OCR
RECOGNISING ACHIEVEMENT

GCSE

Methods in Mathematics (Pilot)

General Certificate of Secondary Education

Unit **B391/02:** Higher Tier

Mark Scheme for January 2013

Oxford Cambridge and RSA Examinations

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.

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.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

OCR will not enter into any discussion or correspondence in connection with this mark scheme.

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Annotations

Annotation	Meaning
✓	Correct
×	Incorrect
BOD	Benefit of doubt
FT	Follow through
ISW	Ignore subsequent working (after correct answer obtained), provided method has been completed
M0	Method mark awarded 0
M1	Method mark awarded 1
M2	Method mark awarded 2
A1	Accuracy mark awarded 1
B1	Independent mark awarded 1
B2	Independent mark awarded 2
MR	Misread
SC	Special case
^	Omission sign

These should be used whenever appropriate during your marking.

The **M**, **A, B** etc annotations must be used on your standardisation scripts for responses that are not awarded either 0 or full marks.
It is vital that you annotate these scripts to show how the marks have been awarded.
It is not mandatory to use annotations for any other marking, though you may wish to use them in some circumstances.

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 for a correct final answer, a partially correct 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.

   - **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 and applies as a default.
   - **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. In questions with no final answer line, make no deductions for wrong work after an acceptable answer (ie **isw**) unless the mark scheme says otherwise, indicated for example by the instruction 'mark final answer'.

7. In questions with a final answer line following working space,

   (i) if the correct answer is seen in the body of working and the answer given on the answer line is a clear transcription error allow full marks unless the mark scheme says 'mark final answer'. Place the annotation ✓ next to the correct answer.

   (ii) if the correct answer is seen in the body of working but the answer line is blank, allow full marks. Place the annotation ✓ next to the correct answer.

(iii) if the correct answer is seen in the body of working but a completely different answer is seen on the answer line, then accuracy marks for the answer are lost. Method marks could still be awarded. Use the M0, M1, M2 annotations as appropriate and place the annotation × next to the wrong answer.

8. 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).

9. 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.

10. 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.

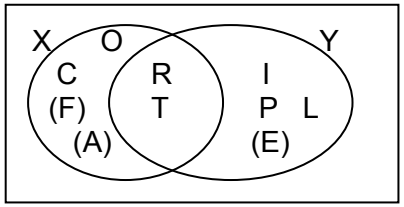
11. Ranges of answers given in the mark scheme are always inclusive.

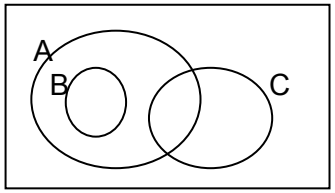
12. For methods not provided for in the mark scheme give as far as possible equivalent marks for equivalent work. If in doubt, consult your Team Leader.

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.

Question			Answer	Marks	Guidance	
1	(a)	(i)	11	1		
		(ii)	10	2	**B1** for $^{-}30$ or 5×2 **seen**	
	(b)	(i)	$\frac{7}{8}$	2	**B1** for $\frac{2}{8}$ or both correctly converted over another common denominator, **seen**	eg $\frac{4}{16}, \frac{10}{16}$ Correct equiv implies **B1**
		(ii)	$\frac{1}{6}$	2	**B1** for $\frac{1}{2} \times \frac{1}{3}$ **seen** or equiv fraction	For B1 isw incorrect attempts to change form or cancel
2			12.88 cm²	3 1	Look back from 12.9 or 13 **M1** for **figs** 56 × **figs** 23 **B1** for **figs** 1288 or **SC2** for answer 15.68 or **SC1** for **figs** 1568 indep	Accept 1288 mm² for 4 marks Not eg 5.6 × 2.3 then × 2.8
3	(a)		$2x - 7$ final ans, **nfww**	3	**B1** for $5x - 10 - 3x \pm 3$ **B1** for simplifying *their* $5x - 10 - 3x \pm 3$ to $ax + b$	
	(b)		2.2 , $\frac{1}{5}, \frac{11}{5}$ **nfww, isw**	2	**FT** from *their* $ax + b = 4 - 3x$ **M1FT** for isolating terms correctly **or** **M1FT** for $x = \frac{b}{a}$ from *their* $ax = b$ ($a \neq 1$)	May start again
4	(a)	(i)	40°	1		
		(ii)	80°	1		

Question			Answer	Marks	Guidance	
	(b)		$\angle$DAC = 90 – 40 = 50, $\angle$ DCA = 180 – 80 – 50 = 50 **oe**	2	Accept because $\angle$BAC = 90 eg 90 – 40 = 50 or 100 – 50 Accept angles of a triangle = 180 **B1** for $\angle$ DAC = 50 and $\angle$ DCA = 50 **soi**	Or, if finding DCA first, accept angles of a triangle = 180 or exterior angle of a triangle Condone single letter angles, may be on diagram
5	(a)		4	1	Accept 2^4	
	(b)	(i)	x^7	1		
		(ii)	1	1		
		(iii)	x^6	1		
		(iv)	x^3	2	**M1** for x^6 or **FT** $\sqrt{their\ x^6}$ or $x^4/x^{(1)}$	Not $\sqrt{(\ x^4/x^{(1)})}$
6	(a)		No and $4^3 = 8^2 = 64$	3	**M1** for showing at least 2 more squares (>3) **M1** for showing at least 2 cubes (>1) If 0 scored allow **SC1** for 64 seen or answer of 0 demonstrated	Accept others eg $9^3 = 27^2 = 729$ Or equiv statements with roots Condone extra wrong work
	(b)		A prime number has <u>only</u> factors 1 and itself A square number must be of form $a \times a$ so has other factors	1	Must say something about factors of prime numbers and square numbers	eg a prime number only has factors 1 and itself so cannot be a number times itself
7	(a)		0.22 0.25 0.15 0.2	2	**B1** for 2 correct decimals or 3 correct fractions or percentages seen	
	(b)		Danni, most (or many) throws	1	Accept because she threw it 500 times	Accept 0.2, D etc
	(c)		0.63 **oe**	2	**M1** for 1 – 0.37 or 100 – 37 **soi** by **figs** 63	

Question			Answer	Marks	Guidance	
8	(a)	(i)	Enlargement	1	No extras	
		(ii)	Translation, Enlargement	1 1	-1 if reflection included	Condone Rotation as extra
	(b)		Reflection $x = 4$	1 1	Any indication of 2nd transformation scores 0	
9			<table><tr><td>A</td><td>Y</td><td>3</td></tr><tr><td>B</td><td>N</td><td></td></tr><tr><td>C</td><td>N</td><td></td></tr><tr><td>D</td><td>Y</td><td>–3</td></tr><tr><td>E</td><td>N</td><td></td></tr><tr><td>F</td><td>Y</td><td>½ oe</td></tr></table>	5	**B2** for Y/Ns correct **or** **B1** for 4 or 5 1 mark (indep.) for each correct gradient	Ignore gradients on incorrect Ys
10			½ (360 – x)	2	**B1** for reflex O = 360 – x or angle ADC = ½x where D is point on major arc AC	
11	(a)	(i)		2	**B1** for up to 3 misplaced or omitted	eg R, T repeated in intersection Ignore any letters in (X U Y)' unless they are repeats of those in X U Y
		(ii)	T R	1	**FT** for *their* Venn diagram	Not eg R, T = 2, 0.2

Question			Answer	Marks	Guidance	
	(b)			3	At least 2 must be labelled **B1** for each condition of $B \subset A$ $B \cap C = \varnothing$ $A \cap C \neq \varnothing$ satisfied If 0 scored, allow **SC1** for correct shape with no labels	Condone omission of rectangle C could be a subset of A If only two circles, only mark available is for $A \cap C \neq \varnothing$
12			$\frac{42}{90}$ **oe isw** incorrect attempts to change form or cancel	3	**M2** for $\frac{7}{10} \times \frac{3}{9} + \frac{3}{10} \times \frac{7}{9}$ **oe** **or** **M1** for $\frac{7}{10}$ and $\frac{3}{9}$ or $\frac{3}{10}$ and $\frac{7}{9}$ **soi** by $\frac{21}{90}$ **or** **SC1** for $\frac{42}{100}$ **oe** as final answer	Must be complete method for their answer. If this appears with other products as well then eligible for M1 only NB equivs $\frac{7}{15}$ or 0.466 to 0.467
13	**(a)**		**b +** $\frac{3}{2}$ **a oe**	1		

Question			Answer	Marks	Guidance	
	(b)*		$\overrightarrow{OD} = \mathbf{a} + \frac{2}{5}(\mathbf{b} - \mathbf{a})$ $= \frac{2}{5}\mathbf{b} + \frac{3}{5}\mathbf{a}$ **oe** $\overrightarrow{OD} = \frac{2}{5}\overrightarrow{OC}$ **oe**	3	**2** for any simplified version of OD, **1** for unsimplified version of OD For 3 marks must have vector arrows on final line	

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