Mark Scheme (Results)

Summer 2013

GCSE Mathematics (Linear) 1MA0
Higher (Calculator) Paper 2H

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If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.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

PAPER: 1MA0_2H					
Question		Working	Answer	Mark	Notes
1			40.5	3	M1 for 1.5×6 or 1.5 ×1.5 M1 for adding area of 5 or 6 faces provided at least 3 are the correct area A1 cao NB: anything that leads to a volume calculation 0 marks.
*2			Not enough mincemeat since 600<700 OR Only able to make 38 mince pies since insufficient mincemeat	4	M1 for 45 ÷ 18 (= 2.5) M1 for 2.5 used as factor or divisor A1 for ingredients as 562.5 and 875 and 250 and 700 and 2.5 (accept 2 or 3) OR for availables as 400, 400, 200 240, 2.4 (accept 2 or 3) C1 ft (dep on at least M1) for identifying and stating which ingredient is insufficient for the recipe (with some supportive evidence) OR M1 for a correct method to determine the number of pies one ingredient could produce M1 for a correct method to determine the number of pies **all** ingredient could produce A1 for 80 and 51 and 90 and 38 and 108 C1 ft (dep on at least M1) for identifying and stating which ingredient is insufficient for the recipe. (with some supportive evidence)

Question		Working	Answer	Mark	Notes
3	(a)		Points plotted at (1,8200) and (3.5,5000)	1	B1 for points accurately plotted ±1/2 square tolerance
	(b)		'the older the car the lower the value' 'the greater the value the newer the car'	1	B1 for an acceptable relationship eg. 'the older the car the lower the value' (accept 'negative correlation' but not just 'negative')
	(c)		5200 to 6600	2	M1 for a single line segment with negative gradient that could be used as a line of best fit or a vertical line from 2.5 or a point at (2.5,y) where y is from 5200 to 6600 A1 for given answer in the range 5200 − 6600
4			126	3	M1 for 1 – 0.05 – 0.32 (= 0.63) M1 for '0.63' × 200 A1 cao OR M1 for 0.05 × 200 (= 10) or 0.32 × 200 (= 64) or 0.37 × 200 (=74) M1 for 200 – '10' – '64' A1 cao OR M1 for 100 – 5 – 32 (= 63) M1 for $\dfrac{"63"}{100} \times 200$ A1 cao SC: B2 for $\dfrac{126}{200}$ as the answer.

PAPER: 1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
5	(a)		Response boxes overlap and are not exhaustive	2	B2 for **TWO** aspects from: No time frame given Non-exhaustive responses Response boxes over-lapping (B1 for ONE correct aspect)
	(b)		How many magazines do you buy each month? 0-4 5-8 over 8	2	B1 for a question with a time frame B1 for at least 3 correctly labelled response boxes (non-overlapping, need not be exhaustive) **or** for a set of response boxes that are exhaustive (could be overlapping) [Do not allow inequalities in response boxes]
	(c)		One reason	1	B1 for ONE reason Eg. All the same age, may all be males, may all like same types of magazines, sample too small, biased
6			4.8	4	M1 for 60 × 60 (=3600) M1 for 15000÷ 20 (=750) or 20÷15000 (=0.00133..) or "3600"÷15000 (=0.24) or 15000÷"3600" (=4.16..) M1 for "3600" ÷ (15000÷20) or "3600"×20÷15000 oe A1 cao

PAPER: 1MA0_2H				
Question	Working	Answer	Mark	Notes
7		28% or $\frac{14}{50}$	4	M1 for 100 − 30 (= 70) or $1 - \frac{3}{10} (= \frac{7}{10})$ M1 for "70" ÷ (3 + 2) (= 14) or $"\frac{7}{10}" \div (3+2) \quad (= \frac{7}{50})$ M1 for "14" × 2 or $\frac{7}{50} \times 2$ A1 for 28% or $\frac{14}{50}$ oe **OR** M1 for a correct method to find (100-30)% of any actual sum of money M1 for "350" ÷ (3 + 2) (= 70) M1 for "70" × 2 A1 for 28% or $\frac{14}{50}$ oe **OR** M1 for starting with two numbers in ratio 3:2, eg 21 and 14 M1 for equating sum of their numbers to 100 − 30 (=70%), eg '21' + '14' (=35) M1 for scaling sum of their numbers to 100%, eg '35'÷70×100 (=50) A1 for 28% or $\frac{14}{50}$ oe SC: award B3 for oe answers expressed in an incorrect form eg $\frac{2.8}{10}$

PAPER: 1MA0_2H				
Question	Working	Answer	Mark	Notes
8		10752	4	M1 for splitting the pentagon (or show the recognition of the "absent" triangle) and using a correct method to find the area of one shape M1 for a complete and correct method to find the total area M1 (dep on at least one prev M1) for multiplying their total area by 2.56 (where total area is a calculation involving at least two areas) A1 cao
9		55	4	M1 for a correct method to find a different angle using 35° M1 for setting up a complete process to calculate angle x A1 cao B1 states one of the following reasons relating to their chosen method: Alternate angles are equal; Corresponding angles are equal; Allied angles / Co-interior angles add up to 180; the exterior angle of a triangle is equal to the sum of the interior opposite angles.

Question	Working	Answer	Mark	Notes
10	<table><tr><td>*x*</td><td>*x*³ + 2*x*</td></tr><tr><td>4</td><td>72</td></tr><tr><td>4.1</td><td>77.(121)</td></tr><tr><td>4.2</td><td>82.(488)</td></tr><tr><td>4.3</td><td>88.(107)</td></tr><tr><td>4.4</td><td>93.(984)</td></tr><tr><td>4.5</td><td>100.(125)</td></tr><tr><td>4.6</td><td>106.(536)</td></tr><tr><td>4.7</td><td>113.(223)</td></tr><tr><td>4.8</td><td>120.(192)</td></tr><tr><td>4.9</td><td>127.(449)</td></tr><tr><td>5</td><td>135</td></tr><tr><td></td><td></td></tr><tr><td>4.65</td><td>109.8(44625)</td></tr><tr><td>4.66</td><td>110.5(14696)</td></tr><tr><td>4.67</td><td>111.1(87563)</td></tr><tr><td>4.68</td><td>111.8(63232)</td></tr><tr><td>4.69</td><td>112.5(41709)</td></tr></table>	4.7	4	B2 for a trial $4.6 \le x \le 4.7$ evaluated correctly (B1 for a trial evaluated correctly for $4 \le x \le 5$) B1 for a different trial evaluated correctly for $4.65 \le x < 4.7$ B1 (dep on at least one previous B1) for 4.7 [Note: Trials should be evaluated to at least accuracy shown in table, truncated or rounded] No working scores 0 marks
11		3.52	3	M1 for $1.35^2 + 3.25^2$ M1 (dep) for $\sqrt{(1.35^2 + 3.25^2)}$ $(= \sqrt{12.385})$ A1 for answer in the range 3.51 to 3.52

Question		Working	Answer	Mark	Notes
12	(a)	$3x - 6 = x + 7$ $2x = 13$	6.5	3	M1 for $3 \times x - 3 \times 2$ $(=3x-6)$ or $\frac{x}{3} + \frac{7}{3}$ seen M1 for correct method to isolate the terms in x or the number terms on opposite sides of an equation A1 for 6.5 oe
	(b)	$2 - y = 1 \times 5$	-3	2	M1 for intention to multiply both sides by 5 (to give $2 - y = 1 \times 5$) A1 cao
13	(a)		(3, 3.5) oe	2	M1 for a correct method to find the value of either the x coordinate or the y coordinate of the midpoint **or** $x = 3$ **or** $y = 3.5$ A1 cao
	(b)		-1.8 oe	2	M1 for correct method to find the gradient OR (+)1.8 A1 for -1.8 oe

PAPER: 1MA0_2H					
Question		**Working**	**Answer**	**Mark**	**Notes**
*14			The Friendly Bank	4	M1 for a correct method to find interest for the first year for either bank **OR** correct method to find the value of investment after one year for either bank **OR** use of the multiplier 1.04 or 1.05 M1 for a correct full method to find the value of the investment (or the value of the total interest) at the end of 2 years in either bank A1 for 2100.8(0) and 2110.5(0) (accept 100.8(0) and 110.5(0)) C1 (dep on M1) ft for a correct comparison of *their* total amounts, identifying the bank from their calculations **OR** M1 for either 1.04 × 1.01 or 1.05 × 1.005 M1 for 1.04 × 1.01 and 1.05 × 1.005 A1 for 1.0504 and 1.05525 C1 (dep on M1) ft for a correct comparison of *their* total multiplying factors identifying the bank from their calculations

PAPER: 1MA0_2H					
Question		Working	Answer	Mark	Notes
15	(a)		-2 -1 0 1 2 3 4 **8** 3 0 **-1 0** 3 **8**	2	B2 for 8, -1, 0, 8 (B1 for at least two of 8, -1, 0, 8)
	(b)		Correct curve	2	M1 (ft) for at least 5 points plotted correctly A1 for a fully correct curve
	(c)	$x^2 - 2x - 3 = 0$ OR $(x - 3)(x + 1) = 0$	3 and −1	2	M1 for the straight line $y = 3$ drawn to intersect the "graph" from (a) A1 for both solutions **OR** M1 for identifying $y = 3$ from the table A1 for both solutions **OR** M1 for $(x \pm 3)(x \pm 1)$ A1 for both solutions

PAPER: 1MA0_2H					
Question		Working	Answer	Mark	Notes
*16		Angle *POT* = 180 – 90 – 32 = 58 (angle between <u>radius</u> and <u>tangent</u> = <u>90</u>^{o} and sum of <u>angles</u> in a <u>triangle</u> = <u>180</u>^{o}) Angle *OST* =angle *OTS* = 58÷2 (<u>ext angle</u> of a triangle <u>equal</u> to sum of <u>int opp angles </u>and base <u>angles</u> of an <u>isos</u> triangle are <u>equal</u>) or (<u>angle</u> at <u>centre</u> = <u>2x</u> <u>angle</u> at <u>circumference</u>) OR Angle *SOT* = 90 + 32 = 122 (<u>ext angle</u> of a triangle <u>equal</u> to sum of <u>int opp angles</u>) (180 – 122) ÷ 2 (base <u>angles</u> of an <u>isos</u> triangle are <u>equal</u>)	29	5	B1 for angle OTP = 90°, quoted or shown on the diagram M1 for a method that leads to 180 – (90 + 32) or 58 shown at *TOP* M1 for completing the method leading to "58"÷2 or 29 shown at *TSP* A1 cao C1 for "angle between <u>radius</u> and <u>tangent</u> = <u>90</u>^{o}" **and** one other correct reason given from theory used NB: C0 if inappropriate rules listed OR B1 for angle OTP = 90°, quoted or shown on the diagram M1 for a method that leads to 122 shown at *SOT* M1 for (180 – "122") ÷ 2 or 29 shown at *TSP* A1 cao C1 for "angle between <u>radius</u> and <u>tangent</u> = <u>90</u>^{o}" **and** one other correct reason given from theory used NB: C0 if inappropriate rules listed

Question		Working	Answer	Mark	Notes
17	(a)		Box plot overlay	2	M1 for a box drawn with at least 2 correct points from LQ, Med and UQ A1 for a fully correct box plot
	(b)		Comparison of a measure of spread plus a comparison of medians (in context)	2	B1 for a correct comparison of a measure of spread (using either range or iqr) B1 for a correct comparison of medians For the award of both marks at least one of the comparisons made must be in the context of the question.
18		$3p^2 = y + 4$ $p^2 = \dfrac{y + 4}{3}$	$p = \sqrt{\dfrac{y + 4}{3}}$	3	M1 for clear intention to add 4 to both sides or divide all terms by 3(with at least 3 terms) M1 for clear intention to find the square root from $p^2 = $ (expression in y) A1 for $p = \sqrt{\dfrac{y+4}{3}}$ oe (accept $\pm$ a correct root)
19	(a)		$3(2 + 3x)$	1	B1 for $3(2 + 3x)$
	(b)		$(y + 4)(y - 4)$	1	B1 for $(y + 4)(y - 4)$
	(c)		$(2p - 5)(p + 2)$	2	M1 for $(2p \pm 5)(p \pm 2)$ A1 for $(2p - 5)(p + 2)$

Question		Working	Answer	Mark	Notes
20		$\cos y = 2.25 \div 6$ $y = \cos^{-1}(2.25 \div 6)$ OR $6\cos 75 = 1.55\ldots$	The ladder is not safe because y is not near to 75	3	M1 for $\cos y = 2.25 \div 6$ oe M1 for $\cos^{-1}(2.25 \div 6)$ C1 for sight of 67-68 and a statement eg this angle is NOT (near to) 75° and so the ladder is not steep enough and so not safe. OR M1 for $\cos 75 = x \div 6$ M1 for $6\cos 75$ C1 for sight of 1.55(29…) and a statement eg that 2.25 NOT (near to) 1.55 and so the ladder is not steep enough and so not safe.
21			48 or 49	2	M1 for $\dfrac{460}{460+320+165} \times 100$ (=48.67 ….) or $\dfrac{460}{9.5}$ or $\dfrac{460}{9.45}$ A1 for 48 or 49
22			1.33	3	M1 for $3.4 = \dfrac{k}{5^2}$ oe or 3.4×5^2 (=85) M1 for '3.4×5^2' $\div 8^2$ A1 for answer in range 1.32 to 1.33 or $\dfrac{85}{64}$
23		d: UB = 54.5 (or 54.499), LB = 53.5 C: UB = 170.5 (or 170.499), LB = 169.5 $170.5 \div 53.5$ $169.5 \div 54.5$	3.19 3.11..	4	B1 for any one correct bound quoted M1 for $170.5 \div 53.5$ or $169.5 \div 54.5$ A1 for UB = answer in range 3.18 to 3.19 from correct working A1 for LB = 3.11.. from correct working

PAPER: 1MA0_2H					
Question		Working	Answer	Mark	Notes
24	(a)		18.2	2	M1 for $\frac{1}{2} \times 6 \times 7 \times \sin 60$ A1 for answer in range 18.1 to 18.2
	(b)		6.56	3	M1 for $6^2 + 7^2 - 2 \times 6 \times 7 \times \cos 60$ M1 for correct order of operation eg $36 + 49 - 42$ (=43) A1 for answer in range 6.55 to 6.56
25			$x = 2.87,$ $y = -0.87$ and $x = -0.87,$ $y = 2.87$	6	M1 for $x^2 + (2 - x)^2 = 9$ M1 for $4 - 4x + x^2$ A1 for $2x^2 - 4x - 5 = 0$ oe 3 term simplified quadratic M1 for a correct method to solve their quadratic Eg $x = \dfrac{4 \pm \sqrt{(16 - 4 \times 2 \times -5)}}{4}$ A1 for $x = 2.87, y = -0.87$ or better A1 for $x = -0.87, y = 2.87$ or better Award marks for equivalent algebraic expressions. Apply the same scheme as above for y first.

Ofqual

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