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Mark Scheme (Results)

November 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If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.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	(a)	$\frac{4}{20} = \frac{2}{10}$	$\frac{1}{5}$	2	M1 $\frac{4}{20}$ oe A1 cao SC B1 for $\frac{16}{20}$ oe if M0 scored
	(b)	$\frac{6}{20} \times 100$ or $\frac{6}{20} = \frac{5\times6}{5\times20}$	30	2	M1 $\frac{6}{20} \times 100$ A1 cao OR M1 $\frac{6}{20} = \frac{5\times6}{5\times20}$ A1 cao
	(c)	10 – 1.50 = 8.50 8.50 ÷ 2 = 4.25 10 ÷ 2 = 5 1.50 ÷ 2 = 0.75 5 + 0.75 =	5.75	2	M1 10 – 1.5(0) = 8.5(0) and '8.50' ÷ 2 (= 4.25) or 10 + 1.5(0) = 11.5(0) and '11.50' ÷ 2 or 10 ÷ 2 and 1.5(0) ÷ 2 or $2x \pm 1.5(0) = 10$ oe A1 cao
2	(a)	2.5 ÷ 0.5	5	2	M1 2.5 ÷ 0.5 accept 2.5 ÷ 30 A1 cao
	(b)		Graph completed correctly	2	B1 line from (2 45pm, 2.5) to (3.45pm, 2.5) B1 line from (3 45pm, 2.5) to (4 30pm, 0) or from (x, 2.5) to (x + 45 mins, 0) Tolerance ±1 square

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Question		**Working**	**Answer**	**Mark**	**Notes**
3		Ext angle = $\frac{360}{6}$ = 60 Int angle = 180 – 60 = 120 120 + 90 = 210 360 – 210 = OR Sum of int angles = 4 × 180 = 720 Int angle = 720 ÷ 6 = 120 120 + 90 = 210 360 – 210 = OR Ext angle = $\frac{360}{6}$ = 60 Ext angle = 90 90 + 60 =	150	4	M1 $\frac{360}{6}$ (=60) M1 (Int angle =) 180 – '60' M1 (dep on at least M1) 360 – ('120' + 90) A1 cao SC B2 answer of 210 OR M1 4 × 180 or 720 seen M1 '720' ÷ 6 M1 (dep on at least M1) 360 – ('120' + 90) A1 cao OR M1 $\frac{360}{6}$ (=60) M1 (Ext angle =) $\frac{360}{4}$ or 180 – 90 or 90 seen as exterior angle on diagram M1 (dep on at least M1) '90' + '60' A1 cao

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Question		**Working**	**Answer**	**Mark**	**Notes**
4		$\frac{2}{3}+\frac{1}{7}=\frac{14}{21}+\frac{3}{21}$ | + | 2 | 3 | | 1 | | 3 | | 7 | 14 | 21 |	$\frac{17}{21}$	2	M1 suitable common denominator (multiple of 21) and at least one of two fractions correct A1 $\frac{17}{21}$ oe NB sight of $\frac{3}{21}$ or $\frac{14}{21}$ alone is **not** sufficient OR Attempt to use decimals, must use at least 2 dp M1 0.66 + 0.14 A1 0.$\dot{8}$0952$\dot{3}$ OR M1 for table structure correct with all cells correct A1 for $\frac{17}{21}$
5	(a)	Vertices at (–4, 2), (–4, 0), (0, 0) and (–2, 2)	Correct translation	2	M1 any translation A1 cao
	(b)	Vertices at (4, 4), (2, 4) and (2, 8)	Correct reflection	2	M1 line $y = x$ drawn or correct reflection in $y = –x$ A1 cao

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Question		**Working**	**Answer**	**Mark**	**Notes**
6		22.5% – 17.5% = 5% $180 \times \frac{5}{100}$ OR 22.5/100 × 180 = 40.50 17.5/100 × 180 = 31.50 40.50 – 31.50 OR 1.225 × 180 = 220.5 1.175 × 180 = 211.5 220.5 – 211.5	9	3	M1 22.5 – 17.5 M1 $180 \times \frac{5}{100}$ oe A1 cao OR M1 $180 \times \frac{22\frac{1}{2}}{100}$ oe or $180 \times \frac{17\frac{1}{2}}{100}$ oe M1 (dep) '40.50' – '31.50' A1 cao OR M1 1.225 × 180 or 1.175 × 180 M1 (dep) '220.5' – '211.5' A1 cao A final answer of 9 obtained with arithmetic errors in working gets M2 A0

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Question		**Working**	**Answer**	**Mark**	**Notes**
7	(a)	$3(2t - 4) = 2t + 12$ $6t - 12 = 2t + 12$ $6t - 2t = 12 + 12$ $4t = 24$	6	3	B1 $6t - 12$ or $2t/3 + 12/3$ M1 correctly isolating their terms in t or their constant terms in an equation A1 cao
	(b)	$(x + 5)(x - 3) = 0$	$-5, 3$	3	M1 $(x \pm 5)(x \pm 3)$ A1 $(x + 5)(x - 3)$ A1 for -5 and 3 **OR** M1 for substitution in formula (condone incorrect signs) M1 for reduction to $\frac{-2 \pm \sqrt{64}}{2}$ A1 for -5 and 3 **OR** M1 for $(x + 1)^2 - 1 - 15 (= 0)$ M1 for $x = -1 \pm \sqrt{16}$ A1 for -5 and 3 **OR** T&I B3 both solutions correct (B1 one solution correct)

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Question		**Working**	**Answer**	**Mark**	**Notes**
8			Diagram	3	B3 fully correct within guidelines OR B1 arc radius 3 cm centre *C* within the guidelines B1 perpendicular bisector of *BD* within the guidelines B1 shading region inside an arc centre *C* below or to the left of a straight line from *AD* to *BC*. Ignore any drawing outside the given rectangle
9		$9x + 12y = 600$ $8x + 12y = 576$ $x = 24$ $3 \times 24 + 4y = 200$ $6x + 8y = 400$ $6x + 9y = 432$ $y = 32$ $3x + 4 \times 32 = 200$	$x = 24$ $y = 32$	4	M1 correct process to eliminate either *x* or *y* (allow one arithmetical error) A1 either $x = 24$ or $y = 32$ M1 (dep on 1st M1) correct substitution of their value of *x* or *y* into one of the equations OR M1 (indep of 1st M1) correct process to eliminate the other variable (allow one arithmetical error) A1 cao for both $x = 24$ and $y = 32$

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Question		**Working**	**Answer**	**Mark**	**Notes**
10	(a)	$6 \times 10^8 \times 4 \times 10^7 = 24 \times 10^{15}$	2.4×10^{16}	2	M1 $24 \times 10^{8+7}$ oe or 24 000 000 000 000 000 or 2.4×10^n A1 cao
	(b)	$6 \times 10^8 + 4 \times 10^7 =$ $6 \times 10^8 + 0.4 \times 10^8$	6.4×10^8	2	M1 $6 \times 10^8 + 0.4 \times 10^8$ or $60 \times 10^7 + 4 \times 10^7$ or 600 000 000 + 40 000 000 or 640 000 000 oe or 6.4×10^n A1 cao
11	(a)(i)		– 0.6 to – 0.5 5.5 to 5.6	3	B1 for both, accept – 0.6 to – 0.5 and 5.5 to 5.6
	(ii)	Draw $y = 6$	– 1.4, 6.4		M1 draw $y = 6$ or one value correct A1 –1.4, 6.4 ± 1 sq
	(b)	Draw $y = x - 4$	$x = 0.2$, $y = -3.8$ $x = 5.8$, $y = 1.8$	3	B1 draw $y = x - 4$ M1 use the points of intersection, can be implied by one value ft their line A1 $x = 0.2$, $y = -3.8$ and $x = 5.8$, $y = 1.8 \pm 1$ sq SC B2 for $x = 3 \pm \sqrt{8}$ and $y = -1 \pm \sqrt{8}$

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Question		**Working**	**Answer**	**Mark**	**Notes**
12	(a)	$-10 - 2 \times 3 \times (-5)^2 = -10 - 150$	-160	2	M1 $-10 - 2 \times 3 \times (-5)^2$ or 75 or 150 or -150 seen A1 cao
	(b)	$y = p - 2qx^2$ $2qx^2 = p - y$ $x^2 = \frac{p-y}{2q}$	$x = \pm\sqrt{\frac{p-y}{2q}}$	3	M1 at least one correct process from: isolate $2qx^2$, divide by q, or by 2 or by $2q$ M1 (dep on M1) attempt to square root both sides of $x^2 = \text{‘}\frac{p-y}{2q}$, A1 $x = \pm\sqrt{\frac{p-y}{2q}}$ oe condone omission of ±
13		Area of triangle $= \frac{1}{2} \times 6 \times 6 \times \sin 30$ Area of sector $= \frac{30}{360} \times \pi \times 6^2$ $\frac{30}{360} \times \pi \times 6^2 - \frac{1}{2} \times 6 \times 6 \times \sin 30$	$3\pi - 9$	4	M1 for ½ × 6 × 6 × sin30 oe M1 for $\frac{30}{360} \times \pi \times 6^2$ oe M1 (dep on at least one previous M1) for subtracting area of triangle from area of sector A1 for $3\pi - 9$ or $3(\pi - 3)$ oe

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Question		**Working**	**Answer**	**Mark**	**Notes**
14		$6^2 - (2\sqrt{3})^2 = 36 - 12 = 24$ Area $= \frac{1}{2} \times 2\sqrt{3} \times \sqrt{24} = \sqrt{72} =$ $\sqrt{36 \times 2} = 6\sqrt{2}$	Proof	5	M1 $6^2 - (2\sqrt{3})^2$ or $\sqrt{48}$ seen or $x^2 + (2\sqrt{3})^2 = 6^2$ oe A1 $\sqrt{24}$ oe M1 (dep on M1) $\frac{1}{2} \times 2\sqrt{3} \times$ '$\sqrt{24}$' A1 $\sqrt{72}$ oe A1 $6\sqrt{2}$ or (k =) 6

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