CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge Ordinary Level

MARK SCHEME for the October/November 2015 series

4024 MATHEMATICS (SYLLABUS D)

4024/22 Paper 2, maximum raw mark 100

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

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International Examinations

Question	Answers	Mark	Part Marks
1 (a) (i) (a)	396	2	**M1** for $\frac{60}{100} \times 360 + 15 \times 12$ or **B1** for $\frac{60}{100} \times 360$ seen
(b)	110 isw	1ft	
(ii)	770	2	**M1** for $x - \frac{26}{100}x = 569.80$ oe or **B1** for ÷ by figs 74
(b)	1.21	3	**M2** for $\frac{850}{1.87}x = 550$ oe or **B1** for $\frac{850}{1.87}$ or $\frac{1.87}{850}$ or $\frac{850}{550}$ or $\frac{550}{850}$ or $\frac{x}{1.87}$ or $\frac{550}{x}$
2 (a)	14	2	**M1** for $\frac{1}{2} \times CA \times (11-7)$ oe or **SC** 1 for 28
(b)	10.8	2	**M1** for $\sqrt{(8-(-2))^2 + (7-11)^2}$
(c)	22.8	2ft	**B1** for $[BC =]$ 5 soi or **M1** for (b) + their$BC + CA$
(d)	21.8	2ft	**M1** for $\tan A = \frac{(11-7)}{(8-(-2))}$ oe
3 (a) (i)	Convincing explanation	1	
(ii)	28	2	**B1** for $O\hat{C}D = 124$ or triangle COD isosceles soi
(iii)	76	1ft	
(b) (i)	Convincing explanation	2	**B1** for a correct pair of equal angles stated
(ii)	2.5	3	**B1** for 8.5 – SR or 8.5 – QS seen and **M1** for $\frac{12}{5} = \frac{8.5 - SR}{SR}$ or $\frac{12}{5} = \frac{QS}{8.5 - QS}$

Question	Answers	Mark	Part Marks
4 (a) (i)	2.12	**2**	**M1** for $\frac{1}{2}\times\frac{4}{3}\times\pi\times r^3 = 20$ soi or **SC1** for 1.68
(ii)	6.79	**2**	**B1** for $\sqrt[3]{\frac{50}{20}}$ or $\sqrt[3]{\frac{20}{50}}$ oe or **M1** for $\left(\frac{5}{x}\right)^3 = \frac{20}{50}$ oe
(b)	187	**3**	**M1** for π(figs 15)^2 oe and **M1** for $\left[\frac{1}{2}\times\right]4\times\pi\times$ (figs 55)^2 – 50 × their πr^2
5 (a)	51.2	**2**	**M1** for $AC^2 + 40^2 = 65^2$ oe
(b)	12.7	**2**	**M1** for $\frac{AF}{30}$ = sin25 oe
(c)	40.4	**3**	**M1** for $\frac{35}{AG}$ = cos30 oe and a further **M1** for $(AG =)\ \frac{35}{\cos 30}$ oe
6 (a) (i)	–4.62 –2.38 final answer	**2**	**B1** for one value **SC1** for both –4.6 and –2.4
(ii)	$(B =)$ 7 $(C =)$ 11	**3**	**M1** for $(x + \frac{7}{2})^2 = \frac{5}{4}$ and **B1** for one correct value
(b)	$x < -2$	**2**	**M1** for isolating $3x$ and – 6 soi
(c)	$(x + 3y)(6 - t)$ oe	**2**	**M1** for the correct extraction of a common factor at any stage
(d)	$(a =)$ 17 $(b =)$ – 16	**4**	**M1** for equalising one set of coefficients or substitution and a further **M1** for eliminating one variable or simplifying an equation in one variable and **A1** for 17 and **A1** for – 16 After **A0**, **SC1** for correct substitution into one of the original equations to find the other variable

Question	Answers	Mark	Part Marks
7 (a)	Fully shown	2	**M1** for the area sine formula
(b)	$2x^2 - 19x + 6 (= 0)$ correctly obtained	3	**B1** for both $x + 12$ and $4 + 2x - 5$ and **M1** for $\frac{x(2x-5)}{their(x+12)their(4+2x-5)} = \frac{1}{3}$
(c) (i)	9.17 0.33	3	**B1** for $\sqrt{(-19)^2 - 4\times2\times6}$ soi and **B1** for $\frac{-(-19) \pm \sqrt{their313}}{2\times2}$ soi and **M1** for both **real** values of $\frac{p \pm \sqrt{q}}{r}$
(ii)	0.33 with reason	1	
(d)	6.35	3ft	**M2** for $(BC^2=)$ $c(i)^2 + (2c(i)-5)^2 - 2\times c(i)\times(2c(i)-5)\times\cos25$ or **M1** for correct formula with one error and **A1 ft** for correct evaluation from their **M1** **SC1** for $x^2 + (2x-5)^2 - 2x(2x-5)\cos25$ oe
8 (a) (i)	2.62	2	**M1** for $\frac{25}{360} \times 2\pi \times 6$
(ii)	7.85	2	**M1** for $\frac{25}{360} \times \pi \times 6^2$
(b) (i)	39.3	1ft	
(ii)	88.8	3ft	**B1** for 30 or 60 or **M1** for 5× (a)(i) and indep **M1** for 2×(a)(ii)
(iii)	471 to 472	2ft	**B1** for height = 15 and radius = 12 soi
(c) (i)	$(h =) \frac{800}{\pi r^2}$	1	
(ii)	h is divided by 4 oe	1	

Question	Answers	Mark	Part Marks
9 (a)	36	**1**	
(b)	Correct plots ft and curve	**2**	**P1** for 6 correct plots **ft**
(c) (i)	$4 <$ gradient < 6	**2ft**	**B1** for tangent at $t = 4$
(ii)	Speed oe	**1**	
(d)	Their 2.5	**2ft**	**B1** for their 1.8 and their 4.3
(e) (i)	Their 1.65 towards Their 4.7 away from	**2ft**	**B1** for one correct **ft**
(ii)	$t^2 + \frac{48}{t} - 20 = 12$ oe isw	**1**	
(iii)	–32 cao	**1**	
10 (a)	Correct histogram	**3**	If 3 not scored, **up to 2 marks** from: **B1** for correct fd's (allow one error) **B1** for correct column widths **B1** for correct heights from their fd's
(b)	$95 < t \leqslant 100$	**1**	
(c)	98.2	**3**	**M1** for $\sum fx$ **B1** for division by 80 seen
(d)	$\frac{28}{80}$ oe	**1**	
(e) (i)	$\frac{992}{6320}$ oe	**2**	**M1** for $2 \times \frac{32}{80} \times \frac{31}{79}$ or $\frac{32}{80} \times \frac{31}{80}$
(ii)	$\frac{64}{6320}$ oe	**2**	**M1** for $\frac{4}{80} \times \frac{8}{79}$ or $2 \times \frac{4}{80} \times \frac{8}{80}$

Question	Answers	Mark	Part Marks
11 (a) (i)	6.08	**1**	
(ii)	$\begin{pmatrix}1\\4\end{pmatrix}$	**2**	**M1** for $\overrightarrow{AF} = \overrightarrow{AH} + \overrightarrow{HF}$ oe or **B1** for $\frac{1}{2}\begin{pmatrix}6\\1\end{pmatrix}$
(iii) (a)	$\begin{pmatrix}4\\-7\end{pmatrix}$	**1**	
(b)	$\overrightarrow{GD} = 2\overrightarrow{FH}$ stated or appropriate numerical vector statement	**1**	dep
(iv)	(9.5, 3)	**1ft**	
(b) (i)	Correct image	**1**	
(ii)	Centre (4, 0) oe Scale factor ×2 oe	**2**	**B1** for either
(iii)	(5, 2)	**1**	
(iv)	Correct image	**2**	**B1** for either Stem of flag R on or parallel to $y = -x$ or Hypotenuse of flag parallel to y-axis. **SC1** for correct clockwise rotation