[4]</b>                   | May be answered in (v)<br>Reading off their values for all three variables, from first iteration<br>£62 (cao), condone 62<br>$72 \times$ their 62 or $48 \times$ their 62 (or equivalent)<br>Both 536 and 24 (cao)                 |      |      |   |   |     |   |   |      |   |   |      |      |   |   |     |   |   |      |     |   |   |      |   |   |      |      |  |  |
| 5        | (vii) | $4P + y \leq 250$<br>No decorations left over so no slack in<br>this constraint $\Rightarrow 4P + y = 250$<br>$250 \div 4 = 62.5$ , so maximum $P = 62$<br>and $y = 2$ boxes of small cupcakes<br><br>No topping left over, $18P + 7y + 3z = 1250$<br>$\Rightarrow z = 40$<br>$x + y + z = 62 \Rightarrow x = 20$  | B1<br>M1<br><br>A1<br><br>M1<br><br>A1<br><b>[5]</b> | $4P + y \leq 250$ in any form<br>Using (their) $4P + y = 250$<br><br>$P = 62$ and deducing that $y = 2$ (cao)<br><br>Using their $P$ and $y$ in $18P + 7y + 3z = 1250$ to give an integer value<br><br>$x = 20$ and $z = 40$ (cao) |      |      |   |   |     |   |   |      |   |   |      |      |   |   |     |   |   |      |     |   |   |      |   |   |      |      |  |  |

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