

**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.

Mark schemes must be read in conjunction with the question papers and the report on the examination.

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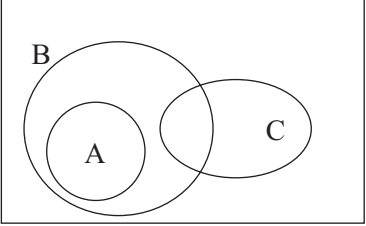
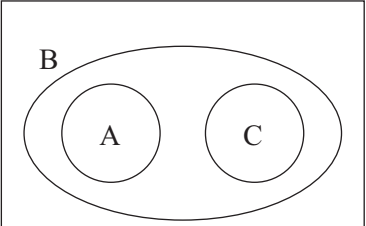
Page 2	Mark Scheme: Teachers' version	Syllabus	Paper
	GCE O LEVEL – October/November 2011	4024	12

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	

Page 3	Mark Scheme: Teachers' version	Syllabus	Paper
	GCE O LEVEL – October/November 2011	4024	12

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 $(\pm) 6$ 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 $(180 - \text{their(a)})/2$
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	

Page 4	Mark Scheme: Teachers' version	Syllabus	Paper
	GCE O LEVEL – October/November 2011	4024	12

17	(a) 57.5 (b) 23 www	1 2ft	ft 4 × their(a) / 10 or M1 for 4 × figs 575, 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

Page 5	Mark Scheme: Teachers' version	Syllabus	Paper
	GCE O LEVEL – October/November 2011	4024	12

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 $\frac{p \pm (\text{or } + \text{ and } -)\sqrt{q}}{r}$ -15 www $\frac{1}{2}$ www	1 1 1	for all three of $p = -29$, $r = 4$ (or 2×2), and $q = 961$ (or $\sqrt{q} = 31$ from $q = 961$)
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 $x \dots 2$ oe
	$x + y < 12\frac{1}{2}$ oe	1	and $x + y \dots 12\frac{1}{2}$ 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)

Page 6	Mark Scheme: Teachers' version	Syllabus	Paper
	GCE O LEVEL – October/November 2011	4024	12

27	(a) (i) 270° (ii) $(2, 0)$ (b) (i) 2 cao (ii) $x = -1$ oe	1 1 1 1	
28	(a) (i) $-\mathbf{p} + \mathbf{q}$ oe (ii) $-4\mathbf{p} + 2\mathbf{q}$ oe (b) (i) $3\mathbf{p} + k(-4\mathbf{p} + 2\mathbf{q})$ oe (ii) $c \times \text{their}(\mathbf{a})(\mathbf{i}) = \text{their}(\mathbf{b})(\mathbf{i})$ oe where $c \neq k, \frac{1}{k}, \text{ or } 1$, provided their (b)(i) consists of a vector expression and k. 1.5 oe	1 1 1ft M1ft A1	ft $3\mathbf{p} + k \times \text{their}(\mathbf{a})(\mathbf{ii})$ or C1 for 1.5 oe, with no appropriate working, and no wrong working