

GCE 2004

November Series



Mark Scheme

Mathematics A

(MAD1)

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of candidates' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

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Dr Michael Cresswell Director Gener

Key to Mark Scheme

M	mark is for	method
m	mark is dependent on one or more M marks and is for.....	method
A	mark is dependent on M or m marks and is for	accuracy
B	mark is independent of M or m marks and is for	method and accuracy
E	mark is for	explanation
✓ or ft or F	follow through from previous incorrect result	
CAO	correct answer only	
AWFW	anything which falls within	
AWRT	anything which rounds to	
AG	answer given	
SC	special case	
OE	or equivalent	
A2,1	2 or 1 (or 0) accuracy marks	
-x EE	deduct x marks for each error	
NMS	no method shown	
PI	possibly implied	
SCA	substantially correct approach	
c	candidate	
SF	significant figure(s)	
DP	decimal place(s)	

Abbreviations used in Marking

MC – x	deducted x marks for mis-copy
MR – x	deducted x marks for mis-read
ISW	ignored subsequent working
BOD	given benefit of doubt
WR	work replaced by candidate
FB	formulae booklet

Application of Mark Scheme

No method shown:

Correct answer without working.....	mark as in scheme
Incorrect answer without working	zero marks unless specified otherwise

More than one method/choice of solution:

2 or more complete attempts, neither/none crossed out	mark both/all fully and award the mean mark rounded down
1 complete and 1 partial attempt, neither crossed out	award credit for the complete solution only


Crossed out work

do not mark unless it has not been replaced

Alternative solution using a correct or partially
correct method

award method and accuracy marks as
appropriate

MAD1

Q	Solution	Marks	Total	Comments	
1	$\begin{array}{cccccccc} 21 & 13 & 35 & 46 & 7 & 12 & 49 & 25 \\ 13 & 21 & 35 & 46 & 7 & 12 & 49 & 25 \\ 13 & 21 & 35 & 46 & 7 & 12 & 49 & 25 \\ 7 & 13 & 21 & 35 & 46 & 12 & 49 & 25 \\ 7 & 12 & 13 & 21 & 35 & 46 & 49 & 25 \\ 7 & 12 & 13 & 21 & 35 & 46 & 49 & 25 \\ 7 & 12 & 13 & 21 & 25 & 35 & 46 & 49 \end{array}$	M1 A1 A1 A1 A1		5	SCA 1 st interchange Pass with no change Pass with no change All correct
	Total			5	
	2(a)	$x \geq 7, y \geq 7$	B1		Both OE; M1 for – ve gradient OE; M1 for – ve gradient
		$y \leq 2x$	B1		
		$y \geq \frac{1}{3}x$	B1		
		$2y + x \leq 40$	M1A1	7	
		$3x + 4y \geq 60$	M1A1		
(b)	Max at (8, 16)	M1A1	3	M1 Considering extremes	
	= 96	A1			
Total			10		
3(a)		M1 A1	2	Correct graph 4 vertices	
	(b)(i) 15	B1	1		
	(ii) 5	B1	1		
	(iii) No, order of vertices is odd	E1	1		
	(c)(i) $\frac{n(n-1)}{2}$	B1	1		OE
	(ii) $n-1$	B1	1		
	(iii) n ODD	B1	1		
	Total				8

MAD1 (cont)

Q	Solution	Marks	Total	Comments
4(a)(i)	odd vertices	E1	1	
(ii)	C, D, E, F $CD + EF = 200 + 150 = 350$ $CE + DF = 200 + 200 = 400$ $CF + DE = 325 + 50 = 375$ Repeat CGD & EF Tour with $A2, B2, C2, D2, E2, F2, G3$ Distance = $1500 + 350$ = 1850	M1 A2,1,0 B1 M1 A1 B1F	7	
(b)	$1 \times 3 \times 5 = 15$	M1A1	2	
Total			10	

MAD1 (cont)

Q	Solution	Marks	Total	Comments																
6(a)	<table style="border-collapse: collapse; margin-left: 20px;"> <tr> <td style="border-right: 1px solid black; padding: 5px;"></td> <td style="padding: 5px;"><i>E</i></td> <td style="padding: 5px;"><i>P</i></td> <td style="padding: 5px;"><i>T</i></td> </tr> <tr> <td style="border-right: 1px solid black; padding: 5px;"><i>E</i></td> <td style="padding: 5px;">-</td> <td style="padding: 5px;">130</td> <td style="padding: 5px;">150</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 5px;"><i>P</i></td> <td style="padding: 5px;">130</td> <td style="padding: 5px;">-</td> <td style="padding: 5px;">100</td> </tr> <tr> <td style="border-right: 1px solid black; padding: 5px;"><i>T</i></td> <td style="padding: 5px;">150</td> <td style="padding: 5px;">100</td> <td style="padding: 5px;">-</td> </tr> </table>		<i>E</i>	<i>P</i>	<i>T</i>	<i>E</i>	-	130	150	<i>P</i>	130	-	100	<i>T</i>	150	100	-	B3,2,1,0	3	
	<i>E</i>	<i>P</i>	<i>T</i>																	
<i>E</i>	-	130	150																	
<i>P</i>	130	-	100																	
<i>T</i>	150	100	-																	
(b)	$C \rightarrow P \rightarrow T \rightarrow A \rightarrow E \rightarrow C$ 40 100 145 95 90 = 470	M1 M1 A1 B1	4	Tour starts and finishes at <i>C</i> Visits every vertex All correct																
(c)	Actual route <i>C P C T C A E C</i> Once each <i>A, E, P, T</i> 2 (+ 2) <i>C</i>	M1 A1	2																	
Total			9																	
7	$x \geq 10$ $y \geq 10$ $z \geq 10$ $x + y + z \geq 100$ $2x + 5y + 3z \leq 400$ $y \geq \frac{2}{5}(x + y + z)$ $\Rightarrow 3y \geq 2x + 2z$ $z \leq \frac{3}{5}(x + y)$	B1 B1 B1 M1 A1 M1A1	7	all three Any inequality with 3 terms i.e. $0.4x - 0.6y + 0.4z \leq 0$																
Total			7																	
Total			60																	