
MATHEMATICS (SYLLABUS D)

4024/12

Paper 1

October/November 2016

MARK SCHEME

Maximum Mark: 80

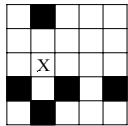
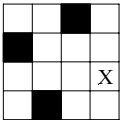
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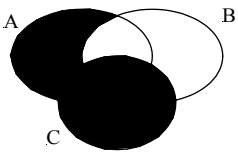
This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, 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 will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the October/November 2016 series for most Cambridge IGCSE[®], Cambridge International A and AS Level components and some Cambridge O Level components.

Question	Answers	Mark	Part marks
1 (a)	2.457	1	
(b)	$\frac{2}{63}$ oe fraction; or 0.031 to 0.032	1 (*)	
2 (a)	123.456	1	
(b)	(0).0643	1	
3 (a)		1	
(b)		1	
4 (a)	2.05	1	
(b)	$-\frac{3}{4}$ -0.7 74% $0.\dot{7}$	1	
5 (a)	41°	1	
(b)	245°	1	
6	$\sqrt{3.98} \approx \sqrt{4}$ or 2, and $602.3 \approx 600$ (or 602), and $2.987 \approx 3$ all three seen (\pm)400 (or 401, 401.3 or better, from 602)	M1* A1	B1 for two correct approximations. Could be implied by 2×200 or $1\ 200/3$. C1 for 400 WAW.
7	Triangle with vertices (1, 1) (1, 5) (7, 5)	2*	B1 for two correct vertices
8 (a)	5.13×10^5	1	
(b)	2.4×10^{-8}	2*	C1 for $A \times 10^{-8}$ with $1 \leq A < 10$ or for 2.4×10^{-10} ; or B1 for 24×10^{-9} or for 0.000 000 024
9 (a)	20 25	1 1	
(b)	Rectangle with base 35 to 50 and height 2	1	

Question	Answers	Mark	Part marks
10 (a)	-3.5 or any equivalent	1	
(b)	$\frac{1}{3}$	2*	<p>M1 for $5 = 4 + 3x$ or B1 for $(f^{-1}(x) =) \frac{x-4}{3}$ oe or B1 for $x = \frac{1}{3}$, followed by further work</p>
11 (a)	4 nfw	2*	<p>B1 for “k” = 36 from $y = k/x^2$ or M1 for $9 \times 2^2 = y \times 3^2$ oe or M1 for $(\text{their } k) / 3^2$ oe</p>
(b)	$\frac{p}{4}$	1	
12 (a)	0	1	
(b)	0.8 oe	2*	<p>M1 for $(15 \times 1 + 6 \times 2 + 3 \times 3 + 4 \times 1) / 50$</p>
13	Correct triangle	3*	<p>Following an attempt at a rotation of 110° about O, award C2 for two correct vertices or C1 for one correct vertex.</p> <p>If [0] scored then either B1 for arc(s) of correct radii, centre O, (from A, B or C); or B1 for AOA' or BOB' or $COC' = 110^\circ$</p>
14 (a)		1	
(b)	8	2*	<p>M1 for $23 + 17 - (36 - 4)$ or M1 for $23 - x + x + 17 - x + 4 = 36$ oe or B1 for $S \cap F' = 15$ or $F \cap S' = 9$</p>
15	<p>A correct method to eliminate one variable</p> <p>Either $x = 5$ or $y = -6$ WWW</p> <p>Both $x = 5$ and $y = -6$ WWW</p>	<p>* M1 A1 A1</p>	<p>If [0] earned, then award C1 for a pair of values that satisfy either equation. If only M1 earned, then award B1 for a <i>correct</i> substitution of their first solution into one, or a <i>correct</i> linear combination of both, of the <i>original</i> equations.</p>

Question	Answers	Mark	Part marks																
16 (a)	13	1																	
(b)	$(\pm)\frac{9}{16}$	1																	
(c)	$4y^3$	1																	
17 (a)	200	1																	
(b)	15 : 1	2*	C/B1 for any correct unsimplified ratio, e.g. 210 : 14; 105 : 7; $\frac{30}{2} : 1$; $\frac{7}{2} : \frac{14}{60}$; 3.5 : 14/60 or M1 for $3.5 \times 60 \times 60 : 14 \times 60$; $3.5 \times 60 : 14$ or B1 for $3\frac{1}{2}$ hrs = $\frac{7}{2} \times 60$; or 210 seen.																
18 (a)	<table border="1" style="display: inline-table; vertical-align: middle;"> <tr><td>–</td><td>3</td><td>4</td><td>5</td></tr> <tr><td>3</td><td>–</td><td>5</td><td>6</td></tr> <tr><td>4</td><td>5</td><td>–</td><td>7</td></tr> <tr><td>5</td><td>6</td><td>7</td><td>–</td></tr> </table>	–	3	4	5	3	–	5	6	4	5	–	7	5	6	7	–	1	
–	3	4	5																
3	–	5	6																
4	5	–	7																
5	6	7	–																
(b)	0	1																	
(c)	$\frac{4}{12}$ oe ; or FT <i>their table</i>	1 ^{1/4}																	
19 (a)	1.65	1																	
(b)	15.15	2*	M1 for <i>their(a)</i> + 100 × 135/1000 or B1 for 13.5 seen.																
20	$3(2x - 1) + 4(x - 2)$; or $6x - 3 + 4x - 8$; or $10x - 11$ <i>their</i> ($10x - 11$) = 24 or $\frac{\text{their}(10x-11)}{12} = 2$ 3.5 oe WWW	M1* M1* A1																	

Question	Answers	Mark	Part marks
21	600 WWW	3*	M2 for $\frac{\pi \times 20^2 \times 16}{\frac{4}{3} \times \pi \times 2^3}$ or B1 for (Volume of water =) $\pi \times 20^2 \times 16$ or for (Volume of one drop =) $\frac{4}{3} \times \pi \times 2^3$ soi
22 (a)	Perpendicular bisector of AB .	1	FT for two intersecting lines – slightly inaccurate but correct types of loci.
(b)	Bisector of angle ABC .	1	
(c)	Correct (bottom right) region shaded.	1 ✓	
23 (a)	14	2*	M1 for $25 - 1 \times 1 - 2 \times 2 - \frac{1}{2} \times 4 \times 3$ oe dissection.
(b)	18 nfw	2*	B1 for sloping side = 5
24 (a)	68	1	
(b)	146	1	
(c)	34; or FT <i>their</i> (a)/2; or FT 180 – <i>their</i> (b)	1 ✓	
(d)	56	1	
25 (a)	$(0, 4\frac{1}{3})$	1	C1 for one or two correct, or for $x \dots 1$ oe, $y \dots 2$ oe, $3y + 2x \dots 13$ oe, with incorrect "...".
(b)	$x \geq 1$ oe, $y \geq 2$ oe, $3y + 2x \geq 13$ oe – all three	2	
(c)	(6, 2)	1	
26 (a) (i)	$2n - 1$ oe	1	
(ii)	421	1	
(b) (i)	8	1	
(ii)	14	1	

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Question	Answers	Mark	Part marks
27 (a)	(-0.9) oe	1	
(b)	420	2*	M1 for $\frac{1}{2} \times 20 \times (12 + 30)$ oe
(c)	25	2*	M1 for $(k - 20) \times 12 = 60$ oe or C1 for $k = 5$