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Mark Scheme (Results)

June 2011

GCSE Mathematics (5384H)
Paper 13H (Non-Calculator)

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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If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.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		15 ÷ 10 80 × 1.5 60 × 1.5 30 × 1.5 36 × 1.5	120, 90, 45, 54	3	M2 for any one of 80 + 40 or 60 + 30 or 30 + 15 or 36 + 18 or 120 or 90 or 45 or 54 seen A1 cao OR M1 for 15 ÷ 10 or 3 ÷ 2 or sight of 1.5 M1(dep) for 80 × '1.5' or 60 × '1.5' or 30 × '1.5' or 36 × '1.5' A1 cao OR M1 for 80 ÷ 10 or 60 ÷ 10 or 30 ÷ 10 or 36 ÷ 10 or 8 or 6 or 3 or 3.6 M1(dep) for '8' × 15 or '6' × 15 or '3' × 15 or '3.6' × 15 A1 cao OR M1 for 80 ÷ 2 or 60 ÷ 2 or 30 ÷ 2 or 36 ÷ 2 or 40 or 30 or 15 or 18 M1(dep) for '40' × 3 or '30' × 3 or '15' × 3 or '18' × 3 A1 cao
2	(a)		20	1	B1 cao
	(b)		18	1	B1 cao
	(c)		Graph completed	2	B1 for line from (12.40, 20) to (1.20, 20) ±2mm B1 ft line from "(1.20, 20)" to axis after 1hr 30 mins±2mm.
3		2 × 5 + 3 × −1	7	2	M1 for 2 × 5 and 3 × −1 or 10 and -3 seen A1 cao

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Question		**Working**	**Answer**	**Mark**	**Notes**
4			Shaded region	3	B1 for circular arc radius 3 cm centre P within square (±2mm) B1 for line 2 cm from PS within square (±2mm) B1cao (see overlay)
5			$\frac{1}{8}$	1	B1 for $\frac{1}{8}$ or 0.125 or 8^{-1}oe
6	(a)		Reflection	2	B2 for vertices of shape plotted at (−3, 2), (−3, 3), (−5, 3), (−6, 2.5), (−5, 2) (B1 for a reflection in any vertical or horizontal line)
	(b)		Translation; $\begin{pmatrix}-6\\-1\end{pmatrix}$	2	B1 for translation B1 for 6 left and 1 down OR $\begin{pmatrix}-6\\-1\end{pmatrix}$ Note: B0 if more than one transformation given
7		1 m² = 100 × 100 cm² 4 m² = 40 000 cm²	Decision and explanation	2	B2 for states Callum is not correct with full correct explanation (B1 for 100 × 100 or 10000 seen or for 200 × 200 or 40 000 seen or for = 0.01 × 0.01 or 0.0001 seen or for 0.04 seen)

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Question		**Working**	**Answer**	**Mark**	**Notes**
8		P: T: B = 1: 3: 6 54÷10 × 6 OR e.g. T=3P B=2T So, B=2(3P)=6P P+T+B=P+3P+6P=10P P = 54÷10 = £5.40 B = 6×£5.40	32.40	3	M1 for 1 : 3 : 6 or any 3 numbers in any order in the ratio 1 : 3 : 6 M1 for 54 ÷ (1 + 3 + 6) × 6 A1 for 32.4(0) **Alternatives** M1 for 1: 3: 6 oeor P + 3P + 6P (=10P) oe egT/3 + T + 2T (=10T/3) or egB/6 + B/2 + B (=10B/6) or 5.4(0) or 16.2(0) seen M1 for 54 ÷ 10 × 6 or [54 ÷ " 10/3 "] × 2 or 54 ÷ " 10/6 "oe A1 for 32.4(0) OR M1 for a partial decomposition of £54 in ratio 1:3:6 e.g.(£)5 +(£)15 + (£)30 (=£50) M1 for a decomposition of the remaining amount in the ratio 1:3:6, e.g. 40(p) + 120(p) + 240(p) (=400p) A1 for 32.4(0)

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Question		**Working**	**Answer**	**Mark**	**Notes**
9		1500 − 250 $\frac{1250}{250}\times\frac{100}{1}$	500	3	B1 for "1500 − 250" or difference of 1250 seen M1 for $\frac{"1500-250"}{250}\times\frac{100}{1}$ A1 cao OR M1 for $\frac{1500}{250}\times\frac{100}{1}$ A1 for 600 B1 ft for "600" – 100
10		$4^2 + 3^2$ $\sqrt{25}$	5	3	M1 for sight of "6 − 2"(=4) and "6 − 3"(=3) M1 (dep) for "4"^{2} + "3"^{2} A1 cao

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Question		**Working**	**Answer**	**Mark**	**Notes**
11	(a)	$\frac{1\times2}{5\times3}$	$\frac{2}{15}$	1	B1 for $\frac{2}{15}$ oe
	(b)	$(2-1)+\frac{5}{15}-\frac{6}{15}$ or $\frac{35}{15}-\frac{21}{15}$ or <table><tr><td></td><td>1</td><td>3</td></tr><tr><td>2</td><td></td><td>6</td></tr><tr><td>5</td><td>5</td><td>15</td></tr></table> <table><tr><td></td><td>7</td><td>5</td></tr><tr><td>7</td><td></td><td>35</td></tr><tr><td>3</td><td>21</td><td>15</td></tr></table>	$\frac{14}{15}$	3	M1 for attempt to find a common denominator or sight of $\frac{5}{15}$ or $\frac{6}{15}$ or $\frac{35}{15}$ or $\frac{21}{15}$ oe or a fully correct table A1 for sight of $\frac{5}{15}-\frac{6}{15}$ or $\frac{35}{15}-\frac{21}{15}$ oe A1 for $\frac{14}{15}$ oe Alternative M1 for 0.33(3…) or 0.4 or 2.33(3…) or 1.4 A1 for 0.33(3…) – 0.4 or 2.33(3…) –1.4 A1 for 0.93(recurring)

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Question		**Working**	**Answer**	**Mark**	**Notes**
12	(a)		9	1	B1 cao
	(b)		$\frac{1}{8}$	1	B1 for $\frac{1}{8}$ oe
	(c)		t^6	1	B1 cao
	(d)	$\frac{n^4}{n^5}$	n^{-1}	2	M1 for $\frac{n^4}{n^{3+2}}$ or $\frac{n^4}{n^5}$ or $\frac{n^{4-3}}{n^2}$ or $\frac{n^1}{n^2}$ or $\frac{n^{4-2}}{n^3}$ or $\frac{n^2}{n^3}$ or a correct second step following an incorrectfirst step eg $\frac{n^4}{n^6}=n^{-2}$ oe A1 for n^{-1} (allow $\frac{1}{n}$)

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Question		**Working**	**Answer**	**Mark**	**Notes**
13		$4x + y = 10$ $4x - 6y = 38$ $7y = -28$, $y = -4$ $4x - 4 = 10$, $x = 3.5$ OR $12x + 3y = 30$ $2x - 3y = 19$ + $14x = 49$, $x = 3.5$ $7 - 3y = 19$, $y = -4$ Alternative $y = 10 - 4x$ $2x - 3(10 - 4x) = 19$ $14x - 30 = 19$; $x = 3.5$ $4 \times 3.5 + y = 10$; $y = -4$	$x = 3.5$ $y = -4$	3	M1 for full method to eliminate x or y, allow one error in calculation M1(dep) for substitution of one variable into one of the equations, or by appropriate method after starting again A1 for 3.5 and -4 oe Alternative M1 for full method to rearrange and substitute to eliminate x or y, allow one error in calculation M1(dep) for substitution of one variable into one of the equations, or by appropriate method after starting again A1 for 3.5 and -4 oe
14	(a)		(10), 3, 2, (1), −6	2	B2 for all 3 correct values (B1 for 2 correct values)
	(b)			2	B2 for fully correct graph OR B1 ft for 5 points plotted correctly ± 2mm B1 for smooth curve drawn through points provided B1 awarded in (a)

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Question		**Working**	**Answer**	**Mark**	**Notes**
15		$t(k-2) = tk - 2t = k$ $tk - \text{k} = 2t$ $k(t-1) = 2t$ $k = \frac{2t}{t-1}$	$k = \frac{2t}{t-1}$	4	M1 for attempt to multiply LHS by (k– 2) or sight of $t(k-2)$ or $tk - 2t$ or $tk - 2$ (ignore RHS) M1 for attempt to subtract k from LHS or sight of $tk - k$ (ignore RHS) or attempt to subtract tk to give $-2t = k - kt$(ignore LHS) M1 for attempt to factorise for k e.g. $k(t-1)$ or $k(1-t)$ A1 for $k = \frac{2t}{t-1}$ or $k = \frac{-2t}{1-t}$ oe
16		$\pi x l = 2\pi x^2$ $h^2 + x^2 = 4x^2$ $h^2 = 3x^2$ Alternative $\pi x\sqrt{h^2 + x^2} = 2\pi x^2$ $\sqrt{h^2 + x^2} = 2x$ $h^2 + x^2 = 4x^2$ $h^2 = 3x^2$	$\sqrt{3}x$	4	B1 for curved surface area of one of the shapes eg $\pi x l$ or$2\pi x^2$ M1 for attempt to equate surface areas eg $\pi x l = 2\pi x^2$ or $l = 2x$ M1 for attempt to connect h and x using Pythagoras theorem eg $h^2 + x^2 = 4x^2$ A1 for $\sqrt{3}x$ or $\sqrt{3x^2}$ Alternative B1 $h^2 + x^2 = l^2$ oe M1 for attempt to equate surface areas eg $\pi x\sqrt{h^2 + x^2} = 2\pi x^2$ oe M1 (dep) for attempt to square both sides of their formula eg $h^2 + x^2 = 4x^2$ A1 for $\sqrt{3}x$ or $\sqrt{3x^2}$ If no marks awarded, SC B1 for attempt to equate surface areas in terms of r rather than x

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Question		**Working**	**Answer**	**Mark**	**Notes**
17	(a)	**AB** = **AO** + **OB**	$-2\mathbf{a} + 3\mathbf{b}$	1	B1 for $-2\mathbf{a} + 3\mathbf{b}$ or $3\mathbf{b} - 2\mathbf{a}$oe
	(b)	**OP** = $2\mathbf{a} + \frac{2}{5}(3\mathbf{b} - 2\mathbf{a})$ $= \frac{6}{5}\mathbf{a} + \frac{6}{5}\mathbf{b}$ $= \frac{6}{5}(\mathbf{a} + \mathbf{b})$ Parallel	$\frac{6}{5}(\mathbf{a} + \mathbf{b})$ is parallel to $\mathbf{a} + \mathbf{b}$	3	M1 for $2\mathbf{a} \pm \frac{2}{5}('3\mathbf{b} - 2\mathbf{a}')$ OR $3\mathbf{b} \pm \frac{3}{5}('2\mathbf{a} - 3\mathbf{b}')$ A1 for $\frac{6}{5}\mathbf{a} + \frac{6}{5}\mathbf{b}$oe A1 for $\frac{6}{5}(\mathbf{a} + \mathbf{b})$ is parallel to $\mathbf{a} + \mathbf{b}$oe
18		$\frac{x\times2(x+1)}{2} - \frac{2\times2(x+1)}{x+1} = 1\times2(x+1)$ $x(x+1) - 4 = 2(x+1)$ $x^2 + x - 4 = 2x + 2$ $x^2 - x - 6 = 0$ $(x-3)(x+2) = 0$	$x = 3, -2$	4	M1 for an attempt to multiply one term of the equation by 2 or $(x + 1)$or $2(x+1)$ with or without cancelling or attempt to write LHS with a common denominator M1for attempt to multiply all terms by $2(x + 1)$ with or without cancelling e.g. $\frac{x\times2(x+1)}{2} - \frac{2\times2(x+1)}{x+1} = 1\times2(x+1)$ or $x(x + 1) - 4 = 2(x + 1)$ A1 for$x^2 + x - 4 = 2x + 2$ or $x^2 - x - 6 = 0$ A1 cao for 3 and – 2

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