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Cambridge Ordinary Level

MARK SCHEME for the October/November 2014 series

4024 MATHEMATICS (SYLLABUS D)

4024/21 Paper 2, maximum raw mark 100

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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) (i)	6	**1**	
(ii)	$\frac{1}{500}$	**1**	
(iii)	2.7	**1**	
(b)	9	**1**	
(c) (i)	3.5	**2**	**B1** for 1.2 seen or division by 120 or **M1** for $x + \frac{20x}{100} = 4.2$ oe
(ii)	Special promotion tin + working	**2**	**M1** attempt at one rate
2 (a)	15 05 or 3 05 pm	**2**	**B1** for (0)9 05 or (0)3 50 seen
			or **M1** for 21 50 + 11 15 or 21 50 + 6
(b)	11 hours 55 minutes	**2**	**B1** for (0)1 45 or 5 hours and 55 minutes seen or **M1** for 13 40 – (0)7 45 + 6 oe
(c) (i)	290 (280 to 300)	**1**	
(ii)	45 or ft from their **(c)(i)**	**1**	
(d)	827	**2**	**M1** for $683 + k \times 24$
3 (a) (i)	Correct quadratic graph through 11 points	**3**	**B2** for curve through at least 8 ft points or for 11 ft points or **B1** for 16 in the table twice or for 6 ft points
(ii)	– 2.35 to – 2.25 and 4.25 to 4.4	**2ft**	**B1** for one correct solution or **M1** for $y = 2$ drawn
(iii)	3.25 to 4.75	**2**	**B1** for tangent drawn at $x = 3$ or for a gradient in range

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	(b)	2.54, – 3.54	**3**	Working seen and www **B1** for $\sqrt{1^2 - 4\times1\times(-9)}$ soi and **B1** for $\frac{-1 \pm \sqrt{their 37}}{2\times1}$ After **B1** or **B0** so far, **M1** for both real values of *their* $\frac{p \pm \sqrt{q}}{r}$
	(c)	$(y =) -3x + 1$	**2**	**B1** for $(y =) -3x + c$ or $(y =) mx + 1$ or **M1** for (i) theoretical or (ii) practical
4	**(a)**	$p = 12$, $q = 16$	**2**	**B1** for one correct Or **M1** for $k \times 5$ or $l \times 2.5$ where k and l are attempts to read from the histogram
	(b) (i)	29.5	**3**	**M1** for sum of the midvalues × frequency and **M1** for division by 60
	(ii)	2070	**2**	**M1** for attempt to use upper bounds of individual intervals
5	**(a)**	19.46 seen	**4**	Working seen. No wrong working. **M2** for $14^2 + 8^2 - 2\times14\times8\times\cos122$ and **A1** for 378.7 soi or **M1** for an incorrect formula with one error and **A1** for 141.3 or 319.35 or 250.7 soi
	(b)	37.5 to 37.6	**3**	**M2** for $\frac{14\sin122}{19.5}$ or **M1** for $\frac{\sin B}{14} = \frac{\sin122}{19.5}$ oe **SC1** for correct method for wrong angle
	(c)	247 to 248	**4**	**M1** for 0.5 × 8 × 8 × sinC = 26 oe soi and **A1** for 54.34 and **M1** for 180 – *their* 54.34 or 238 – *their* 54.34 **SC1** after 0 for CE = 8
6	**(a)**	-1	**1**	
	(b)	$\frac{x+7}{2}$	**2**	**M1** for $x = 2y - 7$ soi or **SC1** for the answer $\frac{y+7}{2}$
	(c)	$g = 2.2$ or $2\frac{1}{5}$ or $\frac{11}{5}$	**3**	**B1** for $2(3g) - 7 = g + 4$ soi and **B1** for $mg = 11$ or $5g = n$ or **SC1** after **B0** for solving *their* linear f(3g) = g + 4

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7 (a) (i)	$\frac{3}{4}$ or 0.75	**1**	
(ii)	$(y =) -4$	**2**	**M1** for 4y – 6y – 3 = 5 or correctly rearranges their linear equation
(b)	$\frac{3w}{w+2}$ final answer	**3**	**B1** for 15w(w – 2) and **B1** for 5(w + 2)(w – 2)
(c) (i)	$p(p + 20)$ or $p^2 + 20p$	**1**	
(ii)	Correct equation and the given form correctly derived.	**2**	**M1** for $35(p^2 + 20p)$ and **A1** for $35(p^2 + 20p) = 122500$ And the given form established.
(iii) (a)	$p = 50$ and $p = -70$	**2**	**M1** for $(p \pm h)(p \pm k)$ where $hk = 3500$
(b)	70	**1ft**	Accept *their* **positive** $p + 20$
8 (a) (i)	112 to 116	**1**	
(ii)	Perpendicular bisector of AB	**1**	
(iii) (a)	Correct region shaded.	**2**	**M1** for clearly identifiable arc centre B radius 8 cm
(b)	2.9 to 3.1	**1**	
(iv)	Yes as path of D passes through the shaded region	**2**	**M1** for line from their D on a bearing 075
(b) (i)	9.43	**2**	**M1** for $(PR^2 =) 5^2 + 8^2$
(ii)	6.38 to 6.39	**3**	**M2** for $\sin 53 = \frac{x}{8}$ oe or **B1** for correct triangle soi
9 (a)	-1	**1**	
(b)	correct triangle	**2**	**B1** for two vertices correct or for an incorrect reflection
(c)	$x = -2.5$	**1**	
(d)	4	**1**	
(e)	Correct octagon	**2**	**M1** for 6 correct vertices or octagon scale factor 2 incorrectly placed

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(f) (i)	1575	**2**	**B1** for any correct relevant area such as 2025 or 1125 or 112.5 soi or **M1** for a complete, consistent, method
(ii)	30	**1**	
(iii)	10350	**2ft**	ft *their* 900 + 6 × *their* 1575 **B1** for 450 seen or **M1** for complete, consistent, method
10 (a) (i) (a)	$2x$	**1**	
(b)	$4x$	**1**	
(c)	$90 - 2x$ oe	**1ft**	
(ii)	19	**3**	**M2** for $180 - 3x = 123$ oe or **B1** for $B\hat{E}0 = (180 - 123)$
(b) (i)	22.3	**2**	**M1** for $\frac{40}{360} \times \pi \times 8^2$
(ii)	476 to 477	**4**	**M1** for $\frac{40}{360} \times \pi \times 16$ and **M1** for 2 × their 22.3 and **B1** for 8 × 20
11 (a) (i)	23 to 25	**1**	
(ii)	12 45 (pm)	**1**	
(iii)	1.9	**1**	
(iv) (a)	Straight lines to (14 45, 5.4) and from (14 45, 5.4) to (15 39, 0)	**2**	**M1** for straight line $d = 5.4$ or straight line from *their* (14 45, 5.4) to (15 39, 0)
(b)	6 cao	**1**	
(b) (i)	Correct sectors and labels	**2**	**M1** for sector of 30 or 150
(ii)	$\frac{5}{12}$ or 0.417 or 0.4166....	**1**	
(iii)	$\frac{41}{66}$ oe, 0.621	**3**	**M2** for $1 - \frac{5}{12} \times \frac{4}{11} - \frac{6}{12} \times \frac{5}{11}$ oe or **M1** for such as $\frac{5}{12} \times \frac{4}{11}$ or $\frac{6}{12} \times \frac{5}{11}$ After **0**, **SC1** for $(2) \times \frac{5}{12} \times \frac{6}{12} + (2) \times \frac{5}{12} \times \frac{1}{12} + (2) \times \frac{6}{12} \times \frac{1}{12}$

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