



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

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**CAMBRIDGE INTERNATIONAL MATHEMATICS**

**0607/31**

Paper 3 (Core)

**May/June 2016**

MARK SCHEME

Maximum Mark: 96

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**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.

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**Abbreviations**

awrt	answers which round to
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

<b>Question</b>	<b>Answer</b>	<b>Mark</b>	<b>Part Marks</b>	
<b>1</b>	<b>(a) (i)</b>	356.3	<b>1</b>	
	<b>(ii)</b>	360	<b>1</b>	
	<b>(iii)</b>	400	<b>1</b>	
	<b>(iv)</b>	$3.56[31] \times 10^2$	<b>1</b>	
	<b>(b) (i)</b>	279.14	<b>1</b>	
	<b>(ii) (a)</b>	20.86	<b>1FT</b>	<b>FT</b> 300 – <i>their</i> (b)(i)
	<b>(b)</b>	7.47 or 7.472 to 7.473	<b>1FT</b>	<b>FT</b> <i>their</i> (b)(ii) $\div$ <i>their</i> (b)(i) $\times$ 100
<b>2</b>	<b>(a) (i)</b>	$4^6$	<b>1</b>	
	<b>(ii)</b>	4096	<b>1</b>	
	<b>(b) (i)</b>	272	<b>1</b>	
	<b>(ii)</b>	255	<b>1</b>	
	<b>(c)</b>	$4^8$	<b>1</b>	
<b>3</b>	<b>(a)</b>	27	<b>1</b>	
	<b>(b)</b>	10	<b>1</b>	
	<b>(c) (i)</b>	50	<b>1</b>	
	<b>(ii)</b>	23	<b>1 FT</b>	<b>FT</b> <i>their</i> 50 – <i>their</i> 27
	<b>(d)</b>	$\frac{1}{20}$	<b>2</b>	<b>B1 FT</b> for $\frac{\textit{their} 23}{460}$

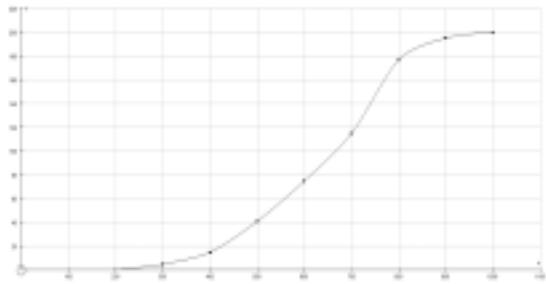
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Question	Answer	Mark	Part Marks																		
4 (a)	<table border="1"> <tr> <td>26</td><td>27</td><td>28</td><td>29</td><td>30</td><td>31</td><td>32</td><td>33</td><td>34</td> </tr> <tr> <td>1</td><td>1</td><td>5</td><td>4</td><td>1</td><td>1</td><td>2</td><td>4</td><td>1</td> </tr> </table>	26	27	28	29	30	31	32	33	34	1	1	5	4	1	1	2	4	1	2	B1 for 4 correct entries
	26	27	28	29	30	31	32	33	34												
	1	1	5	4	1	1	2	4	1												
	(b) (i)	8	1																		
	(ii)	28	1																		
	(iii)	29	1																		
(iv)	30	1																			
(c) (i)	$\frac{4}{20}$ oe isw	1FT	FT $\frac{their4}{20}$																		
(ii)	$\frac{11}{20}$ oe isw	1FT	FT $\frac{2 + their5 + their4}{20}$																		
5 (a) (i)	1	2	M1 for $5 \times 2 - 2 \times 3 - \frac{1}{2} \times 6$ or better																		
	(ii)	3.2	3 M2 for $5B = 12 + 2 + 2$ or better (Allow 1 sign error e.g. $-5B$ ) or M1 for $12 = 5B - 2(1) - \frac{1}{2}(4)$ or better																		
	(b)	-13	2 M1 for $7 \times -3 - 4 \times -2$ or better																		
	(c)	$\frac{2y+9}{3}$ oe final answer	2 M1 for correct first step																		
	(d)	6 kiwi – 2 kiwi = 840 – 480 oe kiwi = 90 pomegranate + 2 × their 90 = 480 oe pomegranate = 300	M1 A1 M1 A1 FT	OR M1 for setting up two equations M1 for eliminating one variable A1 kiwi = 90 A1 pomegranate = 300 second A1 is FT If no working shown SC1 for both answers correct																	
6 (a)	144	2	M1 for $\frac{12}{30} [\times 360]$ seen or $48 \times 3$ or $\frac{60}{5} \times 12$																		
	(b)	Fully correct answer	3 B2 for correct sectors but no labels or B1 for 1 correct sector or B1 for correct 3 labels according to size																		

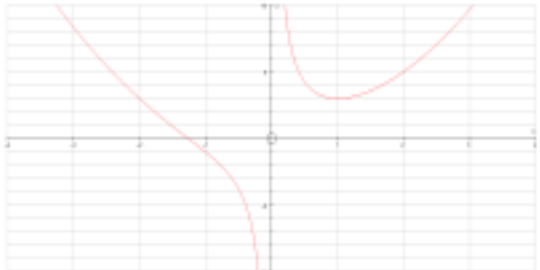
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<b>Question</b>	<b>Answer</b>	<b>Mark</b>	<b>Part Marks</b>
<b>7 (a) (i)</b>	75	<b>1</b>	
<b>(ii)</b>	105	<b>1</b>	
<b>(b)</b>	[ <i>p</i> = ] 70	<b>1</b>	
	[ <i>q</i> = ] 20	<b>1</b>	
	[ <i>r</i> = ] 20	<b>1FT</b>	<b>FT</b> <i>their q</i> or 90 – <i>their p</i>
	[ <i>s</i> = ] 140	<b>1FT</b>	<b>FT</b> 70 + <i>their p</i> or 180 – 2 × <i>their r</i>
<b>8 (a) (i)</b>	1.61 or 1.606 to 1.607	<b>2</b>	<b>M1</b> for $\sin 40 = \frac{BC}{2.5}$ or better
<b>(ii)</b>	4.11 or 4.106 to 4.107	<b>1FT</b>	<b>FT</b> 2.5 + <i>their</i> (a)(i)
<b>(b)</b>	1.92 or 1.915...	<b>2</b>	<b>M1</b> for $\cos 40 = \frac{HB}{2.5}$ or better or <b>M1</b> for $2.5^2 - \textit{their } 1.61^2$
<b>(c)</b>	1.02 or 1.016 or 1.02 to 1.03	<b>1FT</b>	<b>FT</b> 2 × <i>their</i> (a)(i) + <i>their</i> (b) – <i>their</i> (a)(ii)
<b>9 (a)</b>	Correct points plotted (2, 3) and (5, 7)	<b>2</b>	<b>B1</b> for each correct point
<b>(b)</b>	(3.5, 5)	<b>1</b>	
<b>(c)</b>	$\frac{4}{3}$	<b>2</b>	<b>M1</b> for $\frac{\textit{rise}}{\textit{run}}$ or <b>B1</b> for 1.3
<b>(d)</b>	$y = \frac{4}{3}x + 4$ oe final answer	<b>2 FT</b>	<b>FT</b> $y = \textit{their}(c) x + 4$ oe <b>B1</b> for $y = \textit{their} \frac{4}{3}x + k$ or $y = kx + 4$
<b>10 (a) (i)</b>	47.1 or 47.12 to 47.13	<b>1</b>	
<b>(ii)</b>	565 to 566	<b>1 FT</b>	<b>FT</b> <i>their</i> (a)(i) × 12
<b>(b)</b>	720	<b>1</b>	
<b>(c)</b>	154 to 155	<b>1 FT</b>	<b>FT</b> <i>their</i> (b) – <i>their</i> (a)(ii)
<b>(d)</b>	21.39 to 21.53	<b>1 FT</b>	<b>FT</b> <i>their</i> (c) ÷ <i>their</i> (b) × 100

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Question	Answer	Mark	Part Marks																
11 (a)	(0, 2), (-1, 1), (-2, 1), (-3, 2), (-2, 3)	1																	
(b)	(2, -4), (3, -5), (4, -5), (5, -4), (4, -3)	2	<b>B1</b> for translation of $\begin{pmatrix} k \\ -6 \end{pmatrix}$ or $\begin{pmatrix} 2 \\ k \end{pmatrix}$ or <b>B1</b> for $\begin{pmatrix} -6 \\ 2 \end{pmatrix}$																
(c)	(0, 6), (3, 3), (6, 3), (9, 6), (6, 9)	2	<b>B1</b> for any enlargement centre (0, 0) or correct shape, wrong position																
(d)	3 : 1	1																	
(e)	similar	1																	
12 (a)	700 [ $\leq x <$ ] 800	1																	
(b) (i)	$\frac{(200 + 300)}{2} [= 250]$ oe	1																	
(ii)	638.5	2	<b>M1</b> for multiplying midpoints by frequencies (and adding) – implied by 127700																
(c)	<table border="1"> <tbody> <tr><td><math>x &lt; 300</math></td><td>5</td></tr> <tr><td><math>x &lt; 400</math></td><td>15</td></tr> <tr><td><math>x &lt; 500</math></td><td>41</td></tr> <tr><td><math>x &lt; 600</math></td><td>75</td></tr> <tr><td><math>x &lt; 700</math></td><td>115</td></tr> <tr><td><math>x &lt; 800</math></td><td>177</td></tr> <tr><td><math>x &lt; 900</math></td><td>195</td></tr> <tr><td><math>x &lt; 1000</math></td><td>200</td></tr> </tbody> </table>	$x < 300$	5	$x < 400$	15	$x < 500$	41	$x < 600$	75	$x < 700$	115	$x < 800$	177	$x < 900$	195	$x < 1000$	200	2	<b>B1FT</b> for 2 correct entries
$x < 300$	5																		
$x < 400$	15																		
$x < 500$	41																		
$x < 600$	75																		
$x < 700$	115																		
$x < 800$	177																		
$x < 900$	195																		
$x < 1000$	200																		
(d)	Fully correct curve or ruled polygon 	3FT	<b>FT</b> only if increasing  <b>B2FT</b> for <i>their</i> 4 or 5 points plotted correctly or <b>B1FT</b> for <i>their</i> 3 points plotted correctly																

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Question	Answer	Mark	Part Marks
(e) (i)	662 (660 to 680)	1FT	FT as long as it is an increasing curve
(ii)	230 (230 to 260)	2FT	B1 for one correct quartile seen ( $756 \pm 5$ or $526 \pm 5$ ) FT as long as it is an increasing curve
(iii)	12 (8 to 16)	2FT	B1 for $188 \pm 4$ seen or M1 for clear method seen on graph FT as long as it is an increasing curve
13 (a)	Fully correct sketch 	4	B1 for minimum in first quadrant B1 for crossing $x$ -axis approximately between $-1$ and $-2$ B1 for not crossing $y$ -axis B1 for correct overall shape
(b)	$x = 0$	1	
(c)	(1, 3)	1	
(d)	3	1FT	FT <i>their</i> graph