GCSE

Applications of Mathematics (Pilot)

General Certificate of Secondary Education

Unit **A381/01:** Foundation Tier

Mark Scheme for June 2011

Any enquiries about publications should be addressed to:

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)		0 0 3	2	-1 each error (minimum zero)	Condone blank as "0" , reflection lines drawn on diagram if no entries on answer line.
			8 2 3	2	-1 each error (minimum zero)	Condone blank as "0".
	(b)	(i)	7800	1		
		(ii)	3	1		
2	(a)		46	1		
	(b)	(i)	9560	1		
		(ii)	97000	1		
	(c)		$\dfrac{9}{16}$	2	**M1** for $\dfrac{18}{32}$ seen	$\dfrac{9}{16}$ must be seen as final answer to gain 2 marks.
	(d)	(i)	$T = a + 10u + 100m$	2	**B1** for $10u$ or $100m$ seen	Condone $a1 + u10 + m100$
		(ii)	19 aliens + (0) UFO 9 aliens + 1 UFO	1 1		
	(e)	(i)	75 (%)	1		
		(ii)	120 (seconds)	1		Condone 2 minutes stated.

Question			Answer	Marks	Part marks and guidance	
3	(a)		(115 to 145) cm or (1.15 to 1.45) m	1 + 1		2nd units mark dependent on number in range (90 to 170) or (0.9 to 1.7).
	(b)		67 to 73	1		
	(c)	(i)	Gold: Wu or 12.31 Silver: Guilhermina or 12.4(0) Bronze: Santos or 12.99	2	**B1** for gold or bronze correct	Need all three for full credit.
		(ii)	Comparison of both times by athletes (halving or doubling the appropriate ones, or subtraction) at least 2 comparisons and statement agreeing with Balvinder.	3	**B2** for at least 1 comparison and explicit agreement with Balvinder or 2 comparisons and no explicit agreement stated or incorrect comment. **or** **B1** for 1 comparison seen, but with no explicit or incorrect comment.	(table below) A comparison must involve two stated times one of which must be calculated (a third may be implied as originating from the table without being written down).
	(d)		20	2	**B1** for figs 202 ... (miles per hour)	

For part (c)(ii):

Athlete	Santos	Hinton	Kantza	Suaraez	Wu
100m (s)	12.99	13.18	13.20	13.21	12.31
200m (s)	26.99	26.68	26.87	27.61	25.40
200 - 100	14.00	13.50	13.67	14.40	13.09
2 x 100m	25.980	26.360	26.400	26.420	24.620
0.5 x 200m	13.495	13.340	13.435	13.805	12.700
100m/200m	0.481	0.494	0.491	0.478	0.485
200m/100m	2.078	2.024	2.036	2.090	2.063

Question			Answer	Marks	Part marks and guidance	
	(e)*		Correct grant or outlay calculated for all 3 cases, clearly stated, explicit statement of maximum (best) grant or least outlay and clear statement to the effect that C is the best option or equivalent.	5-4	For lower mark - two grants or outlays correctly calculated and labelled/indicated and consistent statement (following through on the third value). or all three correct (all grants or all outlays) but incorrect or no statement.	<u>Grant</u>　　　<u>Actual cost to Jezz</u> **A**: (£) 586.5(0) **or** (£) 1759.5(0) **B**: (£) 567.3(0) **or** (£) 1778.7(0) **C**: (£) 625.6(0) **or** (£) 1720.4(0) "C (is the largest grant / cheapest)" or equivalent.
			Two correctly calculated grants or outlays (may be both or either of grant or outlay) but no/incorrect summary or reference to the original question.	or 3-2	For lower mark one correctly calculated grant or outlay and consistent statement about cheapest of at least two.	
			One correct grant or actual outlay seen not necessarily labelled as such, no/incorrect comment or 3 clear sums of money shown and the smallest chosen as the cheapest deal for Jezz	or 1		
4	(a)		$4x + 4$ or $4(x + 1)$	1		
	(b)	(i)	$(x =)\ 8$	1		Only allow fully embedded answer i.e. $2 \times 8 = 16$
		(ii)	$(x =)\ 6$	1		Only allow fully embedded answer i.e. $6 + 4 = 10$

Question			Answer	Marks	Part marks and guidance	
5	(a)		C	1		
	(b)		D	1		
	(c)		4	3	**B2** for 16 seen. **or** **B1** for one of following areas seen either in text or on diagram 1 or 3 or 4.	For full credit the 4 must clearly be the intended final answer (not on answer line). Full credit for correct drawn solution on grid – does not require numbers i.e. can be a drawing of a 4 by 4 square (internal structure not required).
6	(a)		125° 30° 25°	2	**B1** for additions or subtractions involving 180 clearly seen.	Clearly indicated as the answer.
	(b)		155° 155° 25° 25°	2	**B1** for choice involving two equal angles or two angles that sum to 180°.	
7	(a)		5 and 13	1		Allow 5 × 13
	(b)		3 and 7	1		Allow 3 × 7
	(c)		3	1		Allow 3 × 3 × 3 or 3^3
	(d)		13	1		Allow 13 × 13 or 13^2
	(e)		"Ends in 4" or "It's even" or "2 goes into it"	1		Or sensible equivalent.

Question			Answer	Marks	Part marks and guidance	
	(f)		Does not work for 4 → 25 or 8 → 49 or 14 → 85 or 15 → 91 etc.	3	Clear negative statement and a value of n and its generated non-prime **B2** for two or more prime or non-prime numbers generated from Anna's formula (other than 5 giving 31) **or** **B1** for one prime or non-prime number generated from Anna's formula (other than 5 giving 31) **SC1** Stated value of n combined with negative statement but value of non-prime not stated.	<table><tr><td>n</td><td>p</td><td></td><td>n</td><td>p</td></tr><tr><td>1</td><td>7</td><td></td><td>11</td><td>67</td></tr><tr><td>2</td><td>13</td><td></td><td>12</td><td>73</td></tr><tr><td>3</td><td>19</td><td></td><td>13</td><td>79</td></tr><tr><td>**4**</td><td>**25**</td><td></td><td>**14**</td><td>**85**</td></tr><tr><td>6</td><td>37</td><td></td><td>**15**</td><td>**91**</td></tr><tr><td>7</td><td>43</td><td></td><td>16</td><td>97</td></tr><tr><td>**8**</td><td>**49**</td><td></td><td>17</td><td>103</td></tr><tr><td>**9**</td><td>**55**</td><td></td><td>18</td><td>109</td></tr><tr><td>10</td><td>61</td><td></td><td>19</td><td>115</td></tr><tr><td></td><td></td><td></td><td></td><td></td></tr><tr><td colspan="2">**non-prime**</td><td></td><td></td><td></td></tr></table>
	(g)	(i)	9 369 319	1		
		(ii)	115 119 486 943	1		
8	(a)	(i)	$7(m) - 2x$ oe	1	Accept $5(m) - 2x$, oe	Condone either dimension
		(ii)	$24(m) - 8x$	2	**M1** for $2(5 - 2x) + 2(their$ (i)) or $2(7 - 2x) + 2(their$ (i)) if reversed or $2(7 + 5) - 8x$	Accept equivalent expressions **SC1** for $8x - 24$
	(b)		6 m by 4 m nfww	3	**M2 FT** for $x = ½$ or 0.5 oe **or** **M1 FT** for $8x = 24 - 20$ or $-8x = 20 - 24$	**FT** *their* expression in a(ii)