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Mark Scheme (Results)

November 2011

GCSE Mathematics (1380)
Paper 3H

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November 2011
Publications Code UG029724

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If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.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

1380_3H					
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 fo $\frac{16}{20}$ if M0 scored]
	(b)	$\frac{6}{20}\times 100$ or $\frac{6}{20}=\frac{5\times 6}{5\times 20}$	30	2	M1 $\frac{6}{20}\times 100$ A1 cao or M1 $\frac{6}{20}=\frac{5\times 6}{5\times 20}$ A1 cao
	(c)	10 – 1.50 = 8.50 8.50 ÷2 = 4.25 or 10 ÷ 2 = 5 1.50 ÷ 2 = 0.75	5.75	2	M1 10 – 1.50 (= 8.50) and '8.50' ÷ 2 (= 4.25) or 10 + 1.50 (=11.50) and '11.50' ÷ 2 or 10 ÷ 2 and 1.50 ÷ 2 or $2x \pm 1.5(0) = 10$ oe A1 cao
2	(a)	$4^2 + 6^2 = 2 \times 5^2 + 2$	4th line	1	B1 cao
	(b)	$10^2 + 12^2 = 2 \times 11^2 + 2 = 244$	10th line	2	M1 for two of $10^2 + 12^2$, $2 \times 11^2 + 2$, 244 A1 for a fully correct line 10
	(c)	$2 \times 1000^2 + 2$ $= 2 \times 1\,000\,000 + 2$	2 000 002 or 2 million and 2	2	M1 $2 \times 1000^2 + 2$ A1 for 2 000 002 or 2 million and 2

1380_3H					
Question		**Working**	**Answer**	**Mark**	**Notes**
3		Exterior angle = $\frac{360}{6}$ = 60 Interior angle = 180 – 60 = 120 120 + 90 = 210 360 – 210 = OR Sum of interior angles = 4 × 180 = 720 Interior angle = 720 ÷ 6 = 120 120 + 90 = 210 360 – 210 = OR Exterior angle = $\frac{360}{6}$ = 60 Exterior angle = 90 90 + 60 =	150	4	M1 $\frac{360}{6}$ (= 60) M1 (Interior 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 (Exterior 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
4			3.1	2	M1 sight of 11th value or digits 31 A1 3.1

1380_3H					
Question		**Working**	**Answer**	**Mark**	**Notes**
5	(a)	Vertices at (–4, 2), (–4, 0), (0, 0) and (–2, 2)	Correct translation	2	M1 for 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
6		Distance = 25 + 45 + 30 = 100 Travel time = 100 ÷ 50 = 2 9 am + 2h + 3h **OR** 25 ÷ 50 + 45 ÷ 50 + 30 ÷ 50 = 30 min + 54 min + 36 min = 120 min = 2 hours 9 am + 2h + 3h	2 pm	4	M1 adding 2 or 3 distances with at least 2 correct) M1 '100' ÷ 50 (= 2 hours) M1 9 + 3 + '100 ÷ 50' oe A1 cao **OR** M1 for $\frac{25}{50}$ (= 30 min) or $\frac{45}{50}$ (= 54 min or $\frac{30}{50}$ (= 36 min) M1 for adding 2 or 3 times (from at least 2 correct distances) (= 2 hours) M1 9 + 3 + '30 + 54 + 36' oe A1 cao

1380_3H					
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 $\frac{2t}{3}+\frac{12}{3}$ M1 correctly isolating their terms in t or their constant terms in an equation A1 cao
	(b)	$2(x-y)-3(x-2y)$ $=2x-2y-3x+6y$	$-x+4y$	2	M1 $2x-2y$ or $3x-6y$ or $-3x+6y$ A1 $-x+4y$ or $4y-x$ [SC: B1 for $-x-8y$ or $x+4y$ with or without working if M0 scored]
	(c)	$(x-5)(x+7)$ $= x^2-5x+7x-35$	$x^2+2x-35$	2	M1 3 out of 4 terms correct with correct signs or all 4 terms correct ignoring any sign errors A1 cao
8		$0.5 \times 0.6 = 0.3\ (0)$ 0.3×0.3	0.09	2	B1 0.5 or 0.6 or 0.3 seen B1 cao

1380_3H					
Question		**Working**	**Answer**	**Mark**	**Notes**
9		22.5% – 17.5% = 5% $180 \times \frac{5}{100}$ OR $180 \times \frac{22\frac{1}{2}}{100} = 40.50$ $180 \times \frac{17\frac{1}{2}}{100} = 31.50$ 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 × '$\frac{5}{100}$' 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 [SC: Award M2 A0 for an answer of 9 with 1 arithmetic error]
10		*CBE* = 180 – 2 × 48 = 180 – 96 = 84 *DCB* = 84 OR *CBE* = 180 – 2 × 48 = 180 – 96 = 84 *CBA* = 180 – 84 = 96 *ACB* = 42	42	3	M1 correct method to find < *CBE* or 84 seen at *CBE* on the diagram M1 correct method to find an angle in triangle *ABC* or to find angle *DCB* (these angles may be seen on the diagram) A1 cao

1380_3H					
Question		**Working**	**Answer**	**Mark**	**Notes**
11	(a)	Plot (15, 22) and (55, 15)	Points plotted	1	B1 cao ± ½ square
	(b)		Describe relationship	1	B1 If the temperature increases so the time taken decreases oe (accept negative correlation)
	(c)		18 – 20	2	M1 draw LOBF between (20,18) and (20, 22) to (70,3) and (70,8) A1 18 – 20 (if M0 allow B2 for an answer in the range 18–20)
	(d)		Reason	1	B1 reason e.g LOBF would give negative time, you should not use the LOBF beyond your data
12		$9x + 12y = 600$ $8x + 12y = 576$ $x = 24$ $3 \times 24 + 4y = 200$ $6x + 8y = 400$ $6x + 9y = 432$ $y = 32$ $3x + 4 \times 32 = 200$	$x = 24$ $y = 32$	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 $y = 32$
13	(a)	$(6 \times 10^8) \times (4 \times 10^7) = 24 \times 10^{8+7}$ 24×10^{15}	2.4×10^{16}	2	M1 $24 \times 10^{8+7oe}$ 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 $6\times10^8 + 0.4\times10^8$ or $60\times10^7 + 4\times10^7$ or 600 000 000 + 40 000 000 or 640 000 000 oe or 6.4×10^n A1 cao

1380_3H					
Question		**Working**	**Answer**	**Mark**	**Notes**
14	(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)		–1.4, 6.4		M1 draw $y = 6$ or one value correct A1 –1.4, 6.4 ± 0.2
	(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 $x = 5.8$, $y = 1.8$ ± 1 sq [SC: B2 for $x = 3 \pm \sqrt{8}$, $y = -3 \pm \sqrt{8}$ if B0 A0 scored]
15	(a)		$200 < C \leq 400$	1	B1 cao
	(b)		7, 18, 27, 37, 45, 50	1	B1 cao
	(c)		correct cumulative frequency diagram	2	B1 ft for all 6 points plotted correctly (± 1 sq) at top end of intervals dep on sensible table B1 ft (dep on previous B1) for points joined by curve/line segments [SC: B1 ft from sensible table for 6 points plotted not at ends but consistently within each interval **and** joined or 5 'points' correctly plotted at the top end of intervals]
	(d)	50 – 32	17 – 19	2	M1 Line drawn up to the cumulative frequency graph at 700 or correct reading at 700 ± ½ square or 31 – 33 seen A1 ft graph

1380_3H					
Question		**Working**	**Answer**	**Mark**	**Notes**
16		½ (12 + 8) × 6 = 60 '60' × 20 = 1200 1200 × 5 = 6000 6000 ÷ 1000 = 6	6	5	M1 ½ (12 + 8) × 6 oe or 60 seen M1 (dep) '60' × 20 M1 (indep) '1200' × 5 A1 6000 cao A1 ft (dep on 1st or 3rd M1 scored) for 6
17	(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 $x^2 =$ ' $\frac{p-y}{2q}$, A1 $x = \pm\sqrt{\frac{p-y}{2q}}$ oe condone omission of ±
18	(a)		1	1	B1 cao
	(b)		–2	1	B1 cao
	(c)	$9^{-3/2} = 1/9^{3/2} = 1/3^3$	$\frac{1}{27}$	2	M1 use of reciprocal eg $1/9^{3/2}$ or square root eg 3^{-3}, $\frac{1}{3^3}$ or $\sqrt{729}$ seen or 27 seen or – 27 seen A1 cao

1380_3H					
Question		**Working**	**Answer**	**Mark**	**Notes**
19		$ACB = 90^o$ angle in a semi circle $CBD = 180 - ACB$ co-interior angles add to 180° $CBD = 90°$ $DCB = CDB = (180^o - 90^o) \div 2$ base angles of an isosceles triangles	45	4	B1 $ACB = 90$ (could be on the diagram) or 45 seen in a correct position on the diagram B1 answer of 45 B1 angle in a semicircle = 90 B1 base angles isosceles triangle are equal or alternate angles are equal
20	(a)	$2x^2 - 9x + 4 = (2x - 1)(x - 4)$	$(2x - 1)(x - 4)$	2	M1 $(2x \pm 1)(x \pm 4)$ A1 cao
	(b)	$(2x - 1)(x - 4) = (2x - 1)^2$ $2x - 1 = 0$ or $x - 4 = 2x - 1$ for $x = ½$ or $x = -3$ OR $2x^2 - 9x + 4 = 4x^2 - 4x + 1$ $2x^2 + 5x - 3 = 0$ $(2x - 1)(x + 3) = 0$ OR $(2x - 1)(x - 4) = (2x - 1)^2$ $(2x - 1)[2x - 1 - (x - 4)] = 0$ $(2x - 1)(x + 3) = 0$	$x = \frac{1}{2}, -3$	4	M1 '$(2x - 1)(x - 4)$' $= (2x - 1)^2$ M1 dep for $2x - 1 = 0$ or for $x - 4 = 2x - 1$ oe A1 for $x = ½$ or $x = -3$ A1 cao OR M1 attempts to expand RHS (at least 3 terms with two correct) M1 dep attempts to get $ax^2 + bx + c = 0$ (allow one error) or $2x^2 + 5x - 3$ seen A1 $(2x - 1)(x + 3)$ seen or correct substitution into the quadratic formula A1 cao OR M1 '$(2x - 1)(x - 4)$' $= (2x - 1)^2$ M1 dep attempt to factorise $(2x - 1)[2x - 1 - (x - 4)]$ A1 $(2x - 1)(x + 3)$ seen A1 cao [SC: Answer of -3 or ½, no working, scores B1]

1380_3H					
Question		**Working**	**Answer**	**Mark**	**Notes**
21		$6^2-(2\sqrt{3})^2=36-12=24$ 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 $(2\sqrt{3})^2+x^2=6^2$ 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 $(k)=6$
22	(a)	Probability tree diagram	$\frac{6}{10}, \frac{4}{10}$ $\frac{8}{11}, \frac{3}{11}, \frac{7}{11}, \frac{4}{11}$	2	B1 $\frac{6}{10}, \frac{4}{10}$ oe on first two branches B1 $\frac{8}{11}, \frac{3}{11}, \frac{7}{11}, \frac{4}{11}$ on remaining branches
	(b)	$\frac{6}{10}\times\frac{8}{11}+\frac{4}{10}\times\frac{4}{11}$ $=\frac{48}{110}+\frac{16}{110}$ $=\frac{64}{110}=\frac{32}{55}$	$\frac{64}{110}$	4	M3 $\frac{6}{10}\times\frac{8}{11}+\frac{4}{10}\times\frac{4}{11}$ oe (M2 $\frac{6}{10}\times\frac{8}{11}$ or $\frac{4}{10}\times\frac{4}{11}$ oe or $\frac{6}{10}\times$ their $\frac{8}{11}+\frac{4}{10}\times$ their $\frac{4}{11}$ oe) (M1 their $\frac{6}{10}\times$ their $\frac{8}{11}$ or their $\frac{4}{10}\times$ their $\frac{4}{11}$ oe provided each component < 1) A1 $\frac{64}{110}$ oe

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Order Code UG029724 November 2011

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