Methods in Mathematics (Pilot)

General Certificate of Secondary Education

Unit **B391/02:** Higher Tier

Mark Scheme for June 2012

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 <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 for a correct final answer, a partially correct 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.

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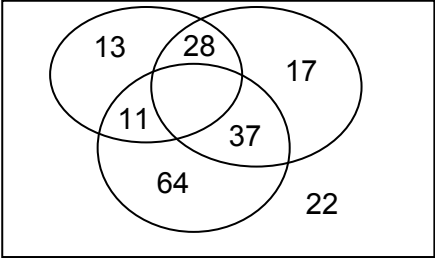
   If the correct answer is seen in the working but a completely different answer is seen in the answer space, then accuracy marks for the answer are lost. Method marks would still be awarded. Use the M0, M1, M2 annotations as appropriate and place the annotation ✗ next to the wrong answer.

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)	0.16	2	**B1** for 0.06 seen, **or** **SC1** for answers 0.08 or 0.7	
		(ii)	16½ (m) or 16.5 or $16\frac{7}{14}$	2	**B1** for 5½ or 115.5 or $\frac{231}{14}$ **oe seen**	eg 33/2, $16\frac{96}{196}$ etc
	(b)	(i)	Brackets round 4 + 3	1	Ignore superfluous brackets	brackets must be in pairs
		(ii)	Brackets round 16 + 4 Brackets round 9 – 5	1 1	Ignore superfluous brackets	brackets must be in pairs
2			Ruled pentagon with 4 angles at centre 70 to 74 inclusive. points to be on circle ± 2mm	4	**B3** for ruled pentagon with 3 angles at centre 70 to 74 inclusive. points to be on circle ± 2mm **or** **B2** for 1 angle subtended by side of polygon at centre measured at 70 to 74 inclusive. (with or without pentagon) **or** **B1** for 360/5 **soi** by 72 or 3 × 180 **oe soi** by 540 or 108 or one angle at centre measured as 70 – 74 with no polygon	can be freehand
3	(a)		$5x\,(x-2)$	2	**B1** for $5(x^2 - 2x)$ or $x(5x - 10)$ or $5x[f(x)]$	Accept $5x\,(1x - 2)$ or $(5x + 0)(x - 2)$ f(x) must be linear

	Question		Answer	Marks	Part Marks and Guidance	
	(b)		Fully correct solution leading to final answer 1.3 **oe**	3	**2** for answer 1.3 with algebraic steps missing or 1.3 not final answer or incorrect answer from 1 algebraic step wrong **1** for answer incorrect with one correct algebraic step shown	Three steps are Multiplying brackets in equation Isolating and combining terms Dividing
4	(a)		34 (miles) $\dfrac{1}{8}$	3	**B2** for 4¼ miles **soi** by 8½, 17 or 42½ **or** **B1** for 12 miles + **B1** for 22 miles **or** **SC1** for (their 4¼) × 8 **oe** correctly evaluated	Or equivalents
	(b)		$3\dfrac{1}{8}$ (miles) **oe**	3	**B1** for $5\dfrac{7}{8}$ or $7\dfrac{3}{8}$ or $11\dfrac{5}{8}$ **oe** **and** **B1 dep** for subtracting, $2\dfrac{3}{4}$, *their* 4¼, *their* 8½ **oe** respectively	For an answer of 5 miles from route CDCBA allow full marks and part marks for eg 9¼ − 4¼
5	(a)		Correct ruled line over range −2 to 2	3	**B2** for shorter correct line or line over range −2 to 2 with gradient 3 or freehand correct line range −2 to 2 **or** **B1** for 3 correct coordinates seen or plotted or ruled line through (0, 2) with $m \neq 0$	(0, 2), (1, 5), (2, 8), (3, 11) (−1, −1), (−2, −4), (−3, − 7)

Question			Answer	Marks	Part Marks and Guidance	
	(b)		1.3 ± 0.1 **oe**	1FT	FT or correct	
	(c)		$y = 3x + 4$	3	**B1** for $y = 3x + c$, $c \neq 2$ **M1** for subst (1, 7) in *their* $y = 3x + c$ **SC2** for $3x + 4$ (no y)	or correct line drawn through (0, 4) and (1, 7)
6	(a)		(2) 3 4 (5) 6 3 4 5 6 7 4 5 6 7 8 (5) 6 7 (8) 9 6 7 8 9 10	1	Condone one error	
	(b)	(i)	$\dfrac{3}{25}$ **oe**	2FT	FT completed table only **B1** FT for numerator **and** **B1** for 25 as a denominator	Equiv fractions decimal or % **isw** for attempts to change form 3 in 25 etc **–1** once for question FT provided $p < 1$
		(ii)	$\dfrac{12}{25}$ **oe**	1FT	FT from *their* table and *their* 25	FT provided $p < 1$
7	(a)		Correct translation	2	**B1** for x or y movement correct **or** **SC1** for translation $\begin{bmatrix} 0 \\ 2 \end{bmatrix}$ or translation of C through $\begin{bmatrix} 2 \\ 0 \end{bmatrix}$	
	(b)		Reflection $y = {}^{-}x$ **oe**	1 1	Any indication of two transformations scores 0	

Question			Answer	Marks	Part Marks and Guidance	
	(c)		Correct enlargement	2	**B1** for enlargement with s.f. 2, centre (0,2) or s.f. −k, centre (0,2) or s.f. −2 with any centre or 2 points correct and third ±½ square or correct 3 points with no triangle	allow freehand k positive
8	(a)		35 (sq units) final answer	3	**M2** for ½(7 + 3) × 7 **oe** **or** **M1** for ½ × 7 × 4 **soi** by 14 or a(7 + 3)b **or** **SC1** for area 35 within area calculation <u>Volume calculations score 0</u>	eg ½ × 7 × 4 + 7 × 3
	(b)	(i)	(0, 1, 7)	1		
		(ii)	(0, 9, 7)	1		
		(iii)	(7, 9, 3)	1		
9	(a)		Parallelogram	1		
	(b)		Kite	1	accept arrowhead	
	(c)		Rhombus	1		
10	(a)		$\frac{1}{16}$ or 0.0625	3	**B2** for 16, $\frac{1}{4}$, $\frac{1}{4096}$ **or** **B1** for 4 or 4096 or reciprocal at any stage	or better eg $\frac{1}{4^2}$ or better eg 4^2

Question			Answer	Marks	Part Marks and Guidance	
	(b)	(i)	13	1		
		(ii)	$(c =) \dfrac{ab}{10}$ **oe**	2	**B1** for $(c =)$ ab as answer or $(c =) ab \times 10^{12}$ **seen**	may be in part **(i)**
11	(a)			3	**B2** for 4 correct **or** **B1** for 2 correct	
	(b)	(i)	$\dfrac{22}{200}$ **oe**	1FT	Accept zero following zero in diagram but not following blank.	Equiv fraction decimal or % **isw** for attempts to change form 22 in 200 etc **–1** once for question
		(ii)	$\dfrac{37}{200}$ **oe**	1FT		
		(iii)	$\dfrac{47}{200}$ **oe**	1FT		