

Mark Scheme (Results)

November 2011

GCSE Mathematics (5MM2F)
Paper 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If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.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)		25.24	1	B1 accept $\frac{631}{25}$
	(b)		53.25	1	B1 accept $\frac{651}{5}$
	(c)		12.4	1	B1 accept $\frac{62}{5}$
	(d)		15.9489	1	B1 cao
2			10	1	B1 cao
3	(a)		81	1	B1 cao
	(b)		$\frac{7}{10}$	1	B1 for $\frac{7}{10}$ oe
	(c)		12	1	B1 cao
	(d)		10	1	B1 cao
	(e)		0.2	1	B1 for 0.2 or 0.222(2...)
	(f)		3 : 5	1	B1 cao

5MM2F_01					
Question	Working	Answer	Mark	Notes	
3	(g)	$\frac{4}{5} = 0.8 = 80\% (= \frac{16}{20})$ $75\% = 0.75 = \frac{3}{4} (= \frac{15}{20})$	$\frac{4}{5}$ bigger	3	M1 for 0.8 or $\frac{80}{100}$ or 80% or 0.75 or $\frac{75}{100}$ or $\frac{3}{4}$ oe or clear attempt to turn 80% and $\frac{3}{4}$ into fractions with a common denominator A1 for 80% and 75% or 0.8 and 0.75 or $\frac{16}{20}$ and $\frac{15}{20}$ or Correct 2 fractions equivalent to 80% and $\frac{3}{4}$ with common denominator C1 (dep on M1) for $\frac{4}{5}$ is bigger oe
4	(a)		Hexagon	1	B1 for hexagon
	(b)(i)		A	2	B1 cao
	(ii)		F		B1 cao
5	(a)(i)		15	2	B1 cao
	(ii)		-7		B1 cao
	(b)		2	1	B1 cao
	(c)		3 or -3	1	B1 cao

5MM2F_01				
Question	Working	Answer	Mark	Notes
6	$\frac{15}{100} \times 240 = 36$ $\frac{1}{8} \times 320 = 40$ $\frac{1}{8} \times 320 \text{ is bigger}$	$\frac{1}{8} \times 320$	4	M1 for $\frac{15}{100} \times 240 (=36)$ oe or $\frac{1}{8} \times 320 (=40)$ oe M1 for $\frac{15}{100} \times 240 (=36)$ oe and $\frac{1}{8} \times 320 (=40)$ oe A1 for 36 and 40 C1 ft (dep on one M1) for ' $\frac{1}{8} \times 320$ '
7	(a)	Parallel lines marked	1	B1 cao
	(b)(i)	65	2	B1 cao
	(ii)	10		B1 cao
8	(a)(i)	15.625	3	B1 cao
	(ii)	2.8		B1 cao
	(iii)	1.1		B1 cao
	(b)(i)	1000	3	B1 cao
	(ii)	100		B1 cao
	(iii)	0.2		B1 for 0.2 or $\frac{1}{5}$
	(c)	$\frac{-9.8}{-1.4}$	2	M1 for $\frac{-9.8}{-1.4}$ or 2.5×2.8 or -3.5×-2 (condone errors in sign) A1 for 7 oe (SC B1 for -7)

5MM2F_01					
Question		Working	Answer	Mark	Notes
9	(i)	$360 - (130 + 90 + 100)$	40	3	M1 for $360 - '130 + 90 + 100'$ or $360 - 100 - 130 - 90$ A1 cao
	(ii)		Reason		C1 for angles in a quadrilateral sum to 360°
10	(a)	$\frac{9}{15}$	$\frac{3}{5}$	2	M1 for $\frac{9}{15}$ or $\frac{a}{15}$ or $\frac{9}{b}$ A1 cao
	(b)		4	2	M1 for a process to reduce by 2 shaded triangles and 1 unshaded triangle or $2 \times a$ and $1 \times a$ where $a = 2, 3, 4$ or 5 A1 cao
11	(a)	$5 \times 2 - 3$	7	2	M1 for 5×2 or $5 - 2$ or $5 \times 2 - 3$ A1 cao
	(b)	$(17 + 3) \div 2$	10	2	M1 for $17 + 3$ or $(17 \pm 3) \div 2$ or $\frac{17}{2} \pm 3$ A1 cao
	(c)	$2 \times m - 3$	$2m - 3$	2	M1 for $2 \times m$ or $m - 3$ or $b \times m - 3$ A1 for $2m - 3$ oe NB If additional variable is introduced as subject then ignore. If $2m - 3 = k$ where k is a number then ignore k

5MM2F_01					
Question		Working	Answer	Mark	Notes
11	(d)	$(n + 3) \div 2$	$\frac{n + 3}{2}$	2	M1 for $n + 3$ or $\frac{n \pm 3}{2}$ oe or $n + 3 \div 2$ or $\frac{n}{2} \pm 3$ or for a reverse flow chart with at least one correct inverse process identified A1 for $\frac{n + 3}{2}$ oe NB If additional variable is introduced as subject then ignore. If $\frac{n + 3}{2} = k$ where k is a number then ignore k
12		$2 \times (6 \times 5) + 2 \times (5 \times 12) + 2 \times (6 \times 12)$ $= 60 + 120 + 144$ $= 324$	324 cm^2	4	M1 for $5 \times 6 (=30)$ or $12 \times 5 (=60)$ or $6 \times 12 (=72)$ M1 for adding the areas of 5 or 6 faces, at least 4 of which must be correct A1 cao C1 (indep) for cm^2
13	(a)(i) (ii)		$\frac{1}{10}$ Any two of $\frac{1}{2}$ or $\frac{1}{3}$ or $\frac{1}{4}$	2	B1 cao B1 for any two from $\frac{1}{2}$ or $\frac{1}{3}$ or $\frac{1}{4}$ (B0 if $\frac{1}{8}$ or $\frac{1}{10}$ is included)

5MM2F_01				
Question	Working	Answer	Mark	Notes
13	(b)	No + reason	2	M1 for an attempt to add two fractions/decimals/percentages (equivalent to $\frac{1}{2}$ and $\frac{1}{4}$) and divide by 2 or 0.375 or $\frac{3}{8}$ or 37.5% A1 for No with 0.33... and 0.375 or 33.33..% and 37.5% or $\frac{1}{3}$ and $\frac{3}{8}$
	$\frac{1}{2} = 0.5, \frac{1}{4} = 0.25, \frac{1}{3} = 0.33...$ $\frac{(0.5 + 0.25)}{2} = 0.375 \neq 0.33...$ <p>OR</p> $\frac{1}{2} + \frac{1}{4} = \frac{3}{4}, \frac{3}{4} \div 2 = \frac{3}{8} \neq \frac{1}{3}$ <p>OR</p> $\frac{(50\% + 75\%)}{2} = 37.5\% \neq 33.33...\%$ <p>OR</p> $\frac{1}{2} - \frac{1}{4} = \frac{1}{4}, \frac{1}{4} \div 2 = \frac{1}{8}, \frac{1}{2} + \frac{1}{8} = \frac{3}{8} \neq \frac{1}{3}$ <p>Or</p> $\frac{1}{2} = \frac{6}{12}, \frac{1}{4} = \frac{3}{12}, \frac{1}{3} = \frac{4}{12}; 4 \text{ is not midway between 6 and 3 demonstrated}$			

5MM2F_01				
Question	Working	Answer	Mark	Notes
14	$\frac{138}{2}$ OR $180 - 138 = 42$ $2x = 18 - 42$ $x = 138 \div 2$	69	3	M1 for $\frac{138}{2}$ or $\frac{(180-42)}{2}$ A1 cao C1 for exterior angle equals sum of interior opposite angles. OR Angles or a straight line add to 180° , angles in a triangle add to 180°
15		Tessellation	2	B2 for at least 5 correctly tessellating shapes added with no gaps (B1 for 3 or 4 correctly tessellating shapes added with no gaps)
16	(a) $15 - (3.25 + 5.37)$ (b) $CD = 10 - 8.5 = 1.5$ $AB = 10 - 7.8 = 2.2$ $BC = 10 - (1.5 + 2.2)$ OR $BC = 8.5 + 7.5 - 10$ OR $BC = 7.8 - (10 - 8.5)$	6.38 6.3	2 2	M1 for $15 - 3.25 - 5.37$ or $(15 - 5.37) - 3.25$ or $15 - (5.37 + 3.25)$ or $(10 - 8.5) + (10 - 7.8)$ or $1.5 + 2.2$ or 3.7 A1 cao M1 for $10 - ('10 - 8.5') - ('10 - 7.8')$ or $('8.5 + 7.8') - 10$ or $7.8 - ('10 - 8.5')$ A1 cao

5MM2F_01				
Question	Working	Answer	Mark	Notes
17	(a)	-3, -2, -1, 0, 1	2	B2 for all 5 correct values and no extras; ignore repeats, any order (-1 for each omission or additional value)
	(b)	$3 < x \leq 5$	2	B2 for $3 < x \leq 5$ or just >3 and ≤ 5 (B1 for $3 < x$ or $x \leq 5$ or $5 \geq x$ or >3 or ≤ 5 or $3 \leq x < 5$)
	(c)	$x \leq \frac{15}{4}$	2	NB: Accept the use of any letter other than x throughout and ignore any attempts to list integer values M1 for intention to subtract 3 from both sides or divide each term by 4 or $(x =) \frac{15}{4}$ oe A1 for $x \leq \frac{15}{4}$ oe
18	Area of cross-section $5 \times 2 + 2 \times 2 = 14$ or $5 \times 4 - 3 \times 2 = 14$ Volume of prism = $14 \times 6 = 84$ or $5 \times 2 \times 6 + 2 \times 2 \times 6$ $= 60 + 24$ $= 84$ or $5 \times 4 \times 6 - 3 \times 2 \times 6$ $= 120 - 36 = 84$	84	4	M1 for splitting cross-section into at least two rectangles or completing the enclosing rectangle M1 (dep) for a complete area, correct product for at least one rectangle M1 (dep) for 'area' $\times 6$ A1 cao or M1 for splitting prism into at least two cuboids or completing the enclosing cuboid M1 (dep) for correct product for volume of at least one cuboid M1 (dep) for complete volume of prism (at least one product must be correct) A1 cao

5MM2F_01				
Question	Working	Answer	Mark	Notes
19	(a) $5 \times 8 + 7$	47	2	M1 for $5 \times 8 + 5$ A1 cao
	(b) $5 + 10 \times 2.5$	30	2	M1 for $5 + 10 \times 2.5$ A1 cao
	(c) $v = u + 10t$ $v - u = 10t$	$t = \frac{v - u}{10}$	3	M1 for clear attempt to subtract u from both sides of the equation or $-u$ in a reverse flow diagram M1 for clear attempt to divide all 3 terms by 10 or $\div 10$ in a reverse flow diagram A1 for $t = \frac{v - u}{10}$ or $t = (v - u) \div 10$ SC : B2 for $t = v - u \div 10$
20	(a) $\frac{360}{5}$	72	2	M1 for a complete correct method to find exterior angle eg $\frac{360}{5}$ A1 cao
	(b) $180 - 72$	108	2	M1 ft for $180 - '72'$ or $((5 - 2) \times 180) \div 5$ A1cao SC : If no marks scored in (a) or (b) then award 1 mark in (a) for sight of $\frac{360}{5}$ seen anywhere

5MM2H_01				
Question	Working	Answer	Mark	Notes
21	$\frac{\frac{1}{2} \times \pi \times 10^2 - \pi \times 5^2}{2} = 12.5\pi$	39.3	5	<p>M1 for $\pi \times 5^2$ (=78.5(39...)) or $\pi \times 10^2$ (=314(.159...)) or 100π or 25π</p> <p>M1 for $\frac{1}{2} \times \pi \times 10^2$ (=157(.07...)) or 50π</p> <p>M1 (dep on at least one of the previous Ms) for $\frac{1}{2} \times \pi \times 10^2 - \pi \times 5^2$</p> <p>M1 (dep on previous M) for $(\frac{1}{2} \times \pi \times 10^2 - \pi \times 5^2) \div 2$</p> <p>or</p> <p>$\frac{'157.07...'-'78.53...'}{2}$ or 25π/2</p> <p>A1 for answer in range 39.2 – 39.3</p> <p>or</p> <p>M1 for $\pi \times 5^2$ (=78.5(39...)) or $\pi \times 10^2$ (=314(.159...)) or 100π or 25π</p> <p>M1 for $\frac{1}{4} \times \pi \times 10^2$ (=78.5(398...)) or 25π</p> <p>M1 for $\frac{1}{2} \times \pi \times 5^2$ (=39.2(69...)) or 12.5π</p> <p>M1(dep on 2 previous Ms) for '78.5' – '39.2'</p> <p>A1 for answer in range 39.2 – 39.3</p>

5MM2F_01					
Question		Working	Answer	Mark	Notes
22	(a)		1, -3, 6	2	B2 for all 3 correct (B1 for 1 or 2 correct)
	(b)		Graph	2	B2 for a fully correct graph or B1 ft for all their points plotted correctly $\pm 2\text{mm}$ B1 for a smooth curve drawn through their points provided B1 awarded in (a)
	(c)		1.7, -1.7	2	B1 for -1.6 to -1.8 or ft from their graph B1 for 1.6 to 1.8 or ft from their graph

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