



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

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**MATHEMATICS**

**0580/31**

Paper 3 (Core)

**October/November 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
nfw	not from wrong working
soi	seen or implied

Question	Answer	Mark	Part marks	
<b>1</b> (a) (i)	1700 or 5pm	<b>2</b>	<b>B1</b> for 2200 or [0]5 20 or 10pm or 5:20am or <b>6h</b> 40	
	(ii) 15 575	<b>1</b>		
	(b) (i)	2200	<b>2</b>	<b>B1</b> for 440 or <b>M1</b> for $660 \times 2 + \textit{their} 440 \times 2$ or $\frac{10}{3} \times 660$ or better
		(ii) 104.5 105.5	<b>1</b> <b>1</b>	
	(c) (i)	30	<b>1</b>	
		20 72	<b>1 1</b>	
(ii)	Correct pie chart	<b>1</b>		
<b>2</b> (a) (i)	94	<b>2</b>	<b>M1</b> for $\frac{160 + 58 + 45 + 82 + 125}{5}$ or $\frac{470}{5}$	
	(ii) 115	<b>1</b>		
	(b) $\frac{1800}{5000}$ oe isw	<b>1</b>		
	(c)	[0].15 oe	<b>2</b>	<b>M1</b> for $1 - (0.15 + 0.23 + 0.4 + 0.07)$ or $1 - 0.85$
	(d)	39.5[0]	<b>2</b>	<b>M1</b> for [8.50 +] (7.75 × 4) soi by 31  If zero scored, <b>SC1</b> for 47.25
(e)	Correct bar chart	<b>3</b>	<b>B1</b> for any correct linear scale starting at zero soi  <b>B2</b> for all bars correct height and equal width, with equal gaps or no gaps or <b>B1</b> for all bars correct height with unequal widths and/or gaps or at least three bars correct height with equal width, with equal gaps or no gaps	

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<b>Question</b>	<b>Answer</b>	<b>Mark</b>	<b>Part marks</b>
<b>3 (a) (i)</b>	63	<b>1</b>	
<b>(ii)</b>	8	<b>1</b>	
<b>(iii)</b>	11	<b>1</b>	
<b>(iv)</b>	144	<b>1</b>	
<b>(b)</b>	$4^2 [=] 16$ $5^2 [=] 25$	<b>1</b>	
<b>(c) (i)</b>	16384	<b>1</b>	
<b>(ii)</b>	1	<b>1</b>	
<b>(iii)</b>	74.1 or 74.08 to 74.09	<b>1</b>	
<b>(d)</b>	$2 \times 3^2 \times 5$ or $2 \times 3 \times 3 \times 5$	<b>2</b>	
<b>4 (a)</b>	3	<b>1</b>	
	cm <sup>2</sup>	<b>1</b>	
<b>(b) (i)</b>	Rotation	<b>1</b>	
	90° [anticlockwise] oe	<b>1</b>	
	[Centre] (0,0) oe	<b>1</b>	
<b>(ii)</b>	Correct trapezium	<b>2</b>	
<b>(iii)</b>	Correct trapezium	<b>2</b>	
			<b>B1</b> for translation of $\begin{pmatrix} 5 \\ k \end{pmatrix}$ or $\begin{pmatrix} k \\ -2 \end{pmatrix}$
			<b>B1</b> for correct size and orientation but incorrect position

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Question	Answer	Mark	Part marks
5	(a) (i) 17.5	1	
	(ii) She stopped oe	1	
	(iii) 8.75	2	<b>M1FT</b> for <i>their</i> (a)(i) $\div 2$ soi
	(b) 660 275 385	3	<b>M2</b> for one correct value in correct place or $\frac{1320}{(5+12+7)} \times k$ where $k$ is 5, 12 or 7 or better in working or <b>M1</b> for $\frac{1320}{(5+12+7)}$ or better
	(c) 5321.66 cao	4	If zero scored, <b>SC1</b> for all correct answers in incorrect order <b>M2</b> for $5000 \times 1.021^3$ oe or <b>M1</b> for $5000 \times 1.021 \times 1.021$ oe <b>A1</b> for 5321.661..... <b>B1 indep</b> for their answer corrected to 2 d.p. if their unrounded answer is shown to at least 3 d.p.
6	(a) (i) 46	1	
	(ii) Add 7 oe	1	
	(b) 4, 7, 12	2	<b>M1</b> for 2 correct or 3, 4, 7
	(c) (i) $2a - 3h$ final answer	2	<b>B1</b> for $2a$ or $-3h$
	(ii) $13x - 9$ final answer	2	<b>M1</b> for $5x + 15$ or $8x - 24$ or $13x$ or $-9$
	(d) $3(2g + 5)$ final answer	1	
	(e) 11 nfww	3	<b>M2</b> for $5x = 55$ or $x + 6 = 17$ or <b>M1</b> for $5x + 30 [= 85]$ or $5(x + 6) [= 85]$ or <b>M1</b> for correct first step of incorrect linear equation if of the form $ax + b = 85, a \neq 1$

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Question	Answer	Mark	Part marks
7 (a)	$-5x + 6$	3	<b>B2</b> for $-5x$ (oe) + 6 or $-5x + k$ or <b>B1</b> for $kx + 6$ $k \neq 0$ or [gradient =] $\frac{\text{rise}}{\text{run}}$ with correct values or [gradient =] $\pm 5 \frac{k}{k}$
(b) (i)	3 12	1, 1	
(ii)	Correct curve	4	<b>B3FT</b> for 5 or 6 correctly plotted points or <b>B2FT</b> for 3 or 4 correctly plotted points or <b>B1FT</b> for 1 or 2 correctly plotted points
(c)	0.2 to 0.35	1	<b>FT</b>
8 (a) (i)	Correct net	3	<b>B2</b> for 3 or 4 correct faces in correct position or <b>B1</b> for 1 or 2 correct faces in correct position
(ii)	36	2	<b>M1</b> for $6 \times 3 \times 2$ oe
(b)	Hexagon	1	
(c)	Obtuse angle indicated	1	
(d)	16	2	<b>M1</b> for $\frac{360}{22.5}$ or $\frac{360}{n} = 22.5$ or $\frac{180(n-2)}{n} = 157.5$ oe
(e) (i)	$\sqrt{20^2 - 12^2}$	<b>M2</b>	<b>M1</b> for $20^2 = 12^2 + x^2$ or $[x^2 =] 20^2 - 12^2$
(ii)	153 or 152.5 to 152.6	5	<b>M2</b> for $\frac{\pi 6^2}{2}$ soi by 56.5... or $18\pi$ or <b>M1</b> for $\pi 6^2$ soi by 113 or 113.0... or 113.1... or $36\pi$  <b>M1</b> for $0.5 \times 12 \times 16$ soi by 96  <b>M1dep</b> for <i>their</i> 56.5... + <i>their</i> 96 dep on at least M1 earned soi

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Question	Answer	Mark	Part marks	
<b>9</b>	(a) 105 806	<b>1</b>		
	(b) $1.03 \times 10^5$	<b>1</b>		
	(c)	(i) 46 100	<b>1</b>	
		(ii) 100	<b>1</b>	
	(iii) $6.82 \times 10^6$	<b>2</b>	<b>B1</b> for figs 682	
	(d) 1.47 or 1.466 to 1.467	<b>3</b>	<p><b>M2</b> for <math>\left(\frac{30\,851}{30\,405} - 1\right) [\times 100]</math> oe soi by 0.0146.... or 0.0147</p> <p>or <math>\left(\frac{30\,851}{30\,405}\right) \times 100 [-100]</math> oe soi by 101.46.... or 101.47</p> <p>or <b>M1</b> for <math>\left(\frac{30\,851}{30\,405}\right)</math> soi by 1.0146..... or 1.0147</p> <p>Alternative method</p> <p><b>M2</b> for <math>\frac{30\,851 - 30\,405}{30\,405} [\times 100]</math> oe soi by 0.0146.... or 0.0147</p> <p>or <b>B1</b> for 30 851 – 30 405 soi by 446</p>	
<b>10</b>	(a) 35	<b>2</b>	<b>B1</b> for 7	
	(b) 305	<b>1</b>		
	(c) Point marked in correct position	<b>2</b>	<b>B1</b> for point at 4.5 cm or $050^\circ$ from <i>Y</i>	