AQA

ASSESSMENT and
QUALIFICATIONS
ALLIANCE

General Certificate of Education

Mathematics 6300
Specification A

MAP1 Pure 1

Mark Scheme

2005 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

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	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 book

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

MAP1 – AQA GCE Mark Scheme, 2005 June series

MAP1

Q	Solution	Marks	Total	Comments
1	f(1.5) = -0.375	B1		
	f(1.6) = 0.656	B1		
	Sign change $\Rightarrow$ root between	E1	3	
	Total		**3**	
2(a)	Ratio = 4	B1	1	allow 1 : 4 or 4 : 1
(b)	Formula for nth term	M1		stated or used
	nth term $12\left(4^{n-1}\right)$	A1	2	OE; allow M1A0 for $12\left(4^{n}\right)$
(c)	Formula for sum of GP	M1		stated or used
	$S = 12\dfrac{(4^{30}-1)}{4-1}$	m1		
	$\ldots = 4\left(4^{30}-1\right)$	A1		OE
	$\ldots = 2^{62}-4$	A1	4	convincingly shown (AG)
	Total		**7**	
3(a)	$y' = 4\ldots$	B1		
	$\ldots - \dfrac{1}{2}x^{-\frac{3}{2}}\ldots$	M1A1		M1 if coefficient or index correct
	$y'' = \dfrac{3}{4}x^{-\frac{5}{2}}$	m1A1F	5	m1 if coefficient or index correct; ft wrong coefficient of $x^{-\frac{3}{2}}$
(b)	When $x = \dfrac{1}{4}$, $y' = 0$	M1A1	2	convincingly verified (AG)
(c)(i)	At SP, $y'' = 24$	A1F	1	dependent on m1 in (a); ft wrong coefficient of $x^{-\frac{5}{2}}$
(ii)	Positive value $\Rightarrow$ minimum	E1F	1	ft wrong value of y'' at SP
	Total		**9**	
4(a)	$\left(\dfrac{280 - 120}{8}\right) = 20$ or better	M1		allow M1A0 if this is c's answer; allow M1 if formula for nth term stated or used
	So number of rows = 20 + 1 = 21	A1	2	NMS 2/2
(b)	Formula for sum of AP	M1		stated or used
	Numbers substituted	m1		including c's value for n
	Number of tiles = 4200	A1F	3	NMS 3/3; ft wrong value for n
	Total		**5**	

MAP1 (cont)

Q	Solution	Marks	Total	Comments
5(a)(i)	Arc length formula	M1		stated or used
	Perimeter = 9 (cm)	A1	2	
(ii)	Sector area formula	M1		stated or used
	Area = 4.5 (cm^2)	A1	2	
(b)(i)	$\frac{1}{2}r^2\theta = 4.5$	M1		OE; M1A0 for verification
	Hence result	A1	2	convincingly shown (AG)
(ii)	$2r + r\theta = 18$	M1		OE; M1A0 for verification
	Hence result	A1	2	convincingly shown (AG)
(iii)	All terms multiplied by r	M1		M1A0 for verification
	Hence result	A1	2	convincingly shown (AG)
(iv)	$r = \dfrac{18 \pm \sqrt{18^2 - 72}}{4}$	M1		OE
	$r \approx 8.47$	A1		Allow AWRT 8.47
	$\theta \approx 0.125$	m1A1	4	Allow AWRT 0.125 or 0.126
	Total		**14**	
6(a)	$\sin\dfrac{\pi}{3} = \dfrac{\sqrt{3}}{2}$ and/or $\cos\dfrac{\pi}{3} = \dfrac{1}{2}$	M1		PI
	Result verified convincingly	A1	2	AG
(b)	$\sin^2 x + \cos^2 x \equiv 1$	M1		stated or used
	Result clearly established	A1	2	AG
(c)	Solution of quadratic	M1		leading to two values of cos x
	$\cos x = -1 \Rightarrow x = \pi$	A1		condone degrees or decimals
	$\cos x = \dfrac{1}{2} \Rightarrow x = \dfrac{\pi}{3}\ldots$	A1		condone degrees or decimals
	… or $\dfrac{5\pi}{3}$ (only other root)	A1	4	ignore values outside domain; NMS 0/4
	Total		**8**	

MAP1 – AQA GCE Mark Scheme, 2005 June series

MAP1 (cont)

Q	Solution	Marks	Total	Comments
7(a)	Reflection in *y*-axis	B2,0		
	Stretch in *x* direction	M1		
	…SF $\dfrac{1}{2}$	A1	4	Allow 2/4 for 'stretch in *x* direction, SF $-\dfrac{1}{2}$'
(b)(i)	$\displaystyle\int e^{-2x}\,dx = -\dfrac{1}{2}\,e^{-2x}\,(+c)$	M1A1	2	M1 for $k e^{-2x}$
(ii)	Substitution and subtraction	m1		
	Answer in required form	A1	2	convincingly found (AG)
(c)(i)	Range is f(*x*) > 0	B1	1	Allow any symbol for f(*x*); condone ≥ for >
(ii)	$\ln z$ appearing in c's solution	M1		where *z* is any function of *x* or *y*
	Complete method	m1		
	$f^{-1}(x) = -\dfrac{1}{2}\ln x$	A1	3	
(iii)	$f^{-1}\left(e^{-2}\right) = 1$ or $f^{-1}\left(e^{2}\right) = -1$	B1		OE
	convincingly drawn (AG)	E1	2	$\lvert y \rvert \le 1 \Leftrightarrow -1 \le y \le 1$ at least implied
	Total		**14**	
	TOTAL		**60**	