



Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

MATHEMATICS

0580/31

Paper 3 (Core)

May/June 2016

MARK SCHEME

Maximum Mark: 104

Published

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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	Mark	Part marks
1	(a) (i)	$\frac{2}{5}$ oe	1 Allow 0.4 , 40%
	(ii)	$\frac{3}{5}$ oe	1 Allow 0.6 , 60%
	(iii)	0	1
	(b) (i)	4	1
	(ii)	4.3	3 M1 for $2 \times 3 + 3 \times 2 + 4 \times 6 + 5 \times 4 + 6 \times 5$ or 86 M1dep for <i>their</i> $86 \div 20$ If M0M0 SC1 for 57.5
	(iii) (a)	$\frac{3}{20} \times 360$	1
	(b)	90	2 M1 for $\frac{5}{20}$ oe or $\frac{360}{20}$ oe implied by 18 seen
	(c) (i)	14	2 M1 for $\frac{168}{360}$ oe or $\frac{360}{30}$ oe implied by 12 seen
	(ii)	43.3	3 B1 for [total angle=] 156° M1 for $\frac{\textit{their angle}}{360} [\times 100]$ oe If B0M0 SC1 for 53.3
	(iii)	5	2 M1 for $\frac{10}{100} \times 360$ oe or 36
2	(a) (i)	3	1
	(ii)	36	1
	(iii)	49	1
	(iv)	27	1
	(b) (i)	43	1
	(ii)	50	1

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Question	Answer	Mark	Part marks
(c)	$\frac{2}{3}$	1	
(d) (i)	$3^2 \times 5$ or $3 \times 3 \times 5$	2	B1 for 3 and 5 only identified as factors or for a correct product e.g. 9×5 or 3×15
(ii)	15	2	M1 for $3 \times 5 \times 7$ [= 105] or B1 for 3 or 5 as final answer
3 (a)	7034.16	3	M2 for $14 \times 237 \times 2 \times 1.06$ oe or M1 for $14 \times 237 \times 2$ oe or 237×1.06 oe or $237 \times 2 \times 1.06$ oe or $237 \times 1.06 \times 14$ oe
(b)	4.22	2	M1 for $20 - 2 \times 7.89$
(c)	1608 or 408 pm	2	B1 for 45 min soi
(d)	03 00 or 3 am	3	M1 for $270 \div 32.4$ or 8.33[...] or 8 (h) 20 (min) M1dep for 18 40 + <i>their</i> 8.33
(e)	1000	2	M1 for $\frac{1800}{4+5}$ [$\times 5$] oe
4 (a) (i)	Wednesday	1	
(ii)	5	1	accept -5
(iii)	-3 -2 -1 0 1 2 5	1	
(iv)	-6	1	
(b)	2 million or 2 000 000	1	
(c)	115 125	2	B1 for either correct or both correct but reversed
(d)	28.3 or 28.27 to 28.28	4	B1 for radius of 5 cm or 4 cm soi M2 for $\pi \times 5^2 - \pi \times 4^2$ soi or M1 for $\pi \times 5^2$ or $\pi \times 4^2$ soi If 0 scored SC2 for $\pi \times 10^2 - \pi \times 8^2$ or SC1 for $\pi \times k^2$
5 (a) (i)	[0]67	1	
(ii)	135	2	B1 for 9 (cm)
(iii)	Correct diagram	2	B1 for correct bearing B1 for correct length

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Question	Answer	Mark	Part marks
(b) (i)	29	1	
(ii)	252	2FT	M1FT for $180 + 43 + \textit{their}$ (b)(i)
(c)	445	2	M1 for $267^2 + 356^2$ or better
6 (a) (i)	8	1	
(ii)	-2	3	M1 for first step correctly completed M1FT for second step correctly completed
(b) (i)	$19x + 117$	2	B1 for $19x + c$ or $mx + 117$
(ii)	$15x + 625 = \textit{their}$ (b)(i)	1	
	127	2	M1FT for the first correct step of <i>their</i> linear equation
7 (a)	Correct image, points at (0,-3), (0,-1), (2,-3) and (4,-1)	2	B1 for one correct movement either horizontal or vertical
(b) (i)	Correct image, points at (0, 6), (8, 6), (4, 2) and (0, 2)	2	B1 for correct scale factor and orientation but incorrect centre
(ii)	$\frac{1}{2}$	1	
(c)	Reflection [in mirror line] $x = -1$ oe	1 1	
(d)	Rotation [centre] (0, 0) oe [angle] 180° oe	1 1 1	
			SC1,1,1 for Enlargement , SF = -1, centre (0, 0)
8 (a) (i)	73.38	3	B1 for 5.4 or 4.7 soi M1 for a completely correct method
(ii)	160 000	2FT	B1FT for <i>their</i> (a)(i) $\times 2175$ or $159601.5[0]$
(b)	45.8 or 45.80 to 45.81	2	M1 for $\tan [=] 1.8 \div 1.75$
(c)	53 060.4[0]	3	M2 for $50\,000 \times 1.02^3$ oe or M1 for two years compound interest eg $50\,000 \times 1.02^2$ oe implied by 52 020

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Question	Answer	Mark	Part marks
(d)	10	3	M2 for $(\frac{198000}{180000} \times 100) - 100$ oe or $(\frac{198000 - 180000}{180000}) \times 100$ or M1 for $\frac{198000}{180000} [\times 100]$ oe or figs 11 or B1 for 198 000 – 180 000 or 18 000 seen
9 (a)	... 14 ... 20 20 ... 14 ... 0	3	B2 for 3 or 4 correct B1 for 2 correct
(b)	Completely correct curve	4	B3FT for 8 or 9 points correctly plotted or B2FT for 6 or 7 points correctly plotted or B1FT for 4 or 5 points correctly plotted
(c)	(3.5, h)	1	$20 < h \leq 20.4$
(d) (i)	Correct ruled line	1	
(ii)	1.4 5.6	1, 1FT	FT <i>their</i> graph and line