OCR
RECOGNISING ACHIEVEMENT

GCSE

Mathematics B (MEI)

General Certificate of Secondary Education

Unit **B294:** Paper 4 (Higher – Terminal)

Mark Scheme for June 2011

Oxford Cambridge and RSA Examinations

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All Examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

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Subject-Specific Marking Instructions

1. **M** marks are for using a correct method and are not lost for purely numerical errors.
   A marks are for an accurate answer and depend on preceding **M** (method) marks. Therefore **M0 A1** cannot be awarded.
   B marks are independent of **M** (method) marks and are awarded for a correct final answer or a correct intermediate stage.
   SC marks are for special cases that are worthy of some credit.

2. Unless the answer and marks columns of the mark scheme specify **M** and **A** marks etc, or the mark scheme is 'banded', then if the correct answer is clearly given and is not from wrong working **full marks** should be awarded.

   Do not award the marks if the answer was obtained from an incorrect method, ie incorrect working is seen and the correct answer clearly follows from it.

3. Where follow through (**FT**) is indicated in the mark scheme, marks can be awarded where the candidate's work follows correctly from a previous answer whether or not it was correct.

   Figures or expressions that are being followed through are sometimes encompassed by single quotation marks after the word *their* for clarity, eg FT 180 × (*their* '37' + 16), or FT 300 – √(*their* '$5^2 + 7^{2}$'). Answers to part questions which are being followed through are indicated by eg FT 3 × *their* (a).

   For questions with FT available you must ensure that you refer back to the relevant previous answer. You may find it easier to mark these questions candidate by candidate rather than question by question.

4. Where dependent (**dep**) marks are indicated in the mark scheme, you must check that the candidate has met all the criteria specified for the mark to be awarded.

5. The following abbreviations are commonly found in GCSE Mathematics mark schemes.

   - **cao** means **correct answer only**.
   - **figs 237**, for example, means any answer with only these digits. You should ignore leading or trailing zeros and any decimal point eg 237000, 2.37, 2.370, 0.00237 would be acceptable but 23070 or 2374 would not.
   - **isw** means **ignore subsequent working** (after correct answer obtained).
   - **nfww** means **not from wrong working**.
   - **oe** means **or equivalent**.
   - **rot** means **rounded or truncated**.
   - **seen** means that you should award the mark if that number/expression is seen anywhere in the answer space, including the answer line, even if it is not in the method leading to the final answer.

- **soi** means **seen or implied**.

6. Make no deductions for wrong work after an acceptable answer unless the mark scheme says otherwise, indicated for example by the instruction 'mark final answer'.

7. As a general principle, if two or more methods are offered, mark only the method that leads to the answer on the answer line. If two (or more) answers are offered, mark the poorer (poorest).

8. When the data of a question is consistently misread in such a way as not to alter the nature or difficulty of the question, please follow the candidate's work and allow follow through for **A** and **B** marks. Deduct 1 mark from any **A** or **B** marks earned and record this by using the MR annotation. **M** marks are not deducted for misreads.

9. Unless the question asks for an answer to a specific degree of accuracy, always mark at the greatest number of significant figures even if this is rounded or truncated on the answer line. For example, an answer in the mark scheme is 15.75, which is seen in the working. The candidate then rounds or truncates this to 15.8, 15 or 16 on the answer line. Allow full marks for the 15.75.

10. If the correct answer is seen in the body and the answer given in the answer space is a clear transcription error allow full marks unless the mark scheme says 'mark final answer' or 'cao'. Place the annotation ✓ next to the correct answer.

    If the answer space is blank but the correct answer is seen in the body allow full marks. Place the annotation ✓ next to the correct answer.

    If the correct answer is seen in the working but a completely different answer is seen in the answer space, then accuracy marks for the answer are lost. Method marks would still be awarded. Use the M0, M1, M2 annotations as appropriate and place the annotation ✗ next to the wrong answer.

11. Ranges of answers given in the mark scheme are always inclusive.

12. For methods not provided for in the mark scheme give as far as possible equivalent marks for equivalent work. If in doubt, consult your Team Leader.

13. Anything in the mark scheme which is in square brackets […] is not required for the mark to be earned, but if present it must be correct.

Section A

Question			Answer	Marks	Part marks and guidance	
1	(a)		88	2	**M1** for (55/5) × 8 oe	
	(b)		12	2	**M1** for (72/30) × 5 oe	Eg 30 ÷ 5 = 6, 72 ÷ 6
2	(a)		F	1		
	(b)		D	1		
	(c)		C	1		
	(d)		A	1		
3	(a)		3 ×180 oe and 540 ÷ 5 = 108 or 360 ÷ 5 = and 180 – 72 = 108	2	**M1** for 3 ×180 oe or 360 ÷ 5 = ext angle OR '540 ÷ 5' or 180–'*their* ext angle' Ext angle can be implied by later work '*their* ext angle' from numerical errors only	Reverse method must be equally convincing NB 108 × 5 = 540 followed by 540 ÷ 5= 108 scores 0
	(b)		9 with supporting working	3	**M1** for 360 – (90 + 108) or 90 + 72 **M1** for (180 – their 162)/2 **SC1** for 9 with no supporting working	
4	(a)		3 apples cost 3*a* p and 5 bananas cost 5*b* p total cost = (£2) = 200p	1 1	Not '3 apples and 5 bananas'	
	(b)		4*a* + 2*b* = 164	1 1	ISW attempt to reach 2*a* + *b* = 82 **SC1** for answer 4a + 2b = 164 in working but spoilt	

Question			Answer	Marks	Part marks and guidance	
	(c)	(i)	Ruled line through (0, 82) and (41, 0)	2	**B1** for line through either (or other correct marked point) with negative gradient	
		(ii)	*a* and *b* read from their intersection	1+1	strict FT ± $\frac{1}{2}$ small square For FT, both coordinates must be positive non-zero If 0 **SC1** for 30, 22	
5	(a)		3, 8, 15	2	**B1** for 2 correct in the right position or 0, 3, 8 or 8, 15, 24	
	(b)		23 – 3*n* oe	2	**B1** for –3*n* soi	
6	(a)		1.26×10^3	2	**B1** for 12.6×10^2 seen	
	(b)		4.7×10^6	2	**B1** for figs 47 or 4 200 000 + 500 000	
	(c)		1.4×10^{10}	2	**B1** for figs 14 or $p \times 10^{10}$, $1 \leq p < 10$	
7	(a)		154 angle between radius and tangent (=90) (co-)interior, allied	2 1 1	**B1** for BAO = 26 (may be on diagram) Or ∠between OC and horizontal = 64° Or corresponding or alternate ∠s with corresponding construction line	 Reason must correspond with their method which must be correct Condone Z or F angles

Question			Answer	Marks	Part marks and guidance	
	(b)		103 nfww $\angle$ at circumference = $\frac{1}{2}$ $\angle$at centre	**2FT** **1dep**	**FT** for 180 – $\frac{1}{2}$ their (a) **B1** for reflex $\angle$ AOC = 206 or $\angle$AGC = 77'or $\angle$OBC = 77' Or opposite angle of cyclic quad if AGC drawn or isosceles triangle if OB drawn or alternate segment if AC drawn All reasons dep on correct method	Where 'G' is point on major arc AC Accept eg 'angle at centre theorem'
8	**(a)**		$5\sqrt{3}$	**2**	**M1** for $\frac{30}{2\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}}$ or $\frac{10 \times 3}{2\sqrt{3}}$ or better	
	(b)		$14\sqrt{3}$	**1FT**	FT $4\sqrt{3} + 2$ *their* (a) written as $a\sqrt{3}$	
9	**(a)**		$\frac{2}{3}$ **c** + $\frac{1}{3}$ **a**	**3**	**B2 for** unsimplified **B1** for – **c** + **a** or **–a + c** seen **M1ft** for **c** + $\frac{1}{3}$ *their* $\overrightarrow{CA}$ or **a** + $\frac{2}{3}$ their $\overrightarrow{AC}$	$\overrightarrow{CA}$, $\overrightarrow{AC}$ must in terms of **a** and **c**
	(b)		$\overrightarrow{AD}$ = **c** + $\frac{1}{2}$ **a** $\frac{2}{3}$ (**c** + $\frac{1}{2}$ **a**) = $\frac{2}{3}$ **c** + $\frac{1}{3}$ **a** oe Or $\overrightarrow{OP} = \frac{2\mathbf{c} + \mathbf{a}}{3}$ and $\overrightarrow{AD} = \frac{2\mathbf{c} + \mathbf{a}}{2}$ conclusion	**1** **1** **1**	Dep on previous 2 marks And to include $\overrightarrow{OP} = k\overrightarrow{AD}$ or 'proportion of **a**s to **c**s is the same	Can say in words eg 'is a multiple of'

Question			Answer	Marks	Part marks and guidance	
10	(a)		4	1		
	(b)		60	2	**B1** for 180 seen or any indication of ÷ 3	

Section A Total: 50

Section B

Question			Answer	Marks	Part marks and guidance	
11	(a)		0.181	2	**B1** for 0.18(0)..... seen Or **SC1** for correct rounding <u>seen</u> from their figures	Eg 2.776..... to 2.78
	(b)		2.62	2	**B1** for 23.32 or 4.829..... or 12.02..... or 2.615... or 2.61 seen	
12	(a)		bigger/wider sample	1		Eg more results , more cars
	(b)		1191 or 1192	2	ISW for rounding of 1190 or 1200 **B1** for 1191.2.....or 1191.3 **M1** for 5600 × (234/1100) soi by answer in range 1170 to 1196	
13	(a)		£1353.93 or £1353.92 or £1354	2	**M1** for 1250 × (187.6/173.2)	
	(b)		18.879 to 19%	3	**M2** for (201.5 – 169.5)/169.5 oe or **M1** for 201.5/169.5 or 201.5 – 169.5	
14	(a)		Rotation 90° anticlockwise oe about (–1, 2)	1 1 1	Not 'turn' condone 'rotation(al) symmetry' **SC1** for a pair of transformations which include rotation 90° anti-clockwise oe	
	(b)		Triangle at (5, 3), (2, –3) , (5, –3)	2	**B1** for 2 points correct Or **SC1** for enlargement s.f. –3 with wrong centre, or (4, 3), (4, –1), (2, –1) or (2, 9), (–1, 9), (–1, 3)	
15	(a)		$x \geq 2\frac{1}{2}$ or 5/2 or 2.5	2	Condone $2\frac{1}{2} \leq x$. **B1** for $2x \geq 6 - 1$ or **SC1** for $x > 2\frac{1}{2}$ or $x < 2\frac{1}{2}$ or $x \leq 2\frac{1}{2}$ or $x \geq 3\frac{1}{2}$	Or 2.5, 5/2 Or 3.5, 7/2

Question			Answer	Marks	Part marks and guidance	
	(b)		$y \geq \frac{1}{2}x$ oe $x + y \leq 6$ oe	**1** **2**	Condone >, < Condone < , **B1** for $x + y = 6$, ≥ 6, > 6	
16	**(a)**		65	**1**		
	(b)		8.25 oe	**2**	**M1** for 11 × (6/8) oe seen	
17	**(a)**		$x = \frac{4 - y}{2y + 3}$ oe	**3**	**B1** for $y + 2xy = 4 - 3x$ **M1 FT** for $2xy + 3x = 4 - y$ oe **M1 FT** extracting x as common factor and dividing by bracket	factorising dep on x (2 terms) isolated
	(b)		$V = \frac{Ar}{2}$	**3**	**M1** for $h = V/\pi r^2$ or $A/2\pi r$ or $V/A = r^2/2\pi r$ **M1** for substituting their h, in A or V formula or cancelling h	
18	**(a)**		circle centre (0, 0) through (3, 0), (0, 3), (-3, 0), (0, -3)	**M1** **A1**	Condone freehand	
	(b)	**(i)**	$x^2 + (2x + 1)^2 = 9$ $4x^2 + 2x + 2x + 1$ Completion to $5x^2 + 4x - 8 = 0$	**M1** **B1** **A1**	 Dep on B1 with no errors	
		(ii)	x = 0.93, –1.73 y = 2.85 or 2.86 and – 2.45 or – 2.46	**3** **1FT**	**B2** for either or for both answers to greater accuracy **Or M1** for substitution in formula with at most 1 error FT *their x* s	0.926.... or 0.927 and –1.726... or –1.727 must have full fraction line at substitution stage
19			Bars width 0-1, 1-3 , 3-5 , 5-10 , 10-20 heights 25, 16, 9, 3, 1	**1** **2**	 Touching line **B1** for 3 correct heights	

Question			Answer	Marks	Part marks and guidance	
20	(a)		2/87 oe	3	or awrt 0.0230 **M2** for 5/30 × 4/29 Or **SC1** for 25/900 (or awrt 0.0278) or 20/900 or 25/870 or 169/870 oe	ISW attempts to cancel or change form of answer
	(b)		11/39 oe	4	Or awrt 0.282 **M3** for 11/13 × 2/12 + 2/13 × 11/12 oe Or **M2** for one of above products Or **B1** for 2/12 or 11/12 seen Or **SC1** for 44/169 or 0.260 or 0.26 if 22/169 seen	ISW attempts to cancel or change form of answer

Section B Total: 50

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