

June 2004

GCE ORDINARY LEVEL

MARKING SCHEME

MAXIMUM MARK: 100

SYLLABUS/COMPONENT: 4024/02

**MATHEMATICS (Syllabus D)
Paper 2**



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1	(a)	(i)	(a) 360 (m) (b) 4800 (m)	B1 B1	2	f.t. 5160 – their 360	
		(ii)	$\frac{6000 \times 3}{10}$ o.e. M1 = 1800 (m)	A1	2	sc1 for 4200 or 600s or 10min seen.	
		(iii)	$\frac{6000}{7}$ (s) M1 = 14m 17s	A1	2	Allow M1 if 857. ...seen	
	(b)	(i)	1 : 250000	B1	1	Allow $n = 250000$	
		(ii)	$2 \times \frac{6}{5}$ (figs) o.e. M1 = 2.4 cm	A1	2	e.g. $\frac{6000 \times 100}{250000}$ Accept 0.024m NB: figs 24→M1 immediately	
					9		
2	(a)	$(t - 5)(2v + 1)$ o.e.	B2	2	sc1 for any factor e.g. $2(tv - 5v)$ or if solution given.		
	(b)	$\frac{h}{k} = 9$ or $\sqrt{h} = 3\sqrt{k}$ M1 $\rightarrow k = \frac{h}{9}$	A1	2	sc1 for any of: $k = \frac{\sqrt{h}}{3}, k = \frac{h}{\sqrt{3}}, k = \frac{h}{3^2}$		
	(c)	For numerical $\frac{p \pm (or + or -)\sqrt{q}}{r}$ $p = 23$ and $r = 2$ $q = 205$ or $\sqrt{q} = 14.3$ $x = 18.66$ 4.34	B1 B1 B1 B1	4	as final answer or $\left(x - \frac{23}{2}\right)^2$ B1, 51.25 B1		
	(d)	$\begin{pmatrix} 8 & 4 \\ -6 & 0 \end{pmatrix}$ Accept $a = 8, b = 4$ etc	B2	2	sc1 for 18.6→18.7 and 4.3→4.35 or for any two answers given to 2 dec. places. sc1 for 3 elements correct or $3Y = 2\begin{pmatrix} 12 & 6 \\ -9 & 0 \end{pmatrix}$		
						10	
3	(a)	(i)	30 (cm ²)	B1	1	Possible GRAD answers (a)(iii) 59.0... (b)(i) 5.56... (b)(ii) 77.5... Ignore superfluous reasoning.	
		(ii)	$\frac{1}{2} \times 5h + \frac{1}{2} \times 6 \times 4 =$ their 30 or 9 sin their $D\hat{A}B \rightarrow 7.18 \rightarrow 7.2$	M1 A1	2		
		(iii)	$\tan DAB = \frac{4}{3}$ (or $\sin DAB = \frac{7.2}{9}$ etc.) $\rightarrow 53 \rightarrow 53.14$	M1 A1	2		
	(b)	(i)	$\cos 51 = \frac{RS}{8}$ o.e. M1 $\rightarrow 5 \rightarrow 5.04$	A1	2		
		(ii)	$\frac{\sin Q}{8} = \frac{\sin 95}{8.5}$ M1 $\rightarrow \frac{8 \sin 95}{8.5}$ M1 (dep) $\rightarrow 69.6 \rightarrow 70$	A1	3		
		(iii)	(a) No: $PQR \neq 90$ or equiv (b) Mid pt of PR	B1 B1	2		
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4	(a)	$180 - \frac{360}{5}$ or $\frac{5-2}{5} \times 180$ o.e.	M1			
		$\rightarrow 108^\circ$	A1	2	AG	
			B1			
	(b) (i)	2 lines of symmetry Rot. sym. of order 2	B1	2		
	(ii)	Rhombus	B1		Accept diamond.	
	(iii)	252°	B1			
	(iv)	36°	B1	3		
	(c) (i)	40°	B1			
	(ii)	100°	B1			
	(iii)	120°		3		
				10	f.t. 220 – their 100	f.t.
5	(a)	$n(S \cup F)'$ or $n(S' \cap F')$ or $n(\quad) - n(S \cup F)$	B1	1		
	(b)	$y + 80 + 35 - x = 100$ o.e.	M1 $\rightarrow x - 15$ A1	2		
	(c) (i)	$x_{\min} = 15$	B1			
	(ii)	$y_{\max} = 20$	B1	2		
				5		
6	(a)	$p = 14$ $q = 27$	B1	1	<u>both</u>	
	(b)	$k = 2$	B1	1	Accept $3n + 2$	
	(c)	$7n$ -1	B1 B1	2	Accept unsimplified	
	(d)	$R = 41$ $B = 20$ 9 fences with either $\frac{400}{41}$ or $\frac{200}{20}$	B1 B1	2 6	NB: 9 fences without working sc1	

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7	(a)	$2 \times 3^2 (56.5..)$ $+ 3^2 (28.2..)$ $= 84.8 - 84.834$	M1 M1 A1	3	
	(b)	$I = \sqrt{16^2 + 4^2} (16.5)$ $\rightarrow \text{CSA} = \pi \times 4 \times 16.5$ $= 207 - 207.5$	M1 M1 A1	3	
	(c) (i)	$\frac{r}{d} = \frac{4}{16} \text{ or } r = \frac{4d}{16}$	B1	1	A.G Alternatively: 4 <u>and</u> 16 with mention of shape or similarity o.e.
	(ii)	$V = \frac{1}{3} \times \pi \times 4^2 \times 16$ $= 267.9 \rightarrow 268.2$	M1 A1	2	
	(iii)	$\frac{1}{3} \pi r^2 d = \frac{268}{2}$ $\frac{1}{3} \pi \frac{d^3}{16} = \frac{268}{2} \text{ o.e.}$ $\rightarrow d = 12.69 - 12.7 \text{ (cm)}$	M1 M1	3	
				12	
8	(a)	Scales All 8 points correctly plotted (within 1 mm) Smooth curve through pts (allow marginally incorrect pts)	S1 P1 C1	3	Lost for st. lines, incomplete, grossly thick.
	(b) (i)	116 – 117	V1		Accept (4.5 , 116)
	(ii)	1.1 – 1.2 <u>and</u> 5.2 to 5.3	V1	2	DiHo Accept (1.1 , 128) , (5.2 , 128)
	(c)	suitable tangent 22 – 40	T1 T1	2	
	(d)	98	K1	1	(2.5 , 98) not accepted
	(e) (i)	$100 = \frac{A}{2} + 2B \rightarrow 200 = A + 4B$	E1		AG
	(ii)	$140 = A + B \text{ or } 100 = \frac{A}{3} + 3B \text{ etc.}$ $A = 120 \quad B = 20$	E1 B2	4	sc1 for attempt to solve $200 = A + 4B$ and 2 nd equation in A and B
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9	(a)	$(BC^2) = 7^2 + 8^2 - (or +) (2).7.8.\cos 120$ (or 60) $BC^2 = 7^2 + 8^2 - 2.7.8 \cos 120 \rightarrow BC = 13$	B1 B1	2	AG Possible GRAD answers (a) 12.4... (AG) (b) 26.62...
	(b)	Area = $\frac{1.7.8.\sin 120}{2}$ = 24.2 – 24.25 (cm ²)	M1 A1	2	
	(c) (i)	$\frac{1.13.r}{2}$	B1		
	(ii)	$\frac{+1.7.r + 1.8.r}{2}$ M1 = 14r	A1		
	(iii)	14r = 24.2 r = 1.728 → 1.733	M1 A1	5	
	(d)	24.2 – x 1.73 ² = 61 – 61.2 (%)	M1 A1	3 12	
10	(a)	Widths 2, 1, 1, 2, 2, 3 Heights 3½, 8, 6, 5, 1½, 2 All correct (inc. given scales)	M1 M1 A1	3	Allow any clear indication. fx = 63 + 84 + 69 + 130 + 45 + 105 = 496 Allow 1 omission or 2 incorr mid pts not $\frac{0}{40}$ isw
	(b)	11 < x ≤ 12	B1	1	
	(c)	fx (496) M1 f (40) M1 = 12.4 indep	A1	3	
	(d)	26	B1	1	
	(e) (i)	0	B1		
	(ii)	$\frac{6}{40}$	B1		
	(f)	(2x) $\frac{6}{40} \times \frac{34}{39}$ M1 = $\frac{17}{65}$	A1	4 12	

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11	(a)	(i)	Number of events	B1		
		(ii)	(a) $\begin{pmatrix} 44 \\ 46 \end{pmatrix}$	B1 + B1		sc1 for (44, 46)
			(b) School scores, totals, no of points o.e.	B1 indep of (a)		
		(iii)	$\begin{pmatrix} 55 \\ 55 \end{pmatrix} \rightarrow \text{Yes, (tie)}$	B1	5	
(b)	(i)		$\overline{PX} = -\frac{1}{3}p + \frac{1}{3}q$ o.e	B1		Accept unsimplified answers
	(ii)		$\overline{OX} = \frac{2}{3}p + \frac{1}{3}q$ o.e	B1		Accept unsimplified answers
	(iii)		$\overline{QY} = p + (k-1)q$ o.e	B1	3	Accept unsimplified answers
	(iv)		$\lambda \overline{OX} = \overline{QY}$ M1 $k = \frac{3}{2}$	A1	2	
	(v)		$\overline{PZ} = \frac{1}{2}q$	B2	2	Accept unsimplified answers
					12	