Mark Scheme (Results)

June 2011

International GCSE
Mathematics (4MB0) Paper 02

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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		
		$\dfrac{x(x-2)}{2(x+4)}$ OR $\dfrac{x^2 - 2x}{2x + 8}$	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 $\angle ADC \quad = 62°$ ($\angle$ at centre)			
		B1		
	$\angle ABC = 118°$ ($\angle$ at centre/opp angles cyclic quad)	B1ft		
	$\angle BCO = 62°$ ($\angle$ between // lines)	B1ft		
	at least **two** valid reasons consistent with their $\angle$	B1	4	
	Method 2: (using isosceles triangles) $\angle CAO$ (or $\angle ACO$ or $\angle BAC$) = 28°	B1		
	$\angle ABO$ (or $\angle BOC$) = 56°	B1 ft		
	$\angle BCO = 62°$	B1 ft		
	at least **two** valid reasons consistent with their $\angle$ (isosceles triangle, alt angles between // lines.....)	B1	4	4
4.	height of cone = $\sqrt{(39^2 - 15^2)}$	M1		
	= 36 cm	A1		
	volume = $\frac{1}{3}\pi."36".15^2 + \frac{2}{3}\pi 15^3$			
	either volume correctly stated and with values substituted	M1		
	2nd volume correctly stated with values substituted and added	M1 dep		
	Conclusion	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)	$\dfrac{1}{(x+2)^2 - 9}$	M1		
			$\dfrac{1}{x^2 + 4x - 5}$ or $\dfrac{1}{(x+5)(x-1)}$	A1		
		(ii)	$y(x+23) = 1$ OR $x + 23 = 1/y$	M1		
			$\dfrac{1-23x}{x}$ OR $\dfrac{1}{x} - 23$	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) $\quad 2x^2$ or $4xy$, $(S=)\,2x^2 + 4xy$	B1, B1	2	
	(b) $\quad y = \dfrac{50 - 2x^2}{4x}$ (o.e.)	B1	1	
	(c) $\quad \dfrac{50 - 2x^2}{4x} \cdot x^2$ + conclusion	B1	1	
	(d) $\quad$ one term correctly differentiated	M1		
	$\dfrac{25}{2} - \dfrac{3x^2}{2}$	A1		
	$\text{c's}\left(\dfrac{25}{2} - \dfrac{3x^2}{2}\right) = 0$	M1 dep		
	2.89	A1	4	
	(e) $\quad$ 23.4, 24	B1, B1	2	
	(f) $\quad$ graph penalties (-1) straight line segments each point missed ($\pm$ ½ small square) each missed segment each point not plotted each point incorrectly plotted ($\pm$ ½ small square) tramlines very poor curve i.e. line too thick	B3	3	
	(g) $\quad$ 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		
	$\text{Sin} \angle CAB = \dfrac{35 \times \sin 100}{"69.3"}$		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