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

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Question	Answers	Mark	Part Marks
1 (a) (i)	30%	2	**M1** for figs$(5625 \div 18\,750)$ or **SC1** for 70(%) as final answer
(ii)	305	3	**M1** for $(13125)\times\frac{22}{100}$ oe and **M1** for $\frac{18750 - \textit{their}2887.5}{52}$
(iii)	15 000	2	**M1** for $x+\frac{25x}{100}=18750$ oe or **B1** for $\div 125$
(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 $p \times \text{their}m - 4 \times \text{their}n(= 97)$ oe

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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 $\overrightarrow{DE}$ = **b** – **a** oe **B1** for $\overrightarrow{DB} = \frac{2}{3}$**a** or $\overrightarrow{EC} = \frac{2}{3}$**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

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(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 values
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 $\sqrt{11^2 - 4\times 3\times 4}$ soi and **B1** for $\frac{-11 \pm \sqrt{their 73}}{2\times 3}$ 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 $\frac{1}{2}\times 5\times 7\times \sin PQR$
(iii)	136.3°	**3**	**M1** for $8\times 2\times \sin ZWX = \frac{1}{2}\times 4\times 6\times \sin 67$ oe and **A1** for 43.7° soi or **M1** for $180 - their 43.7$ soi
(b) (i)	6.16	**3**	**M2** for $9^2 + 12^2 - 2\times 9\times 12\times \cos 30$ 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 $\cos CAM = \frac{9^2 + 12^2 - 12.5^2}{2\times 9\times 12}$ oe or **M1** for $12.5^2 = 9^2 + 12^2 - 2\times 9\times 12\cos\theta$ oe After 0, **SC1** for *their*A – 30, or one of *M* or *C*

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10 (a)	11 11	**1**	
(b)	correct scales, plots (ft) and curve	**3**	**P2** correct scales and at least 7 plots (ft) or 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

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