UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Ordinary Level

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.

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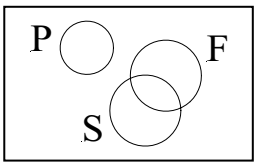
UNIVERSITY of CAMBRIDGE
International Examinations

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 $\frac{3}{5\text{“}y\text{”}-2}$ or **B1** for $5x\text{“}y\text{”} = 2x + 3$ oe or **B1** for $5\text{“}y\text{”}-2=\frac{3}{x}$ (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	

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 × their **(a)** or **M1** for attempting to find 3 or more of 40, 60, 100 or 120 soi

17	**(a)** (0, –3) cao	**1**	
	(b) $y > \frac{1}{4}x$ oe	**1**	if 0 scored then **C1** for y … $\frac{1}{4}x$ 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**	

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

26	**(a)** 90° ... tangent-radius property oe	**1**	must mention "tangent" and "radius"
	(b) recognisable attempt at Pythagoras in ΔOTB.	**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**