

**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.

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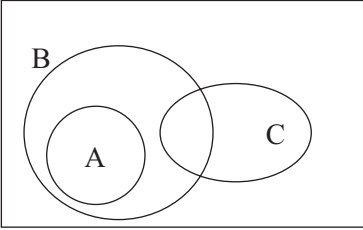
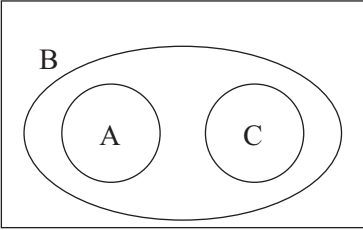
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Abbreviations

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) $\frac{35}{36}$	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	

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10	 <p>OR</p> 	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 (±) 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	

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17	(a) 57.5 (b) 23 www	1 2ft	ft $4 \times \text{their(a)} / 10$ or M1 for $4 \times \text{figs } 575$, or $4 \times \text{figs } \{\text{their(a)}\}$ 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

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23	(a) $(3x - 1)(3x + 1)$	1	<p>or C2 for one correct value from correct factors</p> <p>or B1 for the factors $(2y - 1)$ and $(y + 15)$ seen but not necessarily multiplied together</p> <p>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).</p>
	(b) Using factors:	3	
	both -15 and $\frac{1}{2}$ from correct factors		
	Using the formula:		
	for $\frac{p \pm (\text{or } + \text{ and } -)\sqrt{q}}{r}$	1	for all three of $p = -29$, $r = 4$ (or 2×2), and $q = 961$ (or $\sqrt{q} = 31$ from $q = 961$)
	-15 www	1	
	$\frac{1}{2}$ www	1	
24	(a) 0	1	or M1 for an attempt at $\sum fx$, possibly implied by sum = 64.
	(b) 1	1	
	(c) 1.6 or $1\frac{3}{5}$ or $\frac{8}{5}$	2	
25	(a) $x > 2$ oe	1	<p>if zero scored, then C1 for $x \dots 2$ oe</p> <p>and $x + y \dots 12\frac{1}{2}$ oe with incorrect (in)equalities for “...”</p>
	$x + y < 12\frac{1}{2}$ oe	1	
	(b) (i) $(9, 3)$	1	
	(ii) 4	1	
26	(a) correct triangle	1	dep. on correct loci in (b)
	(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	

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