Cambridge
O Level

Cambridge International Examinations
Cambridge Ordinary Level

MATHEMATICS (SYLLABUS D) **4024/11**

Paper 1 **October/November 2016**

MARK SCHEME

Maximum Mark: 80

Published

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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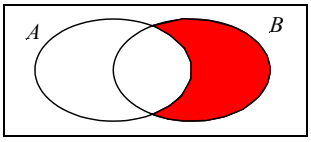
Question	Answers	Mark	Part marks
1 (a)	$\frac{17}{30}$ h	1	
(b)	(0).0033	1	
2 (a)	7	1	
(b)	30	1	
3 (a)	$\frac{13}{40}$ cao	1	
(b)	$\frac{7}{20}$ $\frac{9}{25}$ 0.38 0.4	1	
4 (a)	4.8(0)	1	
(b)	24	1	
5 (a)	360 cao	1	
(b)	4	1	
6	15	2 *	**B1** for "k" = –150 provided y = "k"/x is used. or **M1** for $–50 \times 3 = –10y$ oe or **M1** for y = (*their k*)/(–10) when y = "k"/x is used.
7	40	2 *	**M1** for $\frac{360}{180-171}$; or $171n = 180(n – 2)$ oe
8 (a)	7	1	
(b)	$\frac{4y}{3x}$; or $\frac{4yx^{-1}}{3}$	1	
9 (a)	0.155 cao	1	
(b)	20 WWW	1 *	
10 (a)	4.5×10^8	1	
(b)	3×10^9	2 *	**C1** for $A \times 10^9$ with $1 \leqslant A < 10$; or for 3×10^{11} or **B1** for 0.3×10^{10}

11	**(a)**	0.35 oe	1	
	(b)	$3 - 10x$ oe	2 *	**C1** for $10x - 3$ or **B1** for 10 "y" = 3 – "x"
12	**(a) (i)**	9	1	
	(ii)	89	1	
	(b)		1	
13	**(a)**	0.5 oe	1	
	(b)	$\frac{2}{3}$ oe	1 *	
	(c)	(–) 8	1	
14	**(a)**	2.7 oe	2 *	**M1** for $\frac{BC}{6} = \frac{1.8}{4}$ oe
	(b)	$\frac{4}{5}$ oe	1 *	
15	**(a)**	Rotation 90° clockwise oe, centre (3, 1)	1 1	Mark lost if a second transformation is named.
	(b)	vertices: (–2, 4), (–4, 0), (–4, 4)	2 *	**B1** for two correct vertices, or for vertices (2, 0), (4, 0), (4, 4)
16	**(a)**	$5(1 - 2t)(1 + 2t)$	2 *	**C1** for $(1 - 2t)(1 + 2t)$ or **B1** for one of $5(1 - 4t^2)$; $(5 + 10t)(1 - 2t)$; $(5 - 10t)(1 + 2t)$
	(b)	$(3y - 2x)(y + 3)$	2 *	**B1** for one of the partial factorisations $y(3y - 2x)$; $2x(y + 3)$; $3(3y - 2x)$; $3y(y + 3)$; or their negatives, seen.

17 **(a)**	57°	1	
(b)	33°	1	
(c)	FT 180° – their (a); or 123°	1 *	
(d)	220°	1	
18	Correctly equating one pair of coefficients or expressing one variable in terms of the other. A correct method to eliminate one variable. Either $x = -4$ or $y = 2$ WWW. Both $x = -4$ and $y = 2$ WWW.	* **M1** **M1** **A1** **A1**	If [0] earned, then award **C1** for a pair of values that satisfies either equation. If only **M1** + **M1** earned, then award **B1** for a *correct* substitution of their first solution into one, or a *correct* linear combination of both, of the *original* equations.
19 **(a)**	the point P marked correctly	1	
(b)	the point Q marked correctly	1	
(c)	$-\mathbf{a} - 2\mathbf{b}$ oe	2	**C1** for $-\mathbf{a}$; or for $-2\mathbf{b}$
20 (a)	125° to 129°	1	
(b) **(i)**	correct arc	1	
(ii)	correct straight line	1	
(iii)	PD =3.4 to 3.8 cm WWW	1 dep	Dependent on correct types of loci, that intersect.
21 **(a)**	$\begin{pmatrix} 0 & -5 \\ 7 & 9 \end{pmatrix}$	2	**C1** for 2 or 3 correct elements; or for 3 or 4 elements of $\begin{pmatrix} 12 & -1 \\ -1 & 9 \end{pmatrix}$.
(b)	$\frac{1}{7}\begin{pmatrix} 3 & 1 \\ -1 & 2 \end{pmatrix}$; or $\begin{pmatrix} \frac{3}{7} & \frac{1}{7} \\ -\frac{1}{7} & \frac{2}{7} \end{pmatrix}$; or any equivalent seen	2 *	**C1** for $\frac{1}{7}\begin{pmatrix} . & . \\ . & . \end{pmatrix}$; or for $k\begin{pmatrix} 3 & 1 \\ -1 & 2 \end{pmatrix}$, $k \neq \frac{1}{7}$
(c)	$\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$	1	

22	**(a)**	10.4 or any equivalent	2 *	**M1** for $\frac{v-4}{8}=\frac{8}{10}$ oe or **B1** for 6.4 oe; or for 1.6 oe; seen
	(b)	80	2 *	**C1** for 140 or **M1** for 10 × (4 + 12)/2 oe
	(c)	Curve, concave upwards, from (0, 0) to (10, their(b)	1 √	independent
		Straight line from (10, their(b)) to (15, 60 + their(b))	1 √	independent
23	**(a)**	7, 21	1	
	(b)	$2n - 1$ oe	1	
	(c)	FT 3 × *their* (b) provided this is a function of n; or $6n - 3$ oe	1 √	
	(d) (i)	48	1	
	(ii)	$3n^2$	2 *	**M1** for a sensible method, e.g. writing terms as 3×1, 3×4, 3×9, ... or **B1** for $An^2 + Bn + C$, $A \neq 0$ from a valid method.
24	**(a)**	(9, 2)	1	
	(b)	$x < 9$ oe	1	In (b), if [0] scored for $x < 9$ and $y > 2$ then **C1** for both {x ... 9 or x ... their(9)}
		$y > 2$ oe	1	*and* {y ... 2 or y ... their(2)}
		$x - y > 3$ oe	1	
	(c)	$a = 8$	1	In (c), if [0] scored then
		$b = 4$	1	**C1** for $a = 4$ and $b = 8$; or for $a = 6$ and $b = 3$.