CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Ordinary Level

MARK SCHEME for the October/November 2013 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.

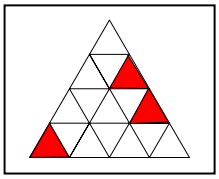
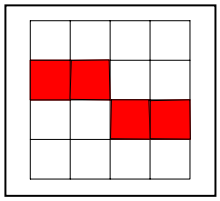
Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the October/November 2013 series for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level components and some Ordinary Level components.

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

Question	Answers	Mark	Part marks
1 (a)	2.38 oe	1	
(b)	80 (.0)(0)	1	
2 (a)	$1\frac{9}{20}$	1	
(b)	0.0602	1	
3 (a)	–7	1	
(b)	$\frac{x+6}{2}$ oe	1	
4 (a)	(0)3 hours 48 minutes	1	
(b)	$\frac{2}{5}$ 44% $\frac{4}{9}$	1	
5 (a)		1	
(b)		1	
6	8	2	**B1** for "k" = 40 or **M1** either for 20 × 2 = 5y oe; or for (their k)/5, when y = "k"/x used
7 (a)	3.5×10^{7}	1	
(b)	1.4×10^{-6}	1	
8	$\frac{3}{7}$	2	**B1** for $7x = c$, or for $\frac{7x}{c} = C$, or for $cx = 3C$; where c and C are integers (not 0).

9	200	2	Dep. on **three** correct approximations **seen**. **B1** for either $\sqrt{35.78} \approx 6$, or $\sqrt[3]{1005} \approx 10$
10	**Any** number **between** 4 and 5	2	**B1** for $x < 5$, or for $5 > x$ seen. This may appear as, e.g., $4 < x < 5$.
11 (a)	45.5°	1	
(b)	151°	2	**C1** for $151 < x \leq 151.2$ or **M1** for 360 – 46.5 – 162.5 or **M1** for 360 – 46 – 162 – 1
12 (a)	$\frac{9}{25}$	1	
(b)	$\frac{3}{t^3}$ or $3t^{-3}$	1	
(c)	$\frac{x^2}{3y}$ or $\frac{1}{3}x^2y^{-1}$	1	
13	Both $x = \frac{1}{2}$ and $y = -4$	3	**C2** for either x or y correct WWW or **C1** for a pair of values that satisfy either equation
14 (a)	1.35	1	
(b)	1.1	1	
(c)	104	1	
15 (a)	B C D	1	
(b)	E	1	
(c)	$y < \frac{1}{2}x$ oe	1	

16		76	3	Dep. on volume expressions in terms of a^3. **C2** for $76a$, or $76a^2$, or $76(\pi)a^3$, or $\frac{76}{a}$, or $\frac{76}{a^2}$, or $\frac{76}{a^3}$ **B1** for a 3-spheres volume of $\frac{4}{3}\pi\times(2a)^3\times 3$ or $32\pi a^3$ and **B1** for a cylinder volume of $\pi\times(3a)^2\times 12a$ or $108\pi a^3$; or **B1** for **both** $108\pi\ldots$ and $32\pi\ldots$without a^3.
17	**(a)**	$(5t-2)(5t+2)$	1	
	(b)	$2r^2(3H-h)$	1	
	(c)	$(4x-3)(2y+1)$	2	**B1** for partial factorisation $4x(2y+1)$ or $-3(2y+1)$ or $2y(4x-3)$ seen
18	**(a)**	16	1	
	(b)	Rectangle, base 2 to 3, height 6 units Rectangle, base 7 to 9, height 2 units	1 1	
	(c)	ft $\frac{15}{31+their(p)}$	1 √	
19	**(a)**	(2, 1)	1	
	(b)	$-\frac{2}{3}$ or any equiv. **value**	1	
	(c)	13	2	**C1** for (√) 52 or **M1** for $6^2+(-4)^2$, or for $6^2+(4)^2$, etc.

20	**(a)**	Reflection $y = x$ oe	1 1	but lost if more than one transf. named indep. – but lost if more than one transf. named
	(b) (i)	Triangle with vertices (–1, 0), (–3, 0), (–3, 1)	1	
	(ii)	$\begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}$	1	
21	**(a)**	1	1	
	(b)	$\frac{1}{15}$	1	
	(c)	$\frac{4}{15}$	2	**M1** for $\frac{3}{6}\times\frac{2}{5}\times\frac{2}{6}\times\frac{1}{5}$ oe or for any complete possibility diagram such as the one below, **correctly used**.
22	**(a)**	48°	1	
	(b)	66°	1	
	(c)	24°	1	
	(d)	35°	1	
23	**(a)**	$15^2 - 1^2 = 8 \times (1 + 2 + 3 + 4 + 5 + 6 + 7)$	1	
	(b)	$(2n + 1)^2 - 1^2$ oe	1	
	(c)	$(2n + 1)^2 = 4n^2 + 4n + 1$ or $(2n + 1)^2 - 1^2 = 4n^2 + 4n$, or $(2n)(2n + 2)$ Division of both sides by 8 and result obtained correctly	**B1** **M1**	
24	**(a)**	96° to 98°	1	
	(b) (i)	acceptable perpendicular bisector of AB	1	
	(ii)	acceptable bisector of angle ABC	1	
	(c)	10 to 10.3	1	dep.on both **(b)** marks

	2	3	3	4	4	4
2	–	23	23	24	24	24
3	32	–	33	34	34	34
3	32	33	–	34	34	34
4	42	43	43	–	44	44
4	42	43	43	44	–	44
4	42	43	43	44	44	–

25	**(a)**	16	1	
	(b)	150	1	
	(c)	45 WWW or ft $\frac{750-their(b)}{20}+15$	2	**C1** for $\frac{750-their(b)}{20}$ or **M1** for ½ × (k + k – 15) × 20 = 750 or **M1** for 20(k – 15) + *their*(b) = 750 oe
	(d)	10	1	
26	**(a)**	Establishing, with reasons, that two pairs of angles are equal; and a conclusion (or an introductory statement), that the triangles are similar. e.g. $A\hat{B}D = B\hat{D}C$ (alternate angles) $A\hat{D}B = B\hat{C}D$ (given) Since two angles are equal, triangles *ABD* and *BDC* are similar.	2	**B1** for $A\hat{B}D = B\hat{D}C$, **with** mention of alternate angles
	(b) (i)	6.3	2	**B1** for $\frac{BC}{4.2}=\frac{6}{4}$ oe
	(ii)	$\frac{4}{9}$	1	