

Mark Scheme (Results)

Summer 2009

GCSE

GCSE Mathematics (Modular) - 2381

Paper: 5384H/14H

GCSE MATHEMATICS 2381 (MODULAR)
RESULTS MARKSCHEME

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If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.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

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Question	Working	Answer	Mark	Notes	
1	(a)	325×1.68	546	2	M1 for 325×1.68 seen or digits 546 A1 for 546, accept 546.00, 546.0
	(b)	$117 \div 1.5$	78	2	M1 for $117 \div 1.5$ seen or digits 78 A1 for 78, accept 78.00, 78.0
2	(a)		Correct shape	2	B2 for correct shape; any orientation. (B1 for any two sides correct or all correct for scale factor other than 1 or 2), tolerance to within half square
	(b)		Reflection in line $x = 0$	2	B1 for reflection, reflect, reflected. B1 for line $x = 0$ or y -axis NB: more than one transformation should be awarded 0 marks.
3		$143.64 \div 19 = 7.56$ $7.56 \times 31 =$	234.36	3	M1 for $143.64 \div 19$ (or 7.56 seen) or 143.64×31 (or 4452.84 seen) M1(dep) for '7.56' \times 31 or '4452.84' \div 19 or $143.64 + 12 \times 7.56$ A1 for 234.36 cao accept 234.36p Alternative method: M1 for $\frac{31}{19}$ (or 1.63(1...) seen) M1 (dep) '1.63...' \times 143.64 A1 for 234.36 cao accept 234.36p

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Question	Working	Answer	Mark	Notes	
4	(a)	$1.8 \times -8 + 32$	17.6	2	M1 for 1.8×-8 or -14.4 or $\frac{-72}{5}$ seen or $32 - '1.8 \times 8'$ or $1.8 \times -8 + 32$ seen A1 for 17.6 or $\frac{88}{5}$ or 17.60 oe
	(b)	$68 = 1.8C + 32$ $1.8C = 68 - 32$ $C = 36 \div 1.8$	20	2	M1 for $68 - 32$ or 36 or $68 = 1.8C + 32$ seen; condone replacement of C by another letter. A1 for 20 cao NB Trial and improvement score 0 or 2
5	(a)	$18 \div 6 : 12 \div 6$	3 : 2	2	M1 for 18 : 12 or 12 : 18 or 1.5:1 or 1:0.67 oe or correct ratio reversed eg 2:3 A1 for 3 : 2 or 1 : 0.6 ... [recurring]
	(b)	$5 + 1 = 6$ $54 \div 6 = 9$ 5×9	45	2	M1 for $\frac{5}{5+1} \times 54$ or $\frac{1}{5+1} \times 54$ or $54 \div '5+1'$ or 54×5 or 270 or 9 : 45 or 9 seen, as long as it is not associated with incorrect working. A1 for 45 cao

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6		<table border="1"> <tr><td>2</td><td>48</td></tr> <tr><td>3</td><td>87</td></tr> <tr><td>2.5</td><td>65.(625)</td></tr> <tr><td>2.6</td><td>69.(576)</td></tr> <tr><td>2.7</td><td>73.(683)</td></tr> <tr><td>2.65</td><td>71.6(09)</td></tr> <tr><td>2.61</td><td>69.9(79)</td></tr> <tr><td>2.62</td><td>70.3(84)</td></tr> <tr><td>2.63</td><td>70.7(91)</td></tr> <tr><td>2.64</td><td>71.1(99)</td></tr> <tr><td>2.66</td><td>72.(021)</td></tr> <tr><td>2.67</td><td>72.4(34)</td></tr> <tr><td>2.68</td><td>72.8(48)</td></tr> <tr><td>2.69</td><td>73.2(65)</td></tr> </table>	2	48	3	87	2.5	65.(625)	2.6	69.(576)	2.7	73.(683)	2.65	71.6(09)	2.61	69.9(79)	2.62	70.3(84)	2.63	70.7(91)	2.64	71.1(99)	2.66	72.(021)	2.67	72.4(34)	2.68	72.8(48)	2.69	73.2(65)	2.6	4	<p>B2 for trial $2.6 \leq x \leq 2.7$ evaluated (B1 for trial $2 \leq x \leq 3$ evaluated)</p> <p>B1 for different trial $2.6 < x \leq 2.65$</p> <p>B1(dep on at least one previous B1) for 2.6</p> <p>Values evaluated can be rounded or truncated, but to at least 2sf when x has 1dp and 3sf when x has 2dp</p> <p>NB Allow 72 for evaluation using $x = 2.66$</p> <p>NB No working scores no marks even if answer is correct</p>
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7			construction	2	<p>M1 for a pair of arcs drawn from the same centre on 2 lines at same distance from meeting point; or a single arc crossing both lines; using an arc with a radius which is the length of the shorter line will imply an intersection with the end of that line. ($\pm 2\text{mm}$)</p> <p>A1 for bisector ($\pm 2^\circ$) and correct arcs</p> <p>SC: B1 for bisector ($\pm 2^\circ$) with no arcs, or incorrect arcs if M0 awarded.</p> <p>Accept bisectors that are dashed or dotted.</p>																												
8		$(0.5 \times 3.14... \times 8) + 8$	20.56 - 20.58	3	<p>M2 for $(0.5 \times \pi \times 8)$ or $\pi \times 4$ or $(\pi \times 8 + 8)$ or $(0.5 \times \pi \times 8 + 8)$ oe</p> <p>(M1 for $\pi \times 8$ or $2\pi \times 4$; for a value 25.1-25.2 inclusive unless seen with incorrect working eg πr^2)</p> <p>A1 for 20.56 – 20.58</p> <p>(SC: B2 if M0 scored for 12.56 - 12.58)</p>																												

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Question	Working	Answer	Mark	Notes
9	$4.6 + 3.85 = 8.45$ $3.2^2 - 6.51 = 3.73$ $8.45 \div 3.73 =$	2.26541555	2	M1 for $\frac{169}{20}$ or $\frac{256}{25}$ or $\frac{373}{100}$ or 3.73 or 10.24 or 8.45 seen A1 for 2.265(41555); accept $\frac{845}{373}$
10	(a)	t^{6+2}	1	B1 for t^8 or for t^{6+2}
	(b)	m^{8-3}	1	B1 for m^5 or for m^{8-3}
	(c)	$2^3 \times x^3$	2	B2 for $8x^3$ cao (B1 for ax^3 , $a \neq 8$ or $2x \times 2x \times 2x$ or $8x^n$ $n \neq 0,3$)
	(d)	$3 \times 4 \times a^{2+5} \times h^{1+4}$	2	B2 for $12a^7h^5$ (B1 for $12a^7h^n$, $n \neq 0,5$ or $12a^mh^5$, $m \neq 0,7$ or ka^7h^5 , $k \neq 12$ or $3 \times 4 \times a^{2+5} \times h^{1+4}$)

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11	$9^2 - 6^2$ $81 - 36 = 45$ $\sqrt{45}$	6.705 - 6.71	3	M1 for $9^2 - 6^2$ or $81 - 36$ or 45 or $9^2 = AB^2 + 6^2$ oe M1 for $\sqrt{81 - 36}$ or $\sqrt{45}$ A1 for 6.705 - 6.71 [SC: M1 for $\sqrt{81 + 36}$ or $\sqrt{117}$]
12	4500×1.04^2	4867.20	3	M1 for 4500×1.04 or for $4500 + 0.04 \times 4500$ or for 4680 or 180 or 360 or 4860 M1 (dep) '4680' $\times 1.04$ or for '4680' $+ 0.04 \times$ '4680' A1 for 4867.2(0) cao (If correct answer seen then ignore any extra years) Alternative method M2 for 4500×1.04^2 or 4500×1.04^3 A1 for 4867.2(0) cao [SC: 367.2(0) seen B2]

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Question	Working	Answer	Mark	Notes
13	$\cos x = \frac{5}{8}$	51.3 - 51.35	3	<p>M1 for $\cos(x) = \frac{5}{8}$</p> <p>M1 for $\cos^{-1} \frac{5}{8}$ or $\cos^{-1} 0.625$, or $\cos^{-1}(5 \div 8)$</p> <p>A1 for 51.3 - 51.35 (SC B2 for 0.89 – 0.9 or 57 - 57.1 seen)</p> <p>Alternative Scheme $h^2 = 8^2 - 5^2 (=39)$</p> <p>M1 for $\sin(x) = \frac{\sqrt{39}}{8}$ or $\tan(x) = \frac{\sqrt{39}}{5}$ or</p> <p>$\frac{\sin x}{\sqrt{39}} = \frac{\sin 90}{8}$ oe or</p> <p>$(\sqrt{39})^2 = 8^2 + 5^2 - 2 \times 8 \times 5 \times \cos x$</p> <p>M1 for $\sin^{-1}\left(\frac{\sqrt{39}}{8}\right)$ or $\sin^{-1}\left(\frac{\sqrt{39} \times \sin 90}{8}\right)$ or</p> <p>$\tan^{-1}\left(\frac{\sqrt{39}}{5}\right)$ or $\cos^{-1}\left(\frac{8^2 + 5^2 - (\sqrt{39})^2}{2 \times 8 \times 5}\right)$</p> <p>A1 for 51.3 - 51.35</p>

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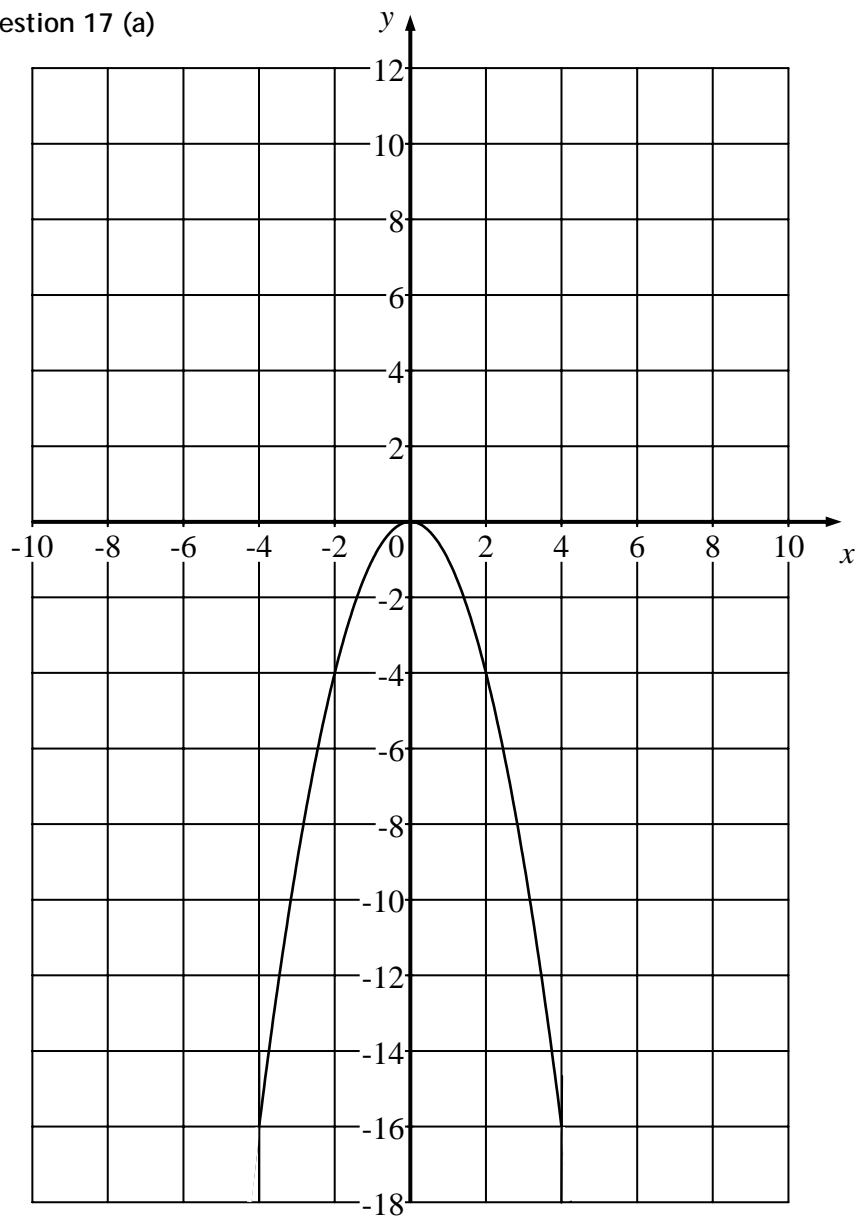
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Question	Working	Answer	Mark	Notes
14	$P = \frac{k}{d^2}$ $k = Pd^2 = 10000 \times 0.4^2$ $= 1600$ when $d = 0.8$, $P = \frac{1600}{0.8^2}$	2500	3	M1 $P = \frac{k}{d^2}$ or $P \propto \frac{1}{d^2}$ M1 $k = 10000 \times 0.4^2$ A1 2500 cao OR M1 $\frac{x}{10000} = \frac{0.4^2}{0.8^2}$ M1 $\frac{0.4^2}{0.8^2} \times 10000$ A1 2500 cao

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Question	Working	Answer	Mark	Notes
15	(a)	-0.41, 2.41	3	M1 for substitution into formula (condone incorrect signs) $x = \frac{- -2 \pm \sqrt{(-2)^2 - 4 \times 1 \times (-1)}}{2}$ $= \frac{2 \pm \sqrt{8}}{2}$ $= \frac{2 \pm 2.82843}{2}$ $x = -0.4142 \text{ or } x = 2.4142$
	(b)	-0.41, 2.41	1	M1 for $\frac{2 \pm \sqrt{8}}{2}$ A1 for -0.41 to -0.415 and 2.41 to 2.415 OR M1 for $(x-1)^2 - 1^2 - 1$ seen M1 for $(x-1) = \pm\sqrt{2}$ A1 for -0.41 to -0.415 and 2.41 to 2.415 T&I B3 both solutions, B1 1 solution
16	(a)	b - a	1	B1 for b - a or - a + b oe
	(b)	proof	3	M1 for $\vec{OP} = \vec{OA} + \vec{AP}$ oe or $\vec{OP} = \vec{OB} + \vec{BP}$ oe M1 for $\vec{AP} = \frac{3}{5}x$ "(b - a)" oe or $\vec{BP} = \frac{2}{5}x$ "(a - b)" oe A1 for $a + \frac{3}{5}x$ (b - a) oe or $b + \frac{2}{5}x$ (a - b) oe leading to given answer with correct expansion of brackets seen

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Question		Working	Answer	Mark	Notes
17	(a)		Curve	2	B2 parabola max (0,0), through (-2, -4) and (2, -4) Tol $\frac{1}{2}$ sq (B1 parabola with single maximum point (0,0) or through (-2, -4) and (2, -4), but not both or the given parabola translated along the y-axis by any other value than -4 - the translation must be such that the points (0,4), (-2,0), (2,0) are translated by the same amount. Tol $\frac{1}{2}$ sq)
	(b)		Curve	2	B2 parabola max (0,4), through (-4, 0) and (4,0) Tol $\frac{1}{2}$ sq (B1 parabola with single maximum point (0,4)) Tol $\frac{1}{2}$ sq

PTO for graphs for Q17

Question 17 (a)



Question 17 (b)

