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Mark Scheme (Results)

Summer 2013

International GCSE Mathematics (4MB0) Paper 01R

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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded.
- Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme.
- Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.
- **Types of mark**
    - M marks: method marks
    - A marks: accuracy marks
    - B marks: unconditional accuracy marks (independent of M marks)
- **Abbreviations**
    - awrt – answers which round to....
    - cao – correct answer only
    - ft – follow through
    - isw – ignore subsequent working
    - SC - special case
    - oe – or equivalent (and appropriate)
    - dep – dependent
    - indep – independent
    - eeoo – each error or omission

- **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.

- **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 it is clear from the working that the "correct" answer has been obtained from incorrect working, award 0 marks.

  Any case of suspected misread loses A (and B) marks on that part, but can gain the M marks.

  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 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.

  If there is no answer on the answer line then check the working for an obvious answer.

- **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: eg. Incorrect cancelling of a fraction that would otherwise be correct.

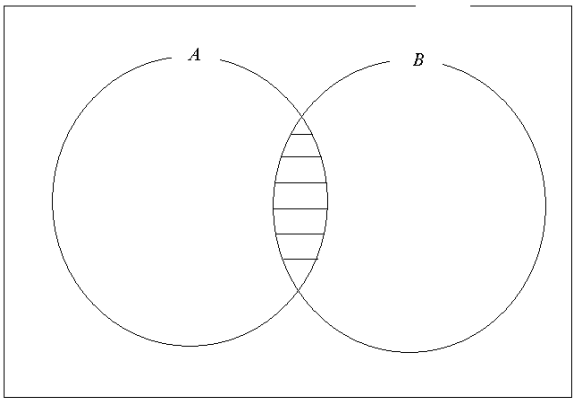
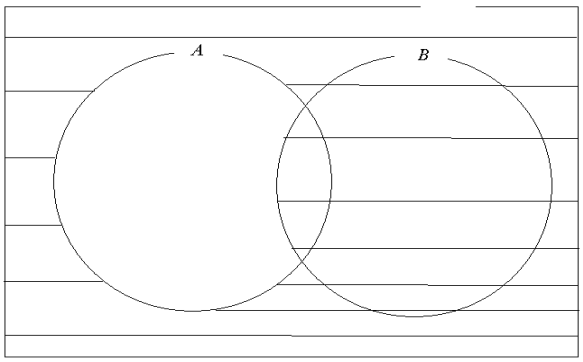
  It is not appropriate to ignore subsequent work when the additional work essentially makes the answer incorrect eg algebra.

  Transcription errors occur when candidates present a correct answer in working, and write it incorrectly on the answer line; mark the correct answer.

- **Parts of questions**
  Unless allowed by the mark scheme, the marks allocated to one part of the question CANNOT be awarded in another.

International GCSE Maths B
Summer 2013 – Mark Scheme

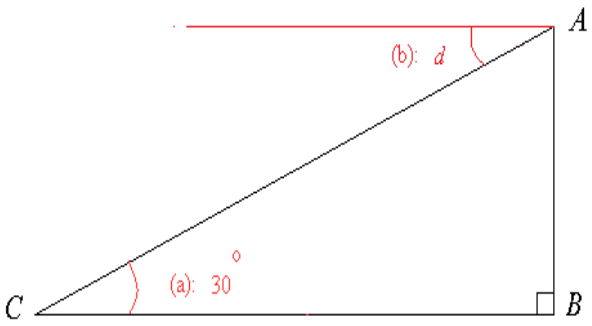
Question Number	Working	Notes		Mark
1	$9-3x-2x+8$ *Note: Allow one sign slip* $17-5x$ *Note: No isw*	M1 A1	 2	 2

Question Number	Working	Notes		Mark
2(a)		B1	1	1
2(b)		B1	1	1

Question Number	Working	Notes		Mark
3	$\angle AFB = 60^o$ or $\angle FBC = 60^o$ or $\angle AFC = 110^o$ $\angle BFC = 50^o$ *Note: Correct Answer gains both marks* *Note: Accept angles marked on diagram*	B1 B1	 2	 2

Question Number	Working	Notes		Mark
4	$(1-2\times4)-(1-2\times5)$ *Note: Accept* $(1-2\times5)-(1-2\times4)$ *Note: Condone missing brackets in 1st term* -2 or $+2$ *Note: Correct answer only seen gains full marks*	M1 A1	2	2
4 Special Case	Two different consecutive terms, leading to an answer of -2 or +2 earns M0, A1			

Question Number	Working	Notes		Mark
5	$y=\frac{10}{5}-\frac{2}{5}x$ or $\frac{dy}{dx}=-\frac{2}{5}$ or finding the gradient between 2 points *Note: Accept* $m=-\frac{2}{5}$ *Note: Gradient between two points: coordinates must be correct and an attempt at* $\frac{\text{difference in y}}{\text{difference in x}}$ *(allow one sign slip)* $-2/5$	M1 A1	2	2

Question Number	Working	Notes		Mark
6				
6(a)	Angle (a) marked on diagram	B1		
6(b)	Angle (b) marked on diagram	B1	2	2

Question Number	Working	Notes		Mark
7	$\frac{1.35-1.20}{1.20}\times 100$ or $\frac{x}{100}\times 1.20 = 0.15$ (o.e.) *Note: Ignore £ sign (and extra % signs that appear)* 12.5%	M1 A1	 2	 2

Question Number	Working	Notes		Mark
8(a)	4	B1	1	1
8(b)	4	B1	1	1

Question Number	Working	Notes		Mark
9	$9\times\left(\frac{1}{1000}\right)$ or $9\times(60\times 60)$ $9\times\left(\frac{1}{1000}\right)\times 60\times 60$ (o.e.) 32.4 km/ h	M1 M1dep A1	 3	 3

Question Number	Working	Notes		Mark
10(a)	3.214565×10^4 (correct answer only)	B1	1	1
10(b)	32145.7 *Note: Accept* 3.21457×10^4	B1	1	1
10(c)	32100 *Note: Accept* 3.21×10^4 *Note: Accept 32100.0 or 32100.00*	B1	1	1

Question Number	Working	Notes		Mark
11(a)	15/35 or 3/7 (or equivalent) *Note: Accept a decimal answer which rounds to 0.429* *Accept 42.9% or 42.86%*	B1	1	1
11(b)	"$\frac{15}{35}$" × "$\frac{14}{34}$" (o.e.) *Note: with replacement* "$\frac{15}{35}$" × "$\frac{15}{35}$" earns M1 $\frac{3}{17}$ awrt 0.176 or 0.177 (o.e.) *Note: Accept 17.6%*	M1 A1	 2	 3

Question Number	Working	Notes		Mark
12	$(3^{3x-5} =)\quad 3^{2x}$ $\therefore 3x-5=2x$ or $3x - 5 = 2$ $x=5$ *Note: Answer dependent on at least one M mark*	M1 M1 A1	 3	 3
12 Special Case	If Trial and Error has been used, then award M0, M0, B1			

Question Number	Working	Notes		Mark
13	$y \leq 6$ (o.e) $y \geq 7 - x$ (o.e) $4 \geq x - y$ (o.e) *Note: Allow weak inequalities* *Note: Equalities/incorrect inequalities score zero BUT if the inequalities are all the wrong way round AND all three are 'correct' then award B0, B0, B1*	B1 B1 B1	 3	 3

Question Number	Working	Notes		Mark
14	Attempt at method for finding LCM and/or HCF *Note: Accept prime factors of two of the numbers* *Note: A minimum of two correct factor trees* *Note: Compound division method (minimum of one common factor found correctly)* LCM = 1260 HCF = 6 *Note: Award M1 by implication if correct answer(s) seen and identified* *Note: If correct answers are present, but the wrong way round (i.e. LCM = 6; HCF = 1260) then award M1,A0, A1 (i.e. deduct only ONE of the accuracy marks)* *Note: Accept answers as the product of prime numbers LCM =* $2^2 \times 3^2 \times 5 \times 7$*;* HCF = 2x3	M1 A1 A1	3	3

Question Number	Working	Notes		Mark
15(a)	22	B1	1	
15(b)	$\frac{20+29+22+28+22+27+22+26+24+25+24+25}{12}$ (allow 1 slip) *Note: Allow, for one slip, 11 correct terms listed in the numerator divided by 11* *Note:* $\frac{294}{12}$ *implies correct method* 24.5	M1 A1	2	3

Question Number	Working	Notes		Mark
16	$a^2 = 1 - \frac{b^2}{c^2}$	M1		
	$c^2a^2 = c^2 - b^2$ **OR** $\frac{b^2}{c^2} = 1 - a^2$ **OR** $a^2 = \frac{c^2 - b^2}{c^2}$	M1dep		
	$c^2 = \frac{b^2}{1 - a^2}$ (isolating c^2)	A1		
	$c = \sqrt{\frac{b^2}{1 - a^2}}$ (o.e)		3	3
	Note: No isw (if incorrect subsequent working is seen, then deduct the 'A' mark)			

Question Number	Working	Notes		Mark
17(a)	3, 6, 9, 12, 15	B1	1	
17(b)	9, 12	B1	1	
17(c)	5, 7, 11, 13			
17(d)	2, 4			
	Note: for all questions above, condone use of brackets, condone missing commas, numbers may appear in any order			

Question Number	Working	Notes		Mark
18	$\sin 50 = \frac{AB}{5}$ (AB = 3.83)	M1		
	Note: Accept AB = 3.8 or better			
	new height of B above A = "3.83" + 1	M1dep		
	sin (new. angle) = "4.83"/5 (o.e.)	A1		
	Note: Where the candidate determines the length of the new AC (1.2918...), it must be correct for method			
	Note: Accept $\frac{\sin 50}{\sin \theta} = \frac{"3.83"}{"3.83"+1}$ *for method*			
	new angle = 75.02 (awrt 75°)	A1	4	4

Question Number	Working	Notes		Mark
19(a)	$\|\mathbf{C}\| = 5x10 - 9x6$ *Note: Allow method for an embedded 5x10 – 9x6* -4 *Note: An answer of -4 implies full marks*	M1 A1	2	
	Special case: Award M0, A1 for an answer of 4			
19(b)	$\begin{pmatrix} -5 & -4 \\ 18 & 27 \end{pmatrix}$ *Note: One error is awarded B1, B0*	B1(-1eeoo)	2	4

Question Number	Working	Notes		Mark
20	Bar heights 6, 4, 8, 4 with widths correct *Note: Tolerance on all lines* $\pm\frac{1}{2}$ *small squares*	B1, B1, B1, B1	4	4

Question Number	Working	Notes		Mark
21(a)	(a) $\overrightarrow{AB} = \begin{pmatrix} 3 \\ 4 \end{pmatrix}$	B1	1	
21(b)	$\left\|\overrightarrow{AB}\right\| = \sqrt{"3"^2 + "4"^2}$ 5 *Note: Accept an answer which would round to <u>their</u> 3 SF answer*	M1 A1ft	2	
21(c)	$\tan\theta = \frac{"4"}{"3"}$ (o.e) M1 *Note: Accept an equivalent, but correct trigonometrical statement* $\theta = 53.13^o \rightarrow$ **awrt 53°** *Note: Accept an answer which would round to <u>their</u> 3 SF answer (or to the integer number of degrees)*	M1 A1ft	2	5

Question Number	Working	Notes		Mark
22(a)	Motorist decelerates (at a constant rate) *Note: Accept (motion of the) car decreases* *Note: Accept slows down* from 15 m/s to 6 m/s or (±) 0. 225 m/s^2 (deceleration rate)	B1 B1	2	
22(b)	$\frac{1}{2}\ 10\times15\ +\ 100\times15\ +\frac{1}{2}\times\ 15+6\ \times40+\frac{1}{2}\ 6\times10$ 2 correct areas *Note: Where candidate is simply adding together sub areas, you are looking for any 2 of: 75, 1500, 180, 240, 30 (or a combination of these)* *Note: Where candidate is taking the area of a rectangle around the graph and then subtracting external areas, you are lookin for any 2 of: 2400, 75, 270 (180+90), 30* *Note: Areas may be left in unsimplified form* Completely correct method *Note: Allow one numerical calculation slip (not a missing area)* 2025m	M1 M1dep A1	3	
22(c)	"2025"/ 160 s = **awrt 12.7 m/s**	B1ft	1	6

Question Number	Working	Notes		Mark
23(a)	**Penalise incorrect rounding ONCE.** $\frac{60}{360}\times\pi\times r^2=50$ $r=\sqrt{50\times\frac{1}{\pi}\times\frac{360}{60}}$ (o.e) r = 9.77 (m) (cao) *Note: For method, accept* $\sqrt{\frac{300}{\pi}}$ *for r*	M1 M1dep A1	3	
23(b)	$\frac{60}{360}\times(2\pi\times"9.77")$ *Note: For method, accept* $\sqrt{\frac{300}{\pi}}$ *for r* $\frac{60}{360}\times(2\pi\times"9.77")+2\times"9.77"$ $29.77\rightarrow 29.8m$ (awrt)	M1 M1dep A1	3	6

Question Number	Working	Notes		Mark
24(a)	$\frac{(5-2)\times 180}{5}$ **OR** $180-\frac{360}{5}$	M1		
	$108°$	A1	2	
24(b)	Either $\angle EDF = 38^o$ or $\angle DEF = 23^o$	M1		
	Note: Angle(s) may be marked on the diagram			
	$\angle EDF = 38^o$ **and** $\angle DEF = 23^o$	A1		
	obtuse $\angle DFE$ = 180 –"38" – "23"			
	reflex $\angle DFE$ = 360 - "119"	M1		
	reflex $\angle DFE$ = 241	A1	4	4
	ALTERNATIVE: Sum of angles of hexagon = 4×180 (o.e)	M1		
	= 720	A1		
	$\therefore$ "$720-(3\times 108+70+85)$	M1dep		
	reflex $\angle DFE$ = 241	A1		

Question Number	Working	Notes		Mark
25(a)	$f(11) = 2(11)^3 - 17(11)^2 - 58(11) + 33$ (subst.) *Note: 2662 – 2057 – 638 + 33 earns M mark* **OR** attempt at dividing $2x^3 - 17x^2 - 58x + 33$ by $(x - 11)$. *Note: An attempt must show at least* $2x^2 + 5x$ *in the quotient…* correct conclusion	B1	1	
25(b)	$2x^2 + 5x$ $2x^2 + 5x - 3$ *Note: The M1, A1marks above may possibly be obtained in (a) above.* $(x + 3)(2x - 1)$ *Note: Attempt to factorise their trinomial quadratic.* *When multiplying out their two bracketed terms, it must produce at least two of their 3 trinomial terms* $(x - 11)(x + 3)(2x - 1)$ *Note: Must show all three terms collected together for the final A mark* *Note: Completely correct answer, but no working shown implies full marks (for part (b)* *Note: Do not isw. Solving an equation at the end loses last A mark.*			
	Special Case: No method seen (or awarded) and only one further factor (other than (x – 11)) i.e. (x + 3) or (2x – 1) seen then award M0, A0, M0, A1			

Question Number	Working	Notes		Mark
26(a)	*P* correctly positioned and labelled *(± 2mm)*	B1	1	
26(b)	*L* correctly positioned and labelled *(± 2mm)*	B1ft	1	
26(c)	$287 \pm 2^{\circ}$ or N(73 ± 2)W or W(17 ± 2)N1	B1	1	
26(d)	$8 \times 1\frac{3}{4}$ (o.e) *Note: Accept 1.45 for $1\frac{3}{4}$ for method* 14km (cao)	M1 A1	 2	
26(e)	*T* correctly positioned and labelled	B1	1	
26(f)	11.2km (± 0.3km)	B1ft	1	7

Question Number	Working	Notes		Mark
27(a)	$x = 1$ or $x \neq 1$ or "1" or "can't be 1"	M1	1	
27(b)	$yx - y = 1$ or $y - 1 = \frac{1}{x}$ (no slips) *Note: Allow the interchange of x and y* $g^{-1}: x \mapsto \frac{1+x}{x}$ (correct conclusion) *Note: Must be in x and we must see a correct mapping expression*	M1 A1	 2	
27(c)	$4x - 2 = \frac{1+x}{x}$ **OR** $\frac{1}{4x-2\ -1} = x$ $4x^2 - 3x - 1 = 0$ $(4x + 1)(x - 1)$ (= 0) *Note: Attempt to factorise their trinomial quadratic. When multiplying out their two bracketed terms, it must produce at least two of their 3 trinomial terms.* *Note: If formula used, it must be a correct subs. into a correctly quoted formula. Do not penalise -3^2 in the discriminant* $x = -\frac{1}{4}$, $x = 1$	M1 A1 M1 A1	 4	7

	Note: Ignore subsequent working			

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