

Mark Scheme (Results)

June 2011

Methods in Mathematics (GCSE)
Unit 2: Methods 5MM2F_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If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.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

5MM2F_01					
Question		Working	Answer	Mark	Notes
1	(a)		27.16	1	B1 cao
	(b)		60.84	1	B1 cao
	(c)		68	1	B1 cao
	(d)		16.9	1	B1 cao
	(e)		151.29	1	B1 cao
2			$\frac{1}{3}$	2	M1 $\frac{20}{60}$ oe or 0.333... or clear attempt to convert 20 out of 60 into a fraction or decimal A1 cao
3			One pair of parallel lines marked on diagram	1	B1 cao
4	(a)		0.07, 0.2, 0.27, 0.7, 0.72	1	B1 cao
	(b)		$\frac{1}{3}, \frac{1}{2}, \frac{7}{12}, \frac{3}{4}, \frac{5}{6}$	2	M1 attempt to convert at least 3 fractions to decimals or to fractions with common denominator A1 cao SC : B1 for 4 fractions in the correct position SC : B1 for all fractions in reverse order
	(c)		30%, 0.4, $\frac{1}{2}, \frac{3}{5}, 0.65$	2	M1 for attempt to convert all to a common form (decimals or percentages or fractions) A1 for numbers in correct order SC : B1 for 4 numbers in the correct position SC : B1 for all numbers in reverse order

5MM2F_01				
Question	Working	Answer	Mark	Notes
5	$(180 - 34) \div 2 (= 73)$ $180 - "73"$	107	4	M1 for $(180 - 34) \div 2 (= 73)$ M1 for $73 + 34$ A1 for x identified as 107° C1 for the exterior angle of a triangle is equal to the sum of the interior opposite angles Alternative scheme M1 for $(180 - 34) \div 2 (= 73)$ M1 for $180 - "73"$ A1 for x identified as 107° C1 for Angles on a straight line add up to 180° and Angles in a triangle add up to 180°
6	(a)	11	1	B1 for 9 or -9
	(b)	33	1	B1 for 33 or -33
	(c) $36 - 159$	-123	2	M1 for $36 - 159$ A1 cao
	(d) $35 \times 9 \div 5 + 32$	95	3	M1 for 35×9 or 315 or $35 \div 5$ or 7 M1 for " 315 " $\div 5$ or " 7 " $\times 9$ A1 cao
	(e) $(68 - 32) \times 5 \div 9$	20	3	M1 for sight of one operation reversed or attempt to reverse their equation from (d) M1 for fully correct method possible ft from their equation in (d) A1 cao

5MM2F_01				
Question	Working	Answer	Mark	Notes
7	(a)		0.25	1 B1 cao
	(b)		$\frac{27}{100}$	1 B1 cao
	(c)		$\frac{7}{20}$	2 M1 for $\frac{35}{100}$ oe A1 cao
	(d)		4 squares shaded	2 M1 for 4 seen or $\frac{4}{10}$ or 0.4 A1 for any 4 squares shaded
	(e)		56	1 B1 cao
8	(a)		1 : 3	2 M1 for 4 : 12 A1 cao SC : B1 for 3 : 1
	(b)		$\frac{2}{5}$ oe	2 B2 for $\frac{2}{5}$ oe (B1 for $\frac{a}{5}$, $a < 5$ or $\frac{2}{b}$, $b > 2$)
9			142	2 M1 for $720 - (110 + 92 + 158 + 85 + 133)$ or $720 - 578$ A1 for 142 cao

5MM2F_01					
Question		Working	Answer	Mark	Notes
10	(a)		D	1	B1 cao
	(b)		Correct tessellation	2	B2 for 5 additional shapes tessellating correctly (B1 for 3 or 4 shapes tessellating correctly)
	*(c)		Correct reasoning	3	M1 for $360 \div 9 = 40$ or 7×180 A1 for 140 C1 for reason eg. 140 is not a factor of 360
11	(a)	$1204 \div 7 \times 3$	516	2	M1 for $1204 \div 7 \times 3$ oe A1 cao
	(b)	$2.58 \div 3 \times 5$	£4.30	2	M1 for $2.58 \div 3 \times 5$ or $258 \div 3 \times 5$ oe or $2.58 \div 3 (=0.86)$ or $258 \div 3 (=86)$ A1 for 4.30 or 4.3
12	(a)(i)		9.424777...	2	B1 for 9.42477(7961...) or 9.426
	(ii)		9.4		B1 ft
	(b)		290.25	2	M1 for 210.25 or $\frac{841}{4}$ or 80 or $\frac{1161}{4}$ A1 cao
13	(a)		12	1	B1 cao
	(b)		84	2	M1 for $29 - 17$ or 12 or correct flow chart reversed or $\frac{x}{7} + 17 = 29$ A1 cao

5MM2F_01					
Question		Working	Answer	Mark	Notes
14	(a)		8	1	B1 cao
	(b)	$3 \times 7 + 5$	26	2	M1 for $3 \times 7 + 5$ A1 cao
	(c)	$3 \times (-6)^2 - 8$	100	2	M1 for $3 \times (-6)^2 - 8$ or $(-6)^2 = 36$ or 108 A1 cao
15		$d - 2f = 3g$ $(d - 2f) \div 3 = g$	$\frac{d - 2f}{3}$	2	M1 for attempting to subtract $2f$ from both sides or dividing all terms by 3 or $g = ad - 2f$, $a \neq 0$ or $g = \frac{1}{3}d + af$, $a \neq 0$ A1 cao
16		$15 \times 6 \times 7$	630 cm^3	3	M1 for $15 \times 6 \times 7$ A1 cao B1 for cm^3

5MM2F_01				
Question	Working	Answer	Mark	Notes
17	$\frac{2}{5} = 40\%$ $40\% + 15\% = 55\%$ 27 is 45% or $\frac{9}{20}$ $27 \div 9 \times 8$	24	5	M1 for 40% or $2 \div 5 \times 100$ oe M1 for “40%” + 15% (=55%) M1 for equating 100% – “55%” with 27 yellow counters M1 for $27 \div “45” \times 40$ oe A1 cao or M1 for $\frac{15}{100}$ oe M1 for correct attempt to find common denominator to add $\frac{15}{100}$ and $\frac{2}{5}$ (= $\frac{55}{100}$) M1 for equating 1 – “ $\frac{55}{100}$ ” with 27 yellow counters M1 for $27 \div “45” \times 100$ oe A1 cao or M1 for 0.15 or 0.4 M1 (dep) for ‘0.15 + ‘0.4’ (=0.55) M1 for equating 1 – ‘0.55’ with 27 yellow counters M1 for $27 \div 0.45$ A1 cao

5MM2F_01				
Question	Working	Answer	Mark	Notes
*18	$BDC = 180 - 117 (=63)$ $CBD = 180 - 63 - 31$ OR $CBD = 117 - 31$	86	5	M1 for $180 - 117 (=63)$ M1 for $180 - '63' - 31 (=86)$ A1 for $x = 86^\circ$ [Note: For the award of A, it is NOT enough just to say, or show, that angle $CBD = 86^\circ$] C2 for all 3 reasons angles in a triangle add up to 180° angles on a straight line add up to 180° corresponding angles on parallel lines are equal (C1 for 1 or 2 reasons) OR M2 for $117 - 31$ A1 for $x = 86^\circ$ [Note: For the award of A, it is NOT enough just to say, or show, that angle $CBD = 86^\circ$] C2 for both reasons External (exterior)angle of a triangle equals sum of two interior opposite angles corresponding angles on parallel lines are equal (C1 for 1 reason)
19	$13 \times 18 + 12 \times 18 + 5 \times 18 + \frac{1}{2} \times 5 \times 12 \times 2$	600	3	M1 for $13 \times 18 (=234)$ or $12 \times 18 (=216)$ or $5 \times 18 (=90)$ or $\frac{1}{2} \times 5 \times 12 (=30)$ M1 for attempt to add 4 or 5 areas, 3 of which must be correct A1 cao

5MM2F_01				
Question	Working	Answer	Mark	Notes
20	$4.7 \times 2 (= 9.4)$ $\pi \times 9.4$	29.5	3	M1 for $4.7 \times 2 (= 9.4)$ M1 for $\pi \times "9.4"$ A1 for 29.5 – 29.55
21	(a) $\frac{15}{100} \times 600$ or 0.15×600	90	2	M1 for $\frac{15}{100} \times 600$ or 0.15×600 oe A1 cao
	(b) $\frac{88}{100} \times 150$ or 0.88×150 OR $150 - \frac{12}{100} \times 150$ or $150 - 0.12 \times 150$	132	2	M1 for $\frac{88}{100} \times 150$ or 0.88×150 or $150 - \frac{12}{100} \times 150$ or $150 - 0.12 \times 150$ oe A1 cao
22	(a)	-1, 0, 1, 2, 3	2	B2 for all 5 values and no others (B1 for 4 correct values and no others or all 5 correct values and one additional incorrect value)
	(b)	$-1 \leq p < 4$	2	B2 for $-1 \leq p < 4$ or just ≥ -1 and < 4 [B1 for $-1 \leq p$ or $p < 4$ or $p \geq -1$ oe or ≥ -1 or < 4 or $-1 < p \leq 4$] [Note: accept the use of any letter other than p throughout and ignore any attempt to list integer values]

5MM2F_01				
Question	Working	Answer	Mark	Notes
23	$2x + 2(x + 9) < 200$ $2x + 2x + 18 < 200$ $4x + 18 < 200$ $4x < 182$ $x < 45.5$ OR $200 \div 4 = 50$ $9 + 9 \div 4 = 4.5$ $50 - 4.5 = 45.5$ OR $200 - 18 = 182$ $182 \div 4 = 45.5$	45	4	B1 for $x + 9$ oe seen (it could just be on a diagram) or any rectangle with length 9 cm greater than width M1 for $2x + 2(x + 9)$ oe A1 for 45.5 B1 for answer of 45 OR M1 for $200 \div 4 (=50)$ M1 for $(9 + 9) \div 4 (=4.5)$ A1 for 45.5 B1 f answer of 45 OR M1 for $200 - 18 (= 182)$ or 91, 91, 9, 9 seen M1 for $182 \div 4$ A1 for 45.5 B1 for answer of 45 SC : B3 for an answer of 45.5
24	$\pi \times (10.4 \div 2)^2 - 0.5 \times 9.6 \times 4$	65.7	5	M1 for $10.4 \div 2 (=5.2)$ M1 for $\pi \times 5.2^2 (=84.948\dots)$ M1 for $0.5 \times 9.6 \times 4 (=19.2)$ M1(dep on at least one previous M1) for '84.948...' – '19.2' [ie their area of the circle – their area of the triangle] A1 for an answer in the range 65.7 – 65.8

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