UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Ordinary Level

MARK SCHEME for the October/November 2011 question paper

for the guidance of teachers

4024 MATHEMATICS (SYLLABUS D)

4024/12   Paper 1, maximum raw mark 80

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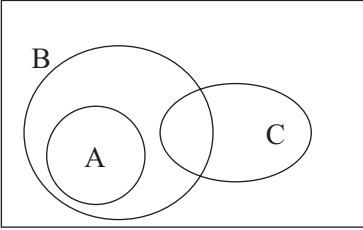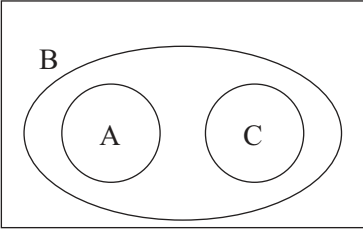
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Abbreviations

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
soi	seen or implied

Qu		Answers	Mark	Part marks
1	(a)	$\dfrac{35}{36}$	1	
	(b)	0.4	1	
2	(a)	18	1	
	(b)	$1\dfrac{3}{4}$ (hours), 6 500 (seconds), 110 (minutes)	1	
3	(a)	6	1	
	(b)	5	1	
4	(a)	0 cao	1	
	(b)	$2x - 3$	1	
5	(a)	4.2×10^{-5}	1	
	(b)	2.1×10^{7}	1	
6	(a)	$(x) > 6$ cao	1	
	(b)	-5	1	
7	(a)	$\dfrac{15}{16}$	1	
	(b)	$8x^{6}$ cao	1	
8	(a)	25	1	
	(b)	$57 - 2^{n} + n$ oe	1	
9	(a)	$\dfrac{180}{p+1}$	1	
	(b)	$2p + 2$, or any equivalent	1	

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10		2	or **C1** for A inside B or **C1** for C intersecting B, but not A (if A drawn) or for C inside B and not intersecting A (if A drawn)
11	$\sqrt{(110 - 0.2(0) \times 370)}$ as the first line of working $(\pm)$ 6 www	M1 A1	or **B1** for two of 110, 0.2(0), 370 seen or **C1** for 6(.0)(0) www, following other approximations or without any working or **B1** for 74
12	20	2	or **C1** for 12 or **M1** for 8×2.5 oe; or for $8 + 8 \times 1.5$ oe
13	**(a)** 15 oe **(b)** 12 oe **(c)** $\dfrac{60}{n}$	1 1 1	
14	**(a)** 94° **(b)** 133° **(c)** 43°	1 1 1ft	 ft $(180 - \text{their}\textbf{(a)})/2$
15	**(a)** correct ruled line **(b)** $\dfrac{7}{15}$ cao **(c)** 240	1 1 1	
16	**(a)** 4 **(b)** rectangles base 4 to 5, height 4 base 5 to 8, height 1	1 1 1	

17	(a) 57.5	1	
	(b) 23 www	2ft	ft $4 \times$ their(a) $/ 10$ or M1 for $4 \times$ figs 575, or $4 \times$ figs{their(a)} with no further working except conversion to cm
18	(a) (0)6 18 (h)	1	Accept (0)6:18; (0)6.18; or similar.
	(b) $26\frac{2}{3}$	2	or M1 for $\frac{200}{7.5}$ oe or M1 for $\frac{150 + \text{their second distance}}{7.5}$
19	$x = 9$ and $y = -6$	3	or C2 for one answer correct www; or C1 for a pair of values that fits either equation, provided that this pair has been obtained by the method of substitution, equal coeffs., or matrices/determinants and **not** by trial and error.
20	(a) $180 - x - y$ or $180 - (x + y)$ only	1	
	(b) $3\frac{3}{4}$ or any equiv.	1	
	(c) $\frac{9}{16}$	1	
21	(a) $(-)$ 5	1	
	(b) 3 400	2	or M1 for **clearly** trying to find the **correct** area.
22	(a) $\begin{pmatrix} 11 & -6 \\ -1 & -2 \end{pmatrix}$	2	or C1 for 3 or 2 correct elements
	(b) $\begin{pmatrix} \frac{1}{2} & 1 \\ \frac{1}{2} & 2 \end{pmatrix}$ or $\frac{1}{2}\begin{pmatrix} 1 & 2 \\ 1 & 4 \end{pmatrix}$	2	or B1 for det A = 2, or for $k\begin{pmatrix} 1 & 2 \\ 1 & 4 \end{pmatrix}$ oe

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23	**(a)** $(3x - 1)(3x + 1)$	**1**	
	(b) Using factors: both -15 and $\frac{1}{2}$ from correct factors	**3**	or **C2** for one correct value from correct factors or **B1** for the factors $(2y - 1)$ and $(y + 15)$ seen but not necessarily multiplied together If a **clear**, incorrect pair of linear factors is used, then award **C1** for **each** correctly obtained ft solution, possibly unsimplified – (max. of 2 marks).
	Using the formula: for $\dfrac{p \pm (\text{or} + \text{and} -)\sqrt{q}}{r}$	**1**	for all three of $p = -29$, $r = 4$ (or 2×2), and $q = 961$ (or $\sqrt{q} = 31$ from $q = 961$)
	-15 www	**1**	
	$\frac{1}{2}$ www	**1**	
24	**(a)** 0	**1**	
	(b) 1	**1**	
	(c) 1.6 or $1\frac{3}{5}$ or $\frac{8}{5}$	**2**	or **M1** for an attempt at $\sum fx$, possibly implied by sum = 64.
25	**(a)** $x > 2$ oe	**1**	if zero scored, then **C1** for $x \dots 2$ oe
	$x + y < 12\frac{1}{2}$ oe	**1**	**and** $x + y \dots 12\frac{1}{2}$ oe with incorrect (in)equalities for "…"
	(b) (i) $(9, 3)$	**1**	
	(ii) 4	**1**	
26	**(a)** correct triangle	**1**	
	(b) (i) one or two st. line(s), parallel to AC, 2.5 cm from AC	**1**	
	(ii) bisector of angle ABC	**1**	
	(c) $PQ = 5.4$ to 5.7	**1**	dep. on correct loci in **(b)**

27	(a)	(i)	$270°$	1	
		(ii)	$(2, 0)$	1	
	(b)	(i)	2 cao	1	
		(ii)	$x = -1$ oe	1	
28	(a)	(i)	$-\mathbf{p} + \mathbf{q}$ oe	1	
		(ii)	$-4\mathbf{p} + 2\mathbf{q}$ oe	1	
	(b)	(i)	$3\mathbf{p} + k(-4\mathbf{p} + 2\mathbf{q})$ oe	1ft	ft $3\mathbf{p} + k \times$ their **(a)(ii)**
		(ii)	$c \times$ their**(a)(i)** = their**(b)(i)** oe where $c \neq k, \dfrac{1}{k}$, or 1, provided their **(b)(i)** consists of a vector expression and k.	M1ft	or **C1** for 1.5 oe, with no appropriate working, and no wrong working
			1.5 oe	A1	