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Mark Scheme (Results)
June 2012

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If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.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

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5MM2F_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
1	(a)		45.4	1	B1 45.4 cao
	(b)		25.8	1	B1 25.8 cao
	(c)	150 - 136	±14	2	M1 150 – 136 or 14+136 or counting on or counting back A1
2	(i)		40.96	4	B1 cao
	(ii)		11		B1 cao
	(iii)		101		B1 cao
	(iv)		3.36		B1 cao
3	(a)		Marked	1	B1 for parallel lines marked
	(b)		Marked	1	B1 for equal angles marked
4	(i)		89	4	B1cao
	(ii)		111		B1 cao
	(iii)		3		B1 cao
	(iv)		14		B1 cao
5	(a)		Correct drawing	1	B1 any st line that cuts opposite sides or any diagonal or the vertical line that passes through the intersection point of the two diagonals
	(b)		*b*	1	B1 cao

5MM2F_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
6		30 + 6 = 36, 36 ÷4	9	2	M1 +6 or ÷4 or correct understanding of reverse process by means of number machines or one trial with total seen A1 9 cao
7	(a)		$\frac{27}{100}$	1	B1 $\frac{27}{100}$ oe
	(b)		$\frac{21}{50}$	1	B1 $\frac{21}{50}$ cao
	(c)		0.73	1	B1 0.73, .73, 0.730 oe
	(d)		0.7	1	B1 0.7, .7, 0.70 oe
	(e)		$\frac{453}{1000}$	1	B1cao
	(f)		6 squares	1	B1 for 6 full squares shaded oe
	(g)		0.2 or $\frac{1}{5}$	1	B1 0.2, $\frac{1}{5}$ oe
8			Correct line	2	B1 line drawn parallel to *AB* B1 line the same length as *AB*

5MM2F_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
9	(a)	10 ×7 = 70; 70÷2	35	2	M1 10 ×7 ÷ 2 oe A1 35 cao
	(b)	48 × 2 = 96; 96÷8	12	3	M1 48 × 2 or 96 or 48÷8 or 6 or 8÷2 M1 (dep) '96'÷8 or '6' × 2 or 48÷4 A1 12 cao
10	(a)		$\frac{1}{3}$ or 0.333(..) or $0.\dot{3}$	1	B1
	(b)	75% 70% 73% 7% Alternative method 0.75 0.7 0.73 0.07	7%. 70%, 0.73, $\frac{3}{4}$ oe	2	M1 Correct method to convert one of these values into an equivalent form eg $\frac{3}{4}$ is 3÷4×100 or 3÷4(=0.75) A1 cao Sc B1 (If no method mark awarded) One incorrect and the other three then correct
	(c)	$300 \div 100 \times 17$ 10% is 30, 5% is 15, 1%is 3 30+15+3+3	51	2	M1 $300 \div 100 \times 17$ oe or complete method to find 17% A1 cao

5MM2F_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
11		$\frac{3}{5}\times 20 = 12$, $20 - 12$ Or $1-\frac{3}{5}=\frac{2}{5}$, $\frac{2}{5}\times 20 = 8$ OR Diagram used Red 3 parts, Green 2 parts $20 \div 5 = 4$ $2 \times 4 = 8$	8	3	M1 $\frac{3}{5}\times 20$ or 12 or 0.6x20 or 60÷100x20 oe M1 20 – '12' C1 Dep on M1 for a clear statement that green is 8(cm) OR M1 $1-\frac{3}{5}$ or $\frac{2}{5}$ or 1-0.6 or 0.4 or 100-60 or 40 M1 '$\frac{2}{5}$'× 20 oe or 0.4x20 or complete method for 40% of 20 C1 Dep on M1 for a clear statement that green is 8(cm) OR M1 5 equal sections shown on diagram M1 each section shown as 4 either in working or on diagram C1 Dep on M1 for a clear statement that green is 8(cm) OR M1 20 ÷ 5 M1 4 × 2 C1 Dep on M1 for a clear statement that green is 8(cm)

5MM2F_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
12	(a)		Pentagon	1	B1 cao
	(b)		Correct tessellation	2	B2 fully correct at least 7 shapes including the one given (B1 at least 4 shapes tessellating including the one given)
13	(a)		22, 7	2	B1 22 cao B1 7 cao
	(b)		0.25 or $\frac{1}{4}$	1	B1 0.25 or $\frac{1}{4}$ oe
14		Shaded 30 × 24 = 720 720 × 2 = 1440 Unshaded 30 ×15 = 450 450 × 2 = 900 24 × 15 = 360 360 × 2 = 720 1620 Or TSA = 30 ×24 × 2+ 30 × 15 × 2 + 24 × 15 × 2 = 3060 Shaded 30 ×24 × 2 = 1440	No + calculation	4	M1 correct method for area of any one face eg 30 ×24 M1 correct method for either total unshaded or total shaded A1 1440 and 1620 C1 correct conclusion dep on at least M1 Or M1 correct method for area of any one face eg 30 ×24 M1 correct method for either total unshaded or total shaded or total surface area A1 3060 and 1620 or 1440 C1 correct conclusion dep on at least M1

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Question		**Working**	**Answer**	**Mark**	**Notes**
15	(a)	A: x B: $x + 4$ $x + x + 4$	$T = 2x + 4$	3	B3 for $T = 2x + 4$ oe (B2 for $2x + 4$ oe or for $T = 2x + b$ where $b \neq 0$ **or** $T = ax + 4$ where a not equal to 0 (B1 for $x + 4$ or for T = any expression)
	(b)	$2 \times 13 + 4$ Or $13 + 17$	30	2	M1 ft from their formula in the form $ax + b$ when a and $b \neq 0$ A1 ft Or M1 13 + 13 + 4 A1
16		$1.98 \div 2 = 0.99$ 0.99×7	6.93	3	M1 $1.98 \div 2$ or 1.98×7 or 1.98×3 oe M1 '0.99' × 7 or '13.86' ÷ 2 or '1.98 x 3' +'0.99' A1 cao
17	(i)	16:24	2:3	3	M1 40 – 16 or 24 M1 16 : '(40-16)' oe A1 2:3 cao (SC B2 for 3:2)
	(ii)	$\frac{16}{40} = \frac{2}{5}$	$\frac{2}{5}$	1	B1 $\frac{2}{5}$ oe

5MM2F_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
18		$1640 \times \frac{30}{100} = 492$ 1640 ÷10 = 164 492+164 + 550 = 1206 1640 – 1206 = 434 Or $1640 \times \frac{40}{100}$ = 656, 656 + 550 = 1206 1640 – 1206 = 434	Yes	5	M1 for attempting to find the area of one section (blue or yellow) M1 for attempting to find the area of the second section (yellow or blue) or award M2 for attempt to find the combined area of blue and yellow) M1 for attempting to find the total area of three sections **or** four sections using white as 400 **or** subtracting the 3 sections from 1640 A1 1206 or 434 or1606 C1 dep on at least M1 for correct conclusion based upon their calculations relating their white area to 400 or "1206" to 1240 or "1606" to 1640
19	(a)	3 × 5.2 + 4 × 4.8 15.6 +19.2	34.8	2	M1 3 × 5.2 (= 15.6) or 4 × 4.8 (=19.2) or '3 × 5.2 + 4 × 4.8' A1 34.8 cao
	(b)	$3p = 21.6$, 32 – 21.6 = 10.4 Or $q = \frac{y - 3p}{4} = \frac{32 - 3 \times 7.2}{4}$	2.6	2	M1 32 – 21.6 or 10.4 in working A1 cao Or M1 $4q=y-3p$ or better A1 cao

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Question		**Working**	**Answer**	**Mark**	**Notes**
20		180 – 136 = 44 360 – 44 – 120 – 110 =	86°	5	M1 180 – 136 = 44 M1 360 – 120 –'44'– 110 A1 cao C1 sum of angles on a st line is 180° , no contradictions C1 sum of angles in a quadrilateral is 360°, no contradictions
21		$\frac{1}{2}\left(\frac{1}{2}+\frac{1}{4}\right)=\frac{1}{2}\times\frac{2+1}{4}=\frac{3}{8}$ Or $\frac{1}{2}-\frac{1}{4}=\frac{2-1}{4}=\frac{1}{4}$ $\frac{1}{4}+\frac{1}{4}\div 2=\frac{1}{4}+\frac{1}{8}=\frac{3}{8}$	0.375 or $\frac{3}{8}$ oe	3	M1 $\frac{1}{2}+\frac{1}{4}$ oe or 0.5 + 0.25 or 50 + 25 M1 $\frac{1}{2}$ '$(\frac{1}{2}+\frac{1}{4})$'oe or '0.75'÷2 or '75'÷ 2 A1 $\frac{3}{8}$ oe Or M1 $\frac{1}{2}-\frac{1}{4}$ oe or 0.5-0.25 or 50-25 M1 $\frac{1}{4}$ +', $\frac{1}{4}$,÷2 or 0.25+'(0.25'÷2) or 25% + '(50-25)'÷2%oe with percentage sign A1 $\frac{3}{8}$ oe OR M1 change both fractions to 8ths M1 '(4+2)' ÷2 or '$(\frac{4}{8}+\frac{2}{8})$'÷2 A1 $\frac{3}{8}$ oe SC B1 for (37 + 38)/2 or 37.5

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Question		**Working**	**Answer**	**Mark**	**Notes**
22		C = $\pi \times 10$	31.4 cm	2	M1 for π × 10 or 2 × π × 5 A1 for 31.4 – 31.42
23		3 + 5 = 8 100 ÷8 = 12.5 12.5 × 3 = 37.5 Or $\frac{3}{8} \times 100$	37.5%	2	M1 3 + 5 = 8 and 100 ÷8 or 30 + 50 = 80 and 100 ÷ 80 × 30 A1 cao Or M1 $\frac{3}{8} \times 100$ or $\frac{30}{80} \times 100$ oe A1 cao SCB1 62.5%
24			−3,−2, −1 , 0, 1	2	B2 −3,−2, −1 ,0,1 (B1 condone one error or omission e.g .−2, −1 ,0,1 or −3,−2, −1 ,0, 1, 2)
25	(a)(i) (ii) (b)	 $180^o - 53^o$	72^o Alternate angles 127^o	2 2	B1 for 72^o B1 for <u>alternate</u> angles M1 $180^o - 53^o$ A1 cao OR M1 180 – (360 – "72" – (180–72) – (180 – 53)) A1 cao

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Question		Working	Answer	Mark	Notes
26	(a)		5, -1, -1	2	B2 all 3 correct (B1 any 1 correct)
	(b)	x: -1, 0, 1, 2, 3, 4 y: **5**, 1, **-1**, **-1**, 1, 5	Correct graph	2	B1 ft 5 or 6 points plotted correctly B1 cao for the correct curve
27		$8.4^2 + 8.4^2$ $\sqrt{70.56 + 70.56} = \sqrt{141.12}$	11.9cm	3	M1 $8.4^2 + 8.4^2$ oe M1 $\sqrt{70.56 + 70.56}$ or $\sqrt{141.12}$ A1 11.85 – 11.9
28	(a)		120^o	1	B1 cao
	(b)	90 + 120 = 210 360 – 210 = 150 Ext angle = 30 No of sides = 360 ÷30 = 12	12	3	M1 360 – (‘120’+ 90) (=150) M1 (dep on M1) for ext angle = 180 – “150” A1 cao

Q08

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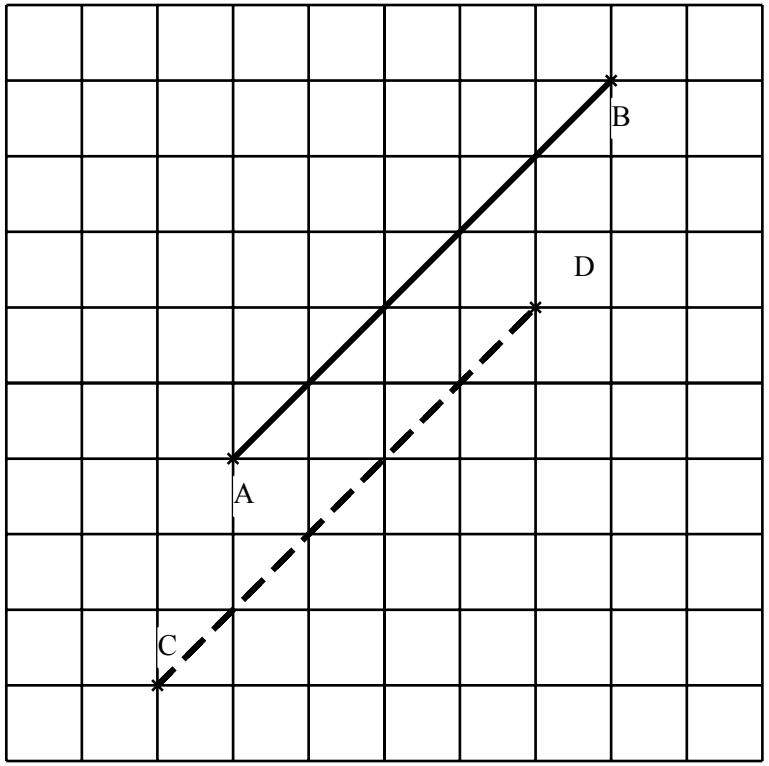
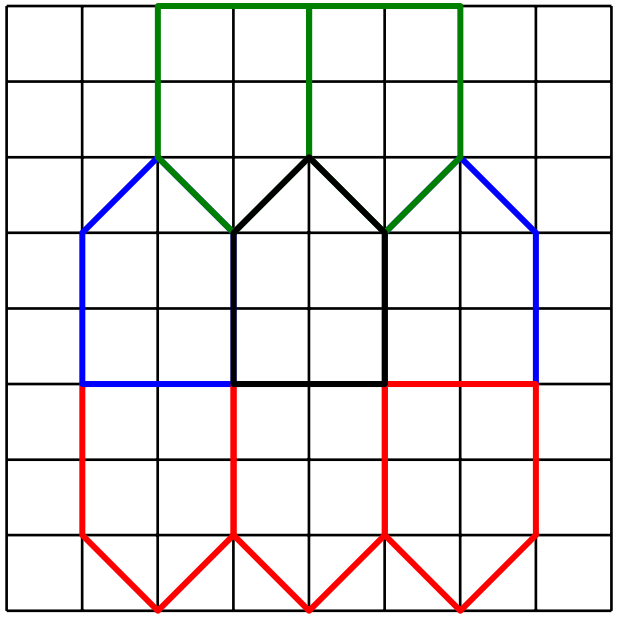


Q11



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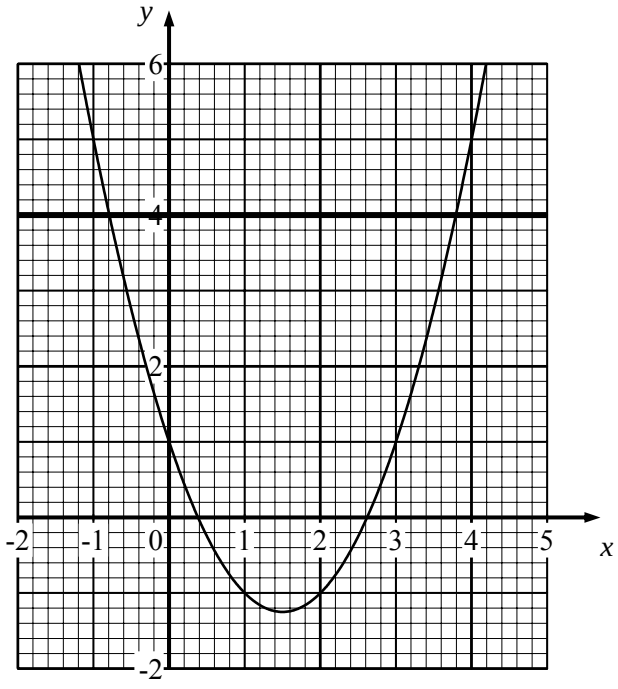

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