OCR
Oxford Cambridge and RSA

GCE

Mathematics (MEI)

Unit **4771**: Decision Mathematics 1

Advanced Subsidiary GCE

Mark Scheme for June 2017

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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.

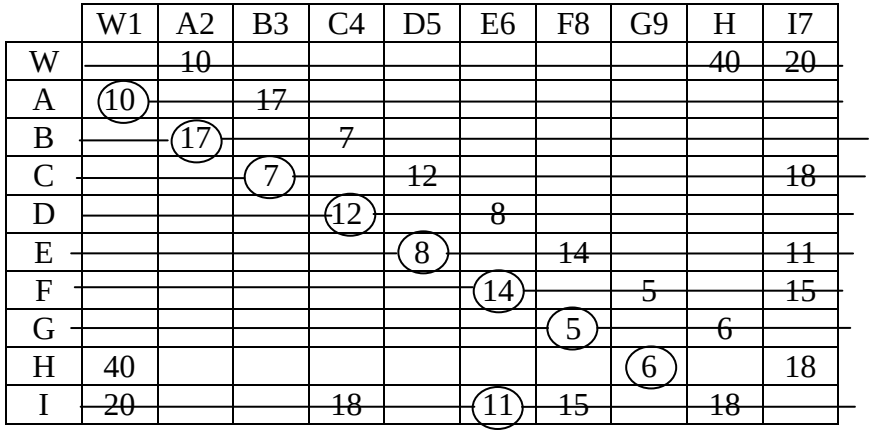
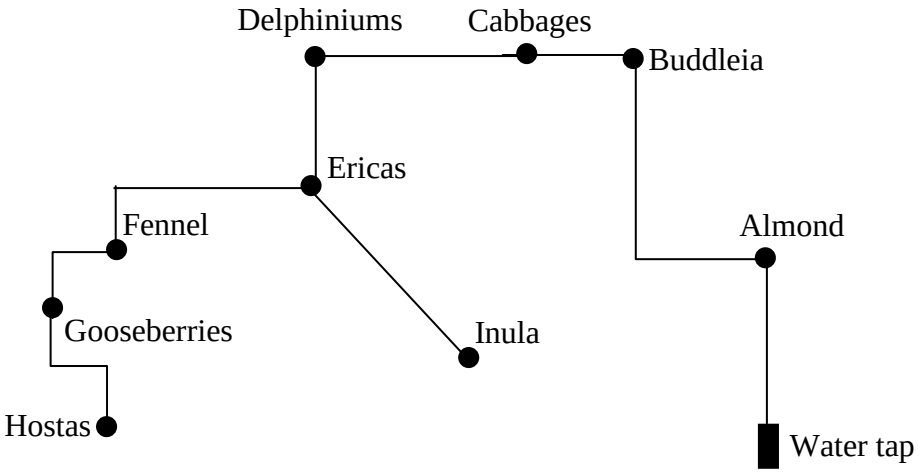
All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

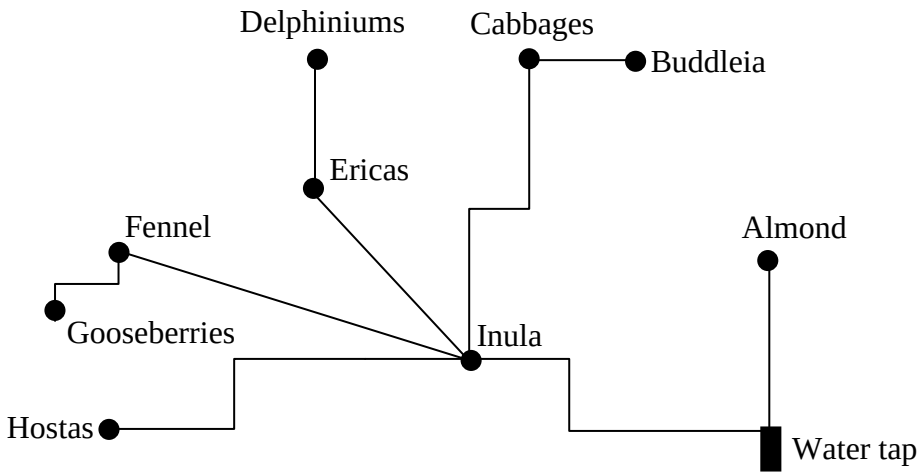
Mark schemes should be read in conjunction with the published question papers and the report on the examination.

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

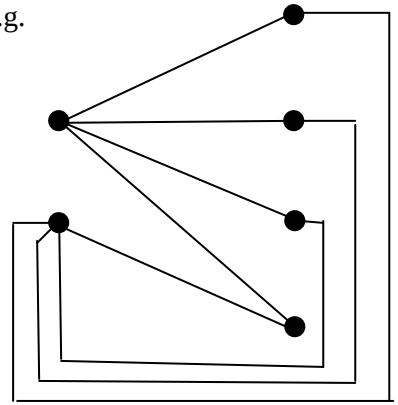
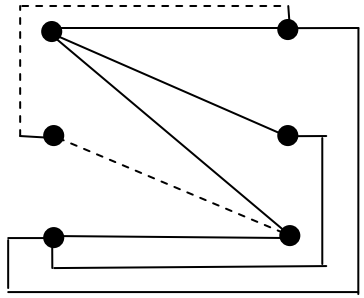
Annotations and abbreviations

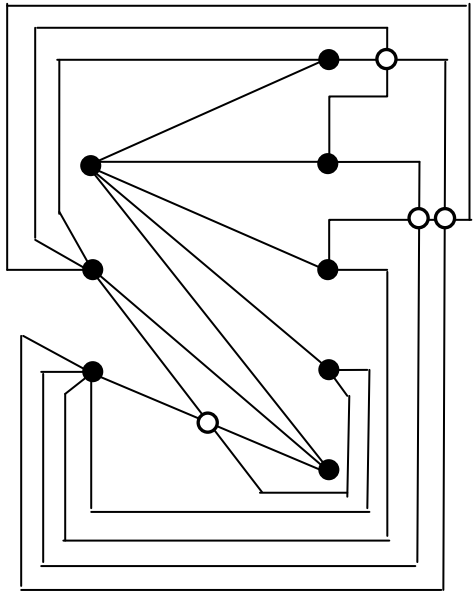
Annotation in scoris	**Meaning**
✓and ✗	
BOD	Benefit of doubt
FT	Follow through
ISW	Ignore subsequent working
M0, M1	Method mark awarded 0, 1
A0, A1	Accuracy mark awarded 0, 1
B0, B1	Independent mark awarded 0, 1
SC	Special case
^	Omission sign
MR	Misread
Highlighting	
Other abbreviations in mark scheme	**Meaning**
E1	Mark for explaining
U1	Mark for correct units
G1	Mark for a correct feature on a graph
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

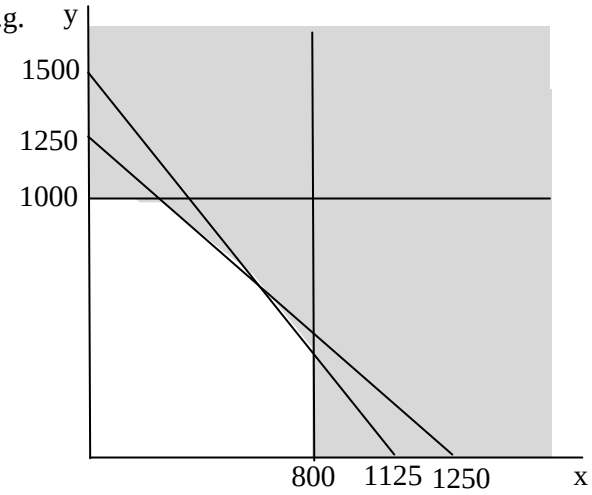
Question	Answer	Marks	Guidance
1 (i)		B1 B1 B1	indicating selections deleting in rows numbering columns
	Length of pipe used = 90m	B1cao	
		B1cao	

	(ii)			M1	3 out of 4 connections for A, B, D and G correct
			112m Shorter runs, or less exposure to risk.	A1 B1	cao

Question			Answer	Marks	Guidance
2	(i)		P 112 M 250 C (0) 100 110 120 130 131 132 133 134 135 136 137 138 The answer is 138	 B1 M1 A1 B1	 correct to statement 100 (i.e. 130)
	(ii)		e.g. add 34 If P + C + 1000 > M then goto 40 35 Let C = C + 1000 36 Goto 34	 B1 B1 B1	 (ignore "34" and "40") (ignore "35") logic all OK
	(iii)		e.g. P = price, M = money tendered, C = change	B1	No need to consider note denominations instead of powers of 10.

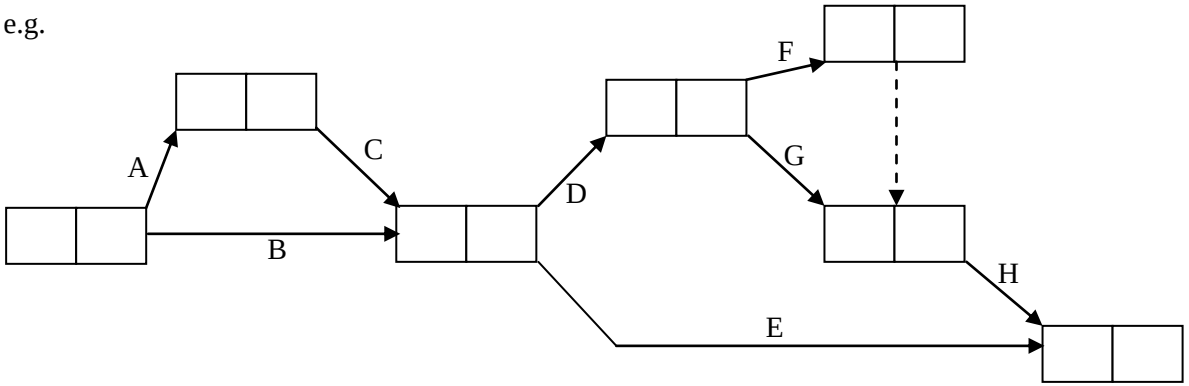
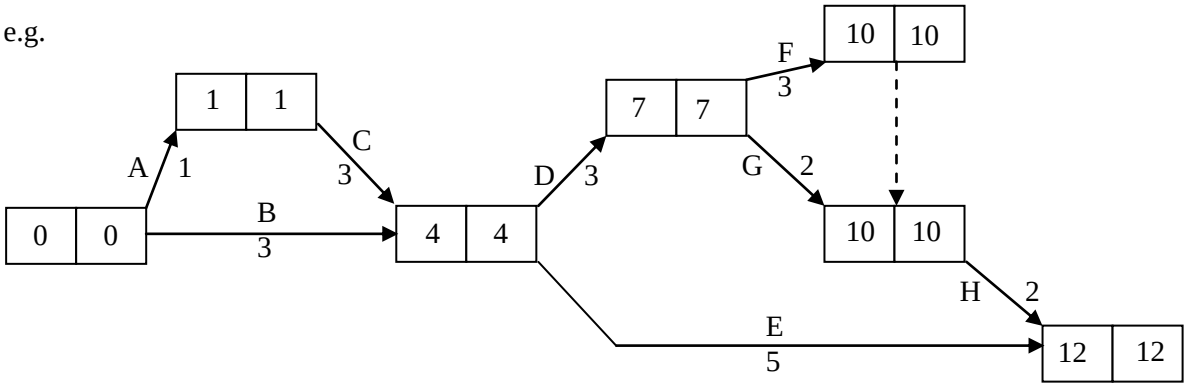
Question			Answer	Marks	Guidance
3	(i)		e.g. 	B1	
	(ii)		e.g. as per the above, with top left connected directly and bottom left connected around the back.	B1	
	(iii)		e.g. 	B1	$K_{2,3}$ seen
			e.g. (Dotted connections not needed.) The middle left cannot access the middle right.	M1 E1	choice of just two points that cannot be connected on the candidate's graph. dependent on the M1

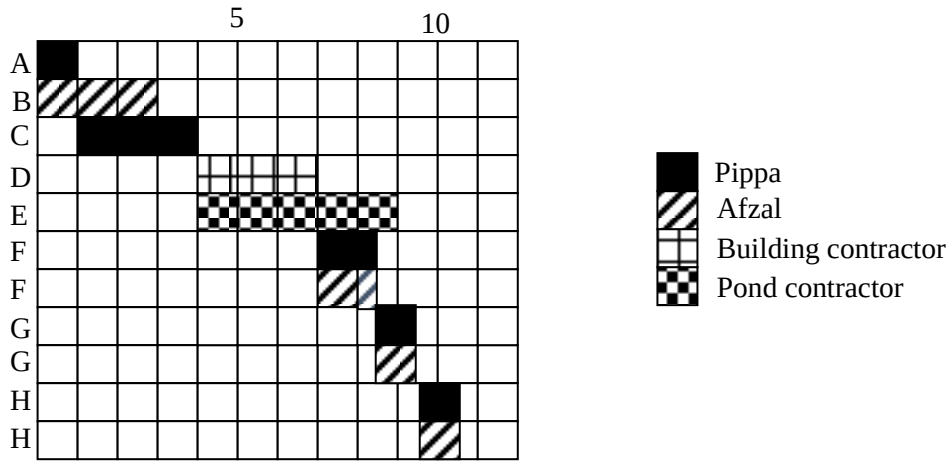
	(iv)		(5-1)×(5-1)/4 = 4 crossings e.g. 	B1 B1	can be implied
	(v)		e.g. They inform about how many layers will be needed.	B1	

Question			Answer	Marks	Guidance
4	(i)		£9 and £6 respectively	B1	
	(ii)		Let x be the number of deciduous trees and y the number of evergreens.	B1	
			Max 9x+6y	B1	
			st 8x+6y<9000	B1	
			16x+16y<20000	B1	
			x<800		
			y<1000	B1	
	(iii)		e.g.  $(800,\ 433\frac{1}{3}) \rightarrow 9800$ $\left((800, 0) \rightarrow 7200\right)$ $(750, 500) \rightarrow 9750$	B1	labelling and scaling axes
				B1	line for space constraint
				B1	line for finance constraint
				B1	lines for availability constraints
				B1	feasible region indicated (with 6 or 5 lines correct)
				B1	for profit at $(800,\ 433\frac{1}{3})$ and (750, 500) or gradient method with gradient -1.5
			Profit is £9800	B1	9800 indicated
	(iv)		£100 (at (800, 450))	B1	
			£100 (also at (800, 450))	B1	
	(v)		(750, 500) or 15 and 10 bundles (giving £9750 - but this not required)	B1	

Question			Answer	Marks	Guidance
5	(i)		stating 0000 gives a score of 0 stating 1111 gives a score of 15 all equally likely	B1 B1 B1	or 16 (B1) distinct numbers generated (B1)
	(ii)		1 10	B1 B1	penultimate last SC1 … 8, 5
	(iii)		The ball will not have an equal probability of landing in each jar	B1	
	(iv)		e.g. 00, 01 → 00 02, 03 → 03 04, 05 → 12 06, 07 → 15 08 – 11 → 01 12 – 15 → 02 16 – 19 → 04 20 – 23 → 07 24 – 27 → 08 28 – 31 → 11 32 – 35 → 13 36 – 39 → 14 40 – 47 → 05 48 – 55 → 06 56 – 63 → 09 64 – 71 → 10 72 – 99 → reject and repeat e.g. corner 00 00-01 2 edge 01 02-05 4 edge 02 06-09 4 corner 03 10-11 2 edge 04 12-15 4 inside 05 16-23 8 inside 06 24-31 8 edge 07 32-35 4 edge 08 36-39 4 inside 09 40-47 8 inside 10 48-55 8 edge 11 56-59 4 corner 12 60-61 2 edge 13 62-65 4 edge 14 66-69 4 corner 15 70-71 2 reject 72-99 28	M1 A1 M1 A1 M1 A1 M1 A1	reject some efficient – numbers stated rule for corner jars rule for edge jars rule for inside jars

	(v)		e.g. Using the above rule(s), the first ball lands in jar 00 (00) and the second in jar 06 (10).	B1 B1	√ subject to last 3 M marks

Question			Answer	Marks	Guidance
6	**(i)**		e.g.  	M1 A1 A1 A1	activity-on-arc A, B, C D, E Rest
6	**(ii)**		e.g.  minimum completion time – 12 days critical activities – A, C, D, F, H.	M1 A1 M1 A1 B1 B1	forward pass backward pass

6	**(iii)**		e.g.  Minimum completion time = 10.5 days Afzal needs to be employed for 6.5 days.	B1 B1 B1 B1 B1	A, B, C D, E F, G, H
6	**(iv)**		17 days	B1	

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