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CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Ordinary Level

MARK SCHEME for the October/November 2012 series

4024 MATHEMATICS (SYLLABUS D)

4024/11 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.

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

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Question	Answers	Mark	Part marks
1 (a)	$\frac{17}{30}$ oe	1	
(b)	$\frac{8}{45}$ oe	1	
2 (a)	0.76 oe	1	
(b)	15	1	
3 (a)	120	1	
(b)	16	1	
4	220 $2\frac{1}{4}$ 2300 0.021	2	**C1** for 3 correct when one is covered or **C1** for reversed answer
5 (a)	21 30 or (0) 9 30 p.m. only	1	
(b)	338 (.0) (0)	1	
6 (a)	3.4×10^{-5}	1	
(b)	$2\ (.0) \times 10^{16}$	1	
7 (a)	5 cao	1	
(b)	0.17	1	
8	42	2	**B1** for 120 or 168 seen
9	28	2	**B1** for $k = 4$ or **B1** for $\frac{1}{5} \times 20 = y \times \frac{1}{7}$ oe
10 (a)	135	1	
(b)	195	1	
11 (a)	3	1	
(b)	2.5	1	
12 (a)	$\left(\frac{1}{4} \text{ and } \frac{3}{4}\right)$; (0 and 1); $\left(\frac{1}{3} \text{ and } \frac{2}{3}\right)$ – all three pairs	2	**B1** for any one pair
(b)	$\frac{1}{4}$ oe	1	

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13	**(a)**	1.5	**1**	
	(b)	8.4	**2**	**B1** for (figs 345 × 20), or for figs 69
14	**(a)**	**(i)** 6	**1**	
		(ii) $\frac{9}{16}$	**1**	
	(b)	$8x^6$ cao	**1**	
15	**(a)**	36	**1**	
	(b)	28	**1**	
	(c)	112 or 4 × their **(b)**	**1**✓	
16	**(a)**	$\begin{pmatrix} \frac{1}{3} & 0 \\ 0 & 1 \end{pmatrix}$ or $\frac{1}{3}\begin{pmatrix} 1 & 0 \\ 0 & 3 \end{pmatrix}$ oe	**1**	
	(b)	(one way) stretch	**1**	
		parallel to x-axis / y-axis invariant **and** (stretch/scale) factor 3	**1 dep**	
17	**(a)**	$x > 1$ $x + y < 9$	**1** **1**	**C1** for the two correct lines with wrong inequality symbols
	(b)	10	**1**	
18	**(a)**	$5p(4 + 5p)$	**1**	
	(b)	$(3 – 2t)(3 + 2t)$	**1**	
	(c)	$(9 – x)(1 + 4x)$ or $(x – 9)(–4x – 1)$	**1**	
19		720 or 540	**B1**	
		$10x$ = *their* (720) or $5x$ + *their* (180) = *their* (540)	**M1**	
		72	**A1**	Ans. of 72 WW scores 2.
20	**(a)**	$2x – 3$	**1**	
	(b)	$A = -\frac{3}{2}$ oe	**1**	**B1** for $\frac{-9+3}{2} + \frac{t+3}{2}$ oe
		$B = \frac{1}{2}$ oe	**1**	or **B1** for f(–9) = –3 cao

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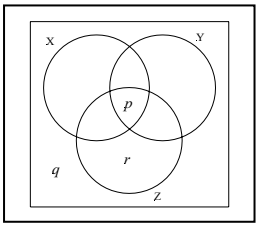
21	**(a)**	7	**1**	
	(b)	correct *p* correct *q* correct *r*	**1** **1** **1**	
22	**(a)**	68	**1**	
	(b)	52	**1**	
	(c)	56	**1**	
	(d)	72	**1**	
23	**(a)**	(–) 2	**1**	
	(b)	20	**1**	
	(c)	600	**1**	
	(d)	40 or 10 + 30 × | *their* (a) | / 2	**1**✓	
24	**(a)**	(3, 5)	**1**	
	(b)	**(i)** (4, 6)	**1**	
		(ii) 29 or $(\textit{their}\ C_x + 1)^2 + (\textit{their}\ C_y - 8)^2$	**2**✓	**M1** for numerical $\overrightarrow{AB} + \overrightarrow{BC} = \overrightarrow{AC}$ or **B1** for $(\overrightarrow{AC} =)\begin{pmatrix} 5 \\ -2 \end{pmatrix}$
25	**(a)**	$3n - 2$ ($3n - 1$) $3n$	**1**	
	(b)	**(i)** 121 and 120	**1**	
		(ii) $3n$ ($3n - 2$) oe or f.t from *their* (a) response provided it is in terms of n.	**1**✓	
		(iii) $(3n - 1)^2 - 3n\,(3n - 2)$	**M1**	
		correctly reaching 1	**A1**	If [0] scored then award **B1** for $(3n - 1)^2$ or for $9n^2 - 6n + 1$ seen and used

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26	**(a)**	264 ° to 268 ° inclusive	**1**	
	(b)	Acceptable quadrilateral *ABCD*	**1**	
	(c)	**(i)** acceptable perp. bisector of *AB*	**1**	
		(ii) acceptable bisector of angle *ABC*	**1**	
	(d)	correct region (top l.h. corner) shaded	**1**	dep. on two reasonably accurate intersecting lines
27	**(a)**	$\begin{pmatrix} -3 & -1 \\ -2 & -1 \end{pmatrix}$ cao	**2**	**C1** for 2 or 3 elements correct
	(b)	**(i)** 1 row 2 columns	**1**	
		(ii) (4 3)	**2**	**C1** for $(4p\ 3p)$ or for $\begin{pmatrix} 4 \\ 3 \end{pmatrix}$ or **B1** for $(2x - x + 3y)$ or **M1** for x = $k\begin{pmatrix} 8 & 5 \end{pmatrix}\begin{pmatrix} 3 & 1 \\ 0 & 2 \end{pmatrix}$