

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 $\sqrt{1^2 - 4 \times 1 \times (-9)}$ soi and B1 for $\frac{-1 \pm \sqrt{their 37}}{2 \times 1}$ 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 $\times$ 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 $14^2 + 8^2 - 2 \times 14 \times 8 \times \cos 122$ 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 $\frac{14 \sin 122}{19.5}$ or M1 for $\frac{\sin B}{14} = \frac{\sin 122}{19.5}$ oe SC1 for correct method for wrong angle
(c)	247 to 248	4	M1 for $0.5 \times 8 \times 8 \times \sin C = 26$ 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 <i>their</i> 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 <i>their</i> $900 + 6 \times \text{their } 1575$ 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 $\hat{BE}0 = (180 - 123)$
(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 $2 \times \text{their } 22.3$ 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 <i>their</i> (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 $(2) \times \frac{5}{12} \times \frac{6}{12} + (2) \times \frac{5}{12} \times \frac{1}{12} + (2) \times \frac{6}{12} \times \frac{1}{12}$