



**Cambridge International Examinations**  
Cambridge International General Certificate of Secondary Education

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**MATHEMATICS**

**0580/33**

Paper 3 (Core)

**May/June 2016**

MARK SCHEME

Maximum Mark: 104

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

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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	
	(iii) (b) Correct enlargement	2	
3 (a) (i)	754 or 753.9 to 754.1	2	M1 for $\pi \times 4^2 \times 15$ or better
	cm <sup>3</sup> 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 $A - \pi r^2 = 2\pi r h$ or better
	(c) $\pi r(2h + r)$ final answer	2	or B1 for $\frac{A}{2\pi r} = h + \frac{\pi r^2}{2\pi r}$ or better
	(d) (i) 2 : 3	1	B1 for $\pi(2rh + r^2)$ or $r(2\pi h + \pi r)$
	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 $(920 + 1070 + 3100 + 2240 + 2650 + 1840) \div 6$ or $11820 \div 6$

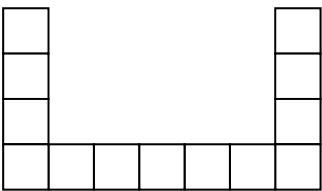
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Question	Answer	Mark	Part marks		
5	(a) (i)	-4 -16 8 1	2	<b>B1</b> for 3 correct	
	(ii)	Completely correct curve	4		
	(b)	2	1		
	(c) (i)	Ruled line $y = x$ drawn	1		Must at least intersect the graph in two places
	(ii)	$y = x$ oe	1		
	(d)	Continuous ruled line $y = 7$ drawn	1		Must intersect the graph
	2.1 to 2.5	<b>1FT</b>			
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		<b>B1</b> for 2 correct and at most one error
	(b)	$2 \times 3^2 \times 13$ or $2 \times 3 \times 3 \times 13$	2		<b>B1</b> for 2, 3 and 13 only identified as factors or for a correct product eg $2 \times 9 \times 13$ , $18 \times 13$
	(c) (i)	$3^{11}$	1		follow through <i>their</i> (c)(ii)
	(ii)	177 147	1		
	(iii)	$1.77[147] \times 10^5$	<b>1FT</b>		
	(d) (i)	$\frac{1}{9}$	1		
(ii)	3	1			

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Question	Answer	Mark	Part marks
7 (a)	48 to 52	1	
(b) (i)	Correct ruled angle bisector with 2 pairs of correct arcs	2	<b>B1</b> for accurate with no / one pair of arcs or <b>M1</b> for 2 pairs of correct arcs with no / wrong line
(ii)	270 to 278	2FT	<b>B1</b> for $13.5 \pm 0.2$ [cm] seen in working or <b>B1FT</b> for <i>their</i> line from $E \pm 0.2$ cm to outside
(iii)(a)	$9 \times 1000 \div (60 \times 60)$	1	
(iii)(b)	108 to 111.2	2FT	<b>M1FT</b> for <i>their</i> (b)(ii) $\div 2.5$
(c)	Correct ruled perpendicular bisector of $DE$ with 2 pairs of arcs	2	<b>B1</b> for accurate with no / one pair of arcs or <b>M1</b> for correct intersecting arcs with no / wrong line
(d) (i)	Arc centre $A$ , radius 7.5 from $AB$ to $AE$	2	<b>B1</b> 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 $180 - (73 + 19 + \textit{their} (b)(i))$
(iii)	90	1	
(iv)	19	1	
(v)	71	2	<b>M1</b> for [angle $CAF =$ ] $90 - 19$ or <b>B1</b> for angle $CAF = 90^\circ$ soi
(c)	40.8 cao	3	<b>B2</b> for 40.84..... or <b>M1</b> for $13\pi$ oe seen in the working  <b>B1 independent</b> for rounding their circumference correctly if to more than 1 d p

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