

**CAMBRIDGE INTERNATIONAL EXAMINATIONS**

Cambridge Ordinary Level

## **MARK SCHEME for the October/November 2015 series**

### **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.

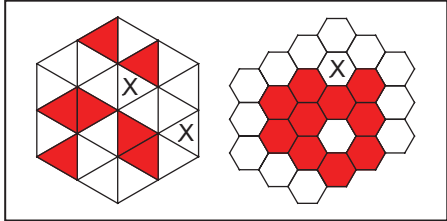
Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge will not enter into discussions about these mark schemes.

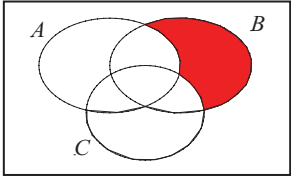
Cambridge is publishing the mark schemes for the October/November 2015 series for most Cambridge IGCSE<sup>®</sup>, Cambridge International A and AS Level components and some Cambridge O Level components.

® IGCSE is the registered trademark of Cambridge International Examinations.

<b>Page 2</b>	<b>Mark Scheme</b>	<b>Syllabus</b>	<b>Paper</b>
	<b>Cambridge O Level – October/November 2015</b>	<b>4024</b>	<b>12</b>

Question	Answers	Mark	Part marks
<b>1 (a)</b>	0.009(0...)	1	
<b>(b)</b>	1.8	1	
<b>2 (a)</b>	59.3(0)	1	
<b>(b)</b>	90	1	
<b>3</b>	(±) 12 WWW	2 *	<b>B1</b> for “ <i>k</i> ” = (±) 6, from $y = “k”\sqrt{x}$ or <b>M1</b> for $18 \times \sqrt{4} = y \times \sqrt{9}$ oe or <b>M1</b> for ( <i>their k</i> ) $\times \sqrt{4}$ oe provided $y = “k”\sqrt{x}$ used
<b>4 (a)</b>	$-\frac{3}{5}$ , or -0.6	1	
<b>(b)</b>	$\frac{x-1}{4}$ oe	1 (*)	
<b>5 (a)</b>	0.0505	1	
<b>(b)</b>	0.06(0)(0) oe from 9, 0.2 and 30	1 *	
<b>6</b>	$\begin{pmatrix} -2 & -1 \\ -1 & 5 \end{pmatrix}$	2	<b>C1</b> for 2 or 3 correct elements
<b>7 (a)</b>		1	
<b>(b)</b>		1	
<b>8</b>	d, a, b, e, c	2	<b>C1</b> for four correct when one is covered up
<b>9 (a)</b>	55	1	
<b>(b)</b>	6.5, or FT 61.5 – <i>their(a)</i>	1 $\sqrt{h}$	
<b>10 (a)</b>	$4.5 \times 10^{-6}$	1	
<b>(b) (i)</b>	$2.4 \times 10^{16}$	1	
<b>(ii)</b>	$5.6 \times 10^8$	1	
<b>11 (a)</b>	1	1	
<b>(b)</b>	$\frac{2}{3}$	1	
<b>(c)</b>	$81x^6$	1	

Page 3	Mark Scheme	Syllabus	Paper
	Cambridge O Level – October/November 2015	4024	12

Question	Answers	Mark	Part marks
12 (a)	$2 \times 3^2 \times 11$ oe	1	
(b) (i)	12, or $2^2 \times 3$	1	
(ii)	90, or $2 \times 3^2 \times 5$	1	
13	$x = 45$ $y = 20$ $z = 115$	1 1 1	
14 (a)	20	1	
(b)	1 WWW	2 *	<b>M1</b> for $\frac{(80+45)}{25}$ or for $25 = \frac{45+80}{4+t}$ oe or <b>B1</b> for <i>total time = 5 hours</i>
15 (a)		1	
(b) (i)	6	1	
(ii)	10, 14, 16	1	
16 (a) (i)	$(2p - 3q)(2p + 3q)$	1 (*)	
(ii)	$(2n - 1)(n + 3)$	1 (*)	
(b)	$\frac{9y+8x}{12xy}$	1	
17 (a)	28	1	
(b)	62	1	
(c)	48 or FT 110 – <i>their (b)</i>	1 $\checkmark^b$	
18 (a)	$x > 3$ ; $y < 6$ ; $y > x + \frac{1}{2}$ ; oe all three	2	<b>C1</b> for 2 correct; or for $x \geq 3$ ; $y \leq 6$ ; $y \geq x + \frac{1}{2}$ ; oe all three
(b)	5	1	or for one correct strict inequality, <b>and</b> the other two correct, but with equality as well.

Page 4	Mark Scheme	Syllabus	Paper
	Cambridge O Level – October/November 2015	4024	12

Question	Answers	Mark	Part marks
19	12 WWW	3 *	<p><b>M1</b> for starting to solve the problem correctly, using exterior angles sum = 360 or interior angles sum = <math>180 \times 3x - 360</math> oe  <b>and A1</b> for correct equation(s) in <i>their</i> variable(s), e.g.  <math>2x(180 - 155) + x(180 - 140) = 360</math> oe  or <math>155 \times 2x + 140 \times x = 180 \times 3x - 360</math> oe  <math>(n - 2) \times 180 = n \times \left( \frac{2 \times 155 + 140}{3} \right)</math> oe  <math>n \times \left[ 180 - \left( \frac{2 \times 155 + 140}{3} \right) \right] = 360</math> oe  <math>450x = 180(n - 2)</math> <b>and</b> <math>n = 3x</math></p> <p><b>or M2</b> for a complete method, clearly explained, that does not use algebra</p>
20 (a) (i)	65.4	1	
(ii)	64	1	
(iii)	160	1	
(b)	Parallel CF curve from ( 62, 0 ) to ( 72, 400 )	1	
21 (a)	(0)96 to (0)98	1	
(b) (i)	Perpendicular bisector of <i>BC</i> .	1	
(ii)	Bisector of angle <i>ABC</i> .	1	
(c)	<i>DA</i> = 80 to 84 km	1	Dependent on two acceptable intersecting loci
22 (a)	$(4, -\frac{1}{2})$	1	
(b)	$\frac{5}{6}$	1	
(c) (i)	4	1	
(ii)	-2.5, or any equiv.	1	
23 (a)	$\frac{1}{4} \quad \frac{1}{4} \quad \frac{1}{4} \quad \frac{1}{4}$	1	
(b) (i)	5 6 7 8	1	
(ii)	$\begin{pmatrix} 15 \\ 16 \end{pmatrix} \quad \frac{10}{16} \quad \frac{3}{16} \quad 0$ or FT from <i>their (bi)</i> table	1	

Page 5	Mark Scheme	Syllabus	Paper
	Cambridge O Level – October/November 2015	4024	12

Question	Answers	Mark	Part marks
(c)	$\frac{7}{16}$ oe WWW	2 *	<b>M1</b> for $\frac{1}{4} \times$ ( sum of (bii) table) oe, or for $\sum xy$ , attempt, where $x$ and $y$ are corresponding values in the two tables
24 (a)	43 47 cao	1	
(b)	997	1	
(c)	(- )10	1	
(d)	407	1	
(e)	39	1	
25 (a)	1.5	1	
(b)	$15k - 75$ ; or $15(k - 5)$	2 *	<b>M1</b> for $\frac{1}{2} \times 10 \times 15 + (k - 10) \times 15$ oe seen
(c) (i)	Horizontal line from ( 0, 12 ), going to, or beyond, $t = k$ .	1	
(ii)	25 WWW or FT for correctly solving $12k = \text{their } (b)$ , provided $k > 10$	1 * $\checkmark^b$	
26 (a)	$\begin{pmatrix} 2 & 2 & 8 \\ 0 & 1 & 3 \end{pmatrix}$	2	<b>C1</b> for 4 or 5 correct elements in a $2 \times 3$ matrix
(b) (i)	$\frac{1}{2} \begin{pmatrix} 1 & 0 \\ 0 & 2 \end{pmatrix}$ or any equiv seen	1 *	
(ii)	$\begin{pmatrix} 1 & 2 \\ 0 & 1 \end{pmatrix}$ , or $\frac{1}{2} \begin{pmatrix} 2 & 4 \\ 0 & 2 \end{pmatrix}$	2 *	<b>M1</b> for $\mathbf{M} \begin{pmatrix} 2 & 0 \\ 0 & 1 \end{pmatrix} = \begin{pmatrix} 2 & 2 \\ 0 & 1 \end{pmatrix}$ oe or $\begin{pmatrix} a & b \\ c & d \end{pmatrix} \begin{pmatrix} 2 & 0 \\ 0 & 1 \end{pmatrix} \begin{pmatrix} 1 & 0 & 1 \\ 0 & 1 & 3 \end{pmatrix} = \text{their } (a)$ oe