

Mark Scheme (Results) November 2010

GCSE

GCSE Mathematics (1380)
Paper 3H

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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	ft - follow through	isw - ignore subsequent working
SC: special case	dep - dependent	oe - or equivalent (and appropriate)
indep - independent		

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If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.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

1380/3H								
Question	Working	Answer	Mark	Notes				
1	$24 \div 2$	36	2	M1 for $24 \div 2$ or $\frac{3}{2} \times 24$ oe or 12 A1 cao				
2 (a)		p^4	1	B1 cao				
(b)		$6cd$	1	B1 for $6cd$				
3 (a)		<table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>13</td> <td>15</td> </tr> <tr> <td>15</td> <td>17</td> </tr> </table>	13	15	15	17	1	B1 cao
13	15							
15	17							
(b)		(4, 7), (6, 5), (8, 3)	2	B2 for all 3 pairs (numbers in any order in each pair, condone use of addition sign) and no extra pairs (B1 for one or two or three correct pairs and no more than three extra pairs given, ignoring repeats)				
(c)		$\frac{3}{20}$ oe	2	B2 ft accept answer as fraction or decimal or percentage (B1 for $\frac{x}{20}$, $x < 20$, $x \neq 3$ or $\frac{3}{x}$, $x > 3$, $x \neq 3$) SC: If no marks scored award B1 for '3 out of 20' as final answer or other use of incorrect notation				

1380/3H				
Question	Working	Answer	Mark	Notes
4 (a)		$4n - 2$	2	B2 for $4n - 2$ (oe including unsimplified) (B1 for $4n$ or $4n + k$, $k \neq -2$ or $4n - k$, $k \neq 2$ or $n = 4n - 2$)
(b)(i)	$10 - 3^2$	1	2	B1 cao
(ii)	$10 - 5^2$	- 15		B1 cao
5	$\pi \times 10^2$	314	2	M1 for $\pi \times 10^2$ oe or 3.14×10^2 oe or 100π A1 for 314 oe
6	$\frac{4000}{200 \times 5}$	4	2	M1 for rounding at least one of the numbers to 1 significant figure correctly A1 for answer between 3 and 4 inclusive

1380/3H																																														
Question	Working	Answer	Mark	Notes																																										
7	$\begin{array}{r} 175 \\ \times 37 \\ \hline 1225 \\ 5250 \\ \hline 6475 \end{array}$ <table border="1" style="margin: 10px auto;"> <tr><td></td><td>1</td><td>7</td><td>5</td><td></td></tr> <tr><td>0</td><td>0</td><td>2</td><td>1</td><td>3</td></tr> <tr><td></td><td>3</td><td>1</td><td>5</td><td></td></tr> <tr><td>6</td><td>0</td><td>4</td><td>3</td><td>7</td></tr> <tr><td></td><td>7</td><td>9</td><td>5</td><td></td></tr> <tr><td></td><td>4</td><td>7</td><td>5</td><td></td></tr> </table> <table border="1" style="margin: 10px auto;"> <tr><td>100</td><td>70</td><td>5</td><td></td></tr> <tr><td>3000</td><td>2100</td><td>150</td><td>30</td></tr> <tr><td>700</td><td>490</td><td>35</td><td>7</td></tr> </table> $3000 + 2100 + 150 + 700 + 490 + 35 = 6475$		1	7	5		0	0	2	1	3		3	1	5		6	0	4	3	7		7	9	5			4	7	5		100	70	5		3000	2100	150	30	700	490	35	7	64.75	3	<p>M1 for a complete method with relative place value correct, condone 1 multiplication error, addition not necessary M1(dep) intent to add A1 cao</p> <p>or</p> <p>M1 for a completed grid with not more than 1 multiplication error, addition not necessary M1(dep) intent to add A1 cao</p> <p>or</p> <p>M1 for sight of any complete partitioning method, condone 1 multiplication error, final addition not necessary M1(dep) intent to add A1 cao</p> <p>NB : In all methods ignore placement of decimal point until final answer.</p>
	1	7	5																																											
0	0	2	1	3																																										
	3	1	5																																											
6	0	4	3	7																																										
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1380/3H				
Question	Working	Answer	Mark	Notes
8	(-2, 6) (-1, 5) (0, 4) (1, 3) (2, 2) (3, 1) (4, 0), (5, - 1)	Line drawn	3	<p>(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 $x = -2$ and $x = 5$</p> <p>or</p> <p>(No table of values) M2 for at least 2 correct points (and no incorrect points) plotted or line segment of $x + y = 4$ drawn (ignore any additional incorrect segments) (M1 for at least 3 correct points plotted with no more than 2 incorrect) A1 for correct line between $x = -2$ and $x = 5$</p> <p>or</p> <p>(Use of $y = mx + c$) M2 for at least 2 correct points (and no incorrect points) plotted (M1 for $y = 4 - x$ or line drawn with gradient of -1 or line drawn with a y intercept of 4 and a negative gradient) A1 for correct line between $x = -2$ and $x = 5$</p>

1380/3H																																	
Question	Working	Answer	Mark	Notes																													
9 (a)	$180^\circ - 60^\circ$ or $60^\circ + 60^\circ$	120°	2	M1 for $180 \div 3$ or 60 as angle of triangle or $180 - 60$ or $60 + 60$ A1 cao																													
(b)		Reason	1	B1 for at least one correct reason and no incorrect reasons (ignore irrelevant reasons) 'angles on a straight line add to 180° ' or 'angles in a triangle add up to 180° ' or 'angles in an equilateral triangle are equal' or 'exterior angle of a triangle is equal to the sum of the interior angles at the two other vertices'																													
10 (a)		<table border="1" style="border-collapse: collapse; text-align: center;"> <tbody> <tr><td>6</td><td>9</td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>7</td><td>2</td><td>4</td><td>7</td><td>7</td><td>7</td><td>8</td></tr> <tr><td>8</td><td>0</td><td>1</td><td>2</td><td>3</td><td>3</td><td>6</td></tr> <tr><td>9</td><td>1</td><td>2</td><td></td><td></td><td></td><td></td></tr> </tbody> </table> <table border="1" style="border-collapse: collapse; text-align: center;"> <tbody> <tr><td>Key: 7 2 = 72</td></tr> </tbody> </table>	6	9						7	2	4	7	7	7	8	8	0	1	2	3	3	6	9	1	2					Key: 7 2 = 72	3	M1 for unordered stem and leaf diagram (condone 2 errors, 1 number misplaced counts as one error) A1 for correctly ordered and fully correct diagram NB: ignore commas between leaves, stems could be 60,70,80,90 B1 for key e.g. 7 2 = 72
6	9																																
7	2	4	7	7	7	8																											
8	0	1	2	3	3	6																											
9	1	2																															
Key: 7 2 = 72																																	
(b)		77	1	B1 ft																													

1380/3H				
Question	Working	Answer	Mark	Notes
11	$600 + 300 + 150$ $6000 + 1050$ $7050 - 3000$ $4050 \div 10$	405	6	M1 for $600 + 300 + 150$ oe or 6000×0.175 oe (NB must be VAT of 6000) M1 for $6000 + "1050"$ A1 for 7050 cao M1 for $"7050" - 3000$ M1 for dividing by 10 A1 for 405 cao
12 (a)		Correct description	3	B1 for rotation B1 for about (0,0) B1 for 180° (accept half turn) NB: If more than one transformation seen then B0
(b)		triangle with vertices (6, 1) (6, 4) (5, 4)	1	B1 cao
13	$t - 2 = \frac{v}{5}$ or $5t = v + 10$	$v = 5(t - 2)$	2	M1 subtracting 2 from each side or multiplying each side by 5 A1 for $v = 5(t - 2)$ or $v = 5t - 10$ (multiplication signs may be present) SC : If no marks scored, award B1 for $v = 5t - 2$ oe or $v = t - 10$ or $v = t - 2 \times 5$ oe
14	$\frac{2+12}{2}, \frac{3+7}{2}$	7, 5	2	M1 for $\frac{2+12}{2}$ oe or $\frac{3+7}{2}$ oe (may be implied by one correct co-ordinate) A1 cao (SC : B1 for 5, 7)

1380/3H				
Question	Working	Answer	Mark	Notes
15		B and E	2	B2 for B and E (B1 for one correct)
16 (a)	$3x + 15 + 10x - 12$	$13x + 3$	2	M1 for correct expansion of one bracket A1 cao
(b)		$x + 2$	1	B1 (accept $\frac{x+2}{1}$)
(c)		$5(x + 2)$	1	B1 cao
(d)		$xy(x + y)$	2	M1 for $x(xy + y^2)$ or $y(x^2 + xy)$ or xy as one of two factors with other factor incorrect but with two terms (eg. $xy(x^2 + y^2)$) A1 cao
17		Correct construction	2	M1 for two pairs of correct intersecting arcs (may both be on the same side of AB) A1 for correct perpendicular bisector (SC. B1 for line within guidelines if no marks awarded)

Question	Working	Answer	Mark	Notes
18 (a)	$2\frac{17}{20} - 1\frac{8}{20}$	$1\frac{9}{20}$	3	<p>M1 for dealing with the whole numbers M1 for finding a correct common denominator A1 for $1\frac{9}{20}$ or $\frac{29}{20}$ oe or B1 for $\frac{57}{20}$ or $\frac{7}{5}$ oe M1 for finding a correct common denominator A1 for $1\frac{9}{20}$ or $\frac{29}{20}$ oe or M1 for 2.85 M1 for 1.4 A1 for 1.45 oe</p>
(b)	$\frac{8}{3} \times \frac{7}{4} = \frac{8 \times 7}{3 \times 4} = \frac{56}{12}$	$4\frac{2}{3}$	3	<p>B1 for $\frac{8}{3}$ oe or $\frac{7}{4}$ oe M1 for multiplying numerator and denominator of "$\frac{8}{3}$" and "$\frac{7}{4}$" A1 for $4\frac{2}{3}$ oe mixed number or $\frac{14}{3}$ oe OR B1 for 2.67 or 2.66(...) and 1.75 M1 (dep B1) for correct method of multiplication A1 for $4\frac{2}{3}$ oe</p>

1380/3H				
Question	Working	Answer	Mark	Notes
19 (a)	$15 \div 10$ 8×1.5	12	2	M1 for $15 \div 10$ or 1.5 or $\frac{3}{2}$ or $\frac{2}{3}$ A1 cao
(b)	$\frac{1}{2} \times (8 + "a") \times 5$	50	2	NB : ft from (a) provided ' DC ' > 8 M1 for $\frac{(8+"a") \times 5}{2}$ A1 ft or M1 for $(8 \times 5) + \frac{1}{2}("DC" - 8) \times 5$ A1 ft or M1 for $\frac{1}{2} \times "DC" \times 15 - \frac{1}{2} \times 8 \times 10$ A1 ft or M1 for $\frac{1}{2} \times 8 \times 10 \times "1.5^2" - \frac{1}{2} \times 8 \times 10$ A1 ft

1380/3H				
Question	Working	Answer	Mark	Notes
20 (a)		13.2	1	B1 cao
(b)	13.8 - 12.6	1.2	2	M1 for 13.8 - k or k - 13.8 or k - 12.6 or 12.6 - k where k can be any value A1 cao
(c)		Reason	1	B1 for correct reason e.g. because the IQR ignores extreme values.
21	Equation (1) \times 3 then add equation (2) \times 2 leads to $26x = 13$ $3 + 2y = -3$	$x = \frac{1}{2}$ $y = -3$	4	M1 for coefficients of x or y the same followed by correct operation, condone one arithmetic error A1 for one correct answer M1 (dep) for substituting found value in one equation A1 cao for other correct answer (SC: B2 for one correct answer only if M's not awarded)
22 (a)		Reason	1	B1 for angle between a tangent and a radius is a right angle (or 90°)
(b)	$8^2 + 6^2$ $\sqrt{100}$ 10 - 6	4	3	M1 for $\sqrt{8^2 + 6^2}$ A1 for 10 A1 cao

1380/3H				
Question	Working	Answer	Mark	Notes
23 (a)	$x^2 - 3x + 5x - 15$	$x^2 + 2x - 15$	2	M1 for four correct terms with or without signs, or 3 out of no more than 4 terms with correct signs. The terms may be in an expression or in a table A1 cao
(b)	$(x + 9)(x - 1) = 0$ OR $a = 1, b = 8, c = -9$ $x = \frac{-8 \pm \sqrt{8^2 - 4 \times 1 \times -9}}{2 \times 1}$ $= \frac{-8 \pm \sqrt{100}}{2}$ OR $(x + 4)^2 - 16 - 9$ $(x + 4)^2 = 25$ $x = -4 \pm \sqrt{25}$	$x = 1$ or $x = -9$	3	M2 for $(x + 9)(x - 1)$ (M1 for $(x \pm 9)(x \pm 1)$) A1 cao or M1 for correct substitution in formula of 1, 8, ± 9 M1 for reduction to $\frac{-8 \pm \sqrt{100}}{2}$ A1 cao or M1 for $(x + 4)^2$ M1 for $-4 \pm \sqrt{25}$ A1 cao SC: if no marks score then award B1 for 1 correct root, B3 for both correct roots.

1380/3H				
Question	Working	Answer	Mark	Notes
24 (a)	$\frac{8}{5} = 1.6$	<i>Bar of height 3cm drawn</i>	2	M1 for $2\text{cm}^2 = 1$ pupil oe or calculation of $fd = 1.6$ or bar of area 12 cm^2 but not correct shape A1 cao
(b)	$6 + 8 + 6 + 5$	25	2	B2 for 25 (B1 for frequency of 5 for number of students who watched between 20 and 30 hours)
25	$\frac{180}{1000} \times 50$	9	2	M1 for $\frac{180}{1000} \times 50$ oe A1 cao
26 (a)	$P = \frac{k}{V} : 5 = \frac{k}{8}; k = 40$	$P = \frac{40}{V}$	3	M1 for $P \propto \frac{1}{V}$ or $P = \frac{k}{V}$, k algebraic M1 for subs $P = 5$ and $V = 8$ into $P = \frac{k}{V}$ A1 for $P = \frac{40}{V}$
(b)	$P = \frac{40}{2}$	20	1	B1 ft on k for $P = \frac{k}{V}$

1380/3H				
Question	Working	Answer	Mark	Notes
27 (a)	$\vec{OP} = \mathbf{a} + \mathbf{b}$ $\vec{OM} = \frac{1}{2}\vec{OP}$	$\frac{1}{2}(\mathbf{a} + \mathbf{b})$	2	M1 for $\vec{OP} = \vec{OT} + \vec{TP}$ or $\vec{OM} = \frac{1}{2}\vec{OP}$ or $\vec{OM} = \frac{1}{2}\vec{OT} + \frac{1}{2}\vec{TP}$ or $\vec{OP} = \mathbf{a} + \mathbf{b}$ A1 for $\frac{1}{2}(\mathbf{a} + \mathbf{b})$ oe SC : B1 for $\mathbf{a} + \mathbf{b} \div 2$
(b)	$\vec{TO} + \vec{OM}$ $-\mathbf{a} + \frac{1}{2}(\mathbf{a} + \mathbf{b})$	$-\frac{1}{2}\mathbf{a} + \frac{1}{2}\mathbf{b}$	2	M1 for $-\mathbf{a} + \frac{1}{2}(\mathbf{a} + \mathbf{b})$ oe or $\vec{TM} = \vec{TO} + \vec{OM}$ or $\vec{TM} = \vec{TP} + \vec{PM}$ A1 ft
28 (a)		Circle, centre O , radius 3	2	M1 for a complete circle centre $(0, 0)$ A1 for a correct circle within guidelines
(b)		$x = 2.6, y = -1.6$ or $x = -1.6, y = 2.6$	3	M1 for $x + y = 1$ drawn M1 (dep) ft from (a) for attempt to find coordinates for any one point of intersection with a curve or circle A1 for $x = 2.6, y = -1.6$ and $x = -1.6, y = 2.6$ all ± 0.1

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