GCSE

Methods in Mathematics (Pilot)

Unit **B391/02:** Higher Tier

General Certificate of Secondary Education

Mark Scheme for June 2015

Annotations used in the detailed Mark Scheme.

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 <u>using a correct method</u> and are not lost for purely numerical errors.
        A marks are for an <u>accurate</u> answer and depend on preceding **M** (method) marks. Therefore **M0 A1** cannot be awarded.
        B marks are <u>independent</u> of **M** (method) marks and are awarded for a correct final answer or a correct intermediate stage.
        SC marks are for <u>special cases</u> 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 <u>not from wrong working</u> **full marks** should be awarded.

        Do <u>not</u> award the marks if the answer was obtained from an incorrect method, ie incorrect working is seen <u>and</u> 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.

Question			Answer	Marks	Part marks and guidance	
1	(a)	(i)	33 912 [.0]	1		
		(ii)	78 500	1		
	(b)		$\dfrac{500 \times 0.03}{(20 \text{ or } 21) + (9 \text{ or } 10)}$ or $\dfrac{500 \times 0.03}{30}$ 0.5 **oe**	**M1** **A2**	Allow 3 rounded (30 counts as 2) **A1** for 15	
2	(a)		$\dfrac{17}{24}$	2	**M1** for $\dfrac{21}{24} - \dfrac{4}{24}$ **oe** soi by equiv fraction.	Condone 1 wrong numerator
	(b)		$\dfrac{1}{63}$	2	**M1** for original product with at least 1 'cancelling' Or **SC1** for equiv fraction	eg $\dfrac{4}{36} \times \dfrac{1}{7}$ For SC1, ISW attempts to cancel
3	(a)		45	2	**M1** for 360 − (110 + 80 + 125)	
	(b)		55	2	**B1** for BEA = 70 or ½(110) seen	May be on diagram

Question			Answer	Marks	Part marks and guidance	
4	(a)	(i)	Equal **oe**	1		eg the same, $y = x$
		(ii)	Q correctly shown	1		Condone three separate circles or Q next to each of correct points
	(b)		1	1FT	Ft from their Venn diagram	For FT, there must be a Q on the diagram. 2 loops both labelled or both unlabelled FT from combined. 2 loops, one labelled Q, FT from that
	(c)		$\dfrac{8}{36}$ **oe**	2FT	FT from *their* Venn diagram **B1** for $\dfrac{k}{36}$, $k < 36$ or $\dfrac{8}{k}$, $k \geq 25$	(*their* 8)/36 For FT, there must be a Q on the diagram. 2 loops both labelled or both unlabelled FT from combined. 2 loops, one labelled Q, FT from that ISW attempts to change form or cancel
5	(a)		$2x + x + 30 + x = 310$ **oe** ISW	2	**B1** or $2x$ and $x + 30$ soi by $3x + 30$	Minimum $4x = 280$
	(b)		$x = 70$	2	**B1** $310 - 30$ soi by 280	May be in (a)

Question			Answer	Marks	Part marks and guidance	
6			12 **nfww**	4	**M1** for correct method for total area using algebra **A1** for correct equation or **B1** for 1 step in solving equation OR **B2** for bottom triangle = 18 or **B1** for top rectangle = 30 + **B1** for h = 18 OR **B1** for each correct full trial up to a maximum of 2	Or **M1** for 3 × 30 – 48 **A1** for ½(30 + L) × 2 = *their* 42 Must be clear Must be clear Choose best
7	(a)		(2, –1)	2	Or **B1** for correct marking of point (2, –1) or correct co-ords for their point	Their point must be below $y = 1$
	(b)		½x + 2 **oe**	2	**B1** for $mx + 2$ or ½$x + c$	Condone eg – 2 < ½x + 2 < 2 $m \neq 0$
8	(a)		$4x - 21y$ Final answer	3	**B2** for $4x + ky$ or $kx - 21y$ or **B1** for $6x - 15y - 2x - 6y$	B2 or B1 could be scored in working
	(b)		$2a(a + 3)$ Final answer	2	**B1** for $2(a^2 + 3a)$ or $a(2a + 6)$ or $2a(a + 3)$ seen	Condone missing final bracket and/or multiplying out to check
9	(a)		1.26×10^{-4}	2	**B1** for figs 126 seen	
	(b)		1.5×10^8 and 3×10^5 seen Distance ÷ speed 500 or 5×10^2	M2 M1 B1	or **M1** for either or both standard forms correct or both approximations correct	For M2 can see s.f. and rounding separately i.e figs 1.5 and figs 3

Question			Answer	Marks	Part marks and guidance	
10			90° anti-clockwise or 270° clockwise Centre (a, $a - 1$) $x = a + 1.5$ OR 90°clockwise or 270° anticlockwise Centre (b, $b - 4$) $y = b - 2.5$	**1** **1** **1** **1** **1** **1**	Dep on 90° anti-clockwise or 270° clockwise Dep on previous mark Dep on 90° clockwise or 270° anti-clockwise Dep on previous mark If 0 scored **SC1** for Centre (a, $a - 1$) and $x = a + 1.5$ Or Centre (b, $b - 4$) and $y = b - 2.5$	
11	**(a)**		$27 + 4\sqrt{3}$ Final answer	**2**	**B1** for $c + 4\sqrt{3}$ or $27 + k\sqrt{3}$	c or $k\sqrt{3}$ can be in two parts
	(b)		$-2 + 32\sqrt{3}$ Final answer	**4**	**B3** for $c + 32\sqrt{3}$ or $-2 + k\sqrt{3}$ Or **B1** for $11 + \sqrt{3}$ + **B1** for $-1 + \sqrt{3}$ Or **B1** for $25 + 10\sqrt{3}$ + $10\sqrt{3}$ + $2\sqrt{3}.2\sqrt{3}$ + **B1** for $36 - 6\sqrt{3}$ $- 6\sqrt{3}$ + $\sqrt{3}.\sqrt{3}$	c or $k\sqrt{3}$ can be in two parts For this B1 condone sign errors

Question			Answer	Marks	Part marks and guidance	
12			Full Proof including $\overrightarrow{BQ} = \frac{2}{3}\mathbf{a}$ correctly obtained	5	For full marks must have vector arrows on majority of 2 letter vectors **B4** for $\overrightarrow{BQ}$ correctly obtained but with missing vector marks. OR **B3** for $\overrightarrow{OQ} = \mathbf{b} + \frac{2}{3}\mathbf{a}$ correctly obtained OR **B2** for $\overrightarrow{OP} = \frac{3}{5}\mathbf{b} + \frac{2}{5}\mathbf{a}$ **oe** ISW OR **B1** for $\overrightarrow{AB} = \mathbf{b} - \mathbf{a}$ **oe** or $\overrightarrow{BA} = \mathbf{a} - \mathbf{b}$ **oe**	Condone no vector marks on **a**, **b** but for full marks not capitals Not just written down or $\overrightarrow{PQ} = \frac{2}{5}\mathbf{b} + \frac{4}{15}\mathbf{a}$, accept unsimplified fractions or $\overrightarrow{BP} = \frac{2}{5}\mathbf{a} - \frac{2}{5}\mathbf{b}$ **oe** ISW For all marks must be correct vector notation and algebraically correct. Eg not $\frac{2}{5} - \mathbf{b} + \frac{2}{5}\mathbf{a}$
13	(a)		$\frac{20}{36}$ **oe nfww**	3	**M2** for $\frac{2}{6} + \frac{4}{6} \times \frac{2}{6}$ oe or $1 - \frac{4}{6} \times \frac{4}{6}$ oe Or **M1** for $(\frac{4}{6}$ or $\frac{5}{6}) \times \frac{2}{6}$ oe seen	
	(b)		$\left(\frac{4}{6}\right)^{n-1} \times \frac{1}{6}$ **oe**	2	**M1** for $\left(\frac{4}{6}\right)^{n-1}$ or $\left(\frac{4}{6}\right)^{n}$ or $\left(\frac{5}{6}\right)^{n-1}$ or $\left(\frac{5}{6}\right)^{n}$ seen	

OCR (Oxford Cambridge and RSA Examinations)
1 Hills Road
Cambridge
CB1 2EU

OCR Customer Contact Centre

Education and Learning
Telephone: 01223 553998
Facsimile: 01223 552627
Email: general.qualifications@ocr.org.uk

www.ocr.org.uk

For staff training purposes and as part of our quality assurance
programme your call may be recorded or monitored