CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge Ordinary Level

MARK SCHEME for the October/November 2014 series

4024 MATHEMATICS (SYLLABUS D)

4024/22 Paper 2, maximum raw mark 100

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 2014 series for most Cambridge IGCSE®, Cambridge International A and AS Level components and some Cambridge O Level components.

Question	Answers	Mark	Part Marks
1 (a) (i)	30%	2	**M1** for figs(5625 ÷ 18 750) or **SC1** for 70(%) as final answer
(ii)	305	3	**M1** for $(13125)\times\frac{22}{100}$ oe and **M1** for $\frac{18750-their2887.5}{52}$
(iii)	15 000	2	**M1** for $x+\frac{25x}{100}=18750$ oe or **B1** for ÷ 125
(b) (i)	65400	1	
(ii)	294	1	
(iii)	877	2	**B1** for use of the quotient of the rates
2 (a) (i)	23	1	
(ii)	90 with reason	1	
(iii)	Parallel lines established	1	
(b)	Convincing argument	3	This must have e.g. $XQ = XY$ justified. If there is no justification, then MAX **B2** from **B1** for $XQ = XY$ oe And **B1** for relating this to the perimeter of PXZ Or **B1** for equal (alternate or bisected) angles
3 (a)	$\frac{1}{16}$ or 0.0625	1	
(b)	$\frac{42}{256}$ or 0.164 oe	3	**B2** for $(2)\times\frac{7}{16}\times\frac{3}{16}$ or **B1** for both $\frac{7}{16}$ and $\frac{3}{16}$ or **SC1** after 0 for $\frac{7}{40}$
(c) (i)	26	1	
(ii)	$m = 5$ $n = -3$	2	**B1** for one correct or **M1** for correct substitution and evaluation of the other variable or for an equation in one variable
(d)	$p = 17$	2	**M1** for $p\times$ their$m - 4\times$ their$n(=97)$ oe

4	(a) (i)	105	2	**B1** for $\left(\frac{1}{2}\right)\times 7\times 3\times 10$ or **M1** for Area of cross section × 10 soi
	(ii)	197.2 (m^2)	4	**M1** for $3^2 + 7^2$ and **M1** for area of one triangular face and **M1** for area of one rectangular face
	(b) (i)	0.845	2	**M1** for $\frac{h}{2} = \sin 25$ oe
	(ii)	0.280	2	**M1** for $\frac{y}{0.6} = \tan[...]$ oe or **SC1** for 25
5	(a)	63.7 or 63.6 (m)	2	**M1** for $\pi \times \frac{d}{2} = 100$
	(b)	9540 to 9560	3ft	**M1** for πr^2 soi and **M1** for *their* circular area + 100 × *their* **(a)**
	(c) (i)	18.7 to 19.0 (m)	3ft	**M1** for $2\pi R$ And **M1** for *their* $2\pi R - 200$ or $\pi R - 100$
	(ii)	30.8 to 31.1	2ft	**M1** for $\frac{\theta}{360}\times 2\pi r$ oe
6	(a)	Correct shape *ABCD*	4	**B1** for $A\hat{B}C = 56$ **B1** for $B\hat{A}D = 104$ **M1** line *CD* // *AB* **A1** for perpendicular length 4.5
	(b)	115 – 125 m	2ft	**M1** for *their CD*
7	(a) (i)	Convincing argument	3	www e.g. need to see **b** – **a** and $\frac{5}{3}$(**b** – **a**) **B1** for $\overrightarrow{DE} = \mathbf{b} - \mathbf{a}$ oe **B1** for $\overrightarrow{DB} = \frac{2}{3}\mathbf{a}$ or $\overrightarrow{EC} = \frac{2}{3}\mathbf{b}$ oe soi
	(ii)	9 : 25 oe	2	**B1** for at least 3 : 5 oe seen
	(b) (i)	Triangle with vertices (6, 1), (10, 1), (10, 4)	2	**B1** for two vertices correct
	(ii)	Stretch(ing)	1	
	(iii)	$\begin{pmatrix} 2 & 0 \\ 2 & 1 \end{pmatrix}$	2	**B1** for one error or **M1** for multiplication in the correct order

(iv)	$\begin{pmatrix} \frac{1}{2} & 0 \\ -1 & 1 \end{pmatrix}$	**2ft**	**B1** for $\frac{1}{2}$ or $\begin{pmatrix} 1 & 0 \\ -2 & 2 \end{pmatrix}$ or *their* ft var
8 (a) (i)	2.24	**1**	
(ii)	$(h=)\frac{T^2 g}{4\pi^2}$ oe	**3**	**M1** for $T^2 = \frac{4\pi^2 h}{g}$ oe and **M1** for any correct transposition at any stage
(b)	14	**2**	**B1** for 42 or 16 or **M1** for $45 - p - 3 = 2p$
(c)	–5.5 oe	**3**	**M1** for $3(2x-3)+4(5-x)$ oe soi and **M1** for $6x - 4x = 9 - 20$ soi oe
(d)	–0.41 –3.26	**3**	**B1** for $\sqrt{11^2 - 4\times3\times4}$ soi and **B1** for $\frac{-11 \pm \sqrt{their 73}}{2\times3}$ After **B1** or **B0** so far **M1** for both real values of $\frac{p \pm \sqrt{q}}{r}$
9 (a) (i)	11.05 confirmed	**1**	
(ii)	39.1° or 39.2°	**2**	**M1** for $\frac{1}{2}\times5\times7\times\sin PQR$
(iii)	136.3°	**3**	**M1** for $8\times2\times\sin ZWX = \frac{1}{2}\times4\times6\times\sin 67$ oe and **A1** for 43.7° soi or **M1** for $180 - their 43.7$ soi
(b) (i)	6.16	**3**	**M2** for $9^2 + 12^2 - 2\times9\times12\times\cos 30$ soi or **M1** for cosine formula with 1 error and **A1** for 412 (soi by 20.3), 131.5 (soi by 11.5) or 117 (soi by 10.8)
(ii)	41.4	**3**	**M2** for $\cos CAM = \frac{9^2 + 12^2 - 12.5^2}{2\times9\times12}$ oe or **M1** for $12.5^2 = 9^2 + 12^2 - 2\times9\times12\cos\theta$ oe After 0, **SC1** for *their* A – 30, or one of *M* or *C*

10 (a)	11 11	**1**	
(b)	correct scales, plots (ft) and curve	**3**	**P2** correct scales and at least 7 plots (ft) All plots correct ft or **P1** for aleast 7 plots (ft) or Correct scales drawn
(c)	2 (±0.5)	**2ft**	Dependent on tangent drawn at $x = 3$ **M1** for tangent at $x = 3$
(d) (i)	–5 cao	**1**	
(ii)	**(a)** –1 **(b)** 5	**2**	**B1** for either
(e)	(0.6) (3.4)	**3ft**	**B1** for $x^2 - 4x - 1 = -3$ soi and **B1** for the line $y = -3$ or **M1** for $x^2 - 4x - 1 = k$ and **A1** for the line $y = k$ **SC3** for 0 for new curve drawn
11 (a)	histogram correct	**3**	**H2** for four columns correct or **H1** for one correct frequency density
(b) (i)	correct plots and give curve	**2**	**P1** for at least 4 correct plots
(ii)	**(a)** (195) (g)	**1ft**	
	(b) 72 to 88 (g)	**2ft**	**B1** for 152 to 158 and 230 to 240 Or **M1** for UQ – LQ
(iii)	50 78 72 32 4	**1**	
(iv)	**(a)** 36 cao	**1**	
	(b) 85 or 86 or ft (th Percentile)	**2ft**	**B1** for 15 or 14.4 or ft Or **M1** for subtraction from 240 or 250