Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

MATHEMATICS **0580/33**

Paper 3 (Core) **May/June 2016**

MARK SCHEME

Maximum Mark: 104

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 will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the May/June 2016 series for most Cambridge IGCSE®, Cambridge International A and AS Level components and some Cambridge O Level components.

® IGCSE is the registered trademark of Cambridge International Examinations.

This syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

© UCLES 2016

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)	11 ÷ (11 + 14 + 5) × 18	**1**	
(ii)	[paths] 8.4 [buildings] 3[.0]	**1** **1**	
(b)	[Mammals] 4.2 [Reptiles] 1.98	**1** **1**	
(c) (i)	7 [h] 45 [min]	**1**	
(ii)	55 [h] 45 [min]	**2FT**	**B1** for 55.75 seen or 38 [h] 45 [min] or 17 [h] soi or **M1FT** for 5 × *their* (c)(i) + 2 × 8 [h] 30 [min] or better
(d) (i)	[$] 48[.00]	**2**	**M1** for 2 × 11 + 2 × 9.25 + 7.50 or better If M0 then **SC1** for 55.50
(ii)	12.5	**3FT**	**M2** for $\frac{their(d)(i)-42}{their(d)(i)}$[×100] or $\left(100-(\frac{42}{their(d)(i)}\times 100)\right)$ or **M1** for $\frac{42}{their(d)(i)}$ or figs 875 or **B1** for *their (d)(i)* – 42 or *their* 6 seen
2 (a) (i)	10	**2**	**M1** for 360 ÷ 36
(ii)	144	**1**	
(iii)	1440	**1FT**	*their* (a)(i) × *their* (a)(ii)

© Cambridge International Examinations 2016

Question	Answer	Mark	Part marks
(b) (i)	5.5 or $5\frac{1}{2}$	1	
(ii)	Translation	1	
	$\begin{pmatrix}-3\\-8\end{pmatrix}$	1	
(iii) (a)	Correct reflection	2	**B1** for reflection in $x = k$ or reflection in $y = 2$
(iii) (b)	Correct enlargement	2	**B1** for correct scale factor and orientation but incorrect centre
3 (a) (i)	754 or 753.9 to 754.1	2	**M1** for $\pi \times 4^2 \times 15$ or better
	cm^3 or cubic centimetres	1	Independent mark
(ii)	427 or 427.2 to 427.312	2	**M1** for $2 \times \pi \times 4 \times 15 + \pi \times 4^2$ or better
(b)	$\frac{A-\pi r^2}{2\pi r}$ oe final answer	2	**B1** for $A - \pi r^2 = 2\pi rh$ or better or $\frac{A}{2\pi r} = h + \frac{\pi r^2}{2\pi r}$ or better
(c)	$\pi r(2h + r)$ final answer	2	**B1** for $\pi(2rh + r^2)$ or $r(2\pi h + \pi r)$
(d) (i)	2 : 3	1	
	2 : 3	1	Accept 1 : 1.5 or $\frac{2}{3}$: 1
(ii)	Similar	1	
4 (a)	5 bars correct heights and equal widths	2	**B1** for 4 bars correct height and equal widths or 5 bars of correct height
(b)	2010	1	
(c) (i)	2180	1	
(ii)	2040	2	**B1** for ordering at least 4 or identifying the middle two
(iii)	1970	2	**M1** for (920 + 1070 + 3100 + 2240 + 2650 + 1840) ÷ 6 or 11820 ÷ 6

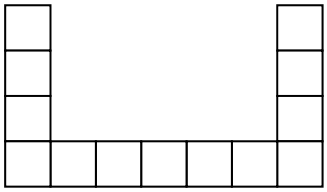
© Cambridge International Examinations 2016

Question	Answer	Mark	Part marks
5 (a) (i)	−4 −16 8 1	**2**	**B1** for 3 correct
(ii)	Completely correct curve	**4**	**B3FT** for 9 or 10 correctly plotted **B2FT** for 7 or 8 correctly plotted **B1FT** for 5 or 6 correctly plotted
(b)	2	**1**	
(c) (i)	Ruled line $y = x$ drawn	**1**	Must at least intersect the graph in two places
(ii)	$y = x$ oe	**1**	
(d)	Continuous ruled line $y = 7$ drawn	**1**	Must intersect the graph
	2.1 to 2.5	**1FT**	
6 (a) (i)	57	**1**	
(ii)	48	**1**	
(iii)	50	**1**	
(iv)	53	**1**	
(v)	63	**1**	
(vi)	64	**1**	
(vii)	49	**1**	
(viii)	Any three from 41 43 47 53 59 61 67	**2**	**B1** for 2 correct and at most one error
(b)	$2 \times 3^2 \times 13$ or $2 \times 3 \times 3 \times 13$	**2**	**B1** for 2, 3 and 13 only identified as factors or for a correct product eg $2 \times 9 \times 13$, 18×13
(c) (i)	3^{11}	**1**	
(ii)	177 147	**1**	
(iii)	$1.77[147] \times 10^5$	**1FT**	follow through *their* (c)(ii)
(d) (i)	$\frac{1}{9}$	**1**	
(ii)	3	**1**	

© Cambridge International Examinations 2016

Question	Answer	Mark	Part marks
7 (a)	48 to 52	1	
(b) (i)	Correct ruled angle bisector with 2 pairs of correct arcs	2	**B1** for accurate with no / one pair of arcs or **M1** for 2 pairs of correct arcs with no / wrong line
(ii)	270 to 278	2FT	**B1** for 13.5 ± 0.2 [cm] seen in working or **B1FT** for *their* line from *E* ± 0.2cm to outside
(iii)(a)	9 × 1000 ÷ (60 × 60)	1	
(iii)(b)	108 to 111.2	2FT	**M1**FT for *their* (b)(ii) ÷ 2.5
(c)	Correct ruled perpendicular bisector of *DE* with 2 pairs of arcs	2	**B1** for accurate with no / one pair of arcs or **M1** for correct intersecting arcs with no / wrong line
(d) (i)	Arc centre *A*, radius 7.5 from *AB* to *AE*	2	**B1** for centre *A*, incorrect radius or correct arc too short
(ii)	Correct region shaded	1FT	follow through provided an area is possible
8 (a)	Isosceles	1	
(b) (i)	73	1	
(ii)	15	1FT	FT is 180 – (73 + 19 + *their* (b)(i))
(iii)	90	1	
(iv)	19	1	
(v)	71	2	**M1** for [angle *CAF* =] 90 – 19 or **B1** for angle *CAF* = 90° soi
(c)	40.8 **cao**	3	**B2** for 40.84….. or **M1** for 13π oe seen in the working **B1 independent** for rounding their circumference correctly if to more than 1 d p

© Cambridge International Examinations 2016

Question	Answer	Mark	Part marks
9 (a)	Cube	1	
(b) (i)		1	
(ii)	13	1	
	17	1	If 0 scored **SC1** for second number 4 more than the first
(iii)	$4n - 3$ oe final answer	2	**B1** for $4n - j$ or $kn - 3$ ($k \neq 0$)
(iv)	73	1FT	follow through linear expressions in (b)(iii)
(v)(a)	25	2	**B1FT** for *their* (b)(iii) = 98 or **B1** for 25.25
(v)(b)	1	1FT	follow through *their* (b)(v)(a) if an integer

© Cambridge International Examinations 2016