CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Ordinary Level

MARK SCHEME for the October/November 2012 series

4024 MATHEMATICS (SYLLABUS D)

4024/21 Paper 2, maximum raw mark 100

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Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

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Qu	Answers	Mark	Part Marks
1	**(a)** 4.28	**2**	**M1** for PQ = 4.5cos18 oe
	(b) **(i)** 36 (.0)	**2**	**M1** for $\sin A\hat{B}C = \frac{6}{10.2}$ oe
	(ii) 5.68 or 5.69	**4ft**	**M3** for $\sqrt{14.3^2 - (10.2^2 - 6^2)} - 6$ oe or **M2** for a complete method for CD or **M1** for $BC^2 = 10.2^2 - 6^2$ or $DC^2 = 14.3^2 -$ their BC^2 oe **SC1** for their CD – 6
2	**(a)** **(i)** $10p + 1$	**2**	**B1** for $5p - 1 + 5p + 2$
	(ii) $x < -1$	**2**	**B1** for $-2x$, $5 - 3$ oe correctly isolated.
	(b) **(i)** 3	**1**	**SC** 2 for $\frac{A}{y+2}$ or $\frac{A}{2-y}$
	(ii) $(x =) \frac{A}{y-2}$	**3**	**M2** for $\frac{A}{x} = y - 2$ or $yx - 2x = A$ or **M1** for $y = \frac{A}{x} + 2$ or $yx = A + 2x$.
	(c) **(i)** $y = 6x - 5$ correctly derived	**1**	
	(ii) $y = 2x + 19$ correctly derived	**1**	
	(iii) $x = 6$ $y = 31$ isw	**2**	**B1** for one correct or **M1** for eliminating one variable
3	**(a)** **(i)** 30	**1**	
	(ii) 29 (.0)	**3ft**	**SC** 2 for the answer 51.7 or 51.8 or For the answer 129 **M2** for Figs $\frac{(200 - \text{a(i)}) - 131.8}{131.8}$ or **M1** for 200 – **a(i)** or for Figs $\frac{200 - 131.8}{131.8}$
	(b) 950	**3**	**M2** for $x - \frac{15}{100} \times -647.5 = 160$ oe or **B1** for 807.50 soi and **B1** for division by 85.

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4	**(a) (i)** 20°	**1**	
	(ii) 70°	**1**	
	(iii) Rectangle stated and justified	**3**	**B1** for Rectangle stated **B1**for establishing a right angle using 20° and 70° **B1** for 3 right angles stated.
	(b) (i) Similar triangles established	**2**	**B1** for $\frac{CO}{DO}=\frac{AO}{BO}$ oe or for $C\hat{O}A = D\hat{O}B$
	(ii) 1.8	**1**	
5	**(a)** 15.7	**1**	
	(b) 25.7	**1ft**	
	(c) (i) Correct 4 lines drawn	**1**	
	(ii) 4	**1**	
	(d) (i) 25	**1**	
	(ii) 14.3	**3ft**	**M2** for $\frac{1}{2}\pi r^2$ – (d)(i) or **M1** for area of a circle πr^2 soi
6	**(a)** 98.2	**3**	**B1** for $4 \times 70 + 10 \times 85 + 14 \times 92.5 + 20 \times 97.5 + 24 \times 105 + 8 \times 120$ and **B1** for division by 4+10+14+20+24+8
	(b) (i) $\frac{28}{80}$ oe	**1ft**	
	(ii) $\frac{992}{6320}$ oe	**2ft**	**B1** for $\frac{32}{80}\times\frac{31}{79}$ seen or $\frac{32\times31}{80\times80}=\frac{992}{6400}=0.155$
	(c) Correct histogram	**3**	**H2** for 3 correct additional columns **H1** for 1 correct additional column

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7	**(a)** 130 g tin	**2**	**B1** for one correct rate such as 1.3 (g/cen)t or 0.769 (cent/g) seen.
	(b) **(i)** 423 to 424	**2**	**M1** for $\pi \times r^2 \times 11$.
	(ii) 319	**3**	**M2** for $2\pi r^2 + 2\pi r 11$ or **M1** for either of these
	(iii) 1050	**2ft**	**M1** for Figs (their 319 + 30)×3 **B1** for $\div 10^4$
	(c) 7.2	**3**	**M2** for $\frac{x}{9} = \sqrt[3]{\frac{512}{1000}}$ oe or **B1** for $\sqrt[3]{512} : \sqrt[3]{1000}$ soi
8	**(a)** 4.1	**1**	
	(b) Correct plots and curve.	**3**	**P2** for 7 or 8 correct plots ft or **P1** for at least 4 correct plots ft and (dep) **C1** for a smooth curve through all plotted points
	(c) *a* ft 1 cao *b* ft	**2ft**	**B1** for at least one solution
	(d) 1 to 2	**2**	**B1** for the correct tangent drawn
	(e) **(i)** –1	**1**	
	(ii) –1 1 2	**3ft**	**B2** for at least one ft and line drawn or **M1** for their $y = x + a$ drawn. **SC1** for all three found by solving the equation

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9	**(a)** 59.2	**3**	**M2** for $(AB =) \dfrac{65\sin 60}{\sin(180-(60+48))}$ or **M1** for $\dfrac{AB}{\sin 60} = \dfrac{65}{\sin(180-(60+48))}$ oe
	(b) 2360	**2**	**M1** for $\dfrac{1}{2} \times 84 \times 65\sin((180 -) 60)$
	(c) 129	**4**	**M3** for $\sqrt{84^2 + 65^2 - 2 \times 84 \times 65 cos(180 - 60)}$ or **M2** for $84^2 + 65^2 - 2 \times 84 \times 65\cos(180–60)$ or **M1** for $84^2 + 65^2 + 2 \times 84 \times 65\cos(180–60)$ and a dep **A1** for 76.3
	(d) 31.9°	**3**	**M2** for $\tan^{-1} \dfrac{35}{65\sin 60}$ oe or **M1** for $\tan^{-1} \dfrac{35}{d}$ or $\dfrac{d}{35}$ and **B1** for for 65sin60 (= 56.3)

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10	**(a)** $\frac{320}{x}$ oe isw	**1**	
	(b) $\frac{320}{x-80}$ isw	**2**	**B1** for $x - 80$ seen
	(c) $x^2 - 80x - 10240 = 0$ correctly obtained	**3**	**M2** for $\frac{320}{x-80} - \frac{320}{x} = \frac{5}{2}$ oe **M1** for (a) – (b) = ± their2½
	(d) 148.8 – 68.8	**4**	**B1** for $\sqrt{(-80)^2 - 4 \times 1 \times (-10240)}$ soi and **B1** for $\frac{-(-80) \pm \sqrt{\text{their}47360}}{2 \times 1}$ soi and After **B0B1**, allow **SC1** for a correct ft. or **B2** for 148.8 and – 68.8 Final answer or **B1** for one correct solution seen or 148.81. and – 68.81 or 149 and – 69.
	(e) 2 h 9 mins	**2ft**	**B1** for 2.15
11	**(a) (i) (a)** $\frac{1}{2}\mathbf{p} + \frac{1}{2}\mathbf{r}$	**1**	
	(b) $\mathbf{r} + \mathbf{p} - \mathbf{q}$	**1**	
	(c) $\frac{1}{2}\mathbf{p} + \frac{1}{2}\mathbf{r}$	**2ft**	**B1** for unsimplified
	(ii) Equal and Parallel	**1**	
	(b) (i) Correct triangle	**2**	**B1** for two correct vertices or triangle correct size and orientation
	(ii) Correct triangle	**2**	**B1** for two correct vertices or triangle correct size and orientation
	(iii) Complete description www	**3**	**B1** for Rotation **B1** for either 90 anticlockwise or centre (0,3)

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