GCSE

Methods in Mathematics (Pilot)

General Certificate of Secondary Education

Unit **B392/01:** Foundation Tier

Mark Scheme for January 2013

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	Workless mark awarded 1
B2	Workless 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 and applies as a default.
    -   **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. In questions with no final answer line, make no deductions for wrong work after an acceptable answer (ie **isw**) unless the mark scheme says otherwise, indicated for example by the instruction 'mark final answer'.

7. In questions with a final answer line following working space,

   (i) if the correct answer is seen in the body of working and the answer given on the answer line is a clear transcription error allow full marks unless the mark scheme says 'mark final answer'. Place the annotation ✓ next to the correct answer.

   (ii) if the correct answer is seen in the body of working but the answer line is blank, allow full marks. Place the annotation ✓ next to the correct answer.

   (iii) if the correct answer is seen in the body of working but a completely different answer is seen on the answer line, then accuracy marks for the answer are lost. Method marks could still be awarded. Use the M0, M1, M2 annotations as appropriate and place the annotation ✗ next to the wrong 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. 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			[£]6.60	4	**B3** for [melons] £2.50
					           [bananas] £1.80
					           [oranges] £1.50
					           [apples] £0.80
					or cost of 4 fruits 'listed' or 6.6
					or
					B2 for 3 correct costs or cost of 3 fruit listed
					or
					B1 for 1 or 2 correct costs or cost of 2 fruits listed
						1.25 1.25 1.20 0.60 0.75 0.75 0.80

2			15, 19 18, 15 27, 81	6	**B2** for 15, 19 **or** **M1** for 15 or 19 or evidence 'add 4' **and** **B2** for 18, 15 **or** **M1** for 18 or 15 or evidence 'subtract 3' **and** **B2** for 27, 81 **or** **M1** for 27 or 81 or evidence of 'multiply by 3'	
3	(a)		B and C	2	**M1** for evidence of area found for two shapes (A 5, B 8, C 8, D 9)	
	(b)		A	2	**M1** for evidence of perimeter found for two shapes (A 12.4, B 11.7, C 12, D12)	

Question			Answer	Marks	Part Marks and Guidance	
4	**(a)**		5	2	**M1** for $20 \div 3.49$ or $5.7(3...)$ or evidence of 5×3.49 or 6×3.49	

Question			Answer	Marks	Answer
	(b)*		22 [plants] supported by correct calculations (minimum 3×2.40 [= 7.20 and 7.20] + 1.80 = 9.00)	4	**3** for 22 plants but insufficient evidence of calculations or for 20 plants from $2 \times 2.40 + 2 \times 1.80$ **2** for correct cost of plants with number of plants stated from a multiple of 4 plant trays <u>and</u> a multiple of 6 plant trays. (Multiple for either 4 plant trays or multiple 6 plant trays can be 1) or for 20 and 18 plants obtained from considering both 4 and 6 plant trays or for identifying three 6 plant tray and one 4 plant tray but error in calculation **1** for correct cost of plants from a multiple of 4 plant trays <u>and</u> cost of plants for a multiple of 6 plant trays or for correct cost of plants with number of plants stated from either a multiple of 4 plant trays <u>or</u> a multiple of 6 plant trays

Question			Answer	Marks	Part Marks and Guidance	
5	(a)	(i)	3.375	1		
		(ii)	2.4	1		
	(b)		19.11	2	**M1** for 19.1(07) or 160.5 ÷ 8.4 or *their* calculation rounded to 2 decimal places or 90.73	
6	(a)		4	1		
	(b)		13 [°C]	2	**M1** for 6 or 25 [°C]	
7	(a)		9 16 16 20	2	**M1** for 2 entries correct	
	(b)		Shaded tiles 100 Unshaded 44	4	**B2** for 100 **or** **M1** for evidence of square numbers or +3, +5, +7 used **and** **B2** for 44 **or** **M1** for evidence of 'add 4' used or '*their* 20' + 24	
8	(a)		[£]128	2	**M1** for 10% of £64 or 0.2 × 640	
	(b)		50%	2	**M1** for 15/30 **oe**	

Question			Answer	Marks	Part Marks and Guidance	
9	(a)		Tessellation of at least 8 regular hexagons	2	**M1** for tessellation attempted	For **M1** minimum of 4 hexagons with no extra shapes but not straight line or minimum of 6 hexagons with other shapes
	(b)		Explanation eg 3 hexagons meet at a point so each angle is 360° ÷ 3 [= 120]	2	**M1** for incomplete explanation eg 3 hexagons meet at a point or 360° ÷ 3 or angles at a point equal 360	
10	(a)		yes yes no no no	2	**M1** for 4 correct **SC1** for n n n y y	
	(b)		3.25 **oe**	2	**M1** for $8x = 26$ or **FT** *their* $8x = k$ *(k* not 0)	Allow embedded answers Allow eg 26/8
	(c)		$[x] = \dfrac{y-2}{5}$	2	**M1** for $\dfrac{y-2}{5}$ or $y - 2 \div 5$ or $\dfrac{y}{5} - 2$ or for $5x = y - 2$ or for reverse flowchart	
11	(a)		$a = 35$ $b = 105$ $c = 40$ $d = 35$	4	1 mark for each angle	
	(b)		12	2	**M1** for $360 \div 30$	

Question			Answer	Marks	Part Marks and Guidance	
12			(4.5, 5)	5	**B4** Centre marked at (4.5, 5) **OR** **M2** for A, B and C plotted **or** **M1** for 2 points plotted correctly **and** **M1** for D marked at (7,4) FT their A, B and C to give parallelogram **and** **M1** for correct centre marked FT their parallelogram **OR** **M3** for an attempt to find midpoint of AC or BD If reverse coordinates plotted then (5, 4.5) scores **SC3** or centre marked at (5, 4.5) scores **SC2** and D marked at (4,7) [or (10,9)] scores **SC1**	If D is shown at (9,10) then answer (5, 6.5) scores If D is shown at (9, 10) and centre marked at (5, 6.5) **B4** scored Allow **M1** for D marked at (9,10) If D is **not** shown at (9,10) but answer (5, 6.5) given allow **SC3**

Question			Answer	Marks	Answer
13*			True with a correct example including solution **and** False with a correct example including solution	4	**3** for true and false with appropriate examples but no solutions or error in solutions **2** for **either** true with example including solution **or** for false with example including solution or for false and true with two correct examples **1** for **either** true with example but no solution/error in solution or for false with example but no solution/error in solution or for false and false (or true and true) with 2 correct examples or for true and false but without adequate justification

Question			Answer	Marks	Part Marks and Guidance	
14			66	3	**M2** for one error in calculation eg one incorrect 'block' from 45 + 12 + 9 **or** **M1** for one correct 'block' eg 45 (3 × 3 × 5) or 12 (4 × 3) or 9 (3 × 3) or 24 (8 × 3 × base) or 120 (5 × 3 × 8)	eg (22 miscounted as 21 or 23) × 3 eg *their* 22 × 3 Not from counting faces or surface area.
15	(a)		75% 0.75 0.18, $\frac{9}{50}$ 33[⅓], $\frac{1}{3}$	4	**B3** for 4 or 5 correct **or** **B2** for 3 correct **or** **B1** for 1 or 2 correct	Condone missing % sign in percentage column Allow 33[.333...%]
	(b)		$\frac{2}{5}$ **oe**	1	Fraction only	
16			36	**3**	**M2** for 120 ÷ (200/60) or 120 × (60/200) or 20 calories in 6 mins **oe seen** then 6 × 6 **or** **M1** for 200/60 or 60/200 or 120/200 or 20 calories in 6 mins **oe seen**	Allow 120 ÷ 3.3….. **soi** for **M2** 200/60 may be implied by 3.3…. Number of calories given must be a factor of 120

Question			Answer	Marks	Part Marks and Guidance	
17	(a)		$\dfrac{1}{9}$	2	**M1** for equivalent fraction	
	(b)		Two fractions, each less than one, which multiply to give $\dfrac{4}{11}$	2	**M1** for evidence of multiplying two fractions, each <1, not those in **(a)** **SC1** Two fractions which multiply to give $\dfrac{4}{11}$ but where one is ≥1	**NOT** $\dfrac{4}{11}\times 1$ or $\dfrac{4}{1}\times\dfrac{1}{11}$
18	(a)		$\sqrt{10^2-9^2}$ 4.358[898…] **seen** or 4.36 from √19	**M2** **A1**	Allow √19 **nfww** **M1** for a Pythagoras statement **soi** or alternative method **M2** for $\sqrt{4.36^2+9^2}$ = 10 or better **or** **M1** for 4.36^2 + 9^2	$\sqrt{(10^2+9^2)}$ or 10^2-9^2 Condone unrounded final answer
	(b)		Correct pair of sides with evidence that the product is greater than 9 × 4.36 = 39.24	4	**M1** for use of Pythagoras to find another pair of sides (<10) with diagonal 10 **soi** **A1** for 99 < sum of squares < 101 **M1** for 9 × *their* 4.36 **soi** (by 39.23 to 39.24) **A1** for *their* evaluated area compared to *their* 39.24	Correct pair of sides is implied by 99 < sum of squares < 101 eg 6 and 8 **www** implies **M1 A1** **M1** may be seen in part **(a)** Two areas seen can be taken as evidence of comparison.

Question			Answer	Marks	Part Marks and Guidance	
19	**(a)**		(C =) 50 + 20n **oe**	**2**	**B1** for equation of line with gradient 20 or y-intercept 50	20n ± a or bn ± 50 (Condone a or b = 0 or eg n20) NOT 50n + 20n
	(b)		Correct, straight line drawn, through origin and to at least x = 3	**2**	**B1** for correct shorter line or at least two correct points plotted but not joined or for coordinates of two correct points seen (possibly in table) or for straight line through origin with positive gradient.	
	(c)	**(i)**	(5, 150)	**1**	**FT** co-ordinates of *their* intersection	± 1 small square horizontally and vertically
		(ii)	[For five hours] they charge the same amount **oe**	**1**	**FT** *their* **(i)** for time	Allow eg solution of C = 30n and C = 50 + 20n

APPENDIX 1

Exemplar responses for **Q19(c)(ii)**

Response	Mark
The amount charged for the same time is the same	1
The point where Mr F and HD rates are the same	0
The point where Mr F and HD prices are the same	1
The point where Mr F and HD rates/costs are the same	1 bod
It represents how long it takes for costs to be equal	1 bod
The difference in cost	0
The point where Mr F equals HDs price	1
The point where Mr F becomes more expensive than HD	1 bod
The cost is equal minimum allowed	1
The point at which both prices are equal	1
The point where Mr F price and hour and HD meet	0
The point at which "hiring" either Mr F or HD would be the same	1
When the two repair men cost the same	1
The point where Mr F starts to become more expensive than HD	1
How much they both cost for 5 hours	1
Where the pay and hours are the same	0

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