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Mark Scheme (Results)

November 2012

GCSE Mathematics (2MB01) Higher
5MB2H (Non-Calculator) 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If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.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

5MB2H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
1			39.00	3	M1 for 240 ÷ 8 or 30 seen, or 240 × 1.3(0) or 312 seen, or 1.3 ÷ 8 or 0.1625 seen M1 (dep) for 240 × 1.3 ÷ 8 or "30" × 1.3(0) or "312"÷ 8 or "0.1625"×240 A1 for 39.00 or 39 NB: M marks for use of 130 in place of 1.30
2	(a)	5 ÷ 2 2.5 × 4 10 × 28	280	3	M2 for 4 × 28 × 5 ÷ 2 oe (M1 for 5 ÷ 2 × 4 (=10) or 4 × 28 (=112) or 4 ÷ 2 × 28 (=56) oe or 560 seen) A1 cao
	(b)	140 ÷ 28 5 × 2	10	2	M1 for 140 ÷ 28 × 2 or 140 ÷ 14 oe A1 cao
3		Work with whole shape: 12 − 9 4 × (3 + 15) Work with 4 triangles: 15 + 12 + 9 = 36 4×36=144 144 – (9×8) = Work with single triangles: 15 + 12 + 9 = 36 4×(36-18) =	72	3	M1 12 – 9 (=3) M1 for 4 × ("3" + 15) oe A1 cao OR M1 for 4×(15 + 12 + 9) (=144) M1 for '144'-9×8 oe A1 cao OR M1 (15 + 12 + 9) – (2 × 9) (=18) oe M1 for 4× "18" oe A1 cao

5MB2H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
4	(a)	54 ÷ 2 = 27 27 ÷ 3 = 9 9 ÷ 3 = 3 3 ÷ 3 = 1	2 × 3 × 3 × 3	2	M1 for attempt at prime factorization (at least two correct divisions): could be shown as a factor tree OR sight of at least one of each of 2, 3 as factors of 54 A1 for 2 × 3 × 3 × 3 or 2 × 3^3
	(b)	45, 90, 135, 180, 225, 270,.. 54, 108, 162, 216, 270, ..	270	2	M1 for at least 3 multiples of 45 and 54 (can include 45, 54) or a correct method to write 45 as 3×3×5 or 3^2×5 A1 cao
5		25 + 2 × 40	105	3	M2 for a complete method that uses both rates (M1 for method to find cost of first 100 units or £25 seen or £10 per 100 units for 2nd rate or for complete method to find the cost of 800 extra units) A1 cao

5MB2H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
6			120	4	M1 for method to find remaining area of wall eg (3 × 2.4) – (2 × 0.9) or 7.2 – 1.8 (= 5.4) oe M1 for remaining area of wall ÷ area of tile using changed units, eg, "5.4" ÷ "0.12" (= 45) or (7.2 ÷ 0.12) ─ (1.8 ÷ 0.12) oe or 60 – 15 or 45 seen M1 (dep on at least M1) finding the number of boxes (eg ÷6 and round up oe) A1 for 120 cao OR M1 for attempt to find how many rows of tiles eg 300 ÷ 30 and 240 ÷ 40 or 200 ÷ 40 and 90 ÷ 30 using changed units or 10 & 6 or 5 & 3 seen. M1 for complete method to find the number of tiles needed by tessellation method eg ("10"×"6")-("5"×"3") or 60-15 or 45 seen M1 (dep on at least M1) finding the number of boxes (eg ÷6 and round up oe) A1 for 120 cao
7	(a)		370	1	B1 cao
	(b)		0.37	1	B1 cao
	(c)		17.02	1	B1 cao
8	(a)		$7n - 3$	2	B2 for $7n - 3$ oe (B1 for $7n + d$, $d \neq -3$ or absent)
	(b)		47	2	M1 for $3 \times 4^2 - 1$ A1 cao

5MB2H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
9			$112\frac{1}{2}$	4	M1 for exterior angle = 360 ÷ 8 (=45) M1 for interior angle = 180 − "45" (=135) M1 (dep on at least M1) for $\frac{1}{2}$ (360 – "135") or 180 - $\frac{1}{2}$ ("135") A1 for $112\frac{1}{2}$ oe OR M1 for 360 ÷ 8 (=45) M1 for 180 + "45" (=225) or 180 – "45" M1 (dep on at least M1) for "225" ÷ 2 or for $\frac{1}{2}$ (360 – "135") or 180 - $\frac{1}{2}$ ("135") A1 for $112\frac{1}{2}$ oe OR M1 for Sum of interior angles = 180×(8-2) (=1080) M1 for interior angle = "1080" ÷8 (=135) M1 (dep on at least M1) for $\frac{1}{2}$ (360 – "135") or 180 - $\frac{1}{2}$ ("135") A1 for 112.5 oe NB do not award marks for angles that are stated in working but contradicted by their position on the diagram.

5MB2H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
10	(a)		1.25×10^5	1	B1 cao
	(b)		0.0008	1	B1 cao
11		$\frac{1}{2} \times 2x \times x \times (x + 10)$	$V = x^3 + 10x^2$	3	M1 for $\frac{1}{2} \times 2x \times x \times (x + 10)$ A1 for $x^3 + 10x^2$ or $x^2(x + 10)$ B1 for V = cubic expression in x
12	(a)		Q marked and labelled	1	B1 for Q placed correctly (professional judgement if no cross)
	(b)		(3, 2, 4)	1	B1 cao
13	(i)		$\frac{1}{16}$	2	B1 for $\frac{1}{16}$ or 0.0625
	(ii)		4		B1 cao

5MB2H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
14	(a)		$(x + 1)(\boldsymbol{x} + 4)$	2	B2 for $(x + 1)(\boldsymbol{x} + 4)$ (B1 for $(x + a)(\boldsymbol{x} + b)$ with one factor correct or $(x - 1)(\boldsymbol{x} - 4)$ or $x(\boldsymbol{x} + 4)+1(\boldsymbol{x} + 4)$ or $x(\boldsymbol{x} + 1)+4(\boldsymbol{x} + 1)$)
	(b)	$3x(2x + 5) - 1(2x + 5)$ $6x^2 + 15x - 2x - 5$	$6x^2 + 13x - 5$	2	B2 for fully correct (B1 for 3 out of not more than 4 terms including signs or 4 terms correct ignoring signs)
	(c)	$\frac{15}{30x} + \frac{6}{30x} - \frac{10}{30x}$	$\frac{11}{30x}$	2	M1 for attempt to use a correct common denominator with at least 2 correct equivalent fractions A1 for $\frac{11}{30x}$ oe

5MB2H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
*15			Proof	5	B1 for *OM* = *ON* or (*OMN* is) isosceles triangle or OMB = 90° or AMO = 90° B1 for *OMN* = *ONM* or either = $\frac{1}{2}(180 - y)$ oe B1 for (Angle) *BMN* = 90 – "$\frac{1}{2}(180 - y)$" [if algebraic in *y*] C1 for statement angle between tangent and radius = 90° (or perpendicular or right angle) C1 for correct conclusion with BMN stated, accompanied by correct working clearly laid out and in a logical sequence with correct calculations Acceptable alternative: B1 for angle at circumference = $\frac{1}{2}y$ B1 for 'angle at centre is twice the angle at the circumference' oe B1 for angle *BMN* = $\frac{1}{2}y$ C1 for statement 'alternate segment theorem' C1 for correct conclusion with BMN stated, accompanied by correct working clearly laid out and in a logical sequence with correct calculations

5MB2H_01					
Question		**Working**	**Answer**	**Mark**	**Notes**
16		Gradient of $AB = 2$ Gradient of perpendicular line $= -\frac{1}{2}$ $y = -\frac{1}{2}x + c$ $-1 = -\frac{1}{2} \times 5 + c$ $c = \frac{3}{2}$	$y = -\frac{1}{2}x + \frac{3}{2}$	4	M1 for attempt to find gradient of AB M1 (dep) for attempt to find gradient of perpendicular line eg use of -1/m M1(dep on M2) for substitution of $x = 5, y = -1$ A1 for $y = -\frac{1}{2}x + \frac{3}{2}$ oe
17		$6 \times 6 + 6 \times \sqrt{5} - 6 \times \sqrt{5} - \sqrt{5} \times \sqrt{5}$ $\frac{31}{\sqrt{31}} \times \frac{\sqrt{31}}{\sqrt{31}}$	$\sqrt{31}$	3	M1 for $6 \times 6 + 6 \times \sqrt{5} - 6 \times \sqrt{5} - \sqrt{5} \times \sqrt{5}$ or $6^2 - \left(\sqrt{5}\right)^2$ (for 3 out of not more than 4 terms including signs or 4 terms correct ignoring signs) M1 $\frac{"31"}{\sqrt{31}} \times \frac{\sqrt{31}}{\sqrt{31}}$ or for $\frac{\text{[expression in surd form]}}{\sqrt{31}} \times \frac{\sqrt{31}}{\sqrt{31}}$ A1 cao

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