Cambridge
O Level

Cambridge International Examinations
Cambridge Ordinary Level

MATHEMATICS (SYLLABUS D) **4024/12**

Paper 1 **May/June 2017**

MARK SCHEME

Maximum Mark: 80

Published

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.

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

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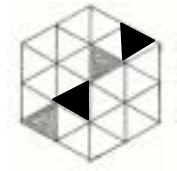
Question	Answer	Marks	Partial Marks
1(a)	$\frac{7}{15}$	**1**	
1(b)	0.0012 oe	**1**	
2(a)		**1**	
2(b)		**1**	
3	0.03 or $\frac{3}{100}$ with 60, 4 and 20 seen	**2**	**B1** for two from 60, 4 and 20 seen related to unrounded values
4	700	**2**	**C1** for answer 900 or **M1** for $\frac{200}{80}\times(360-80)$ oe
5(a)	137	**1**	
5(b)	085	**1**	
6(a)	–7.5	**1**	
6(b)	17	**1**	**FT** 9.5 – *their* **(a)**, where $-9 \leqslant$ *their* **(a)** $\leqslant -7$
7(a)	$A \cap B'$ oe	**1**	
7(b)	$\subset$	**1**	
8(a)	2 hours 45 minutes	**1**	
8(b)	17 [May]	**2**	**C1** for answer 16 [May] or **M1** for $\frac{10\times1000}{30\times20}$ oe
9(a)	–1, 0, 1	**1**	
9(b)	Correct fraction	**1**	E.g. $\frac{2}{3}, \frac{3}{5}, \frac{5}{8}, \frac{7}{10}, \frac{6}{10}$ etc.
9(c)	Irrational number between 2 and 3	**1**	E.g. $\sqrt{5}$, $\frac{2\pi}{3}$ etc.

Question	Answer	Marks	Partial Marks
10(a)	187	**1**	
10(b)	90	**2**	**M1** for 65 × 6 **and** 60 × 5 soi
11	Correct method to eliminate one variable reaching $ax = b$ or $cy = d$	**M1**	
	$x = 3$ $y = –0.5$ oe	**A2**	**A1** for either $x = 3$ or $y = –0.5$ oe Or after **A0**, **C1** for a pair of values that satisfy either equation or for correct answers with no working
12(a)	$y = \frac{12}{x^2}$ oe	**2**	**M1** for $3 = \frac{k}{2^2}$ soi or $\frac{3}{4} = \frac{k}{4^2}$ soi
12(b)	$[\pm]\frac{1}{2}$ oe	**1**	
13(a)	150	**1**	
13(b)	2	**2**	**M1** for $(162 – 150) = 150 \times \frac{x}{100} \times 4$ oe After 0 scored, **C1** for answer 27
14(a)	5	**2**	**M1** for $7 = \frac{3 \times 11 - k}{4}$ soi
14(b)	$\frac{4x + k}{3}$ or $\frac{4x + 5}{3}$ oe final answer	**2**	**FT** *their k* **M1** for correct first step e.g. $x = \frac{3y - k}{4}$ or $4y = 3x – k$ or better
15(a)	Reflection $y = –x$ oe	**2**	**C1** for reflection or for $y = –x$ oe
15(b)	Triangle vertices (–1, 2), (–1, 5), (–2, 4)	**2**	**C1** for correct size and orientation, incorrect position or for 90° clockwise rotation about origin
16(a)	$y = 2x + 3$ oe	**2**	**C1** for $y = 2x + c$ o.e. or $y = mx + 3$ oe $m \neq 0$ or $2x + 3$ or **M1** for gradient = 2 or intercept = 3 soi
16(b)	9	**2**	**M1** for $\frac{5 - -1}{1 - p} = -\frac{3}{4}$ oe or for $5 = -\frac{3}{4} \times 1 + c$ **and** $-1 = -\frac{3}{4} \times p + c$ seen

Question	Answer	Marks	Partial Marks
17(a)	Angles in same segment are equal	**1**	
17(b)	$\angle PQT = 55°$	**1**	
17(c)	$\angle SPQ = 70°$	**1**	
17(d)	$\angle SRQ = 110°$	**1**	**FT** 180 – *their* **(c)**
18(a)	18	**2**	**M1** for $\frac{v-12}{15}$ or $\frac{12-v}{15}$ oe
18(b)	345	**2**	**B1FT** for a correct partial area: 120 or 225 or 300 or 45 or 180 or **M1FT** for $12 \times 25 + 0.5 \times 15 \times$ (*their*18 – 12) oe
19(a)	60	**2**	**B1** for [angle sum of pentagon =] 540 or $(5 – 2) \times 180$ oe
19(b)	24 nfww	**2**	**B1** for exterior angle = 15° or interior angle = 165° soi or **M1** for $\frac{360-30}{2} = \frac{180(n-2)}{n}$ oe
20(a)(i)	2×3^3 or $2 \times 3 \times 3 \times 3$	**1**	
20(a)(ii)	4	**1**	
20(b)(i)	$\frac{3}{2}$ oe	**1**	
20(b)(ii)	6	**1**	
21(a)(i)	$\frac{1}{3}\mathbf{a} + \frac{1}{3}\mathbf{b}$ or $\frac{1}{3}(\mathbf{a} + \mathbf{b})$ or $\frac{\mathbf{a}+\mathbf{b}}{3}$ final answer	**1**	
21(a)(ii)	$\frac{1}{3}\mathbf{a} – \frac{2}{3}\mathbf{b}$ or $\frac{1}{3}(\mathbf{a} – 2\mathbf{b})$ or $\frac{\mathbf{a}-2\mathbf{b}}{3}$ final answer	**1**	
21(b)	Any two pairs of vectors from $\overrightarrow{OA} = \overrightarrow{BC}$ oe $\overrightarrow{OQ} = \overrightarrow{PC}$ oe $\overrightarrow{QA} = \overrightarrow{BP}$ oe **Alternative method:** $OA = BC$ $OQ = PC$ $\angle AOQ = \angle BCP$	**2**	**B1** for any one pair of vectors stated **B1** for two of these pairs of sides stated or one of these pairs of sides and this pair of angles stated

Question	Answer	Marks	Partial Marks
22(a)	6	**2**	**M1** for $720 = 15 \times 8 \times h$ soi
22(b)	396	**2**	**FT** *their h* **C1FT** for answer 276 or for answer 516 or **M1FT** for $8 \times 15 + 2 \times$ *their* $6 \times 8 + 2 \times 15 \times$ *their* 6
22(c)	3.6 oe	**1**	**FT** $0.6 \times$ *their* 6
23(a)	$\frac{3}{4}$ oe	**2**	**M1** for $7x = 3(4 - 3x)$ or better
23(b)	$\frac{2x+3}{x-5}$ final answer	**3**	**B1** for $(2x + 3)(2x - 3)$ seen **B1** for $(2x - 3)(x - 5)$ seen
24(a)	Correctly completed tree diagram $\frac{n-3}{n-1}$ oe $\frac{n-3}{n}$ oe $\frac{n-4}{n-1}$ oe	**2**	**C1** for one correct probability correctly positioned
24(b)	$\frac{3}{n} \times \frac{2}{n-1} = \frac{1}{15}$	**M1**	
	Correct rearrangement with at least one further step to reach $n^2 - n - 90 = 0$	**A1**	
24(c)	10	**2**	**B1** for solutions 10, –9 seen or **M1** for $(n - 10)(n + 9)$ [= 0] or for $\frac{1 \pm \sqrt{(-1)^2 - 4 \times 1 \times -90}}{2 \times 1}$ or better