



GCE

Mathematics

Advanced GCE

Unit **4737**: Decision Mathematics 2

Mark Scheme for June 2012

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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

Annotation	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

- 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 either 0 or full 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 is designed to assist in marking incorrect solutions. Correct *solutions* leading to correct answers are awarded full marks but work must not be judged on the answer alone, and answers that are given in the question, especially, must be validly obtained; key steps in the working must always 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 work must be carefully assessed. When a candidate adopts a method which does not correspond to the mark scheme, award marks according to the spirit of the basic scheme; if you are in any doubt whatsoever (especially if several marks or candidates are involved) you should 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. Method marks are not usually lost for numerical errors, algebraic slips or errors in units. However, it is not usually sufficient for a candidate just to indicate an intention of using some method or just to quote a formula; the formula or idea must be applied to the specific problem in hand, eg by substituting the relevant quantities into the formula. In some cases the nature of the errors allowed for the award of an M mark may be 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.

Unless otherwise indicated, marks once gained cannot subsequently be lost, eg wrong working following a correct form of answer is ignored. Sometimes this is reinforced in the mark scheme by the abbreviation isw. However, this would not apply to a case where a candidate passes through the correct answer as part of a wrong argument.

- d. When a part of a question has two or more 'method' steps, the M marks are in principle independent unless the scheme specifically says otherwise; and similarly where there are several B marks allocated. (The notation 'dep **' is used to indicate that a particular mark is dependent on an earlier, asterisked, mark in the scheme.) Of course, in practice it may happen that when a candidate has once gone wrong in a part of a question, the work from there on is worthless so that no more marks can sensibly be given. On the other hand, when 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 results. Otherwise, A and B marks are given for correct work only – differences in notation are of course permitted. A (accuracy) marks are not given for answers obtained from incorrect working. When A or B marks are awarded for work at an intermediate stage of a solution, 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 often be 'follow through'. In such cases you must ensure that you refer back to the answer of the previous part question even if this is not shown within 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 norm. Small variations in the degree of accuracy to which an answer is given (e.g. 2 or 4 significant figures where 3 is expected) should not normally be penalised, while answers which are grossly over- or under-specified should normally result in the loss of a mark. The situation regarding any particular cases where the accuracy of the answer may be a marking issue should be detailed in the mark scheme rationale. If in doubt, contact your Team Leader.
- g. Rules for replaced work

If a candidate attempts a question more than once, and indicates which attempt he/she wishes to be marked, then examiners should do as 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 last (complete) attempt and ignore the others.

NB Follow these maths-specific instructions rather than those in the assessor handbook.

- h. For a *genuine* misreading (of numbers or symbols) which is such that the object and the difficulty of the question remain unaltered, mark according to the scheme but following through from the candidate's data. A penalty is then applied; 1 mark is generally appropriate, though 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.

Please mark work that is in the wrong answer space provided it is obvious which part of which question the candidate is attempting.

Question		Answer	Marks	Guidance
1	(i)		<p>B1</p> <p>[1]</p>	<p>Correct bipartite graph</p>
1	(ii)	$0500 = D - 0400 = E$ $A = 2200 \quad B = 0100 \quad C = 0200$ $D = 0500 \quad E = 0400$	<p>M1</p> <p>A1</p> <p>[2]</p>	<p>This alternating path written down, starting at 0500, not implied from matching (Do not allow paths from (ii) and (iii) swapped) This matching for A, B, C, D and E written down</p>
1	(iii)	$F = 2200 - A = 0100 - B = 0200 - C = 0300$ $A = 0100 \quad B = 0200 \quad C = 0300$ $D = 0500 \quad E = 0400 \quad F = 2200$	<p>M1</p> <p>A1</p> <p>[2]</p>	<p>This alternating path written down, starting from F, not implied from matching (Do not allow paths from (ii) and (iii) swapped) This complete matching written down</p>

Question	Answer	Marks	Guidance																																																		
2	<p>(iii)</p> <p>Cross through zeros using three lines</p> <table border="1" data-bbox="448 279 985 454"> <tr><td>0</td><td>6</td><td>0</td><td>3</td><td>4</td></tr> <tr><td>0</td><td>5</td><td>1</td><td>5</td><td>4</td></tr> <tr><td>0</td><td>4</td><td>0</td><td>3</td><td>2</td></tr> <tr><td>0</td><td>3</td><td>0</td><td>2</td><td>2</td></tr> <tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td></tr> </table> <p>Augment by 2</p> <table border="1" data-bbox="448 630 985 805"> <tr><td>0</td><td>4</td><td>0</td><td>1</td><td>2</td></tr> <tr><td>0</td><td>3</td><td>1</td><td>3</td><td>2</td></tr> <tr><td>0</td><td>2</td><td>0</td><td>1</td><td>0</td></tr> <tr><td>0</td><td>1</td><td>0</td><td>0</td><td>0</td></tr> <tr><td>2</td><td>0</td><td>2</td><td>0</td><td>0</td></tr> </table> <p>Order in which they attempt to get into building: Hilary, Ken, Gary, Jenni, Ieuan $H = 9, K = 8, G = 7, J = 1, I = 5$ Jenni is least likely to succeed</p>	0	6	0	3	4	0	5	1	5	4	0	4	0	3	2	0	3	0	2	2	0	0	0	0	0	0	4	0	1	2	0	3	1	3	2	0	2	0	1	0	0	1	0	0	0	2	0	2	0	0	<p>M1</p> <p>A1</p> <p>B1</p> <p>B1</p> <p>[4]</p>	<p>Crossing through zeros correctly and substantially correct attempt at augmenting by 2 in a single step (may be implied from augmented matrix)</p> <p>Correct matrix after augmenting, and no further attempts to reduce or augment</p> <p><i>H, K, G, J, I</i></p> <p><i>J (cao www)</i></p>
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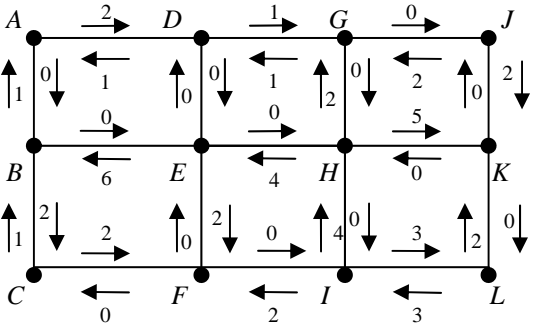
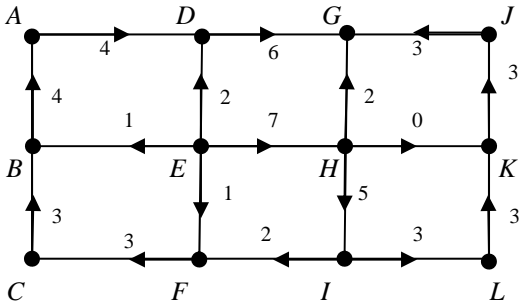
Question	Answer	Marks	Guidance																																																														
3	<table border="1"> <thead> <tr> <th data-bbox="421 247 517 317">Stage</th> <th data-bbox="517 247 613 317">State</th> <th data-bbox="613 247 725 317">Action</th> <th data-bbox="725 247 853 317">Working</th> <th data-bbox="853 247 1010 317">Suboptimal latest time</th> </tr> </thead> <tbody> <tr> <td data-bbox="421 317 517 387" rowspan="2">3</td> <td data-bbox="517 317 613 355">0</td> <td data-bbox="613 317 725 355">0</td> <td data-bbox="725 317 853 355">15 - 4</td> <td data-bbox="853 317 1010 355">*11 am</td> </tr> <tr> <td data-bbox="517 355 613 394">1</td> <td data-bbox="613 355 725 394">0</td> <td data-bbox="725 355 853 394">15 - 2</td> <td data-bbox="853 355 1010 394">* 1 pm</td> </tr> <tr> <td data-bbox="421 394 517 544" rowspan="3">2</td> <td data-bbox="517 394 613 432">0</td> <td data-bbox="613 394 725 432">0</td> <td data-bbox="725 394 853 432">11 - 4</td> <td data-bbox="853 394 1010 432">* 7 am</td> </tr> <tr> <td data-bbox="517 432 613 502" rowspan="2">1</td> <td data-bbox="613 432 725 470">0</td> <td data-bbox="725 432 853 470">11 - 3</td> <td data-bbox="853 432 1010 502" rowspan="2">*10 am</td> </tr> <tr> <td data-bbox="613 470 725 509">1</td> <td data-bbox="725 470 853 509">13 - 3</td> </tr> <tr> <td data-bbox="517 509 613 547">2</td> <td data-bbox="613 509 725 547">1</td> <td data-bbox="725 509 853 547">13 - 4</td> <td data-bbox="853 509 1010 547">* 9 am</td> </tr> <tr> <td data-bbox="421 544 517 847" rowspan="7">1</td> <td data-bbox="517 544 613 655" rowspan="3">0</td> <td data-bbox="613 544 725 582">0</td> <td data-bbox="725 544 853 582">7 - 2</td> <td data-bbox="853 544 1010 655" rowspan="3">* 7 am</td> </tr> <tr> <td data-bbox="613 582 725 620">1</td> <td data-bbox="725 582 853 620">10 - 3</td> </tr> <tr> <td data-bbox="613 620 725 659">2</td> <td data-bbox="725 620 853 659">9 - 3</td> </tr> <tr> <td data-bbox="517 659 613 770" rowspan="3">1</td> <td data-bbox="613 659 725 697">0</td> <td data-bbox="725 659 853 697">7 - 2</td> <td data-bbox="853 659 1010 697">* 5 am</td> </tr> <tr> <td data-bbox="613 697 725 735">1</td> <td data-bbox="725 697 853 735">10 - 6</td> <td data-bbox="853 697 1010 770" rowspan="2">*</td> </tr> <tr> <td data-bbox="613 735 725 774">2</td> <td data-bbox="725 735 853 774">9 - 4</td> </tr> <tr> <td data-bbox="517 774 613 847" rowspan="2">2</td> <td data-bbox="613 774 725 812">1</td> <td data-bbox="725 774 853 812">10 - 2</td> <td data-bbox="853 774 1010 847" rowspan="2">* 8 am</td> </tr> <tr> <td data-bbox="613 812 725 850">2</td> <td data-bbox="725 812 853 850">9 - 3</td> </tr> <tr> <td data-bbox="421 847 517 965" rowspan="3">0</td> <td data-bbox="517 847 613 965" rowspan="3">0</td> <td data-bbox="613 847 725 885">0</td> <td data-bbox="725 847 853 885">7 - 5</td> <td data-bbox="853 847 1010 965" rowspan="3">* 2 am</td> </tr> <tr> <td data-bbox="613 885 725 924">1</td> <td data-bbox="725 885 853 924">5 - 4</td> </tr> <tr> <td data-bbox="613 924 725 962">2</td> <td data-bbox="725 924 853 962">8 - 7</td> </tr> </tbody> </table>	Stage	State	Action	Working	Suboptimal latest time	3	0	0	15 - 4	*11 am	1	0	15 - 2	* 1 pm	2	0	0	11 - 4	* 7 am	1	0	11 - 3	*10 am	1	13 - 3	2	1	13 - 4	* 9 am	1	0	0	7 - 2	* 7 am	1	10 - 3	2	9 - 3	1	0	7 - 2	* 5 am	1	10 - 6	*	2	9 - 4	2	1	10 - 2	* 8 am	2	9 - 3	0	0	0	7 - 5	* 2 am	1	5 - 4	2	8 - 7	<p>M1 A1</p> <p>M1 A1</p> <p>M1 A1</p> <p>M1 A1</p>	<p>Stage and state columns correct Action column correct</p> <p>Correct method for working seen or implied for stage 2 (structure must be correct) Suboptimal values correct for stage 2 (cao)</p> <p>Correct method for working seen or implied for stage 1 (structure must be correct) Stage 1 correct (cao)</p>
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	<p>Alternatively using shortest path and then converting to times at the end</p> <table border="1" data-bbox="421 312 1010 975"> <thead> <tr> <th>Stage</th> <th>State</th> <th>Action</th> <th>Working</th> <th>Suboptimal minimum</th> </tr> </thead> <tbody> <tr> <td rowspan="2">3</td> <td>0</td> <td>0</td> <td>4</td> <td>* 4</td> </tr> <tr> <td>1</td> <td>0</td> <td>2</td> <td>* 2</td> </tr> <tr> <td rowspan="3">2</td> <td>0</td> <td>0</td> <td>4 + 4</td> <td>* 8</td> </tr> <tr> <td rowspan="2">1</td> <td>0</td> <td>3 + 4</td> <td></td> </tr> <tr> <td>1</td> <td>3 + 2</td> <td>* 5</td> </tr> <tr> <td>2</td> <td>1</td> <td>4 + 2</td> <td>* 6</td> </tr> <tr> <td rowspan="8">1</td> <td rowspan="3">0</td> <td>0</td> <td>2 + 8</td> <td></td> </tr> <tr> <td>1</td> <td>3 + 5</td> <td>* 8</td> </tr> <tr> <td>2</td> <td>3 + 6</td> <td></td> </tr> <tr> <td rowspan="3">1</td> <td>0</td> <td>2 + 8</td> <td>* 10</td> </tr> <tr> <td>1</td> <td>6 + 5</td> <td></td> </tr> <tr> <td>2</td> <td>4 + 6</td> <td>*</td> </tr> <tr> <td rowspan="2">2</td> <td>1</td> <td>2 + 5</td> <td>* 7</td> </tr> <tr> <td>2</td> <td>3 + 6</td> <td></td> </tr> <tr> <td rowspan="3">0</td> <td rowspan="3">0</td> <td>0</td> <td>5 + 8</td> <td>* 13</td> </tr> <tr> <td>1</td> <td>4 + 10</td> <td></td> </tr> <tr> <td>2</td> <td>7 + 7</td> <td></td> </tr> </tbody> </table> <p>Latest take-off time = 2 am</p> <p>(0; 0) – (1; 0) – (2; 1) – (3; 1) – (4; 0)</p> <p style="margin-left: 40px;"> <i>A</i> <i>E</i> <i>H</i> 7 am 10 am 1 pm </p>	Stage	State	Action	Working	Suboptimal minimum	3	0	0	4	* 4	1	0	2	* 2	2	0	0	4 + 4	* 8	1	0	3 + 4		1	3 + 2	* 5	2	1	4 + 2	* 6	1	0	0	2 + 8		1	3 + 5	* 8	2	3 + 6		1	0	2 + 8	* 10	1	6 + 5		2	4 + 6	*	2	1	2 + 5	* 7	2	3 + 6		0	0	0	5 + 8	* 13	1	4 + 10		2	7 + 7		<p>B1</p> <p>M1</p> <p>A1</p> <p>[9]</p>	<p>2 am (cao) as a clock time (allow 24 hour clock times but not just 2)</p> <p><i>A</i>, <i>E</i> and <i>H</i> (cao) as letters, not (stage; state)</p> <p>7 am, 10 am, 1 pm (cao), as clock times</p>
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4	(i)	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>Chris</th> <th>Jamie</th> <th>Wendy</th> <th>row min</th> </tr> </thead> <tbody> <tr> <td>Andy</td> <td>-3</td> <td>2</td> <td>-4</td> <td>-4</td> </tr> <tr> <td>Kath</td> <td>5</td> <td>4</td> <td>-6</td> <td>-6</td> </tr> <tr> <td>Zac</td> <td>1</td> <td>-4</td> <td>-5</td> <td>-5</td> </tr> <tr> <td>col max</td> <td>5</td> <td>4</td> <td>-4</td> <td></td> </tr> </tbody> </table> <p>Play-safe for rowers is Andy Play-safe for cyclists is Wendy</p> <p>$\max(\text{row min}) = -4 = \min(\text{col max}) \Rightarrow \text{stable}$ row maximin = col minimax</p>		Chris	Jamie	Wendy	row min	Andy	-3	2	-4	-4	Kath	5	4	-6	-6	Zac	1	-4	-5	-5	col max	5	4	-4		<p>M1 Showing row min values -4, -6, -5; if values are not shown condone talking about maximin or 'highest lowest'</p> <p>A1 Naming Andy or A as play-safe (not just identifying row) SC: Naming Andy or A without working or identifying A row www \Rightarrow B1</p> <p>M1 Showing col max values 5, 4, -4 (or -5, -4, 4) or stating that W dominates over C and J; if values are not shown condone talking about minimax or 'lowest highest', or equivalent</p> <p>A1 Naming Wendy or W as play-safe (not just identifying column) SC: Naming Wendy or W without working or identifying W column www \Rightarrow B1</p> <p>B1 Showing that game is stable, or in words (if Wendy plays then A is best choice for rowers and if Andy plays then W is best choice for cyclists)</p> <p>[5]</p>	
			Chris	Jamie	Wendy	row min																							
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	Chris	Jamie	row min																										
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col max	1	2																											

Question		Answer	Marks	Guidance
4	(iii)	$A = 0.5 \times (-3) + 0.5 \times (2) = -0.5$ $Z = -1.5$	B1 B1 [2]	-0.5 (cao) -1.5 (cao)
4	(iv)	Know it must be a mixed strategy, $p \neq 0$ or 1 $A = 3p - 2(1 - p)$ or $5p - 2$ $Z = -1p + 4(1 - p)$ or $4 - 5p$ $5p - 2 = 4 - 5p$ $\Rightarrow p = 0.6$	B1 M1 A1 [3]	Both expressions in any form Solving where their expressions are equal 0.6 (cao) from a valid method
4	(v)	$-3q + (1 - q) = 2q - 4(1 - q)$ (or either of these = -1) $\Rightarrow 1 - 4q = 6q - 4$ $\Rightarrow q = 0.5$	B1 M1 A1 [3]	Either expression in any form Solving where their expressions are equal (or where either of them equals -E from part (iv)) 0.5 (cao) from a valid method

Question	Answer	Marks	Guidance
5 (i)	Source is E G only has flow into it, no flow out	B1 B1 [2]	E All arrows at G point in
5 (ii)	$6 + 7 - 2$ $= 11$ litres per second	M1 A1 [2]	Answer given as 9, 11 or 13 www 11 (cao), condone units missing
5 (iii)	At most 3 flows into JG along KJ $HK = 0$ $IL = 3$	B1 B1 B1 [3]	Upper capacity $KJ = 3$; condone $KJ = 3$, 'max 3 flows in', 'only 3 can enter J ' but not 'only 3 enters J ' without reference to K 0 (cao) 3 (cao)
5 (iv)	At least 2 flows along IF and 3 flows along IL (to LK) $EH = 7$ $CB = 3$	M1 A1 B1 B1 [4]	2 must flow in IF (condone: '2 out to F '; 'min IF ') and $IL = 3$ (condone: '3 to L '; 'min LK ') (or M1 and A1 swapped) 7 (cao) 3 (cao)
5 (v)		M1 A1 [2]	A flow from E to G of 10 in which $JG = 3$ and $HI = 5$ (even if some capacities are not met) This flow (cao) (Interpret blanks as 0)

Question	Answer	Marks	Guidance
5 (vi)		<p>M1</p> <p>A1</p> <p>[2]</p>	<p>At least six arcs with arrows correctly labelled (or all reversed)</p> <p>cao (or all reversed)</p>
5 (vii)	<p>$E - B - A - D - G$</p>  <p>11 is max flow since cut in (ii) = 11</p>	<p>B1</p> <p>B1</p> <p>B1</p> <p>[3]</p>	<p>This path (or in reverse)</p> <p>This flow of 11 litres per second (cao) (Interpret blanks as 0)</p> <p>Referring to cut in (ii) or convincing reasoning</p>

Question	Answer	Marks	Guidance
6 (i)		<p>M1</p> <p>A1</p> <p>[2]</p>	<p>Correct structure, even with unnecessary dummies and no directions, arcs must be labelled <i>A, B, C, ...</i> Single start and single finish</p> <p>Correct structure with no unnecessary dummies, directed arcs and arcs labelled <i>A, B, C, ...</i></p>
6 (ii)	<p>Minimum project completion time = 12 hours Critical activities: <i>B, C, D, I</i></p>	<p>M1</p> <p>M1</p> <p>A1</p> <p>B1</p> <p>B1</p> <p>[5]</p>	<p>Forward pass correct (ft their network if possible) Backward pass correct (ft their network if poss) Both passes correct (condone unnecessary dummies or implied directions, but not wrong structure)</p> <p>12 hours (cao), condone omission of units <i>B, C, D, I</i> (cao)</p>
6 (iii)	<p>For <i>D</i> to happen, <i>A, B</i> and <i>C</i> must be complete Sally cannot do any of these activities on her own If they share <i>A</i> and <i>B</i> this takes $1 + 2 = 3$ hours Sally cannot help with <i>C</i> so this takes another 2 hours</p>	<p>M1</p> <p>A1</p> <p>[2]</p>	<p><i>A</i> and <i>B</i> need (at least) 3 hours, can share <i>A</i> and <i>B</i></p> <p><i>C</i> takes 2 hours, <i>C</i> cannot be shared</p>

Question		Answer	Marks	Guidance																																																		
6	(iv)	<p>Sally does F, G and $I = 9$ hours and shares A, B, D and $E = 9$ hours</p> <p>Tariq will take 9 hours for the shared activities and another 6 hours for C, H and J So he takes 15 hours</p>	<p>B1 B1</p> <p>B1 [3]</p>	<p>$F, G, I = 9$ Sharing $A, B, D, E = 9$ (total time 18 hours given in question) SC: 'does F, G, I and shares $A, B, D, E = 18$' (with no durations) \Rightarrow B1</p> <p>15 (cao), condone omission of units</p>																																																		
6	(v)	<p>Cannot do any of D, E, G until A, B and C are done This is (at least) 5 hours from the start F, G and $I = 9$ hours, D and $E = 6$ hours $5 + 6 + 9 = 20$ hours</p>	<p>M1</p> <p>A1 [2]</p>	<p>Has to wait for Tariq to do C</p> <p>2 hour delay giving $18 + 2 = 20$ hours 20 (cao), condone omission of units</p>																																																		
6	(vi)	<p>e.g. Share AB, T does C, share $DEFG$, T does HJ, S does I</p> <p>e.g.</p> <table border="1" style="display: inline-table; margin-right: 20px;"> <tr> <td>ABC</td> <td>ABC</td> <td>ABC</td> <td>ABC</td> <td>ABC</td> </tr> <tr> <td>5 hrs</td> <td>5 hrs</td> <td>5 hrs</td> <td>5 hrs</td> <td>5 hrs</td> </tr> <tr> <td>share</td> <td>$DEFG$</td> <td>DE</td> <td>DE</td> <td>DF</td> </tr> <tr> <td>Tariq</td> <td>HJ</td> <td>FHJ</td> <td>GHJ</td> <td>EHJ</td> </tr> <tr> <td>Sally</td> <td>I</td> <td>GI</td> <td>FI</td> <td>GI</td> </tr> </table> <table border="1" style="display: inline-table; margin-right: 20px;"> <tr> <td>ABC</td> <td>ABC</td> <td>ABC</td> <td>ABC</td> <td>ABC</td> </tr> <tr> <td>5 hrs</td> <td>5 hrs</td> <td>5 or 6</td> <td>5 or 6</td> <td>5, 6, 7</td> </tr> <tr> <td>share</td> <td>EF</td> <td>G</td> <td>DG</td> <td>D</td> </tr> <tr> <td>Tariq</td> <td>DHJ</td> <td>$DEHJ$</td> <td>EHJ</td> <td>$DEHJ$</td> </tr> <tr> <td>Sally</td> <td>GI</td> <td>FI</td> <td>FI</td> <td>FGI</td> </tr> </table>	ABC	ABC	ABC	ABC	ABC	5 hrs	5 hrs	5 hrs	5 hrs	5 hrs	share	$DEFG$	DE	DE	DF	Tariq	HJ	FHJ	GHJ	EHJ	Sally	I	GI	FI	GI	ABC	ABC	ABC	ABC	ABC	5 hrs	5 hrs	5 or 6	5 or 6	5, 6, 7	share	EF	G	DG	D	Tariq	DHJ	$DEHJ$	EHJ	$DEHJ$	Sally	GI	FI	FI	FGI	<p>B1</p> <p>M1</p> <p>A1</p> <p>[3]</p>	<p>Share one or both of A, B (Tariq does any not shared) and Tariq does C or Tariq does all three himself (Sally cannot do A or B on her own, and she cannot do C at all)</p> <p>Sally does I on her own</p> <p>A correct description in which precedences are not violated and project is completed in 18 hours or less</p>
ABC	ABC	ABC	ABC	ABC																																																		
5 hrs	5 hrs	5 hrs	5 hrs	5 hrs																																																		
share	$DEFG$	DE	DE	DF																																																		
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