MARK SCHEME for the May/June 2015 series

4024 MATHEMATICS (SYLLABUS D)

4024/12   Paper 1, maximum raw mark 80

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

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Question		Answers	Mark	Part Marks
1	(a)	21	1	
	(b)	$\dfrac{9}{20}$ oe	1	
2		$\dfrac{7}{12}$ $\dfrac{5}{8}$ 0.64 $\dfrac{13}{20}$ 0.7	2	**B1** for 3 correct Or completely reversed answer Or **SC1** for 0.65, 0.583, 0.625 seen
3		4	2	**M1** for $\dfrac{1}{2} \times 12 \times (b + 4b)$ oe Or **B1** for correct use of $\dfrac{1}{2}(a+b)h$
4		11	2	**B1** for answer $\dfrac{11}{60}$ Or $\dfrac{5}{12} \times 60$ **and** $\dfrac{2}{5} \times 60$ soi
5		3 hours 30 minutes	2	**B1** for 20 55 oe seen Or **M1** for 12 25 – (05 25 – 5) Or (12 25 + 5) – 05 25 soi
6		500	2	**B1** for two from 30, 2 and 0.9 seen
7		$\dfrac{96}{64}$ oe isw	2	**B1** for $k = 96$ soi Or **M1** for $24 \times 2^2 = y \times 8^2$ Or y = (their k)/8^2
8	(a)	p, q, r, s, t, u	1	
	(b)	s, v	1	
9	(a)	5.21×10^{-6}	1	
	(b)	3×10^5	1	
10		$p = 3.8$ $q = 77°$	2	**B1** for one correct

11			$(1, 6)\ (1, 5)\ (1, 4)$	2	**B1** for 2 correct no extras Or 3 correct no more than 5 extras After **B0** allow **SC1** for lines $x = 2$ and $y = 7$ drawn on the diagram
12	(a)		-2	1	
	(b)	(i)	-3	1	
		(ii)	$-8, 8$	1	Both correct
13	(a)		$2^2 \times 3 \times 5$	1	
	(b)		15	1	
	(c)		9	1	
14	(a)		Correct triangle with arcs	2	**B1** for correct triangle with no arcs or 1 arc After B0 allow **SC1** for triangle with arcs with 5 cm and 6 cm reversed
	(b)		128 to 133°	1	
15	(a)		6	1	
	(b)		$b = \dfrac{8a - c^2}{3}$ oe	2	**M1** for $c^2 = 8a - 3b$
16	(a)	(i)	9	1	
		(ii)	$\dfrac{1}{3}$	1	
	(b)		$\dfrac{1}{16x^4}$	1	
17	(a)		Stretch y-axis invariant/parallel to x-axis **and** factor 4	2	**B1** for Stretch
	(b)		$\dfrac{x}{4}$	1	
18	(a)		$pq(p - 1)$	1	
	(b)	(i)	$(5x - 4)(x + 1)$	1	
		(ii)	0.8 oe , -1	1	Or FT their factorisation

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19	(a)		1240	2	**M1** for $8 \times 140 + 10 \times (8 + \dfrac{50}{100} \times 8)$ isw After **B0** allow **SC1** for answer of 1160 or 1280
	(b)		276	2	**B1** for $240 \times 0.03 \times 5$ oe seen
20	(a)	(i)	27 cao	1	
		(ii)	5 cao	2	**B1** for 30 ± 0.2 and 25 ± 0.2 seen
	(b)		Median 28, IQR = 5	1	FT their **(a)(i)** + 1 and their **(a)(ii)**
21	(a)		$\begin{pmatrix} -1 & 9 \\ -5 & 13 \end{pmatrix}$	2	**B1** for 2 or 3 correct elements
	(b)	(i)	2.5 oe	1	
		(ii)	$0.5\begin{pmatrix} -1 & 2 \\ -2.5 & 3 \end{pmatrix}$ isw oe	1	FT their **(b)(i)** If 0 scored in **(b)(i)** and **(b)(ii) SC1** for correct FT adjoint matrix $\begin{pmatrix} -1 & 2 \\ -their(bi) & 3 \end{pmatrix}$ isw
22	(a)		0.25	1	
	(b)		32	1FT	FT $8 \div$ their **(a)** soi
	(c)		1.9	2FT	FT $7.6 \times$ their **(a)** **M1** for figs their **(a)** $\times$ figs 76 soi

23	(a)		$\frac{1}{2} \leqslant x < 6$ isw	2	**B1** for $x < 6$ **or** $x \geqslant \frac{1}{2}$ Or for $2x < 12$ **and** $2x \geqslant 1$ Or for $x = 6$ **and** $x = \frac{1}{2}$
	(b)		$x = 5$, $y = -3$	3	**B2** for either x or y correct with supporting working Or **M1** for correct method to eliminate one variable. And **A1FT** for correct evaluation to find the other variable Or after **B0** scored, allow **SC1** for 2 correct values but no working shown or correct substitution and evaluation to find the other variable using one of the original equations
24	(a)		$h = 4r$	2	Answer only is 0. **M1** for either version of the full method, that can be accepted in the form $2 \times \frac{2}{3}\pi r^3 = \frac{1}{3}\pi r^2 h$ or $\frac{4}{3}\pi r^3 = \frac{1}{3}\pi r^2 h$ After **B0**, allow **SC1** for $h = r$
	(b)		17	2FT	**M1** for (their h)$^2 + r^2$
	(c)		$\pi r^2 (2 + \sqrt{17})$ oe	1FT	FT $\pi r^2 (2 + \sqrt{their\,17})$
25	(a)	(i)	$\mathbf{b} - \mathbf{a}$	1	
		(ii)	$3\mathbf{b} - 2\mathbf{a}$	1	
	(b)	(i)	$\frac{4}{3}\mathbf{a}$	2FT	**M1** for such as $\overrightarrow{BO} + \overrightarrow{OC} + \overrightarrow{CE}$ Or $BD - ED$ or $-b + a + AE$ Or **B1** for $(\overrightarrow{CE}) = \pm \frac{1}{3}$ their **(a)(ii)** Or $(\overrightarrow{DE}) = \pm \frac{2}{3}$ their **(a)(ii)**
		(ii)	trapezium	1	
26	(a)	(i)	$95 - 6n$ oe isw	2	**B1** for $- 6n$ seen
		(ii)	16 cao	1	
	(b)	(i)	$2n - 3$	2	**M1** for $(n + 1)^2 - 4(n + 1)$ seen
		(ii)	39 cao	1	