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Mark Scheme (Results)

June 2011

GCSE Mathematics (1380)
Paper 4H

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June 2011
Publications Code UG028365

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If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.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_4H					
Question		**Working**	**Answer**	**Mark**	**Notes**
1	(a)	$1 - (0.2 + 0.1 + 0.5)$ $= 1 - 0.8$	0.2	2	M1 for $1 - (0.2 + 0.1 + 0.5)$ oe A1 for 0.2 oe
	(b)	800×0.2	160	2	M1 for 800×0.2 oe A1 cao
2			Correct enlargement s.f. $\frac{1}{2}$, centre P	3	B3 for correct enlargement s.f. $\frac{1}{2}$ centre P (B2 for correct enlargement s.f. $\frac{1}{2}$, incorrect centre or correct enlargement P, s.f $\neq \frac{1}{2}, 1$, centre P) (B1 for correct enlargement s.f $\neq \frac{1}{2}, 1$,, incorrect centre or for 2 sides correctly enlarged, s.f. $\frac{1}{2}$)
3	(a)		$3 \times 3 \times 5$	2	M1 for 9×5 or 3×15 or 3, 3, 5 seen or a fully correct factor tree or $3 \times 3 \times 5 \times 1$ A1 for $3 \times 3 \times 5$ or $3^2 \times 5$
	(b)		15	2	M1 for $30 = 3 \times 2 \times 5$ or a fully correct factor tree A1 cao Or M1 for at least 4 correct factors of 30 and at least 4 correct factors of 45 with in each case at most 1 incorrect factors A1 cao SC B1 for 3 or 5

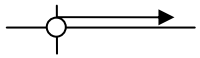
1380_4H					
Question		**Working**	**Answer**	**Mark**	**Notes**
4		x | –2 | –1 | 0 | 1 | 2 | 3 y | –10 | –6 | –2 | 2 | 6 | 10	correct line	3	**(Table of values)** M1 for at least 2 correct attempts to find points by substituting values of x. M1 ft for plotting at least 2 of their points (any points plotted from their table must be correct) A1 for correct line between -2 and 3 **(No table of values)** M2 for at least 2 correct points (and no incorrect points) plotted OR line segment of $4x$-2 drawn (ignore any additional incorrect segments) (M1 for at least 3 correct points with no more than 2 incorrect points) A1 for correct line between -2 and 3 **(Use of y=mx+c)** M2 for line segment of $4x$-2 drawn (ignore any additional incorrect segments) (M1 for line drawn with gradient of 4 OR line drawn with a y intercept of -2 and a positive gradient) A1 for correct line between -2 and 3-
5		$\pi(6)^2 - \pi(5)^2$ $= 113(.0973\ldots) - 78.5(398\ldots)$ $=34.55751919$	34.6	3	M1 for $\pi(6)^2$ oe or $\pi(5)^2$ oe or 113… or 78.5… M1 for $\pi(6)^2 - \pi(5)^2$ oe A1 for 34.5 - 34.6

1380_4H					
Question		**Working**	**Answer**	**Mark**	**Notes**
6	(a)		1 | 6 8 2 | 1 5 7 8 8 3 | 0 6 6 6 8 4 | 1 5 8 8 Key: 1 | 6 = 16	3	B2 for a fully correct ordered diagram (B1 for correct unordered diagram or ordered with at most two errors or omissions) B1 for a correct key (Accept stem written as 10, 20 etc but key only acceptable if consistent with this)
	(b)	Middle numbers = 30 and 36	33	2	B2 for 33 or ft from ordered stem and leaf diagram (B1 for '30,36' written or both ringed in the ordered stem and leaf diagram or in a fully ordered list ft or indicated in an unambiguous way)
7		$\frac{3}{4} \times 120 = 90$ 120 – 90 = 30 left 30 ÷ 3	10	3	M1 for $\frac{3}{4} \times 120$ oe or 90 or $\frac{1}{4} \times 120$ oe or 30 M1(dep) for '30' – (2 × '30' ÷ 3) oe or $\frac{1}{3} \times$ '30' oe A1 cao
8			draw rotation	2	B2 for correct rotation, correct centre (B1 for correct orientation or 90° anticlockwise about O)

1380_4H					
Question		**Working**	**Answer**	**Mark**	**Notes**
9		$\frac{1}{2}(8\times 15)\times 2 + (17\times 10)$ $+ (15\times 10) + (8\times 10)$ $= 60 + 60 + 170 + 150 + 80$	520 cm^2	4	M1 a correct expression for area of one face M1 for five area expressions added (at least three correct) A1 cao NB: if volume calculated then no marks B1 (indep) for cm^2
10	(a)		$7e + 2f$	2	B2 cao (B1 for $7e$ or $+ 2f$ seen)
	(b)	$8x - 4 = 3x - 19$ $8x - 3x = -19 + 4$ $5x = -15$	-3	3	B1 for $8x - 4$ or $3x/4 - 19/4$ seen correctly oe M1 for a fully correct process which results in the terms in x or the constant terms being on one side of the equation from '$ax+b$' = '$cx+d$' $b\neq 0$ A1 cao
	(c)	$y + 4 = 150$ $y = 150 - 4$	146	2	M1 for $y + 4 = 30\times 5$ or $\frac{y}{5} = 30 - \frac{4}{5}$ oe A1 for 146
11	(a)		0	1	B1 cao
	(b)	$(0 + 6 + 14 + 24 + 8) \div 32$ $= 52 \div 32 = 1.625$	1.625	3	M1 for multiplying $f\times x$ (at least 3 correct) M1 (dep) for $\sum fx \div \sum f$ A1 for 1.625, 1.62, 1.63, 1.6 $1\frac{5}{8}$

1380_4H

Question		Working	Answer	Mark	Notes
12		x | $x^3 + 5x$ 3 | 42 3.4 | 56.(304 3.5 | 60.(375 3.6 | 64.(656 3.7 | 69.(153 3.8 | 73.(872 3.9 | 78.(819 4 | 84 3.65 | 66.8(77 3.66 | 67.3(27 3.67 | 67.7(80 3.68 | 68.2(36 3.69 | 68.6(93	3.7	4	B2 for a trial between 3 and 4 exclusive (B1 for a trial between 3 and 4 inclusive) B1 for a different trial of $3.65 \leq x < 3.7$ B1 (dep on at least one previous B1) for 3.7 NB Trials should be evaluated to at least 2 s.f truncated or rounded for values of x correct to 1 dp. Trials should be evaluated to at least 1 dp for values of x correct to 2 dp truncated or rounded. No working scores 0 marks
13	(a)	$\sqrt{\dfrac{920 - 364.5661765}{0.046}}$ $= \sqrt{12074.64834...}$	109.88(47047)	2	B2 for 109.88(….. (B1 for 12074 seen …. or 555.43seen …or 109 to 110)
	(b)		110	1	B1 f.t. provided answer to (a) is more than 3 s.f.

1380_4H					
Question		**Working**	**Answer**	**Mark**	**Notes**
14	(a)(i)		$4(3n + 1)$	1	B1 cao
	(ii)		$3(n + 4)$	1	B1cao
	(b)		$2n + 1$	1	B1cao
15	(a)			2	B2 for an open circle at –3 with either an arrow to the right or a line segment from –3 to at least 5, ±2 mm (B1 for an open circle at –3 with either an arrow to the left or an incorrect line segment OR a closed circle or no circle at –3 with either an arrow to the right or a line segment from –3 to at least 5 ±2 mm)
	(b)	$7y \leq 8 - 36$ $7y \leq -28$	$y \leq -4$	2	M1 for a correct process to isolate $7y$ in an inequality or $y = -4$ or $y < -4$ A1 cao

1380_4H					
Question		**Working**	**Answer**	**Mark**	**Notes**
16		(100% – 10%)×Normal Price=£4.86 Normal Price = £4.86 ÷ 0.9	£5.40	3	M1for '4.86 is 90%' or (100% – 10%) × Normal Price = 4.86 or 4.86 ÷ 90 M1 for 4.86 ÷ 0.9 or 4.86 × 10 ÷ 9 oe A1 £5.40 (accept 5.4) OR M1 10% = £0.54 or £4.86 ÷ 9 M1 (dep) £4.86 + '£0.54' A1 £5.40 (accept 5.4)
17	(a)	$BC \div 12 = 10 \div 6$ $BC = 10 \times 12 \div 6$	20	2	M1 for 12 ÷ 6 or 6 ÷ 12 or 10 ÷ 6 or 6 ÷ 10 oe or a decimal equivalent including 1.6, 1.66...., 1.67 or 1.7 A1 19.9 – 20.4
	(b)	$PR \div 18 = 6 \div 10$ $PR = 6 \times 18 \div 10$	10.8	2	M1 for $6 \times 18 \div 10$ oe or $18 \div (1.6, 1.66..., 1.67, 1.7)$ oe or a complete method ft '20' eg 12 ÷'20'× 18 A1 for 10.8

<table>
<tr><th colspan="6">1380_4H</th></tr>
<tr><th colspan="2">Question</th><th>Working</th><th>Answer</th><th>Mark</th><th>Notes</th></tr>
<tr><td>18</td><td>(a)</td><td></td><td>$c^{8}k^{20}$</td><td>1</td><td>B1</td></tr>
<tr><td></td><td>(b)</td><td>$12x^2 - 3x + 20x - 5$
OR
<table><tr><td>×</td><td>3x</td><td>(+) 5</td></tr><tr><td>4x</td><td>$12x^2$</td><td>(+)20x</td></tr><tr><td>−1</td><td>−3x</td><td>−5</td></tr></table></td><td>$12x^2 + 17x - 5$</td><td>2</td><td>B2 for fully correct
(B1 for 3 out of 4 terms correct in working including signs OR 4 terms correct, ignore signs. In a grid the 20x need not be signed)</td></tr>
<tr><td></td><td>(c)</td><td>$(x - 5)(x + 2) = 0$</td><td>5 and −2</td><td>3</td><td>M1 for $(x \pm 5)(x \pm 2)$
A1 for $(x - 5)(x + 2)$ (= 0)
B1 ft (dep on M1) for $x = 5$ and −2
or
M1 for correct substitution in formula allow sign errors in b and c
M1 for reduction to $\frac{3 \pm \sqrt{49}}{2}$
A1 for 5 and −2
or
M1 for $(x - \frac{3}{2})^2 - \left(\frac{3}{2}\right)^2 - 10 = 0$
M1 for $\frac{3}{2} \pm \sqrt{\frac{49}{4}}$
A1 for 5 and −2

or
T&I B3 both roots
(B1 one root)</td></tr>
</table>

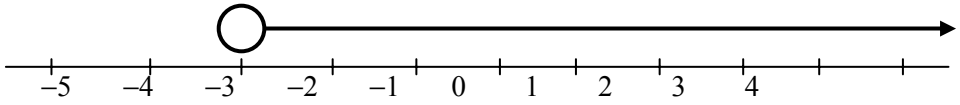
1380_4H					
Question		**Working**	**Answer**	**Mark**	**Notes**
19		$(6.21795 \times 10^{10}) \div 510\,072\,000$ $= 121.9(03378\ldots)$	1.22×10^{2}	3	M1 for SA Jupiter ÷SA Earth eg $(6.21795 \times 10^{10}) \div 510\,072\,000$ oe, eg $62000 \div 51$ or digits 121 …. or digits 122 A1 for 121 – 122 A1 for $1.21 \times 10^{2} - 1.22 \times 10^{2}$
20			$c^2(b + d)$ $\pi a^2 b$ $\frac{2a^3 d}{c}$	3	B3 for all 3 correct, no extras (B2 for 2 or 3 correct and 1 incorrect) (B1 for 1 correct and at most 2 incorrect)
21	(i) (ii)		54 reason	1 1	B1 cao B1 for angles in the same segment (are equal), or angles subtended at the circumference by the same chord (are equal) or angles subtended at the circumference by the same arc (are equal)
22		$700 \div (750 + 700 + 900) \times 50$ $= 700 \div 2350 \times 50$ $= 14.8936\ldots$	15	2	M1 for $700 \div (750 + 700 + 900) \times 50$ or 14.8….or 14.9 seen A1 cao

1380_4H					
Question		**Working**	**Answer**	**Mark**	**Notes**
23	(a)	$x(2x + 6) - 3x = 100$ $2x^2 + 6x - 3x = 100$ $2x^2 + 3x - 100 = 0$	Proof	3	M1 for a correct algebraic expression for the area of at least one rectangle eg $x(2x + 6)$ or $2x^2+6x$ or $3x$ oe M1 for a correct algebraic expression for the area of the unshaded region eg $x(2x + 6) - 3x$ (= 100) or for eg x(2x+6)=100+3x A1 for completion from eg $2x^2 + 6x - 3x$ (= 100) oe
	(b)	$a = 2 \quad b = 3 \quad c = -100$ $x = \dfrac{-3 \pm \sqrt{3^2 - 4(2)(-100)}}{2(2)}$ $= \dfrac{-3 \pm \sqrt{809}}{4}$ = 6.36073… or −7.86073… **OR** $x^2 + 3/2\,x - 50 = 0$ $(x + \frac{3}{4})^2 - (\frac{3}{4})^2 - 50 = 0$ $x + \frac{3}{4} = \pm\sqrt{(\frac{3}{4})^2 + 50}$ x = 6.36073… or −7.86073…	6.36	4	M1 for correct substitution in formula allow sign errors in b and c M1 for reduction to $\frac{-3\pm\sqrt{809}}{4}$ or $\frac{-3+\sqrt{809}}{4}$ A1 for 6.36 to 6.365 or −7.86 to −7.865 A1 for 6.36 to 6.365 OR M1 for $(x + \frac{3}{4})^2$ M1 for $-\frac{3}{4} \pm \sqrt{\frac{9+800}{16}}$ or $-\frac{3}{4} + \sqrt{\frac{9+800}{16}}$ A1 for 6.36 to 6.365 or −7.86 to −7.865 A1 for 6.36 to 6.365 SC: T&I scores 1 mark for 1 correct root or 4 marks for correct length

1380_4H					
Question		**Working**	**Answer**	**Mark**	**Notes**
24		$(\frac{5}{10}\times\frac{4}{9})+(\frac{3}{10}\times\frac{2}{9})+(\frac{2}{10}\times\frac{1}{9})$ $=\frac{20+6+2}{90}$	$\frac{28}{90}$	4	B1 for $\frac{4}{9}$ or $\frac{2}{9}$ or $\frac{1}{9}$ seen as 2nd probability M1 for $(\frac{5}{10}\times\frac{4}{9})$ or $(\frac{3}{10}\times\frac{2}{9})$ or $(\frac{2}{10}\times\frac{1}{9})$ M1 for $(\frac{5}{10}\times\frac{4}{9})+(\frac{3}{10}\times\frac{2}{9})+(\frac{2}{10}\times\frac{1}{9})$ A1 for $\frac{28}{90}$ oe SC Sample Space . B4 for $\frac{28}{90}$ Otherwise B0 Alternative scheme for replacement B0 for 2nd probability with denominator 10 M1 for $(\frac{5}{10}\times\frac{5}{10})$ or $(\frac{3}{10}\times\frac{3}{10})$ or $(\frac{2}{10}\times\frac{2}{10})$ M1 for $(\frac{5}{10}\times\frac{5}{10})+(\frac{3}{10}\times\frac{3}{10})+(\frac{2}{10}\times\frac{2}{10})$ A0 S.C. If M0 scored, award B2 for $\frac{38}{100}$ oe

1380_4H					
Question		**Working**	**Answer**	**Mark**	**Notes**
25	(a)	$BC = \sqrt{8^2 - 3^2} = \sqrt{55} =$ 7.416198... CD = 7.416… ÷ sin 50° = 9.6811….	9.68	4	M1 for $8^2 - 3^2$ oe M1(dep) for $\sqrt{8^2 - 3^2}$ or 7.41… or 7.42 seen Or M1 for $A = \cos^{-1}\left(\frac{3}{8}\right)$ (=67.98°) M1(dep) for $3 \times \tan'67.98'$ or 7.41… or 7.42 seen M1 for '7.4.....' ÷ sin 50 A1 for 9.67 – 9.69 SC B3 for -28.2 to -28.3 using rad or 10.4 – 10.5 using grad
	(b)	$CE^2 = 19^2 + 9.68^2 - 2(19)(9.68) \cos 40$ = 361+93.7024–367.84(0.766) = 172.920612 CE = 13.1499…	13.1	3	M1 for (CE^2 =) 19^2 + '(9.68)'^{2} – 2 (19) '(9.68)' cos 40 M1(dep) for correct order of evaluation to reach $\sqrt{'172.920612'}$ A1 for 13.1– 13.15 SC B2 26.4(5805…) or 26.5 used radians or 12.5(3449…) used gradians
26		LB of 218 = 217.5 UB of 12.6 = 12.65 217.5 ÷ 12.65 = 17.1936…	17.1936....	3	B1 for 217.5 or 12.65 or $12.64\dot{9}$ seen M1 for LB of 218 ÷ UB of 12.6 where $217.5 \leq LB < 218$ and $12.6 < UB \leq 12.65$ A1 17.19 – 17.2

15(a)



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Order Code UG028365 June 2011

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