

**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	<b>M1</b> for figs( $5625 \div 18750$ ) or <b>SC1</b> for 70(%) as final answer
(ii)	305	3	<b>M1</b> for $(13125) \times \frac{22}{100}$ oe and <b>M1</b> for $\frac{18750 - \text{their}2887.5}{52}$
(iii)	15 000	2	<b>M1</b> for $x + \frac{25x}{100} = 18750$ oe or <b>B1</b> for $\div 125$
(b) (i)	65400	1	
(ii)	294	1	
(iii)	877	2	<b>B1</b> 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 <b>B2</b> from <b>B1</b> for $XQ = XY$ oe And <b>B1</b> for relating this to the perimeter of $PXZ$ Or <b>B1</b> for equal (alternate or bisected) angles
3 (a)	$\frac{1}{16}$ or 0.0625	1	
(b)	$\frac{42}{256}$ or 0.164 oe	3	<b>B2</b> for $(2) \times \frac{7}{16} \times \frac{3}{16}$ or <b>B1</b> for both $\frac{7}{16}$ and $\frac{3}{16}$ or <b>SC1</b> after 0 for $\frac{7}{40}$
(c) (i)	26	1	
(ii)	$m = 5 \quad n = -3$	2	<b>B1</b> for one correct or <b>M1</b> for correct substitution and evaluation of the other variable or for an equation in one variable
(d)	$p = 17$	2	<b>M1</b> for $p \times \text{their}m - 4 \times \text{their}n (= 97)$ oe

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

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	(iv) $\begin{pmatrix} 1 & 0 \\ 2 & 0 \\ -1 & 1 \end{pmatrix}$	2ft	<b>B1</b> for $\frac{1}{2}$ or $\begin{pmatrix} 1 & 0 \\ -2 & 2 \end{pmatrix}$ or <i>their</i> ft values
8	(a) (i) 2.24	1	
	(ii) $(h =) \frac{T^2 g}{4\pi^2}$ oe	3	<b>M1</b> for $T^2 = \frac{4\pi^2 h}{g}$ oe and <b>M1</b> for any correct transposition at any stage
	(b) 14	2	<b>B1</b> for 42 or 16 or <b>M1</b> for $45 - p - 3 = 2p$
	(c) -5.5 oe	3	<b>M1</b> for $3(2x - 3) + 4(5 - x)$ oe soi and <b>M1</b> for $6x - 4x = 9 - 20$ soi oe
	(d) -0.41 -3.26	3	<b>B1</b> for $\sqrt{11^2 - 4 \times 3 \times 4}$ soi and <b>B1</b> for $\frac{-11 \pm \sqrt{\text{their}73}}{2 \times 3}$  After <b>B1</b> or <b>B0</b> so far <b>M1</b> 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	<b>M1</b> for $\frac{1}{2} \times 5 \times 7 \times \sin PQR$
	(iii) 136.3°	3	<b>M1</b> for $8 \times 2 \times \sin ZWX = \frac{1}{2} \times 4 \times 6 \times \sin 67$ oe and <b>A1</b> for 43.7° soi or <b>M1</b> for $180 - \text{their}43.7$ soi
	(b) (i) 6.16	3	<b>M2</b> for $9^2 + 12^2 - 2 \times 9 \times 12 \times \cos 30$ soi or <b>M1</b> for cosine formula with 1 error and <b>A1</b> for 412 (soi by 20.3), 131.5 (soi by 11.5) or 117 (soi by 10.8)
	(ii) 41.4	3	<b>M2</b> for $\cos CAM = \frac{9^2 + 12^2 - 12.5^2}{2 \times 9 \times 12}$ oe or <b>M1</b> for $12.5^2 = 9^2 + 12^2 - 2 \times 9 \times 12 \cos \theta$ oe After 0, <b>SC1</b> for <i>their</i> 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	<b>P2</b> correct scales and at least 7 plots (ft) or All plots correct ft or <b>P1</b> for atleast 7 plots (ft) or Correct scales drawn
(c)	2 ( $\pm 0.5$ )	2ft	Dependent on tangent drawn at $x = 3$ <b>M1</b> for tangent at $x = 3$
(d) (i)	-5 cao	1	
(ii)	(a) -1 (b) 5	2	<b>B1</b> for either
(e)	(0.6) (3.4)	3ft	<b>B1</b> for $x^2 - 4x - 1 = -3$ soi and <b>B1</b> for the line $y = -3$ or <b>M1</b> for $x^2 - 4x - 1 = k$ and <b>A1</b> for the line $y = k$  <b>SC3</b> for 0 for new curve drawn
11 (a)	histogram correct	3	<b>H2</b> for four columns correct or <b>H1</b> for one correct frequency density
(b) (i)	correct plots and give curve	2	<b>P1</b> for at least 4 correct plots
(ii)	(a) (195)(g)	1ft	
	(b) 72 to 88(g)	2ft	<b>B1</b> for 152 to 158 and 230 to 240 Or <b>M1</b> for UQ - LQ
(iii)	50 78 72 32 4	1	
(iv)	(a) 36 cao	1	
	(b) 85 or 86 or ft (th Percentile)	2ft	<b>B1</b> for 15 or 14.4 or ft Or <b>M1</b> for subtraction from 240 or 250