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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

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
soi seen or implied

Qu	Answers	Mark	Part marks
1	**(a)** $\frac{35}{36}$	**1**	
	(b) 0.4	**1**	
2	**(a)** 18	**1**	
	(b) $1\frac{3}{4}$ (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)** $\frac{15}{16}$	**1**	
	(b) $8x^6$ cao	**1**	
8	**(a)** 25	**1**	
	(b) $57 - 2^n + n$ oe	**1**	
9	**(a)** $\frac{180}{p+1}$	**1**	
	(b) $2p + 2$, or any equivalent	**1**	

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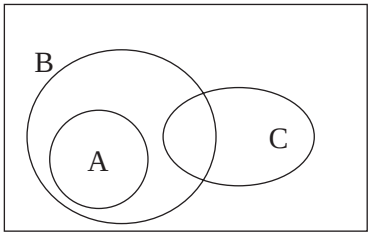
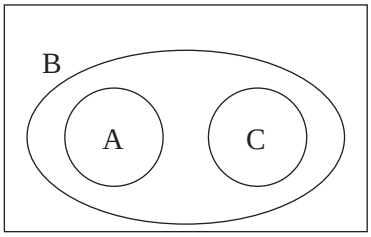
10	 OR 	**2**	or **C1** for A inside B or **C1** for C intersecting B, but not A (if A drawn) or for C inside B and not intersecting A (if A drawn)
11	$\sqrt{(110 - 0.2(0) \times 370)}$ as the first line of working (±) 6 www	**M1** **A1**	or **B1** for two of 110, 0.2(0), 370 seen or **C1** for 6(.0)(0) 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)** $\frac{60}{n}$	**1** **1** **1**	
14	**(a)** 94° **(b)** 133° **(c)** 43°	**1** **1** **1ft**	 ft (180 – their**(a)**)/2
15	**(a)** correct ruled line **(b)** $\frac{7}{15}$ 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**	

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17	**(a)** 57.5 **(b)** 23 www	**1** **2ft**	 ft 4 × their**(a)** / 10or **M1** for 4 × figs 57… or 4 × figs{their**(a)**} with no further working except conversion to cm
18	**(a)** (0)6 18 (h) **(b)** $26\frac{2}{3}$	**1** **2**	Accept (0)6:18; (0)6.18; or similar. 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 **(b)** $3\frac{3}{4}$ or any equiv. **(c)** $\frac{9}{16}$	**1** **1** **1**	
21	**(a)** (–) 5 **(b)** 3 400	**1** **2**	 or **M1** for **clearly** trying to find the **correct** area.
22	**(a)** $\begin{pmatrix} 11 & -6 \\ -1 & -2 \end{pmatrix}$ **(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** **2**	or **C1** for 3 or 2 correct elements 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 $\frac{p \pm (\text{or + and -})\sqrt{q}}{r}$	**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 … 2 oe
	$x + y < 12\frac{1}{2}$ oe	**1**	**and** $x + y$ ... $12\frac{1}{2}$ 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)**

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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 $c \neq k$, $\frac{1}{k}$, 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**	