GCE 2004
June Series

AQA

ASSESSMENT and
QUALIFICATIONS
ALLIANCE

Mark Scheme

Mathematics A
Unit MAME

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.

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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

MAME

Q	Solution	Marks	Total	Comments
1(a)	$x^2 + 2x - 3 = 0$	B1	1	convincingly shown (AG)
(b)	Solution of quadratic	M1		Two solutions needed
				(M1A0 for $x = -1$ or 3)
	Solutions are $(1, 1)$, $(-3, -7)$	A2,1	3	A1 for both x values or one pair; NMS 1/3
	Total		**4**	
2	Mean = 3	B1		Allow NMS
	$E(X^2) = \dfrac{31}{3}$	B1		PI; allow AWRT 10.3 even if this is c's variance
	Variance $= \dfrac{31}{3} - 3^2 = \dfrac{4}{3}$	M1A1F	4	Allow AWRT 1.33; NMS 3/3; ft wrong value for mean or $E(X^2)$
	Total		**4**	
3(a)	Median 15%	B1	1	Allow AWRT 15.0% or 15.1%
(b)	Method for quartiles	M1		PI by at least one correct quartile
	Quartiles 9%, 17.8%	A1A1		Allow AWRT 9%, 18%
	IQR = 8.8%	A1F	4	Allow use of c's reasonable values for quartiles NMS 4/4 for 8.5% to 9.0% Condone omission of % sign in this question
	Total		**5**	
4(a)(i)	P (British) $= \dfrac{13}{30}$	B1	1	Allow decimal answers throughout question
(ii)	P (goalkeeper) $= \dfrac{4}{30}\left(=\dfrac{2}{15}\right)$	B1	1	
(iii)	P (British & goalkeeper) $= \dfrac{2}{30}\left(=\dfrac{1}{15}\right)$	B1	1	
(iv)	P (defender or midfielder) $= \dfrac{21}{30}\left(=\dfrac{7}{10}\right)$	B1	1	
(v)	P (Br or attacker, not both) $= \dfrac{14}{30}\left(=\dfrac{7}{15}\right)$	M1A1	2	M1 for **fully** correct method
(b)(i)	P (goalkeeper $\mid$ British) $= \dfrac{2}{13}$	M1A1	2	M1 for correct denominator
(ii)	*Not* independent (reason)	E2,1	2	E1 if incompletely explained eg no numerical value
	Total		**10**	

MAME (Cont)

Q	Solution	Marks	Total	Comments
5(a)	$\left(\sqrt{3}-\sqrt{2}\right)\left(\sqrt{3}+\sqrt{2}\right)=1$	B1	1	Condone answer $3-2$
(b)(i)	Rationalising denominator	M1		Method must be shown
	Expanding numerator	m1		To give $m+n\sqrt{6}$, not necessarily simplified
	$k=5-2\sqrt{6}$	A1	3	
(ii)	Rationalising denominator	M1		using original k or answer to (i)
	$1/k=5+2\sqrt{6}$	A1	2	
	Total		**6**	
6(a)(i)	$\int y\,\mathrm{d}x=\dfrac{1}{4}x^4-x^3+3x^2\,(+c)$	M1A1	2	M1 if one term or all powers correct. Accept unsimplified
(ii)	Substitution and subtraction Definite integral = 18	m1 A2, 1F	3	Subtraction must be the right way ft one wrong coefficient in (i); A1 if only one (perhaps repeated) error
(b)(i)	$y'=3x^2-6x+6$	M1A1	2	M1 if at least one term correct
(ii)	y increasing if $y'>0$	M1		
	Completing square	m1		or using discriminant
	$y'>0$ for all x	A1	3	
	Total		**10**	
7(a)	At B, $2x+3x=15$	M1		OE elimination
	B is (3, 3)	A1	2	
(b)	Good attempt at equation of CD	M1		Linear equation, with same grad as AB (attempted)
	Gradient of CD correct Constant correct	A1 A1F	3	NMS $2x+3y=30$; 3/3 $2x+3y=k$; 2/3 $2x+3y=$ (other); 0/3 ft wrong grad: eqn satisfied by (6,6)
(c)	D is (0, 10)	A1F	1	ft wrong equation for CD
(d)	Complete method for area Area = 22.5	M2 A2,1	4	A1 if at least relevant area correct
	Total		**10**	

MAME (Cont)

Q	Solution	Marks	Total	Comments
8(a)(i)	$\sum x = 50 \times 300 = 15000$	M1A1	2	M1 for use of $\bar{x} = \dfrac{\sum x}{n}$; NMS 2/2
(ii)	Use of $\dfrac{\sum x^2}{n} - \mu^2 = \sigma^2$	M1		or $\sum x^2 = n(\mu^2 + \sigma^2)$; numbers substituted with at most one error
	Numbers substituted correctly	A1		Max M1A1 for verification
	so $\sum x^2 = 4\,680\,000$	A1	3	convincingly shown (AG)
(b)	All have same number of pages	E1	1	
(c)(i)	$50\,(300) + n(240) = (50 + n)(280)$	M1		Max M1A1 for verification
	$15\,000 - 14\,000 = 40n$	m1		OE
	$n = 25$	A1	3	convincingly found (AG)
(ii)	$\sum y^2 = 25 \times 240^2$	M1		Correct numbers needed here
	$\ldots = 1\,440\,000$	A1	2	
	Total		**11**	
	Total		**60**	