

# Mark Scheme (Results)

Summer 2009

GCSE

GCSE Mathematics (Modular) - 2381

Paper: 5384H/13H

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If working is crossed out and still legible, then it should be given any appropriate marks, as long as it has not been replaced by alternative work.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

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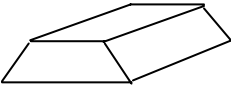
5384H/13H				
Question	Working	Answer	Mark	Notes
1		300, 90, 45, 225	3	<p>M2 for any one of <math>200 + 100</math> or <math>60 + 30</math> or <math>30 + 15</math> or <math>150 + 75</math> or <math>300</math> or <math>90</math> or <math>45</math> or <math>225</math> seen.  A1 cao  or  M1 for <math>12 \div 8</math> or <math>6 \div 4</math> or <math>3 \div 2</math> or sight of 1.5  M1 for <math>200 \times "1.5"</math> or <math>60 \times "1.5"</math> or <math>30 \times "1.5"</math> or <math>150 \times "1.5"</math>  A1 cao  or  M1 <math>200 \div 8</math> or 25  M1 <math>25 \times 12</math> or 300  A1 cao  or  M1 <math>200 \div 4</math> or 50  M1 <math>50 \times 6</math> or 300  A1 cao  or  M1 <math>200 \div 2</math> or 100  M1 <math>100 \times 3</math> or 300  A1 cao  (In any of the above methods the M marks can be awarded for equivalent calculations with 60, 30 or 150)</p>
2		$\frac{3}{20}$	2	<p>M1 for clear attempt to multiply numerators and multiply denominators e.g. <math>\frac{3 \times 1}{5 \times 4}</math> or <math>\frac{12 \times 5}{20 \times 20}</math>  A1 for <math>\frac{3}{20}</math> oe</p>

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Question	Working	Answer	Mark	Notes
3	(a) $2x - 3 + x + 6 + 3x + 1$	$6x + 4$	2	M1 for $2x - 3 + x + 6 + 3x + 1$ or $6x + k$ seen A1 for $6x + 4$ , condone $P = 6x + 4$ but not $x=6x+4$ or $0=6x+4$
	(b) $6x + 4 = 37$ $6x = 33$ $x = 5.5$	5.5	2	M1 for " $6x + 4$ " = 37, must be 3 term linear equation with coefficient of $x \neq 1$ A1 for 5.5, $\frac{11}{2}$ , $5\frac{1}{2}$ oe or ft for their " $6x + 4$ " provided $x$ is positive. Or M1 for a correct 2 stage numerical process to find $x$ A1 for 5.5, $\frac{11}{2}$ , $5\frac{1}{2}$ oe or ft for their " $6x + 4$ " provided $x$ is positive.  T&I Allow 2 marks for 5.5oe , otherwise 0  (SC B1 " $x + k = 37$ " or " $kx = 37$ ) NB Do not award marks in (a) for $6x+4$ in (b)
4	$20 \div 5 (=4)$ $20 - "4" (=16)$ $"16" \times 1.50 (=24)$	9	4	M1 for $20 \div 5$ M1 for $20 - "4"$ where $0 < "4" < 20$ M1 for $"16" \times 1.50$ where $0 < "16" < 20$ A1 cao

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5	(a)	Vertices at (2, -2), (7, -2), (7, -6), (4, -6), (4, -4), (2, -4)	2	B2 for a fully correct rotation [B1 for correct shape with correct orientation OR a 90° anticlockwise rotation about $O$ OR a 180° rotation about $O$ OR for any 3 correct sides in the correct position]
	(b)	Translation by $\begin{pmatrix} 3 \\ -1 \end{pmatrix}$	2	B1 for translation B1 (indep) for $\begin{pmatrix} 3 \\ -1 \end{pmatrix}$ or 3 right and 1 down  N.B. If more than 1 transformation is given then award no marks'
6	(a)	7	2	M1 for $2y - 6 = 8$ or $y - 3 = \frac{8}{2}$ A1 cao
	(b)	$4x - 2x = 12 - 1$	2	M1 $4x - 2x = 12 - 1$ oe A1 5.5 oe
7	$x^2 = 72 \div 2$	6	2	M1 for $72 \div 2$ or 36 seen A1 6 or $-6$ or $\pm 6$
8	(a)	-1, -4, 4	2	B2 for all 3 values correct (B1 for 1 or 2 values correct)
	(b)		2	B1 ft for all 7 of their points correctly plotted B1 ft (dep on at least B1 in (a)) for smooth curve through all 7 of their points

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Question		Working	Answer	Mark	Notes
9	(a)			2	M1 rectangle with either correct width or height or any square A1 cao
	(b)			2	B2 for a correct sketch (B1 any 3-D sketch of no more than 4 faces seen, with a trapezoidal face)
10			Diagram	4	M1 arc radius 4 cm centre $B$ within the guidelines M1 angle bisector from $A$ to $BC$ within the guidelines A1 for clear indication that inside of arc is being identified as correct region for the first condition, or that side of straight line nearer to $C$ is identified as correct region for the second condition. (Note that only 1 of the Ms need be awarded for this A mark to be awarded) A1 fully correct region  Ignore any drawing outside the given triangle

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11	$3x + 4y = 7$ $10x - 4y = 32$  $13x = 39$ $x = 3$  $3 \times 3 + 4y = 7$ $4y = -2$  $x = \frac{7-4y}{3}$ $10\left(\frac{7-4y}{3}\right) - 4y = 32$	$x = 3, y = -\frac{1}{2}$	3	<p>M1 for coefficients of x or y the same followed by correct operation, condone one arithmetical error  M1 (dep) for substituting found value in one equation  A1 cao  SC: B1 for one correct answer only if Ms not awarded</p> <p>Alternative method  M1 for rearranging one equation and substituting in other to eliminate one variable(condone one arithmetical error)  M1 (dep) for substituting found value in one equation  A1 cao</p>	
12	(a)	$3t + 1 < t + 12$ $3t - t < 12 - 1$ $2t < 11$	$t < 5.5$	2	<p>M1 <math>3t - t &lt; 12 - 1</math>  A1 <math>t &lt; 5.5</math> oe  (B1 for <math>t = 5.5</math> or <math>t &gt; 5.5</math> or <math>5.5</math> or <math>t \leq 5.5</math> or <math>t \geq 5.5</math> on the answer line)</p>
	(b)		5	1	B1 for 5 or ft (a)
13	(i)		$170^\circ$	1	B1 cao
	(ii)		Reason	1	B1 for Angle at centre is twice angle at circumference (accept edge, middle, O origin )oe

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14	$(x + 5)(x - 9)$	9, -5	3	<p>M2 for <math>(x - 9)(x + 5)</math> (M1 for <math>(x \pm 9)(x \pm 5)</math> A1 cao 9 and -5</p> <p>OR</p> <p>M1 for substitution into formula (condone incorrect signs) M1 for <math>\frac{4 \pm \sqrt{196}}{2}</math> A1 cao</p> <p>OR</p> <p>M1 for <math>(x - 2)^2 - 2^2 - 45 (= 0)</math> M1 for <math>x = 2 \pm \sqrt{4 + 45}</math> A1 cao</p> <p>OR T&amp;I B3 Both solutions correct (B1 One solution correct )</p>
15	(a)	6	1	B1 for 6 or $\pm 6$
	(b)	$\frac{1}{4}$	2	<p>M1 for <math>8^{\frac{1}{3}} = 2</math> or <math>\frac{1}{\frac{1}{2}}</math> or <math>4^{-1}</math> or <math>64^{\frac{1}{3}}</math> or <math>2^2</math> or 4 or <math>\frac{1}{2^2}</math> or <math>2^{-2}</math></p> <p>A1 for <math>\frac{1}{4}</math> or 0.25 or any equivalent vulgar fraction or decimal</p>

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Question	Working	Answer	Mark	Notes
16	<p><math>AB = AC</math> (equilateral triangle)  <math>AD</math> is common  <math>\angle ADC = \angle ADB</math> (<math>= 90^\circ</math> given)  <math>\triangle ADC \equiv \triangle ADB</math> (RHS)</p> <p>OR</p> <p><math>\angle DAC = \angle DAB</math> (since <math>\angle ACD = \angle ABD</math> and <math>\angle ADC = \angle ADB</math>)  <math>AB = AC</math> (equilateral triangle)  <math>AD</math> is common  <math>\triangle ADC \equiv \triangle ADB</math> (SAS)</p> <p>OR</p> <p><math>\angle DAC = \angle DAB</math> (since <math>\angle ACD = \angle ABD</math> and <math>\angle ADC = \angle ADB</math>)  <math>AD</math> is common  <math>\angle ACD = \angle ABD</math> (equilateral triangle)  <math>\triangle ADC \equiv \triangle ADB</math> (AAS)</p>	Proof	3	<p>M1 for any three correct statements (which do not have to be justified) that together lead to a congruence proof (ignore irrelevant statements)  A1 for a full justification of these statements  A1 for RHS, SAS, AAS, ASA or SSS as appropriate</p> <p>NB The two A marks are independent</p>

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17	$\frac{1}{u} = \frac{1}{f} - \frac{1}{v}$ $\frac{1}{u} = \frac{v-f}{fv}$	$u = \frac{fv}{v-f}$	2	<p>M1 <math>\frac{1}{u} = \frac{v-f}{fv}</math> oe or <math>vf + uf = uv</math> oe or <math>\frac{1}{u} = \frac{f-v}{fv}</math> or</p> <p><math>u = \frac{1}{\frac{v-f}{fv}}</math> or <math>u = \frac{1}{\frac{1}{f} - \frac{1}{v}}</math></p> <p>A1 <math>u = \frac{fv}{v-f}</math> or <math>u = \frac{-fv}{f-v}</math></p>
18	$2 \times 7 - 2 \times \sqrt{3} + 7 \times \sqrt{3} - \sqrt{3} \times \sqrt{3} =$ $14 + 5\sqrt{3} - 3$	$11 + 5\sqrt{3}$	3	<p>M1 for exactly 3 or exactly 4 terms correct including correct signs or all 4 terms correct with wrong signs. M1(dep) for either collecting their two or three terms in <math>\sqrt{3}</math> or for <math>\sqrt{3} \times \sqrt{3} = 3</math> A1 cao</p>
19	$\frac{120}{360} \times \pi \times 2 \times 6$	$4\pi + 12$	3	<p>M1 for <math>\frac{120}{360} \times \pi \times 2 \times 6</math> oe allow 3.14, 3.142, <math>\frac{22}{7}</math> for <math>\pi</math></p> <p>A1 for <math>4\pi</math> or anything in the closed interval [12.56, 12.57], or <math>12\frac{4}{7}</math> oe or <math>\frac{a\pi}{b}</math> where a and b are integers with <math>a = 4b</math></p> <p>A1 <math>4\pi + 12</math> or <math>\pi 4 + 12</math> oe SC( B2 for a fully correct, but unsimplified expression for the perimeter, including <math>\left(\frac{2\pi r}{3}\right) + 12</math> or <math>\left(\frac{2\pi r}{3}\right) + 2r</math> Or for any value in the closed interval [24.56, 24.57] )</p>

Question 10

