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

Paper 1 **October/November 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.

Cambridge International will not enter into discussions about these mark schemes.

Cambridge International is publishing the mark schemes for the October/November 2017 series for most Cambridge IGCSE®, Cambridge International A and AS Level components and some Cambridge O Level components.

This document consists of **5** printed pages.

Abbreviations

cao	correct answer only
dep	dependent
FT	follow through after error
isw	ignore subsequent working
oe	or equivalent
SC	Special Case
nfww	not from wrong working
soi	seen or implied

Question	Answer	Marks	Partial Marks
1(a)	$\dfrac{9}{35}$	1	
1(b)	200	1	
2(a)	7, 8, 5 all three	1	
2(b)	18 × their (min. frequency) FT provided min. frequency < 20	1	
3	$\dfrac{1}{2}$ oe nfww	2	**B1** for "k" = $\dfrac{30}{6}$ oe if $y = \dfrac{k}{x}$ used or FT **M1** for $y = (their\ k) / 10$ when $y = "k" / x$ used or **M1** for $\dfrac{1}{6} \times 30 = y \times 10$
4(a)	$\dfrac{1}{8}$; or 0.125	1	
4(b)	$4x$	1	
5(a)	68	1	
5(b)	14 33; or 2.33 p.m.	1	
6(a)	3.84	1	
6(b)	4	1	
7(a)	78°	1	
7(b)	70°	1	
8(a)	0	1	
8(b)	1.5	1	
9(a)	7.5	1	
9(b)	3 nfww	1	

Question	Answer	Marks	Partial Marks
10	Two or three of 40, 6, 3000	**M1**	
	Final answer 0.08 cao nfww	**A1**	**C1** for 0.08 without any working.
11	14 years 6 months nfww	**2**	**M1** for (3 × (14 years 3 months) + 15 years 3 months) oe
12(a)	25	**1**	
12(b)	$\frac{1}{5}$; or 0.2	**1**	
13(a)	40	**1**	
13(b)	rectangle: base 40 to 50; frequency density (height) 3	**1**	
	rectangle: base 50 to 80; frequency density (height) 1	**1**	
14	−2 and −1	**3**	**B1** for $(-)5x \dots (-)k$; or $(-)1 \dots (-)\frac{5}{k}x$ (i.e. collecting x terms, where ... represents any inequality symbol, or =) and k = 12, 4, 3, 1 or 48. Or equiv., with zero on one side and both terms on the other. **B1** for $x > -2.4$; or for $-2.4 < x$ If 0 scored, then **C1** for one correct solution or for $x = -\frac{12}{5}$ oe in the answer space.
15(a)	5	**1**	
15(b)	72, 70, 38 all three	**2**	**C1** for 72 and 70; or for three angles totalling 180°.
16(a)	3.6×10^{8}	**1**	
16(b)(i)	4.5×10^{-6}	**1**	
16(b)(ii)	$(\pm) 3 \times 10^{-8}$	**1**	
17(a)	77	**1**	
17(b)	20	**2**	**M1** for a wholly correct method, such as $\frac{15000 - 12000}{15000} \times 100$
18(a)	236	**2**	**M1** for 2 × 5 × 11 + 2 × 5 × 6 + 11 × 6 oe or **C1** for 302
18(b)	30	**1**	

Question	Answer	Marks	Partial Marks
19(a)	Probabilities 0.7 and 0.3 on the correct branches	1	
19(b)(i)	0.49 oe	1	
19(b)(ii)	0.42 oe	1	FT from their diagram, provided their diagram probabilities are less than 1, and 0 < ans. < 1.
20(a)	-2	1	
20(b)	$y = -2x + 4$ or FT $y = (their(a)) x + 4$ or $y = (their(a)) (x + 3) + 10$	1	
20(c)	$(3, -2)$	2	**C1** for one correct coordinate
21(a)	$\begin{pmatrix} 7 & 9 \\ -15 & -16 \end{pmatrix}$	2	**C1** for two or three correct elements, or for 3 or 4 elements of $\begin{pmatrix} 11 & -3 \\ -15 & -8 \end{pmatrix}$.
21(b)	$-\dfrac{1}{7}\begin{pmatrix} -4 & -1 \\ 5 & 3 \end{pmatrix}$ oe, e.g. $\begin{pmatrix} \frac{4}{7} & \frac{1}{7} \\ -\frac{5}{7} & -\frac{3}{7} \end{pmatrix}$	2	**B1** for (det **A** =) -7 or **B1** for $\begin{pmatrix} -4 & -1 \\ 5 & 3 \end{pmatrix}$ seen
22(a)	$3a(3a - 2)$	1	
22(b)	$(2 - 5t)(2 + 5t)$	1	
22(c)	$(x + 3d)(2c - y)$	2	**B1** for one of the partial factorisations: $x(2c - y), 3d(2c - y), 2c(x + 3d),$ $-y(x + 3d), y(x + 3d)$
23(a)	97 to 99 inclusive	1	
23(b)	Acceptable line	1	
23(c)	Full circle, centre C, radius 5 cm	1	
23(d)	4.3 to 4.9 cm, dep. on two labelled intersections of an acceptable line and arc.	1	
24(a)	21	1	
24(b)	$\dfrac{18}{20}$ oe	1	
24(c)	420	2	**M1** for a correct, complete, method to find the area. e.g. $\frac{1}{2} \times (30 + 12) \times(60 - 40)$; $12 \times (60 - 40) + \frac{1}{2} \times (60 - 40) \times (30 - 12)$; $(60 - 40) \times 30 - \frac{1}{2} \times (60 - 40) \times (30 - 12)$

Question	Answer	Marks	Partial Marks
25(a)	$7x + 5y > 35$ oe **and** $x < 4$ oe **and** $y < 5$ oe	2	**C1** for two inequalities correct; or for x ... 4 and y ... 5 (with "..." $\neq$ " < ").
25(b)	3 nfww	2	**B1** for x-coord. of A is $\dfrac{10}{7}$ oe; or for eqn. of OA is $y = \dfrac{7}{2}x$ oe
26(a)	49, 19, 30	1	
26(b)(i)	$3n + 4$ oe and isw	1	
26(b)(ii)	$(n + 2)^2$ oe	1	
26(c)	$n^2 + n$; or $n(n + 1)$	2	**M1** for attempt at *their*(bii) – *their*(bi), provided both parts are different expressions in n, and the answer space also contains an expression in n, or is empty: or for a valid method.
27(a)	7	3	**M1** for $\left|\overrightarrow{OP}\right| = \sqrt{(-3)^2 + (4)^2}$ **B1** for $\left|\overrightarrow{PQ}\right| = 2$
27(b)(i)	$\begin{pmatrix} -3 + 2k \\ 4 \end{pmatrix}$ oe	1	
27(b)(ii)	$4\frac{1}{2}$ oe	2	**B1** for expressing $\overrightarrow{OM}$ as a multiple (by 4) of $\overrightarrow{OT}$ or **B1** for T is (6, 4); or for $\overrightarrow{OT} = \begin{pmatrix} 6 \\ 4 \end{pmatrix}$