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CAMBRIDGE INTERNATIONAL MATHEMATICS

0607/31

Paper 3 (Core)

May/June 2016

MARK SCHEME

Maximum Mark: 96

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.

Page 2	Mark Scheme	Syllabus 10	Paper 31
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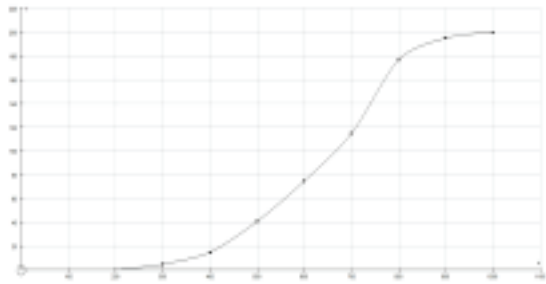
Abbreviations

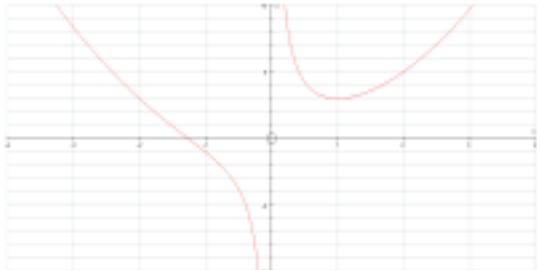
awrt	answers which round to
cao	correct answer only
dep	dependent
FT	follow through after error
isw	ignore subsequent working
oe	or equivalent
SC	Special Case
nfww	not from wrong working
soi	seen or implied

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

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 48×3 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																		

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

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	B1 for translation of $\begin{pmatrix} k \\ -6 \end{pmatrix}$ or $\begin{pmatrix} 2 \\ k \end{pmatrix}$ or B1 for $\begin{pmatrix} -6 \\ 2 \end{pmatrix}$																
(c)	(0, 6), (3, 3), (6, 3), (9, 6), (6, 9)	2	B1 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	M1 for multiplying midpoints by frequencies (and adding) – implied by 127700																
(c)	<table border="1"> <tr><td>$x < 300$</td><td>5</td></tr> <tr><td>$x < 400$</td><td>15</td></tr> <tr><td>$x < 500$</td><td>41</td></tr> <tr><td>$x < 600$</td><td>75</td></tr> <tr><td>$x < 700$</td><td>115</td></tr> <tr><td>$x < 800$</td><td>177</td></tr> <tr><td>$x < 900$</td><td>195</td></tr> <tr><td>$x < 1000$</td><td>200</td></tr> </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	B1FT 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	FT only if increasing B2FT for <i>their</i> 4 or 5 points plotted correctly or B1FT for <i>their</i> 3 points plotted correctly																

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 ± 5 or 526 ± 5) FT as long as it is an increasing curve
(iii)	12 (8 to 16)	2FT	B1 for 188 ± 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