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Mark Scheme (Results)

June 2011

International GCSE
Mathematics (4MB0) Paper 02

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June 2011
Publications Code UG028417

4MB0 Summer 2011 - Paper 2

Question number	Scheme	Marks		
1.	(a) 2500/625	M1		
	4 hrs	A1	2	
	(b) (2500 + 2500)/("4" + "3.5")	M1		
	667 km/h	A1 ft	2	4
2.	(a) factor of x	M1		
	Attempt to factorise $x^2 - 5x + 6$ or orig. cubic	M1		
	$x(x - 3)(x - 2)$	A1	3	
	(b) linear attempt to factorise $2x^2 + 2x - 24$ into two 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.	Note: First three marks for angles, final mark for reasoning Method 1: (using angle at centre) $\angle AOC$(reflex) = 236° ($\angle$ at a point) or $\angle ADC$ = 62° ($\angle$ at centre) $\angle ABC$ = 118° ($\angle$ at centre/opp angles cyclic quad) $\angle BCO$ = 62° ($\angle$ between // lines) at least **two** valid reasons consistent with their $\angle$ Method 2: (using isosceles triangles) $\angle CAO$ (or $\angle ACO$ or $\angle BAC$) = 28° $\angle ABO$ (or $\angle BOC$) = 56° $\angle BCO$ = 62° at least **two** valid reasons consistent with their $\angle$ (isosceles triangle, alt angles between // lines.....)	B1 B1ft B1ft B1 B1 B1 ft B1 ft B1	4 4	4
4.	height of cone = $\sqrt{(39^2 - 15^2)}$ = 36 cm volume = $\frac{1}{3}\pi."36".15^2 + \frac{2}{3}\pi 15^3$ either volume correctly stated and with values substituted 2nd volume correctly stated with values substituted and added Conclusion	M1 A1 M1 M1 dep A1	5	5

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

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

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

Question number	Scheme	Marks		
10.	(a) $2x^2$ or $4xy$, $(S=)\ 2x^2 + 4xy$	B1, B1	2	
	(b) $y = \dfrac{50 - 2x^2}{4x}$ (o.e.)	B1	1	
	(c) $\dfrac{50 - 2x^2}{4x}.x^2$ + conclusion	B1	1	
	(d) one term correctly differentiated	M1		
	$\dfrac{25}{2} - \dfrac{3x^2}{2}$	A1		
	c's$\left(\dfrac{25}{2} - \dfrac{3x^2}{2}\right) = 0$	M1 dep		
	2.89	A1	4	
	(e) 23.4, 24	B1, B1	2	
	(f) graph penalties (-1) straight line segments each point missed (± ½ small square) each missed segment each point not plotted each point incorrectly plotted (± ½ 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	M1		
	1.8 or 1.9, 3.8	A1ft, A1ft	3	16
	SC: No indication on the graph of any line or points identified but both points correct then M1, A1, A0			

Question number	Scheme		Marks		
11.	(a)	$(AC^2 =)\ 54^2 + 35^2 - 2 \times 54 \times 35 \times \cos 100°$	M1		
		2916 + 1225 + 656.4..... (o.e.)	M1 dep		
		69.3 m	A1	3	
	(b)	Use of sine rule with correct values substituted	M1		
		$\text{Sin} \angle CAB = \frac{35 \times \sin 100}{"69.3"}$	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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