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Mark Scheme (Results)

November 2011

GCSE Mathematics (5384H)
Paper 14H (Calculator)

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November 2011
Publications Code UG029748
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NOTES ON MARKING PRINCIPLES

1 Types of mark

M marks: method marks
A marks: accuracy marks
B marks: unconditional accuracy marks (independent of M marks)

2 Abbreviations

cao – correct answer only
isw – ignore subsequent working
oe – or equivalent (and appropriate)
indep - independent
ft – follow through
SC: special case
dep – dependent

3 No working

If no working is shown then correct answers normally score full marks
If no working is shown then incorrect (even though nearly correct) answers score no marks.

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If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.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

5 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.

6 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.

7 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.

8 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.

9 Parts of questions

Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

10 Money notation

Accepted with and without the “p” at the end.

11 Range of answers

Unless otherwise stated, when any 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).

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Question		**Working**	**Answer**	**Mark**	**Notes**
1	(a)	$10x - 7 + 7 = 28 + 7$ or $10x/10 - 7/10 = 28/10$ $10x = 35$	3.5	2	M1 for attempt to '+7' both sides or ÷10 all three terms A1 for 3.5 oe
	(b)	$4y = 54$	13.5	2	M1 for ×9 or ÷4 or ÷0.44(44…) both sides A1 for 13.5 oe
2		650×20/100=130 24×26=624 130+624=754 754-650=	104	4	M1 650×20/100 (=130) oe M1 24×26 (=624) oe M1 "130"+"624" (=754) OR "754" – 650 A1 cao SC: Award 3 marks for 754 seen
3	(a)		Front elevation	2	B2 for correct front elevation (B1 for correct shape, but one dimension incorrect)
	(b)		Plan	2	B2 for correct plan (B1 for rectangle, but one dimension incorrect)
4	(a)	$\frac{6^7}{6^4}$ or $6^1 \times 6^2$ or $\frac{6^5}{6^2}$	6^3	2	M1 for $\frac{6^7}{6^4}$ or $6^1 \times 6^2$ or $\frac{6^5}{6^2}$ A1 cao SC B1 for 216 if M0 scored.
	(b)		x^{15}	1	B1 cao
5		$\pi \times 6 \times 2$	37.7	2	M1 for $\pi \times 12$ A1 37.6 – 37.8

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Question		**Working**	**Answer**	**Mark**	**Notes**
6	(a)	$2x - 10 + x + 50$ (ext angle of a triangle = sum of interior opposite angles) OR $180 - (2x - 10 + x + 50) = 140 - 3x$ (sum of the angles in a triangle = 180) $180 - (140 - 3x)$ (sum of the angles on a straight line = 180)	Results with reasons	3	M1 for $2x - 10 + x + 50$ or $2x + x$ and $50 - 10$ A1 for completing the algebra to complete the proof showing $y=3x+40$. B1 for 'ext. angle of a triangle = sum of opp. int. angles' OR M1 for $180 - (2x - 10 + x + 50)$ or $140 - 3x$ seen. A1 for completing the algebra to complete the proof showing $y=3x+40$. B1 for 'sum of angles in triangle = 180' oe**and** 'sum of angles on a straight line = 180' oe
	(b)	$3x = 145 - 40 = 105$ $105 \div 3$ $35 + 50 = 85$ $2 \times 35 - 10 = 60$ $180 - 145 = 35$	35 85	4	M1 for $(3x =)$ $145 - 40$ or 105 seen or for clear attempt to subtract 40 from both sides of the equation or divide all 3 terms by 3 A1 cao M1 for $2\times35 - 10$ or $35 + 50$ or $180 - 145$ or for substituting '35' in order to find at least one angle; can be implied by sight of 85 or 60 A1 for 85 or ft for '35' provided 'x'< 47
7		$2800 \div (13 + 12 + 10) = 80$p / share $80 \times 12 = 960$ $960 \times \frac{2}{3}$	6.40	4	M1 for $2800 \div (13 + 12 + 10)$ or $28 \div (13 + 12 + 10)$ OR 80 or 0.8 or 10.4(0) or 1040 or 8 seen OR 13/35 or 12/35 or 10/35 oe seen M1 for '80' × 12(=960) or'0.8' × 12 OR 960 or 9.6 seen OR 12/35 × 2800 or 12/35 × 28 oe M1 (indep) for $\times \frac{2}{3}$ oe A1 for £6.40 or 640 pence [accept 6.4] SC : B2 for answer of 10 supported by working

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Question		**Working**	**Answer**	**Mark**	**Notes**
8		1 ÷ 1.14 = 0.877… worse than 0.86 OR 1 ÷ 0.86 = 1.162… better than 1.14 OR Change say £100: 1.14 × 100 = 114 $100 \times \frac{1}{0.86} = 116.28$	Paris since 1.16..> 1.14	3	M1 for any attempted conversion using 1.14 or 0.86 A1 for arriving at two comparable amounts of money in the same currency A1 for Paris with correct figures.
9		$12^2 = h^2 + 6^2$ $h = \sqrt{144-36} = \sqrt{108} = 10.392$ Area = ½ × 6 × 10.392	31.17 to 31.18	4	M1 for $12^2 = h^2 + 6^2$ or $(h^2=)\ 12^2 - 6^2$ M1 for √(144-36) or 10.3(9...) M1 (indep) for ½ × 6 × "*height*" A1 for 31.17 − 31.18 NB: the figure for "height" has to be less than 12 or ft from their Pythagoras calculation.
10		$y = -\frac{1}{2}x + c$ $x = -2y + c$	$y = -\frac{1}{2}x + c$	2	M1 for identification or statement of $-\frac{1}{m}$ or sight of $-\frac{1}{2}$ A1 for equation $y = -\frac{1}{2}x + c$ oe*c* any number or absent.

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Question		**Working**	**Answer**	**Mark**	**Notes**
11		$4x > 10$	$x > 2.5$	2	M1 for $4x > 11 - 1$ or clear attempt to subtract 1 from both sides or clear attempt to divide all 3 terms by 4 or $4x>10$ or $4x=10$ or $4x<10$ etc. A1 oe SC: B1 for 2.5 oe seen if M0 scored.
12		$\frac{15+6}{15} \times 12.5$	17.5	3	M1 for $\frac{DE}{12.5} = \frac{15+6}{15}$ oe**or** $\frac{15}{15+6}$ **or** $\frac{15+6}{15}$ **or** $\frac{7}{5}$ **or** $\frac{5}{7}$ **or** $\frac{2}{5}$ **or** $\frac{5}{2}$ or 1.4 or 0.4 or 2.5 or 0.714…oe M1 for $\frac{15+6}{15} \times 12.5$ or $\frac{21}{15}$ **or** $\frac{7}{5} \times 12.5$ oe **or** $12.5 + \frac{2}{5} \times 12.5$ oe A1 cao
13	(a)		-4,-2,-4,0	2	B2 for all points correctly calculated (B1 for at least 2 calculated correctly)
	(b)		Graph plotted	2	B1 ft for plotting points from their table (allow 1 error) ±1 small square B1 (dep on previous B1) for joining points with a curve; curve within tolerance of all points.

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Question		**Working**	**Answer**	**Mark**	**Notes**
14		$x^2 + 3 = 7x$ $x^2 - 7x + 3 = 0$ $x = \frac{-(-7) \pm \sqrt{(-7)^2 - 4 \times 3}}{2}$ OR $(x - 3.5)^2 = 3.5^2 - 3 = 9.25$ $x - 3.5 = \pm\sqrt{9.25}$	$= \frac{7 \pm \sqrt{37}}{2}$ OR $3.5 \pm\sqrt{9.25}$	3	M1 for $x^2 + 3 = 7x$oe**or** clear intention to multiply all terms by x M1 for $x = \frac{-(-7) \pm \sqrt{(-7)^2 - 4 \times 3}}{2}$ ft from a quadratic equation of the form $ax^2 + bx + c = 0$ where $a,b,c \neq 0$; condone wrong signs for a, b, c in substitution A1 for $x = \frac{7 \pm \sqrt{49 - 12}}{2}$ or for $= \frac{7 \pm \sqrt{37}}{2}$ as the final exact solution. OR M1 for $x^2 + 3 = 7x$oe**or** clear intention to multiply all terms by x M1 for $(x - 3.5)^2 - 3.5^2 + 3 = 0$ ft from a quadratic equation of the form $ax^2 + bx + c = 0$ where $a,b,c \neq 0$ A1 for $3.5 \pm\sqrt{9.25}$ SC : If no marks awarded then B2 for both 6.54(1381265..) **and** 0.458(6187349…)

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Question		**Working**	**Answer**	**Mark**	**Notes**
15		$QR^2 = 14^2 + 9.06^2 - 2.\ 14.\ 9.06\ \cos 62$ $= 196 + 82.08 - 253.68\cos 62$ $= 158.98\ldots.$	12.6	4	B1 for angle $QPR = 62^o$ M1 for $QR^2 = 14^2 + 9.06^2 - 2\times 14\times 9.06\times \cos 62$ M1 for correct order of evaluation **or** 158.9… A1 for 12.6 – 12.62 **or** For methods using trigonometry and Pythagoras No marks until a correct Pythag statement with *QR* as only unknown (Let M be on *PQ* such that angle *RMQ* is 90^o) For example B1 for angle $QPR = 62^o$ M1 for $(QR^2 =)\ 8^2 + (14 - 9.06\cos 62)^2$ M1 for $\sqrt{64+'94.995...'}$ **or** 158.9… A1 for 12.6 – 12.62 SC: B3 for 10.3(5511) or 10.4 using rad **or** 11.6(402014) using grad

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Question		**Working**	**Answer**	**Mark**	**Notes**
16		*AM* = *MC* (given *M* is midpoint) *AL* = *LB* (given *L* is midpoint) *LB* = *MN* (opp sides of a parallelogram) So *AL* = *MN* *BN* = *NC* (given *N* is midpoint) *BN* = *LM* (opp sides of a parallelogram) So *LM* = *NC* triangles are congruent SSS OR *AM* = *MC* (given *M* is midpoint) Angles: *ALM* = *ABN* = *MNC* (corresponding) Angle *AML* = angle *MCN* (corresponding) triangles are congruent ASA OR Angle *CNM* = angle *NML* (alternate) Angle *NML* = angle *MLA* (alternate) SO angle *MLA* = angle *CNB* *AL* = *LB* (*L* midpoint of *AB*) *LB* = *MN* (opp sides of a parallelogram) SO *AL* = *MN* *BN* = *NC* (*N* midpoint of *BC*) *BN* = *LM* (opposite of a parallelogram) SO *LM* = *NC* Triangles are congruent	Proof	3	M1 for either *AM* = *MC* or *AL* = *LB* or *BN* = *NC* M1 for either *LB* = *MN* or *BN* = *LM* A1 conclusion of congruency (eg SSS) with all three sides shown as equal. OR M1 for *AM* = *MC* M1 for either Angle *ALM* = angle *MNC* or Angle *AML* = angle *MCN* or angle *LAM* = angle *NMC* A1 conclusion of congruency (eg ASA) with two angles and one side shown as equal. OR M1 for either *MLA* = *CNM* or *AL* = *LB* or *BN* = *NC* M1 for either *LB* = *MN* or *BN* = *LM* A1 conclusion of congruency (eg SAS) with two sides and one angle shown as equal. SC: include appropriate pair of sides with justification of midpoint rule for M1 in any of the above.

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Question		**Working**	**Answer**	**Mark**	**Notes**
17		2500 ÷ 64.45 = 38.7897595	38.8	4	M1 for 2500 or 1500 seen or 2499 (recurring) M1 for 64.55 or 64.45 seen or 64.5499(recurring) M1 for $area_{max}$ ÷ $length_{min}$eg “2500” ÷ “64.45” A1 for 38.8 or better Accept equivalent working in cm for M marks.

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Order Code UG029748 November 2011

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