GCE 2004
November Series

AQA

ASSESSMENT and
QUALIFICATIONS
ALLIANCE

Mark Scheme

Mathematics A
(Subject Codes 5301, 5306, 5311, 6301 &
6311)

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 ....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)(i)	L is $y = \dfrac{3}{4}x - 3$	B1	1	
(ii)	Gradient of L is $\dfrac{3}{4}$	B1F	1	Condone "$\dfrac{3}{4}x$"; ft wrong coefficient of x
(b)	Perpendicular gradient is $-\dfrac{4}{3}$	B1F		ft wrong gradient for L
	Equation is $y = -\dfrac{4}{3}x$	B1F	2	ft wrong perpendicular gradient
	Total		**4**	
2	Mean is 4.6	B1		Allow NMS
	$E(X^2) = 25.2$	B1		PI
	Variance $= 25.2 - 4.6^2$	M1		Allow M1 even if c then takes the square root
	$= 4.04$	A1F	4	NMS 3/3; ft wrong value for mean or $E(X^2)$
	Total		**4**	
3(a)	$64 = 4^3$	B1	1	
(b)	$\dfrac{1}{64} = 4^{-3}$	B1F	1	ft wrong answer to (a)
(c)	$128 = 4^{\frac{7}{2}}$	B1	1	
(d)	$\sqrt{2} = 4^{\frac{1}{4}}$	B1	1	
	Total		**4**	
4(a)	Widths in ratio 2:1:1:1:5	B1		
	Calculation of FDs	M1		Using unequal widths
	Heights in ratio 4:18:24:20:6	A1F	3	ft wrong widths
(b)	Use of midpoints	M1		Condone one error but must be clear
	Method for mean	M1		using values from given intervals
	Est mean $x = 6.52$	A1		Condone absence of units in answers
				NMS 3/3; allow AWRT 6.52
	Method for variance	M1		After M0 allow B1 for 47.15
	Est variance $= 4.6396$	A1F	5	NMS 2/2; Allow AWRT 4.64; ft wrong value for mean provided all 3 M marks earned;
				No ft if using $\dfrac{\sum(x - \bar{x})^2}{n}$
	Total		**8**	

MAME (cont)

Q	Solution	Marks	Total	Comments
5(a)(i)	P(work & TMR) = $\dfrac{2}{3} \times \dfrac{2}{5} = \dfrac{4}{15}$	M1A1	2	'TMR' means 'ten mile run'
(ii)	P(no work, TMR) = $\dfrac{1}{3} \times \dfrac{4}{5} = \dfrac{4}{15}$	M1A1	2	
(iii)	P(TMR) = $\dfrac{4}{15} + \dfrac{4}{15} = \dfrac{8}{15}$	A1F	1	ft errors in (i) and /or (ii)
(b)	Reasonable attempt	M1		Allow $\frac{x}{y}$ where $0 < x < y = $ (a)(iii)
	P(work $\mid$ TMR) $= \dfrac{1}{2}$	A1F	2	Allow NMS; ft errors in (a)
	Total		**7**	
6(a)	$A = -6$, $B = 4$	B1B1	2	
(b)	$A = -6$, $C = 9$	B1B1F	2	ft wrong answers to (a) $(C = 2B + 1)$
(c)	Good explanation	E2,1F	2	E1 for incomplete explanation eg $\Delta < 0$; ft wrong answer to (b) provided $C > 0$
	Total		**6**	
7(a)(i)	Mean SP = £ $\dfrac{2220}{200} = $ £11.10	M1A1	2	Condone absence of units
(ii)	Mean $x^2 = \dfrac{24660}{200} = 123.3$	B1		PI
	$\text{Var}(x) = 123.3 - 11.1^2 \,(= 0.09)$	M1		
	SD of SP = £0.30	A1	3	Convincingly found (AG)
(b)	Mean profit = £1.10	B1F		ft wrong answer for mean SP
	SD of profit = £0.30	B1	2	
(c)	New $\text{Var}(x) = \dfrac{24660}{210} - \left(\dfrac{2220}{210} \right)^2$	B1B1		B1 for each term
	So new SD $\approx$ £2.38 (19)	B1	3	convincingly shown (AG £2.38)
	Total		**10**	

MAME (cont)

Q	Solution	Marks	Total	Comments
8(a)(i)	$f(-1) = -1 - 4 - 1 + 6 = 0$	B1	1	Convincingly shown (AG)
(ii)	$x + 1$ is a factor	B1	1	PI by correct answer in (iii)
(iii)	$f(x) = (x+1)(x^2 - 5x + 6)$	M1A1		M1 if $-5x$ or $+6$ correct
	$... = (x+1)(x-2)(x-3)$	A2,0	4	Alternative Repeated search (PI): B1 for $f(2) = 0$, B1 for $f(3) = 0$ B2 for complete factorisation SC: $(x-1)(x+2)(x+3)$ 2/4
(b)(i)	$\int ... = \frac{1}{4}x^4 - \frac{4}{3}x^3 + \frac{1}{2}x^2 + 6x$	M1A2	3	$(+c)$; M1 one term, A1 two terms correct
(ii)	Substitution of correct limits	M1		in c's integral (not y or y')
	$\text{Area} = 0 - \left(\frac{1}{4} + \frac{4}{3} + \frac{1}{2} - 6\right) = 3\frac{11}{12}$	A2,1,0	3	-1EE; allow AWRT 3.92
(c)(i)	$y' = 3x^2 - 8x + 1$	M1A1	2	M1 if at least one term correct
(ii)	$\text{At SPs } x = \frac{8 \pm \sqrt{52}}{6}$	M1A1		OE
	$x = \frac{4}{3} \pm \frac{1}{3}\sqrt{13}$	B1	3	Allow B1 if $\sqrt{52} = 2\sqrt{13}$ used
	Total		**17**	
	Total		**60**	