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Mark Scheme (Results)

Summer 2010

GCSE

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

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If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.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

Unless otherwise stated, when an 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)

5384H/13H				
Question	**Working**	**Answer**	**Mark**	**Notes**
1	$\frac{120}{200}\times 100$ OR $\frac{120}{200} = \frac{60}{100}$	60	2	M1 for $\frac{120}{200}\times 100$ A1 cao OR M1 for $\frac{120}{200}\div\frac{2}{2}$ oe e.g. $\frac{60}{100}$ seen A1 cao
2 (a)	$2\times 5+12$	22	2	M1 for 2×5 or 10 seen A1 cao
(b)	$22 = 4w-2$ $w = (22+2)\div 4$	6	2	M1 for $22 = 4w-2$ or for $22+2\div 4$ oe A1 cao
3		Triangle at (1, −2), (−1, −2), (1, −5)	2	B2 for triangle at (1,-2), (-1,-2), (1,-5) (B1 for rotation of 180° about the wrong centre or for a rotation of $90°$, centre (1,0) clockwise or anticlockwise)

Question	Working	Answer	Mark	Notes
4		Translation by $\begin{pmatrix} 3 \\ -2 \end{pmatrix}$	2	B1 for translation B1 (indep) for $\begin{pmatrix} 3 \\ -2 \end{pmatrix}$ or 3 to the right and 2 down oe Note: B0 if more than one transformation given.
5 (a)		10 10	1	B1 for 10 10 oe
(b)		13 – 14	1	B1 for answer in range 13–14 inclusive
(c)		Line from (11 10, 40) to (11 50, 0)	1	B1 for line drawn from (11 10, 40) to (11 50, 0) ±2mm
6 (a)		Accurate drawing	2	B2 cao (any orientation) ±2mm (B1 for any isometric drawing of a cuboid) Ignore presence of hidden lines
(b)	4×3	12	2	M1 for a correct method to find the area of one "face" of the cuboid A1 cao or ft from (a)

Question	Working	Answer	Mark	Notes
7	$\frac{1}{2}\times 3\times 4\times 20$	120	2	M1 for $\frac{1}{2}\times 3\times 4\times 20$ A1 cao
8	$300\div 6=50$ $300\div 10\times 3=90$ $300-50-90$ OR $\frac{1}{6}+\frac{3}{10}=\frac{7}{15}$ $\frac{7}{15}\times 300=140$ $300-140$	160	4	M1 for $300\div 6$ or 50 seen M1 for $300\div 10\times 3$ oe or $30+30+30$ or 90 seen M1 (dep on at least 1 previous M1) for $300-"50"-"90"$ A1 cao OR M1 for $\frac{1}{6}+\frac{3}{10}$ or $\frac{7}{15}$ oe M1 for $"\frac{7}{15}"\times 300$ or 140 seen or $1-"\frac{7}{15}"$ or $\frac{8}{15}$ oe seen M1 (dep on at least 1 previous M1) for $300-"140"$ or 160 seen or $"\frac{8}{15}"\times 300$ A1 cao
9	$360\div 5$ OR $180-(3\times 180\div 5)$	72	2	M1 for $360\div 5$ or $180-(3\times 180\div 5)$ oe A1 cao

Question	Working	Answer	Mark	Notes
10 (a)		3, −3, −1	2	B2 for all 3 correct (B1 for 1 or 2 correct)
(b)		Graph	2	B2 for a fully correct graph OR B1 ft for "7 points" plotted correctly ±2mm B1 for smooth curve drawn through their points provided B1 awarded in (a) Note: a straight line drawn from (-1, -3) to (0, -3) gets a maximum of B1
(c)		−2.3 and 1.3	1	B1 for -2.3 and 1.3 or ft ±2mm on a graph with exactly 2 points of intersection with the *x* axis
11 (a)	$P = x + x + x + x$	$P = 4x$	1	B1 for any correct expression for *P* in terms of *x*, eg. $P = 4x$, $P = 4 \times x$, $P = x + x + x + x$
(b)	$A = x^2 \quad x = \frac{P}{4} \quad A = \frac{P}{4} \times \frac{P}{4}$	$A = \frac{P^2}{16}$	2	M1 rearrange the *P* equation to make *x* the subject, may be implied by $\frac{P}{4}$ seen A1 $A = \frac{P^2}{16}$ oe

Question	Working	Answer	Mark	Notes
12	$4000-\frac{10}{100}\times 4000$ = 3600 $3600-\frac{10}{100}\times 3600$	3240	3	M1 for $4000-\frac{10}{100}\times 4000$ or 0.9×4000 oe or sight of 3600 or 400 or 3200 or 800 seen M1 (dep) $"3600"-\frac{10}{100}\times"3600"$ oe or $"3600"\times 0.9$ A1 cao OR M2 for 4000×0.9^2 (M1 for 4000×0.9^3) A1 cao SC: B2 for answer of 4840, with or without working
13 (a)		$a^2(c+b)$ $4abc$	2	B1 for $a^2(c+b)$ B1 for $4abc$ (−1 for each additional answer to a minimum of 0)
(b)	8×100×100×100	8 000 000 or 8×10^6 or 8 million	2	M1 for sight of 10^6 oe or $100\times 100\times 100$ or $200\times 200\times 200$ A1 for 8 000 000 or 8×10^6 or 8 million

Question	Working	Answer	Mark	Notes
14	$6x + 4y = 16$ $6x + 15y = -6$ $-11y = 22$ $6x + 4 \times -2 = 16$ OR $x = \frac{8 - 2y}{3}$ $2\left(\frac{8-2y}{3}\right) + 5y = -2$ $16 - 4y + 15y = -6$ $11y = -22$ $6x + 4 \times -2 = 16$	$x = 4$, $y = -2$	4	M1 for correct process to eliminate either x or y (condone one arithmetic error) A1 for either $x = 4$ or $y = -2$ M1 (dep on 1st M1) for correct substitution of their found variable or (indep) for correct process to eliminate either x or y (condone one arithmetic error) A1 cao for both $x = 4$ and $y = -2$ SC B1 for $x = 4$ or $y = -2$ if M0 scored

Question	Working	Answer	Mark	Notes
15	Gradient = $\frac{10--2}{3-0}$	$y = 4x - 2$	3	M1 for gradient = $\frac{10--2}{3-0}$ or $(y =)4x + c$ or a right-angled triangle with sides 12 and 3 shown M1 for $(y =)\, mx - 2$, $m \neq 0$, or $10 = 3m + c$ or $-2 = 0m + c$ A1 for $y = 4x - 2$ oe (the y must be included in the equation)
16 (i) (ii) (iii)		1 8 $\frac{4}{9}$	4	B1 cao B1 for 8 or -8 or ±8 M1 for $\left(\frac{8}{27}\right)^{\frac{2}{3}}$ or $\left(\frac{3}{2}\right)^{-2}$ or $\left(\frac{2}{3}\right)^{2}$ or $\frac{1}{\left(\sqrt[3]{\frac{27}{8}}\right)^{2}}$ or better or $\frac{9}{4}$ seen A1 cao

Question	Working	Answer	Mark	Notes
17	$x^2 - 4x - 12 = 0$ $(x-6)(x+2) = 0$ $x = 6, -2$ OR $x^2 - 4x - 12 = 0$ $x = \frac{--4 \pm \sqrt{(-4)^2 - 4\times1\times(-12)}}{2\times1}$ $x = \frac{4 \pm \sqrt{64}}{2}$ $x = 6, -2$	6, −2	4	B1 for $x^2 - 4x - 12 (= 0)$, can be implied by M2 M1 for $(x \pm 6)(x \pm 2)$ M1 for $(x-6)(x+2)$ A1 cao 6 and −2 OR B1 for $-x^2 + 4x + 12 (= 0)$, can be implied by M2 M1 for $(6 \pm x)(2 \pm x)$ M1 for $(-x+6)(x+2)$ A1 cao 6 and −2 OR B1 for $x^2 - 4x - 12 (= 0)$, can be implied by M2 or by correct values of *a*, *b* and *c* M1 for substitution of ±1, ±4 and ±12 into formula (condone incorrect signs) M1 for $x = \frac{4 \pm \sqrt{64}}{2}$ or $x = \frac{-4 \pm \sqrt{64}}{-2}$ A1 cao 6 and −2 OR T&I B4 both solutions correct (B1 one correct solution)

Question	Working	Answer	Mark	Notes
18	*PQT* = 58° (Alternate segment theorem) *QTP* = (180 – 58)/2 (= 61°) (Isosceles triangle) *OTQ* = 61 – (90–58) (Angle between tangent and radius) OR *OTP* = 90 – 58 (=32°) (Angle between tangent and radius) *OTP* = *OPT* = 32° (Isosceles triangle) *POT* = 180 – 32 – 32 = 116° (Angles in a triangle) *PQT* = 116÷2 = 58° (Angle at centre is twice angle at circumference) *QTP* = (180 – 58)/2 (= 61°) (Isosceles triangle) *OTQ* = 61 – (90–58) (Angle between tangent and radius)	29	5	M1 for *PQT* = 58° or $\frac{1}{2}$ (180 – (2 × (90 – 58)) M1 (dep) for *QPT* or *QTP* = (180 – "58")/2 A1 for *OTQ* = 29° B2 for fully correct reasons (B1 for alternate segment theorem or equivalent circle theorems leading to *PQT*)

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