AQA

ASSESSMENT and
QUALIFICATIONS
ALLIANCE

General Certificate of Education

Mathematics 6360

MD01 Decision 1

Mark Scheme

2007 examination - June series

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.

Key to mark scheme and abbreviations used in marking

M	mark is for method
m or dM	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	MC	mis-copy
CAO	correct answer only	MR	mis-read
CSO	correct solution only	RA	required accuracy
AWFW	anything which falls within	FW	further work
AWRT	anything which rounds to	ISW	ignore subsequent work
ACF	any correct form	FIW	from incorrect work
AG	answer given	BOD	given benefit of doubt
SC	special case	WR	work replaced by candidate
OE	or equivalent	FB	formulae book
A2,1	2 or 1 (or 0) accuracy marks	NOS	not on scheme
–x EE	deduct x marks for each error	G	graph
NMS	no method shown	c	candidate
PI	possibly implied	sf	significant figure(s)
SCA	substantially correct approach	dp	decimal place(s)

No Method Shown

Where the question specifically requires a particular method to be used, we must usually see evidence of use of this method for any marks to be awarded. However, there are situations in some units where part marks would be appropriate, particularly when similar techniques are involved. Your Principal Examiner will alert you to these and details will be provided on the mark scheme.

Where the answer can be reasonably obtained without showing working and it is very unlikely that the correct answer can be obtained by using an incorrect method, we must award **full marks**. However, the obvious penalty to candidates showing no working is that incorrect answers, however close, earn **no marks**.

Where a question asks the candidate to state or write down a result, no method need be shown for full marks.

Where the permitted calculator has functions which reasonably allow the solution of the question directly, the correct answer without working earns **full marks**, unless it is given to less than the degree of accuracy accepted in the mark scheme, when it gains **no marks**.

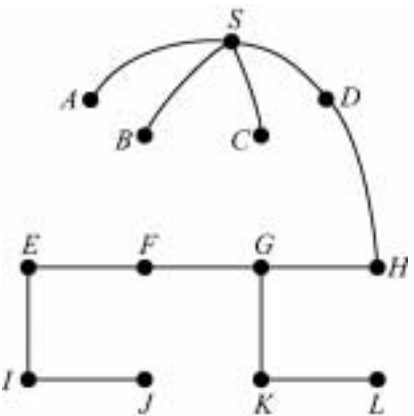**Otherwise we require evidence of a correct method for any marks to be awarded.**

June 07

MD01

Q	Solution	Marks	Total	Comments
1(a)		M1 A1	 2	
(b)	D can only do 4	E1	1	Cannot be matched to task
(c)	$A - 2 + E - 6 + C - 5$ $D - 4 + F - 5 + C - 3 + B - 1$ Match $A2, B1, C3, D4, E6, F5$	 M1A1 M1A1 A1 B1	 6	Starting with A, D, 5, 1 First pass Second pass All Correct **Alt:1** $A - 4 + F - 5$ $\quad\quad D - 4 + A - 2 + E - 6 + C - 3 + B - 1$ **Alt: 2** $\quad D - 4 + F - 5$ $\quad\quad\quad A - 2 + E - 6 + C - 3 + B - 1$
		Total	**9**	
2(a)	$\underline{28}\ \underset{\sim}{22}\ \underset{\cdot}{20}\ \underset{\frown}{17}\ \underline{14}\ \underset{\sim}{11}\ \underset{\cdot}{6}\ \underset{\cdot}{5}$ 14 $\quad\quad\quad\quad\quad\quad$ 28 $\quad$ 11 $\quad\quad\quad\quad$ 22 $\quad\quad$ 6 $\quad\quad\quad\quad$ 20 $\quad\quad\quad$ 5 $\quad\quad\quad\quad$ 17 $\underline{14}$ 11 $\underline{6}$ 5 $\underline{28}$ 22 $\underline{20}$ 17 $\quad$6 $\quad\quad$ 14 $\quad\quad$ 20 $\quad\quad$ 28 $\quad\quad$ 5 $\quad\quad$ 11 $\quad\quad$ 17 $\quad\quad$ 22 $\quad$6 $\quad$5 $\quad$14 $\quad$11 $\quad$20 $\quad$17 $\quad$28 $\quad$22 $\quad$5 $\quad$6 $\quad$11 $\quad$14 $\quad$17 $\quad$20 $\quad$22 $\quad$28	M1 M1 A1 M1 A1	 5	SCA 4 sublists correct 1st pass 2 sublists All correct
(b)(i)	4	B1		
(ii)	4	B1	2	
(c)	28	B1	1	
		Total	**8**	

MD01 (cont)

Q	Solution	Marks	Total	Comments
3(a)(i)				

Q	Solution	Marks	Total	Comments
		M1		SCA
		A1		Correct at *F*
		M1		2 values at *G*
		M1		2 values at *J*
		M1		2 values at *H*
		A1		All correct
	71	B1	7	
(a)(i)	**OR** Working back from L			
	35 at *G*			
	47 at *C*			
	44 at *F*			
	49 at *I* } B1 × 7			
	56 at *B*			
	64 at *E*			
	71 at *A*			
(ii)	*A B F G K L*	B1	1	
(b)	*ADL* gives 62	M1		OE
	AIL gives 69	A1		OE Either, considering routes *ADL* or *AIL*
	∴ *A* to *D*	A1	3	CSO
	Total		**11**	
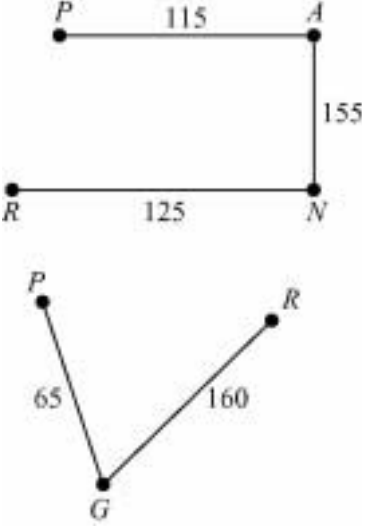
MD01 (cont)

Q	Solution		Marks	Total	Comments
4(a)(i)	*SD*	12	M1		Prim's (first 4 edges, allow 1 slip)
	SC	13			
	SA	14	B1		12 edges
	SB	16			
	DH	75			
	HG	23	A1		*HG* 6th
	GF	22			
	FE	24			
	EI	81	A1		*EI* 9th
	IJ	12			
	GK	83			
	KL	16	B1	5	All correct
(ii)	391		B1	1	
(iii)			M1		MST (10 + edges)
			A1		12 edges
			A1	3	All correct
(iv)	*GF* 7th (22)		B1		
	HG 8th (23)		B1	2	
(b)	Odd vertices (*E, H, J, K*)		E1		PI
	EH + *JK* = 69 + 131 = (200)		M1		2 correct sets of pairings
	EJ + *HK* = 93 + 106 = (199)		A3,2,		
	EK + *JH* = 129 + 142 = (271)		1,0		
	Repeat *EJ* + *HK*				
	Total 1135 + 199 = 1334		B1	6	
	Total			**17**	

MD01 (cont)

Q	Solution	Marks	Total	Comments
5(a)	$5x + 10y \leq 1500$ (balloons)			
	$\Rightarrow x + 2y \leq 300$	E1		
	$32x + 8y \leq 4000$ (sweets)	E1		
	$\Rightarrow 4x + y \leq 500$			
	$x \geq 50, y \geq 50$, at least 50 of each	E1		
	$x + y \geq 140$, at least 140 in total	E1	4	
(b)(i)				

		Marks	Total	Comments
		B1		$x = 50, y = 50$
		B1		$x + y = 140$
		M1		Negative gradient (either)
		A1		$4x + y = 500$
		A1		$x + 2y = 300$
		B1		Feasible region
		M1		Objective line drawn
		A1	8	
(ii)	Maximum $(100,100)$	M1		Considering extreme point on their region
	$= £200$	A1	2	
(iii)	Minimum $(90, 50)$	M1		Considering extreme minimum point on their region
	$= £132$	A1	2	
	Total		**16**	

MD01 (cont)

Q	Solution	Marks	Total	Comments
6(a)(i)	$G \rightarrow P \rightarrow A \rightarrow N \rightarrow R \rightarrow G$	M1		Tour
	65 115 155 125 160	M1		Visits all places
		A1		Correct order
	Total = 620	B1	4	
(ii)		M1		SCA $\left(\text{MST} + \text{extra edge(s)} \right)$
		m1		MST
		A1		
		m1		2 edges from G
	$LB = 395 + 225 = 620$	A1	5	
(iii)	$T = 620$	E1F		Their (a)(ii) $\leq T \leq$ their (a)(i)
				where (a)(i) $\geq$ (a)(ii)
(b)(i)	92	B1	1	
(ii)	87	B1	1	
(iii)	6	B1	1	
(iv)	$n!$	B1	1	
	Total		**14**	
	TOTAL		**75**	