UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Ordinary Level

MARK SCHEME for the May/June 2011 question paper

for the guidance of teachers

4024 MATHEMATICS (SYLLABUS D)

4024/21 Paper 2, maximum raw mark 100

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

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Abbreviations

cao	correct answer only
cso	correct solution only
dep	dependent
ft	follow through after error
isw	ignore subsequent working
oe	or equivalent
SC	Special Case
www	without wrong working

SECTION A

Qu	Answers	Mark	Comments
1	**(a)** 37.35 and A	2	M1 for 315 × 0.05 + 720 × 0.03
	(b) **(i)** \$0.05	1	
	(ii) Large and 0.0485 seen oe	1	
	(c) 890	3	M1 for $\frac{1134.75}{0.85}$ M1 for their 1335 – (375 + 70)
2	**(a)** (7 , 9)	1	
	(b) **(i)** $y = 2x - 5$	2	M1 for gradient $\frac{(15+21)}{(10+8)}$ (= 2)
	(ii) Yes and $-9 = 2 \times -2 - 5$	1ft	ft correct conclusion from their equation with the working shown
	(c) **(i)** **(a)** (–5 , 0)	1	
	(b) $\left(\frac{4p-15}{3}, p\right)$	2	M1 for line through (4 , 9) and (6 , 6)
	(ii) (5 , 7 ½)	2	B1 for either x or y coordinate
3	**(a)** **(i)** 10.6 – 10.62	2	M1 for $\tan 37 = \frac{8}{QR}$
	(ii) 192	2	M1 for 4^3 seen
	(b) 6.40	2	M1 for $\frac{46.62}{0.45}$
	(c) 18	2	M1 for (k =) 90 oe or $\frac{3}{5} \times 30$

4	**(a)** $4x + 5y + 4x + 5y = 1020$ leading to $4x + 5y = 510$ $6x + 3y + 6x + 3y + 4x + y + 4x + y = 1360$ leading to $5x + 2y = 340$	 1 1	
	(b) $x = 40,\ y = 70$	3	M1 for an attempt to make the coefficients of x or y equal M1 for subtracting the two equations
	(c) 0.56	2ft	M1 for figs 0.8×2.1 and figs 1.6×0.7 After 0, SC1 for answer figs 56 ft (2 × their x × their y) / 10 000
5	**(a)** **(i)** $\begin{pmatrix} -10 & -4 \\ 15 & 7 \end{pmatrix}$	2	B1 for 3 correct terms
	(ii) $\begin{pmatrix} -0.5 & -1 \\ 1.5 & 2 \end{pmatrix}$	2	B1 for ½ × (2 × 2 matrix) or for $\begin{pmatrix} -1 & -2 \\ 3 & 4 \end{pmatrix}$ soi
	(b) **(i)** 13	2	M1 for $12^2 + 5^2$ (= 169)
	(ii) $\begin{pmatrix} 8 \\ 6 \end{pmatrix}$	1	
	(c) **(i)** $\begin{pmatrix} -5 \\ 2 \end{pmatrix}$	1	
	(ii) (18 , 9)	1	
	(iii) 22	3ft	M1 for 12 × (their 9 – 3) M1 for an attempt to subtract area of 3 triangles
6	**(a)** **(i)** **(a)** Translation cao	1	
	$\begin{pmatrix} 1 \\ -5 \end{pmatrix}$	1	
	(b) Enlargement cao Scale factor 3, Centre (6, 4)	1 1	
	(ii) **(a)** (–1 , –2) **(b)** (–1 , 0)	1 1	
	(b) **(i)** Kite	1	
	(ii) (1 , 3) (4 , 2)	1 1	Also (4, –1) is correct for 1

SECTION B

7	**(a)** 30.4 to 30.45	4	M1 for $16^2 + 20^2 \pm (2) \times 16 \times 20 \cos 115^o$ M1 for $\sqrt{656 - 640\cos 115}$ A1 for 926.(47….)
	(b) $16\cos 25^o$ oe	2	M1 for $\cos 25 = \frac{x}{16}$
	(c) **(i)** 28 www	2	M1 for $\frac{1}{2}(20 + AD) \times 14.5 = 348$
	(ii) ½ × 28 × 14.5 (= 203) or 348 – ½ 20 × 16 sin115	1	½ 30.4 × 28 sin28.5
	(iii) 28.4 to 28.5	3ft	M1 for ½ × 30.4 × 28 × sin *CAD* = 203 M1 for sin *CAD* = $\frac{203}{½ \times 30.4 \times 28}$ ft their *AC* and their *AD*
8	**(a)** **(i)** $y^2 + 18y + 81 = y^2 + y^2 + 10y + 25$ $y^2 - 8y - 56 = 0$	2	M1 for $(y + 9)^2 = y^2 + (y + 5)^2$ oe
	(ii) 12.5, –4.5	3	M1 for $y = \frac{8 \pm \sqrt{8^2 + 4 \times 56}}{2}$ soi A1 for one solution or 12.48(5)… and –4.48(5)…
	(iii) 21.5	1ft	ft 9 + their positive *y*
	(b) **(i)** **(a)** $Q\hat{O}S = 90 - x$ and conclusion	1	
	(b) $\frac{1}{2}(90 + x)$ oe cao	2	M1 for ½ (180 – (90 – *x*))
	(ii) **(a)** 3 × ½ (90 – *x*) = 2 × ½ (90 + *x*) leading to 180 + 2*x* = 270 – 3*x*	2	M1 for 3 × ½ (90 – *x*) = 2 × their *OQS*
	(b) 18	1	
9	**(a)** **(i)** Histogram with heights 0.14, 0.56 ,0.74, 0.42 and 0.2 widths 100, 50, 50, 50, 100	3	B2 for 4 correct columns or B1 for at least 1 correct column After 0, SC2 for "correct" histogram or SC1 for at least 3 "correct" columns (e.g. no vertical or horizontal scale)
	(ii) 14 – 16	1	
	(iii) 200 $m < 250$	1	
	(iv) $\frac{7}{20}$ cao	1	

	(b) ($p =$) 35	3	M1 for $\frac{125\times14+175p+225\times26}{40+p}=183$ M1 $183p - 175p = 1750 + 5850 - 7320$
	(c) (i) 1	1	
	(ii) $\frac{49k}{750k}$	2ft	M1 for $\frac{7}{20}\times\frac{14}{75}$ ft their $\frac{7}{20}$ and their 75
10	**(a)** 32	2	M1 for $\frac{200}{6.2}$
	(b) (i) 1.13	3	B2 for figs 1128…….(or 113) <u>or</u> M1 for fig 0.2 = πr^2 fig 5
	(ii) (a) 56.5 to 56.51	3	M1 for $\pi \times 1.9^2 \times 5$ M1 for their volume – 0.2
	(b) 53	2ft	M1 for $\frac{3000}{56.5}$ ft their 56.5 with rounding down to an integer
	(c) 12.9	2	M1 for $2 \times \pi \times 1.9$ (= 11.9)
11	**(a) (i)** 35	1	
	(ii) 360	1	
	(iii) 7	1	
	(b) (i) 10	1	
	(ii) (8.00 , 0) to (8.15 , 10) (8.15 , 10) to (8.23 , 22) (8.23 , 22) to (8.47 , 30)	2ft	B1 for 2 correct lines ft their 10 and their 10 + 12
	(iii) 20	2ft	M1 for $\frac{8}{24}(\times60)$ ft $\frac{18 - \text{their } 10}{24/(60)}$
	(c) (i) 12.29 cao	2	M1 for $\sin 55 = \frac{MK}{15}$ oe
	(ii) 247°	1	
	(iii) 10.2 to 10.7	1	