Mark Scheme (Results)

June 2011

Methods in Mathematics (GCSE)
Unit 1: Methods 5MM1F_01

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NOTES ON MARKING PRINCIPLES

1 All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.

2 Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.

3 All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.

4 Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.

5 Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

6 Mark schemes will indicate within the table where, and which strands of QWC, are being assessed. The strands are as follows:

i) *ensure that text is legible and that spelling, punctuation and grammar are accurate so that meaning is clear*
  Comprehension and meaning is clear by using correct notation and labeling conventions.

ii*) select and use a form and style of writing appropriate to purpose and to complex subject matter*
  Reasoning, explanation or argument is correct and appropriately structured to convey mathematical reasoning.

iii) *organise information clearly and coherently, using specialist vocabulary when appropriate*.
  The mathematical methods and processes used are coherently and clearly organised and the appropriate mathematical vocabulary used.

7   With working

If there is a wrong answer indicated on the answer line always check the working in the body of the script (and on any diagrams), and award any marks appropriate from the mark scheme.

If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.

If it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks. Send the response to review, and discuss each of these situations with your Team Leader.

If there is no answer on the answer line then check the working for an obvious answer.

Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks. Discuss each of these situations with your Team Leader.

If there is a choice of methods shown, then no marks should be awarded, unless the answer on the answer line makes clear the method that has been used.

8   Follow through marks

Follow through marks which involve a single stage calculation can be awarded without working since you can check the answer yourself, but if ambiguous do not award.

Follow through marks which involve more than one stage of calculation can only be awarded on sight of the relevant working, even if it appears obvious that there is only one way you could get the answer given.

9   Ignoring subsequent work

It is appropriate to ignore subsequent work when the additional work does not change the answer in a way that is inappropriate for the question: e.g. incorrect canceling of a fraction that would otherwise be correct

It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect e.g. algebra.

Transcription errors occur when candidates present a correct answer in working, and write it incorrectly on the answer line; mark the correct answer.

10   Probability

Probability answers must be given a fractions, percentages or decimals. If a candidate gives a decimal equivalent to a probability, this should be written to at least 2 decimal places (unless tenths).

Incorrect notation should lose the accuracy marks, but be awarded any implied method marks.

If a probability answer is given on the answer line using both incorrect and correct notation, award the marks.

If a probability fraction is given then cancelled incorrectly, ignore the incorrectly cancelled answer.

11   Linear equations
Full marks can be gained if the solution alone is given on the answer line, or otherwise unambiguously indicated in working (without contradiction elsewhere). Where the correct solution only is shown substituted, but not identified as the solution, the accuracy mark is lost but any method marks can be awarded.

12   Parts of questions
Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

13   Range of answers
Unless otherwise stated, when an answer is given as a range (e.g 3.5 – 4.2) then this is inclusive of the end points (e.g 3.5, 4.2) and includes all numbers within the range (e.g 4, 4.1)

Guidance on the use of codes within this mark scheme
M1 – method mark A1 – accuracy mark B1 – Working mark C1 – communication mark QWC – quality of written communication oe – or equivalent cao – correct answer only ft – follow through sc – special case dep – dependent (on a previous mark or conclusion) indep – independent isw – ignore subsequent working

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Question		**Working**	**Answer**	**Mark**	**Notes**
1	(a)		15 204	1	B1 cao
	(b)		Three thousand and seventy six	1	B1 ignore spellings
	(c)		3000	1	B1 accept mixture of digits and words for correct answer
	(d)		45 300	1	B1 cao
	(e)		7200	1	B1 cao
2	(a)		Isosceles triangle drawn	2	B1 for drawing a triangle with 2 equal sides B1 for isosceles (ignore spelling) ft from their triangle
	(b)		trapezium drawn	2	B1 for drawing an trapezium B1 for trapezium (ignore spelling) ft from their quadrilateral
3	(a)		x marked at ½	1	B1 for x marked between ⅜ and ⅝
	(b)		x marked at 0	1	B1 for x marked near 0
	(c)		x marked at 0.6	1	B1 for x marked between ½ and ¾
4		e.g. 2, 3, 5, 29 2, 3, 5, 23 2, 3, 13, 17	Sum of 4 primes	3	M1 for finding at least 2 prime numbers M1 for 4 numbers with a total between 30 and 40 with at least 2 primes A1 for a fully correct solution

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Question		**Working**	**Answer**	**Mark**	**Notes**
5	(a)(i)		(1, 2)	2	B1 cao
	(ii)		(-4,- 2)		B1 cao
	(b)(i)		D marked on grid	2	B1 D correctly marked on grid
	(ii)		(–4, 2)		B1 for (–4, 2) ft from their D marked
6	(a)		3, 6, 9, 12, 15	2	M1 for writing down at least one number from set *A* with no incorrect responses. A1 cao
	(b)		6, 12	1	B1 cao
7	(a)		Obtuse	1	B1 for obtuse (ignore spelling)
	(b)(i)	360 – (140 + 90)	130	3	M1 for 360 – (140 + 90) or 360 – 230 A1 cao
	(ii)		Angles at a point = 360º		B1 for **angles** at a **point** add to **360º**

Question		Working	Answer	Mark	Notes
8	(a)			1	B1 cao
	(b)	4　　　13 10　　31 25　　76	13 31 25	3	B3 all three entries correct or ft "13" with 31 and 25 [B1 one correct entry, ft "13"]
	(c)		$3n + 1$	2	M1 for $3n + a$ where a is an integer $\neq 1$ or n=3n+1 A1 for $3n + 1$
9	(a)		36	1	B1 cao
	(b)		10	1	B1 cao
	(c)	5, 20, 25 and 100 are all multiples	5, 10, 25 or 100	1	B1 for any one from 5, 10, 25 or 100
	(d)	3 and 12　are both factors	3 or 12	1	B1 for any one from 3 or 12
10	(a)		A and D	2	B2 for both correct (B1 for one correct)
	(b)		B and C	2	B2 for both correct (B1 for one correct)

Question		Working	Answer	Mark	Notes
11	(i)		$\frac{1}{4}$	1	B1 accept $\frac{5}{20}$
	(ii)	20 – (5 + 4) = 11	$\frac{11}{20}$, 0.55, 55%	2	M1 for 20 – (5 + 4) or 11 seen or for $\frac{n}{20}$ where $n < 12$ A1 for $\frac{11}{20}$ oe (eg. 55%, 0.55, $\frac{55}{100}$)
	(iii)	20 – 4 = 16 OR $\frac{5}{20} + \frac{11}{20}$	$\frac{4}{5}$, 0.8, 80%	2	M1 for $\frac{20-4}{20}$ or $1 - \frac{4}{20}$ or $\frac{5}{20} + \frac{'11'}{20}$ A1 for $\frac{16}{20}$ oe [SC: B1 for 16 to 20 or 16:20 or 16 out of 20 oe if M0 scored] ft from (i) and (ii) '$\frac{5}{20}$'+'$\frac{11}{20}$'
12	(a)		$3x$	1	B1 cao
	(b)		$5y$	1	B1 cao
	(c)		$4p – 2r$	2	M1 for $4p$ or $–2r$ A1 cao
13			Correct lines drawn	4	B4 for all 5 correct B3 for 3 or 4 correct B2 for 2 correct B1 for 1 correct

Question		Working	Answer	Mark	Notes
14	(a)	374 53 × 1122 18700 19822 	19 822	3	M1 for complete method for multiplying 374 by 3 and 50 condone one error in multiplication M1 (dep) for addition, condone one addition error A1 cao

Grid:

×	300	70	4
50	15000	3500	200
3	900	210	12

15 000 + 3500 + 200 + 900 + 210 + 12 = 19 822

Lattice:

	3	7	4	
1	1 / 5	3 / 5	2 / 0	5
9	/ 9	2 / 1	1 / 2	3
	8	2	2	

Alternative M1 for complete method for multiplying 300, 70 and 4 by 3 and 50 condone one error in multiplication
M1 (dep) for addition, condone one addition error
A1 cao

Alternative M1 for complete method for multiplying 3, 7 and 4 by 3 and 5 condone one error in multiplication
M1 (dep) for addition, condone one addition error
A1 cao

Question		Working	Answer	Mark	Notes
14	(b)	213 46)9798 92 59 46 138 138 0 2 1 3 46)97 ^{5}9 ^{13}8 9798 4600 – 100 5198 4600 – 100 598 460 – 10 138 46 – 1 92 46 – 1 46 46 – 1 0 200 + 10 + 3	213	3	M1 for method that establishes 97 ÷ 46 = 2 M1 for a complete method that deals with remainders, condone one arithmetic error A1 cao Alternative M1 for method that establishes the subtraction of a multiple of 46 or addition of multiples of 46 M1 for a complete method that could lead to the correct answer, condone one arithmetic error A1 cao

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Question		**Working**	**Answer**	**Mark**	**Notes**
15	(a)		17	1	B1 cao
	(b)		13	1	B1 cao
	(c)		457.5	1	B1 cao
	(d)		18	1	B1 cao
	(e)		20	1	B1 cao
16	(a)		59, 63, 72, 88, 90, 97	1	B1 cao
	(b)		0.019, 0.025, 0.52, 0.91, 5.2	1	B1cao
	(c)		−5, −2, − 0.5, 0, 2, 3	1	B1 cao
*17		Shading 10 squares out of 15 Shading 9 squares out of 15 2/3 = 2 ÷ 3 = 0.666… 3/5 = 3 ÷ 5 = 0.6 $\frac{2}{3} = \frac{10}{15}$ $\frac{2}{3} = \frac{9}{15}$	$\frac{2}{3}$	3	M1 for shading 10 squares for 2/3 M1 for shading 9 squares for 3/5 C1 for correct conclusion from their working **or** M1 for writing 2/3 as 0.666… M1 for writing 3/5 as 0.6 C1 for correct conclusion from their working **or** M1 for attempt to write 2/3 or 3/5 with a common denominator A1 for writing 2/3 and 3/5 correctly with common denominator C1 for correct conclusion from their working
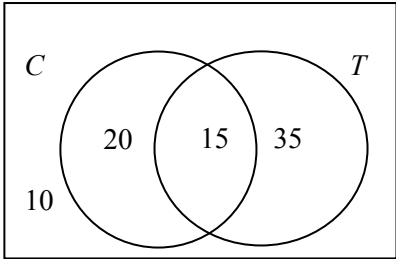
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Question		**Working**	**Answer**	**Mark**	**Notes**
18	(a)		Triangle with vertices: (-3, -1), (-1, -1) and (-1, -4)	2	M1 for a reflection in a horizontal or vertical line A1 for correct reflection
	(a)		Triangle with vertices: (3, 1), (3, -2) and (1, -2)	2	M1 for any translation A1 for correct translation
	(b)		Triangle with vertices: (1, 3), (3, 3) and (1, 0)	2	B2 cao for a correct rotation [B1 for a rotation of of 180º about any point OR for a correct rotation of 90º clockwise or anticlockwise about the point (0, 2)]
19	(i)	$\times$ 1 2 3 4 5 6 2 | 2 4 6 8 10 12 4 | 4 8 12 16 20 24 6 | 6 12 18 24 30 36 8 | 8 16 24 32 40 48 OR $\frac{1}{4} \times \frac{1}{6}$	$\dfrac{1}{24}$	5	M1 for identifying 2 and 1 or 2×1 (= 2) M1 for 24 seen OR an attempt to get the 24 outcomes or an attempt at a sample space or a list of possibilities or a list of ordered pairs [at least 12 correct; outcomes , possibilities, ordered pairs must be shown (ignore incorrect extras)] A1 for 1/24 oe OR M2 for $\frac{1}{4} \times \frac{1}{6}$ (M1 for $\frac{1}{4}$ or $\frac{1}{6}$ seen) A1 for 1/24 oe

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Question		**Working**	**Answer**	**Mark**	**Notes**
19	(ii)		$\dfrac{4}{24} = \dfrac{1}{6}$		M1 ft from their ordered list from part (i) for identifying at least one possible score from; 8×4 (=32), 6×6 (=36), 8×5 (=40) or 8×6 (=48), condone the inclusion of pairs reversed; eg. 4×8, 6×8 and 5×8 [accept the inclusion of 6×5 (=30) as a misread] [accept an answer of $\dfrac{5}{24}$, for M1, ONLY if the 5 outcomes are selected in either part (i) or part (ii)] A1 for 4/24 oe
20		180 – (70 + 70) 180 – 140	40º	4	M1 for identifying two correct equal 70º angles in either triangle M1 for 180 – (70 + 70) A1 for angle *C* = 40º or *F(x)* = 40º C1 for *x* = "40º" 'because the ***triangles*** are ***similar***' or 'one triangle is an ***enlargement*** of the other' ***and*** either 'base ***angles*** of an ***isosceles*** triangle are ***equal***' or 'sum of the ***angles*** in a ***triangle*** is ***180º***' oe

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Question	**Working**	**Answer**	**Mark**	**Notes**
21	$y = 2x - 3$ 	-1	0	1	2	3	4	5	 	-5	-3	-1	1	3	5	7		Correct line from (−1, −5) to (4, 5)	3	**(Table of values)** M1 for at least 2 correct attempts to find points by substituting values of x M1 for plotting at least 2 of their points (if more than two points are plotted, condone one plotting error) A1 for the correct line from (−1, −5) to (4, 5) OR **(No table of values)** M2 for at least 2 correct points (and no incorrect points) correctly plotted or M2 for a line segment of the graph of $y = 2x - 3$ drawn (ignore any additional incorrect line segments) [M1 for at least 3 correct points plotted with no more than 2 incorrect points] A1 for the correct line from (−1, −5) to (4, 5) OR **(Use of $y = mx + c$)** M2 for a single straight line of gradient 2, passing through the point (0, −3) (M1 for a single straight line of gradient 2 or for a single straight line passing through the point (0, −3)) A1 for the correct line from (−1, −5) to (4, 5)

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Question	**Working**	**Answer**	**Mark**	**Notes**
22	$(2x – 3 + 2x + 3) \div 2 \times 4 = 18$ $8x = 18$ $x = 2.25$ $P = 2x – 3 + 2x + 3 + 5 + 5$ $P = 4x + 10$ $P = 9 + 10$ OR $2 \times 2.25 – 3 = 1.5$ $2 \times 2.25 + 3 = 7.5$ $5 + 5 + 1.5 + 7.5$	19 cm	6	M1 for $(2x – 3 + 2x + 3) \div 2 \times 4$ oe M1 for equating "$(2x – 3 + 2x + 3) \div 2 \times 4$" = 18 A1 cao $x = 2.25$ oe (eg. $\frac{18}{8}$) M1 (indep) $2x – 3 + 2x + 3 + 5 + 5$ (= 4x + 10) oe M1 (dep) for substituting "x" into an expression for the perimeter A1 cao OR M1 for $2 \times$ '2.25' $– 3$ (= 1.5) or $2 \times$ '2.2'5 + 3 (= 7.5) M1 for $5 + 5 +$ '1.5' + '7.5' [Note: the '2.25' must be the solution of an algebraic equation for their attempt at the area of the trapezium] A1 cao

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Question	**Working**	**Answer**	**Mark**	**Notes**
23 (a)			4	B1 for 15 shown in the intersection of two sets M1 for an attempt to show 35 – 15 or 50 – 15 in the correct place on the Venn Diagram. M1 for 80 – ["20" + 15 + "35"] (= 10), this may be implied from their numbers in the diagram A1 for a fully correct and labelled diagram [condone omission of the surrounding box]
(b)		$\dfrac{1}{8}$	2	M1 for identifying "10" outside of C and T A1 ft for $\dfrac{'10'}{80}$ o.e.

Ofqual

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