

Methods in Mathematics (Pilot)

General Certificate of Secondary Education

Unit **B392/01**: Foundation Tier

Mark Scheme for June 2011

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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.

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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 $180 \times (\textit{their} '37' + 16)$, or FT $300 - \sqrt{(\textit{their} '5^2 + 7^2')}$. Answers to part questions which are being followed through are indicated by eg FT 3 \times *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).
 - **nfw** 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		13 17 21 20 40 80 37 109 325	1 1 2	B1 for 37 as 3 rd term	
2	(a)	8.6	1		
	(b)	17	1		
	(c)	4096	1		
	(d)	645	2	M1 for 215 or 2580 or 0.75	
3		9 tiles used with rhombus drawn and labelled parallelogram drawn and labelled trapezium drawn and labelled	6	<p>B5 for 9 tiles used, 3 correct drawings and 2 correct labels or for more than 9 tiles used and rhombus, parallelogram and trapezium drawn and labelled.</p> <p>or</p> <p>B4 for 9 tiles used, 3 correct drawings and 1 correct label or 2 correct drawings and 2 correct labels.</p> <p>or</p> <p>B3 for 9 tiles used, 3 correct drawings and 0 correct labels or 2 correct drawings and 1 correct label.</p> <p>OR</p> <p>Mark best 2 quadrilaterals – for each</p> <p>M1 for rhombus or parallelogram or trapezium drawn</p> <p>A1 for correct label</p>	

Question		Answer	Marks	Part marks and guidance	
4	(a)	22	1		
	(b)	(i)	2	B1 for rectangle perimeter 22cm but area <math><18\text{cm}^2</math> (eg 10 by 1)	Mark the dimensions written on diagram. Condone inaccurate diagram. If no dimensions measure <i>their</i> rectangle. Allow square side 5.5cm
		(ii)	1FT 1		
5	(a)*	Explanation Clear concise explanation referring to a quadrilateral being made from 2 triangles and that the sum of the angles of a triangle is 180° .	2	1 for incomplete explanation eg splitting of quadrilateral into 2 triangles described but no reference to 180°	
	(b)	[b =] 125° [c =] 55° [d =] 55°	1 1 1	If 0, for c and d, allow SC1 for both ($360 - 125 - \text{their } b$)/2	
6	(a)	A plotted at (-1, 4) B plotted at (5, 7)	1 1	SC1 for plots at (4,-1) and (7,5)	Condone A and B omitted Condone extra point if it is clearly an attempt at mid-point
	(b)	(2, 5.5)	2	M1 for midpoint marked or one coordinate correct or FT <i>their</i> AB for 1 or 2 marks	

Question			Answer	Marks	Part marks and guidance	
7	(a)	(i)	60	1		
		(ii)	sum of <i>their</i> corner numbers	1FT		
		(iii)	Description: eg the sum of corner numbers is 4 times the middle number	2	M1 for 60 'paired' with 15 and <i>their</i> (ii) 'paired' with <i>their</i> middle or incomplete description.	For 2 marks condone omission of 'sum of corner' or middle number. eg Divide your answer by 4 you get the middle number scores 2. eg It is a quarter of it scores M1.
	(b)	(i)	$x + 11$ $x + 20$ $x + 22$	2	B1 for 2 terms correct	
		(ii)	$4x + 44$	2	M1 for <i>their</i> $x + x + 2 + x + 20 + x + 22$ SC1 for $3x + 53$ or $5x + 55$	Allow $4(x + 11)$
		(iii)	$4 \times (x + 11) = 4x + 44$ or $4x + 44 = 4(x + 11)$	2	M1 for $4 \times$ <i>their</i> expression for the middle attempted.	Condone $x + 11 \times 4$ for M1
8			$\frac{1}{4}$ 0.25 $\frac{1}{20}$ 5% 0.4 40%	4	B4 for all correct or B3 for 4 or 5 correct or B2 for 3 correct or B1 for 1 or 2 correct	

Question		Answer	Marks	Part marks and guidance	
9*	(a)	-2	1		
	(b)	Acceptable answer of $\frac{8}{3}$ or $\frac{40}{15}$ or 2.66 or 2.67 (or better) supported by correct and coherent algebraic statements.	3	<p>isw from their acceptable answer</p> <p>2 for acceptable answer or 2.6 or 2.7 obtained but algebraic statements are inadequate or incorrect solution arising from one error in working but supported by coherent algebraic statements</p> <p>or</p> <p>1 for incorrect solution but evidence of correct expansion of brackets or division by 5 or at least one correct step.</p>	Allow flow diagram or equivalent evidence for 'correct and coherent algebraic statements'
10	(a)	60	2	M1 for $3 \times 4 \times 5$	
	(b)	220	3	<p>M2 for $4 \times 5 \times 8 + \textit{their (a)}$ or $4 \times 5 \times 5 + 4 \times 3 \times 5 + \textit{their (a)}$</p> <p>or</p> <p>M1 for solid split into 2 cuboids with 8cm 'on vertical' or 'on horizontal' or 3 cuboids with appropriate dimensions shown on diagram or in attempt at volume or c/s area or '<i>their L area</i>' $\times 5$ or $4 \times 8 \times 5$ or $3 \times 8 \times 5$ or $100 + \textit{their (a)}$ or 160</p> <p>A1 for 220 or FT '$160 + \textit{their 60}$'</p>	<p>[160] + (a) 100 + 60 + (a)</p>

Question		Answer	Marks	Part marks and guidance	
11	(a)	Line through (10,16), (20,32) and (50,80)	2	M1 for 2 points plotted from table	
	(b)	Leo by 25 miles or 40 km	4	<p>M2 for 840km = 525miles or 550miles = 880km or use of graph to convert 840km to miles or 550 miles to km</p> <p>or</p> <p>M1 for attempt to use table or graph for relevant conversion eg 1 mile = 1.6km from table or 84km = ... miles from graph</p> <p>AND</p> <p>A2 for Leo by 25 miles or 40 km or FT their graph readings if M2 scored or</p> <p>or</p> <p>A1for Leo by 25 or 40 or FT if M2 scored</p> <p>or</p> <p>B1 for correct choice and difference FT <i>their</i> readings or calculations</p>	<p>eg 84km 52 miles, 840km 520km FT graph reading ±1 mile or 1km</p> <p>eg 1 mile = 1.6km from table or 84km = ... miles from graph</p> <p>(Do not ft use of graph through (0,0) and (80,80))</p> <p>For B1 condone omission of km or miles</p>
12		<p>False $\frac{1}{3} = 0.33...$[bigger than 0.3]</p> <p>True $\left(\frac{1}{5}\right)^2 = \frac{1}{25}$ [smaller than $\frac{1}{5}$]</p>	<p>2</p> <p>2</p>	<p>B1 0.33(...) [=1/3] For 2 marks contradiction in justification not accepted.</p> <p>B1 for $\frac{1}{25}$ or 0.04 [For $\left(\frac{1}{5}\right)^2$] For 2 marks contradiction in justification not accepted If 0, 0 scored, SC1 for False, True</p>	<p>eg False they are the same. $\frac{1}{3} =$ 0.33 scores 1 only.</p>

Question		Answer	Marks	Part marks and guidance	
13	(a)	15 [hours] 50 [mins]	2	M1 for 4 hours 45 mins or 3 hours 50 mins or clear method with minor error	
	(b)	(i)	1		
		(ii)	2	M1 for $825400 \div 130400$	
	(c)	True supported by correct working eg England is $6.7 \times \text{pop'n London}$ and Namibia is $7.8 - 7.9 \times \text{pop'n Windhoek}$	2	ALT London 14.9 -15% of England and Windhoek 12.6-12.7% or 13% of Namibia. M1 for either method used but with error	Accept use of estimation methods
14		C B A and E D 1:6 2:10 1:4 3:12 1:3	3	B2 for C B A E D or C B E A D or D A and E B C or B1 for C weakest or D strongest or M1 for B and E simplified to 1:5 and 1:4	A and E the same may be implied by working
15	(a)	108	2	M1 for [ext angle] = $360/5$ or 72 soi or [sum of interior angles =] 3×180 or 540	Allow 6 x 90 from $(2n - 4)$ right angles for M1
	(b)	Explanation: eg $3 \times 108^\circ < 360^\circ$ or $4 \times 108^\circ > 360^\circ$ or 108 does not go into 360 oe or a correct labelled diagram showing 108, 108, 108 and 36	2	B1 for 3 angles at a point < 360 or B1 for 4 angles round a point > 360 or B1 for <i>their (i)</i> does not go into 360 or M1 for unlabelled diagram showing an attempt at 3 pentagons plus a "gap"	Max B1 if angle not 108° (Any explanation without numbers will score a maximum of 1 mark)

Question	Answer	Marks	Part marks and guidance
16	$[x] = \frac{y+9}{5}$	2	<p>M1 for $y + 9 = 5x$ oe (eg $\frac{y}{5} = x - \frac{9}{5}$)</p> <p>SC1 for answer of $y + 9 \div 5$ or $y + \frac{9}{5}$ <i>or</i></p> <p>$\frac{y}{5} + 9$ or for incorrect versions of $\frac{\pm y \pm 9}{\pm 5}$</p> <p>NB There is no FT mark from wrong 1st step eg $7y = 4x$ then $x = 1.75y$ scores 0</p> <p>Allow M1 for correct reverse flow chart (ie correct operations and clearly in correct order eg as shown by arrows)</p>
17	8.48 – 8.49 or 8.5	3	<p>M2 for $\sqrt{72}$ OR $\sqrt{9^2 - 3^2}$ or 8.4(...)</p> <p>or</p> <p>M1 for a Pythagoras statement and</p> <p>A1 for 8.5</p> <p>SC1 for $\sqrt{9^2 + 3^2}$ soi by eg $\sqrt{90}$ or 9.4 to 9.5</p> <p>eg $3^2 + AC^2 = 9^2$</p> <p>Allow M2 for 8.4(..). from scale drawing</p>
18	101	3	<p>M2 for $2n + 1$ or add on 2×47 or $50 + 51$</p> <p>or</p> <p>M1 for tabulation of term and number of sticks or 'goes up by 2' or n^{th} term = $2n + c$</p>

Question		Answer	Marks	Part marks and guidance	
19	(a)	2, 0, 2, 6	2	B2 for all values correct or B1 for 2 values correct	
	(b)		1 1	B1 for at least four of <i>their</i> points correctly plotted B1 for smooth curve through correct points, below x- axis at vertex Tolerance = $\pm 1\text{mm}$ ($\frac{1}{2}$ square) Tolerance = $\pm 2\text{mm}$ (1 square) (Condone one occurrence of multiple lines)	
	(c)	-2.8, 1.8 (both ± 0.1)	2	B1, B1 (or FT <i>their</i> curve) If 0 scored, M1 for evidence of reading from $y = 5$ Accept any answers given as part of a co-ordinate	

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