

**MARK SCHEME for the October/November 2012 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.

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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) 10.6	1	
	(b) $\frac{3}{50}$ cao	1	
2	(a) $2\frac{11}{12}$	1	
	(b) 4 cao	1	
3	(a) 34	1	
	(b) 10	1	
4	(a) $3\frac{1}{2}$ oe	1	
	(b) oe	1	
5	$-1, -\frac{17}{20}, -\frac{4}{5}, 0, \frac{3}{4}$	2	C1 for 4 correct when one is covered or C1 for reversed answer
6	(a) 3 (h)	1	
	(b) 35 or ft $\frac{50 + 90}{\text{their (a)} + 1}$	1 ✓	
7	(a) $8k + 1$	1	
	(b) $2x^2 + 5x - 12$	1	
8	(a) $255^\circ$	1	
	(b) (0)7 h 53 min	1	
9	(a) 6	1	
	(b) 11	1	
10	(a) $2^2 \times 3^2 \times 5$ oe	1	
	(b) 11 www	1	

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11	(a) 6 (b) $\frac{1}{3}$	1 1																			
12	18	2	<b>B1</b> for “k” = 2 or <b>B1</b> for $\frac{32}{4^2} = \frac{y}{3^2}$ oe																		
13	(a) 9.45 (b) 1.95 or <i>their</i> (a) – 7.5	1 1✓																			
14	(a) Both $p = 6$ and $q = 4$ (b) 33 or f.t. $29 +$ their $q$ (provided $q$ has a value) (c) 34	1 1✓ 1																			
15	(a) $4p(4 + p)$ (b) $(x + 2a)(y + 3a)$	1 2	<b>B1</b> for <b>any</b> partial factorisation																		
16	(a) 0 (b) <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td>A</td><td>A</td><td>B</td><td>B</td><td>C</td><td>C</td></tr><tr><td>B</td><td>C</td><td>A</td><td>C</td><td>A</td><td>B</td></tr><tr><td>5</td><td>6</td><td>5</td><td>7</td><td>6</td><td>7</td></tr></table> (c) $\frac{1}{3}$ or f.t. from table $\frac{\text{their (number of 7s)}}{\text{total no. of outcomes}}$ provided (number of 7s) > 0	A	A	B	B	C	C	B	C	A	C	A	B	5	6	5	7	6	7	1 1 1✓	
A	A	B	B	C	C																
B	C	A	C	A	B																
5	6	5	7	6	7																
17	(a) 0.0406 (b) $6.8(00..) \times 10^{-4}$ (c) 4	1 1 1																			
18	(a) 3 (b) $13\frac{1}{2}$ oe (c) $4\frac{1}{2}$ oe	1 1 1																			
19	(a) (b) or $\begin{pmatrix} \frac{3}{4} & \frac{1}{4} \\ \frac{1}{4} & \frac{1}{4} \end{pmatrix}$ oe	2 2	<b>C1</b> for 2 or 3 correct elements  <b>B1</b> for $\det M = 4$ or for $\frac{1}{4} \times (2 \times 2 \text{ matrix})$ or <b>B1</b> for used or seen																		

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20	(a) (i) 4 (ii) 2 (b) Both $a = 1$ and $b = 2$ . $c = 6$	1 1 1 1	
21	(a) (b) (one way) stretch Parallel to $y$ -axis/ $x$ -axis invariant <b>and</b> (stretch/scale) factor $\frac{1}{2}$ .	2 1 1 dep.	<b>C1</b> for 4 or 5 correct elements in a $2 \times 3$ derived matrix
22	(a) (11, 3) (b) parallelogram (c) 27	1 1 2	<b>M1</b> for their $(BC) \times$ their 9 or <b>M1</b> for $9 \times (\text{their } BC + 2) - 2 \times \frac{1}{2} \times 9 \times 2$
23	(a) 124 (b) 118 (c) 31 (d) 38	1 1 1 1	
24	(a) 18 (b) (i) 10 (ii) 20	2	$\frac{360}{\text{their } (180 - 160)}$ <b>M1</b> for or <b>M1</b> for $(n - 2) \times 180 = 160n$ oe
25	(a) $\frac{u}{5}$ or any equiv. (b) (i) correct method $u = 2$ (ii) continuous graph from (0, 0) to (10, 40), without any horizontal or vertical lines. Curve, concave upwards	1 M1 A1 1 1 ind.	e.g. $40 = \frac{1}{2} \times (u + 3u) \times 10$ , or $40 = 10u + \frac{1}{2} \times 10 \times 2u$

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<b>26</b>	<b>(a)</b> 2011	<b>2</b>	<b>B1</b> for $(n = ) 223$ seen
	<b>(b)</b> 36	<b>1</b>	
	<b>(c) (i)</b> $9x - 9y$ , or $9y - 9x$ , or any equiv.	<b>1</b>	
	<b>(ii)</b> “123 is not a multiple of 9” oe	<b>1</b>	
<b>27</b>	<b>(a)</b> $126^\circ$ to $128^\circ$ inclusive	<b>1</b>	dep. on an acceptable $D$ and both <b>(c)</b> marks
	<b>(b)</b> acceptable quadrilateral $ABCD$	<b>1</b>	
	<b>(c) (i)</b> acceptable circular arc, centre $C$	<b>1</b>	
	<b>(ii)</b> acceptable bisector of angle $ABC$	<b>1</b>	
	<b>(d)</b> $DP = 2$ to $2.5\text{cm}$ with correct $P$	<b>1</b>	