

**MARK SCHEME for the October/November 2011 question paper
for the guidance of teachers**

4024 MATHEMATICS (SYLLABUS D)

4024/11

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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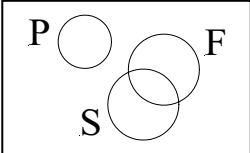
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Abbreviations

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) 11(.0) cao	1	
	(b) 0.014	1	
2	(a) $\frac{13}{15}$ oe	1	
	(b) $\frac{4}{7}$ cao	1	
3	(a) 66(%) $\frac{2}{3}$ 0.67 $\frac{7}{9}$	1	
	(b) 20	1	
4	(a) 3 hours 19 minutes	1	
	(b) 1550	1	
5	$\frac{3}{5x-2}$ or any equiv.	2	or C1 for $\frac{3}{5“y”-2}$ or B1 for $5“y” = 2x + 3$ oe or B1 for $5“y” - 2 = \frac{3}{x}$ (from $y = \frac{2}{5} + \frac{3}{5x}$).
6	6 000 or 6080 or 6100 only	2	or C1 for figs 6, 61 or 608 or B1 for $\sqrt{15.98} \approx 4$ or for 1500 from $\frac{300}{0.2}$
7	$x = -5$	1	
	$y = 4$	1	
8	(a) 2.18×10^6	1	
	(b) $3(.0) \times 10^4$	1	

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9	$a = -5\frac{1}{2}$ $b = -3$	1 1	or C1 for $b = -5\frac{1}{2}$ or for $a = -3$
10	$(x - 5)(2y - 3)$ or $(5 - x)(3 - 2y)$ only	2	or C1 for $(..x .. 5) (..2y .. 3)$ with incorrect +s and -s for .. or B1 for factorisation of any two terms; e.g. $x(2y - 3), 3(-x + 5)$
11	(a) rectangle rhombus (b) parallelogram rectangle rhombus (c) rectangle square	1 1 1	
12	(a) -13 (b) 35 (c) -5	1 1 1	
13	(a) 250 000 (b) 14 (c) 50	1	
14	(a) 5 (b) 3.8 or $3\frac{4}{5}$ or $\frac{19}{5}$	1 2	or M1 for an attempt at $\sum fx$ or for 190 seen
15	(a)  (b) 10 or 14 or 22 or 26 etc	2 1	or C1 for a separate P or C1 for an S that intersects F but not P (unless a null intersection is indicated). or B1 for three intersecting loops with correctly placed integers, all greater than 5, that illustrate the sets correctly – with spaces for nulls.
16	(a) 12 (b) 344	1 2ft	ft $320 + 2 \times$ their (a) or M1 for attempting to find 3 or more of 40, 60, 100 or 120 soi

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17	(a) $(0, -3)$ cao	1	
	(b) $y > \frac{1}{4}x$ oe	1	if 0 scored then C1 for $y \dots \frac{1}{4}x$ oe
	$2x - y > 3$ oe	1	with incorrect (in)equalities for “...”
18	(a) $9a^8$	1	
	(b) 16	1	
	(c) 1	1	
	(d) $\frac{2}{3}$ cao	1	
19	(a) 18	2	or B1 for $160n = (n - 2) \times 180$ oe or M1 for $\frac{360}{(180 - 160)}$
	(b) (i) 10	1	
	(ii) 150	1ft	ft 160 – their (i)
20	(a) correct Shape 4 drawn	1	
	(b) (12) (18) 24 30	1	
	(c) $6n + 6$ oe	1	
	(d) convincing explanation	1	e.g. 100 is not a multiple of 6 $6n + 6 = 100$ does not have a whole number solution; $\frac{94}{6}$ is not a whole number.
21	(a) 24	2	or B1 for $40 \times 3 = 5^x$ or B1 for “ k ” = 120 or B1 for “ $T = \frac{120}{A}$ ” oe
	(b) $\frac{120}{A}$	1	
	(c) $\frac{3}{10}$ cao	1	

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22	<p>(a) 7</p> <p>(b) $\frac{1}{7} \begin{pmatrix} 1 & -2 \\ 1 & 5 \end{pmatrix}$</p> <p>(c) $\begin{pmatrix} 3 \\ -2 \end{pmatrix}$</p>	<p>1</p> <p>1ft</p> <p>2</p>	<p>ft $k \begin{pmatrix} 1 & -2 \\ 1 & 5 \end{pmatrix}$ where $k = \frac{1}{\text{their(a)}}$</p> <p>or M1 for $(\text{their } \mathbf{A}^{-1}) \times \begin{pmatrix} 11 \\ -5 \end{pmatrix}$</p> <p>or M1 for attempting to multiply $\begin{pmatrix} 5 & 2 \\ -1 & 1 \end{pmatrix}$ by $\begin{pmatrix} x \\ y \end{pmatrix}$ and to equate the result to $\begin{pmatrix} 11 \\ -5 \end{pmatrix}$, thus obtaining two equations.</p>
23	<p>(a) 15</p> <p>(b) between 33 and 39 inclusive</p> <p>(c) 36</p> <p>(d) st. line from (3, 0) to (5, 60)</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p>	
24	<p>(a) $\mathbf{p} - \frac{1}{2}\mathbf{q}$ oe</p> <p>(b) $\frac{1}{3}\mathbf{p} - \frac{1}{6}\mathbf{q}$ oe or ft $\frac{1}{3} \times$ their (a)</p> <p>(c) $\frac{1}{3}\mathbf{p} + \frac{5}{6}\mathbf{q}$ or ft $\mathbf{q} +$ their (b)</p> <p>(d) (i) $\mathbf{p} + \frac{k}{2}\mathbf{q}$ oe</p> <p>(ii) 5</p>	<p>1</p> <p>1ft</p> <p>1ft</p> <p>1</p> <p>1</p>	
25	<p>(a) 136° to 138° inclusive</p> <p>(b) (i) st line, parallel to AD, 4 cm above AD</p> <p>(ii) perp. bisector of AD</p> <p>(c) top r.h. region identified by shading</p> <p>(d) P marked on their (b)(i) locus, such that CP is perpendicular to the locus</p>	<p>1</p> <p>1</p> <p>1</p> <p>1ft</p> <p>1ft</p>	

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26	(a) 90° ... tangent-radius property oe	1	must mention “tangent” and “radius”
	(b) recognisable attempt at Pythagoras in $\triangle OTB$.	M1	
	$(x + 10)^2 = x^2 + 40^2$ oe	A1	
	$(x + 10)^2 = x^2 + 20x + 100$	B1	indep
	$x = 75$ www	1	ww award C2