

# Mark Scheme (Results)

June 2011

International GCSE  
Mathematics (4MB0) Paper 02

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Publications Code UG028417

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## 4MB0 Summer 2011 - Paper 2

Question number	Scheme	Marks		
<b>1.</b>	(a) 2500/625	M1		
	4 hrs	A1	2	
	(b) (2500 + 2500)/("4" + "3.5")	M1		
	667 km/h	A1 ft	2	4
<b>2.</b>	(a) factor of $x$	M1		
	Attempt to factorise $x^2 - 5x + 6$ or orig. cubic	M1		
	$x(x - 3)(x - 2)$	A1	3	
	(b) attempt to factorise $2x^2 + 2x - 24$ into two linear terms	M1		
	One pair of factors cancelled	M1 dep		
	$\frac{x(x-2)}{2(x+4)}$ OR $\frac{x^2 - 2x}{2x + 8}$	A1	3	6

Question number	Scheme	Marks		
3.	<p>for</p> <p>Note: First three marks for angles, final mark reasoning</p> <p>Method 1: (using angle at centre)</p> <p><math>\angle AOC(\text{reflex}) = 236^\circ</math> (<math>\angle</math> at a point) or</p> <p><math>\angle ADC = 62^\circ</math> (<math>\angle</math> at centre)</p> <p><math>\angle ABC = 118^\circ</math> (<math>\angle</math> at centre/opp angles cyclic quad)</p> <p><math>\angle BCO = 62^\circ</math> (<math>\angle</math> between // lines)</p> <p>at least <b>two</b> valid reasons consistent with their <math>\angle</math></p> <p>Method 2: (using isosceles triangles)</p> <p><math>\angle CAO</math> (or <math>\angle ACO</math> or <math>\angle BAC</math>) = <math>28^\circ</math></p> <p><math>\angle ABO</math> (or <math>\angle BOC</math>) = <math>56^\circ</math></p> <p><math>\angle BCO = 62^\circ</math></p> <p>at least <b>two</b> valid reasons consistent with their <math>\angle</math> (isosceles triangle, alt angles between // lines.....)</p>	B1 B1 ft B1 ft B1 B1 B1 ft B1 ft B1	4	4
4.	<p>height of cone = <math>\sqrt{(39^2 - 15^2)}</math></p> <p>= 36 cm</p> <p>volume = <math>\frac{1}{3}\pi \cdot 36 \cdot 15^2 + \frac{2}{3}\pi 15^3</math></p> <p>either volume correctly stated and with values substituted</p> <p>2<sup>nd</sup> volume correctly stated with values substituted and added</p> <p>Conclusion</p>	M1 A1 M1 M1 dep A1	5	5

Question number	Scheme	Marks		
5.	(a) 35 - 27, 8	M1, A1	2	7
	(b) 17 - c's(8), 9 SC: 27 - (x + y) M1	M1, A1 ft	2	
	(c) 3y = 35 - c's(a) - c's(b) (o.e.)	M1		
	y = 6, x = 12	A1, A1	3	
6.	(a) trapezium B	B2(-1ee)	2	8
	(b) trapezium C	B2(-1ee) ft	2	
	(c) trapezium D  A rotation of 90° anticlockwise about <b>any</b> point  Correctly placed trapezium (cao)	M1  A1	  2	
	(d) reflection, y = -x	M1, A1	2	
7.	(a) (i) $\frac{1}{(x+2)^2-9}$	M1		9
	$\frac{1}{x^2+4x-5}$ or $\frac{1}{(x+5)(x-1)}$	A1		
	(ii) y(x+23)=1 OR x+23=1/y	M1		
	$\frac{1-23x}{x}$ OR $\frac{1}{x}-23$	A1	4	
	(b) x+23 = "x <sup>2</sup> +4x-5"	M1		
	x <sup>2</sup> +3x-28 (=0)	A1		
	attempt to factorise their trinomial quadratic  <b>OR</b> correct substitution into a correctly quoted formula  -7, 4	M1  A1, A1	  5	

Question number	Scheme	Marks		
8.	<p>Accept fractional or percentage equivalents throughout.</p> <p>(a) 0.25 (o.e.)</p> <p>(b) for each correct pair</p> <p>(c) (i) “0.75” x 0.8, 0.6 (3/5)</p> <p>(ii) “0.25” x “0.9”</p> <p>“0.6” + “0.25” x “0.9”</p> <p>0.83 (or better) (33/40)</p> <p>(d) any probability ÷ (“0.825”)</p> <p>“0.6”/”0.825”</p> <p>0.73 (or better) (8/11)</p>	B1	1	
		B1ft,B1,B1	3	
		M1, A1 ft		
		M1		
		M1		
		A1	5	
		M1		
		M1		
		A1	3	12

Question number	Scheme	Marks		
9.	<p>(a) (i) <math>\frac{1}{2}\mathbf{a}</math> (ii) <math>\mathbf{b} - \mathbf{a}</math></p> <p>(b) <math>\mathbf{a} + \frac{1}{3}(\mathbf{b} - \mathbf{a})</math>, <math>\frac{1}{3}\mathbf{b} + \frac{2}{3}\mathbf{a}</math> (o.e.)</p> <p>(c) <math>-\frac{1}{2}\mathbf{a} + \mathbf{b} + \frac{1}{3}(\mathbf{a} - \mathbf{b})</math>, <math>\frac{2}{3}\mathbf{b} - \frac{1}{6}\mathbf{a}</math> (o.e.)</p> <p>(d) <math>\lambda(\frac{1}{3}\mathbf{b} + \frac{2}{3}\mathbf{a})</math></p> <p>(e) <math>\frac{1}{2}\mathbf{a} + \mu(\frac{2}{3}\mathbf{b} - \frac{1}{6}\mathbf{a})</math></p> <p>Correct expression (unsimplified)</p> <p>(f) Attempt at equating either coefficients of <math>\mathbf{a}</math> or coefficients of <math>\mathbf{b}</math>.</p> <p>One correct equation: <math>\frac{1}{2} - \frac{1}{6}\mu = \frac{2}{3}\lambda</math> or <math>\frac{1}{3}\lambda = \frac{2}{3}\mu</math></p> <p><math>\mu = 1/3, \lambda = 2/3</math></p>	B1, B1	2	
		M1, A1	2	
		M1, A1	2	
		B1ft	1	
		M1		
		A1	2	
		M1		
		A1		
		A1, A1	4	13

Question number	Scheme	Marks		
10.	(a) $2x^2$ or $4xy$ , $(S=) 2x^2 + 4xy$	B1, B1	2	
	(b) $y = \frac{50 - 2x^2}{4x}$ (o.e.)	B1	1	
	(c) $\frac{50 - 2x^2}{4x} \cdot x^2 + \text{conclusion}$	B1	1	
	(d) one term correctly differentiated	M1		
	$\frac{25}{2} - \frac{3x^2}{2}$	A1		
	$c's \left( \frac{25}{2} - \frac{3x^2}{2} \right) = 0$	M1 dep		
	2.89	A1	4	
	(e) 23.4, 24	B1, B1	2	
	(f) graph penalties (-1) straight line segments each point missed ( $\pm \frac{1}{2}$ small square) each missed segment each point not plotted each point incorrectly plotted ( $\pm \frac{1}{2}$ small square) tramlines very poor curve i.e. line too thick	B3	3	
	(g) line drawn or two points marked on their graph consistent with the line drawn  1.8 or 1.9, 3.8  SC: No indication on the graph of any line or points identified but both points correct then  M1, A1, A0	M1  A1ft, A1ft	3	16



Question number	Scheme	Marks		
11.	(a) $(AC^2 =) 54^2 + 35^2 - 2 \times 54 \times 35 \times \cos 100^\circ$	M1		
	2916 + 1225 + 656.4..... (o.e.)	M1 dep		
	69.3 m	A1	3	
	(b) Use of sine rule with correct values substituted	M1		
	$\sin \angle CAB = \frac{35 \times \sin 100}{69.3}$	M1 dep		
	29.8°/29.9°	A1	3	
	(c) $DB/54 = \sin ("29.8")$	M1		
	26.8 m/26.9 m	A1 ft	2	
	(d) $AD/54 = \cos ("29.8")$	M1		
	46.9 m (awrt)	A1		
	"69.3" – "46.9"	B1 ft		
	Seeing "26.8"/2	B1 ft		
	$\sqrt{(("22.4")^2 + ("13.4")^2)}$	M1		
	26.1/26.2 m	A1	6	
	(e) $h/ ("26.1") = \tan 40$	M1		
	21.9 m (Accept 22 or 22.0 m)	A1ft	2	16



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