OCR
Oxford Cambridge and RSA

GCSE

Methods in Mathematics (Pilot)

Unit **B391/02:** Higher Tier

General Certificate of Secondary Education

Mark Scheme for June 2016

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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.

1. 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

2. **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.

3. 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.

4. 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.

5. 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.

6. 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**.

7. 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'.

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. 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.

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

13. 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.

14. 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)		$\frac{1}{2}$ oe $\frac{7}{4}$ oe	2	**B1** for each	
	(b)		0.7^2 oe $\frac{1}{0.7}$ oe	2	**B1** for each	
2			4	3	**M2** for ½(6 + 5 + 6)×*h* = 34 oe Or **M1** for 6 × *h* **or** ½ x 5 x *h* soi	
3		(a)	Correct line across whole range	3	**M2** for line not across whole range or 2 correct points plotted Or **M1** for 2 correct co-ords seen	Condone short by about 2 mm at either end
		(b)	0.5 oe	1	FT their graph ± ½ small square.	
4	(a)	(i)	0.06 oe	1		
		(ii)	20	1		
	(b)	(i)	$1\frac{7}{15}$	2	**M1** for $\frac{10}{15}$ and $\frac{12}{15}$ oe soi by $\frac{22}{15}$ oe	Condone error in one numerator
		(ii)	$1\frac{1}{8}$	2	**M1** for $\frac{3}{2}$ × $\frac{3}{4}$ oe soi by $\frac{9}{8}$ oe	
5			Rotation 90° Clockwise [About] (0, 3)	1 1 1		Zero if other transformations given but centre given as a vector could be awarded 2

Question			Answer	Marks	Part marks and guidance	
6			£23 to £36.60	4	With full working and some use of correct units and dep on at least 2 roundings seen **B3** for correct method with 2 rounding of given quantities answer could be out of range **B2** for 2 correct steps with at least 1 rounding or 3 correct steps no rounding of given quantities **B1** for 1 correct step or 2 correct roundings	To include miles ÷ mpg Gallons × 4.6 or 5 Litres × 1.2 or 1 Answer in range with no working scores 0
7			Correct pentagon	3	Angles at centre all 72± 2° **B2** for 3 or 4 angles at centre 72± 2° **B1** for 72 or 108 seen	See template
8	(a)	(i)	4	1		
		(ii)	5	2	**B1** for 3^8	
	(b)	(i)	1	1		
		(ii)	0.01 oe	1		
9	(a)		$5a - 3a - (2 + 5)$	1		
	(b)		– + –	2	**B1** for 1st & 3rd correct	
	(c)		Eg 3 2 11 or 3 4 14 or 3 6 17 etc	2	**B1** for 3 in correct position Or **B1** for a pair of numbers x, y such that (*their* 3)$x - 2y = -16$	
10	(a)		64	2	**B1** for 1 or 27 or for a two digit square number on answer line Or **B1** systematic lists squares and cubes of at least 4 correct in both lists	
	(b)		80	3	**B2** for 3 criteria met **B1** for 2 criteria met	

Question			Answer	Marks	Part marks and guidance	
11	(a)		125 Opposite angles of a cyclic quadrilateral sum to 180	1 1	Accept full alternative methods	Accept correct answer clearly indicated on diagram
	(b)		35 Alternate segment	1 1dep	Accept full alternative methods	Accept correct answer clearly indicated on diagram
12	(a)	(i)	$\frac{4}{50}$ oe	1		In all parts ISW attempts to 'cancel' or change form of answer to decimal or percentage
		(ii)	$\frac{20}{50}$ oe	2	**B1** for 12 + 3 + 5 soi by 20	
	(b)	(i)	$\frac{4}{490}$ oe	2	**M1** for $\frac{5}{50}$ and $\frac{4}{49}$	If decimals used accept [0].008 or better
		(ii)	$\frac{48}{420}$ oe	3	**M2** for $\frac{3}{21} \times \frac{8}{20} + \frac{8}{21} \times \frac{3}{20}$ oe **M1** for one of above products	If decimals used accept [0].114 or better
13	(a)		3	1	Not 3*x*	
	(b)		$y = -\frac{1}{3}x + 4$ oe	3	**M1FT** $-\frac{1}{\textit{their}\ 3}$ seen **M1** for substituting (6, 2) into *their* ($y = mx + c$) with $m \neq 3$	For three marks must be a three term equation but ISW attempts to simplify. $-\frac{1}{3}x + 4$ award **SC2**
14			$15a^3b - 3\sqrt{3}\ a^2b^2$ Final ans	2	**B1** for one term correct or $\sqrt{3} \times \sqrt{3} = 3$ soi by e.g. 15	

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