



Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CAMBRIDGE INTERNATIONAL MATHEMATICS

0607/43

Paper 4 (Extended)

October/November 2016

MARK SCHEME

Maximum Mark: 120

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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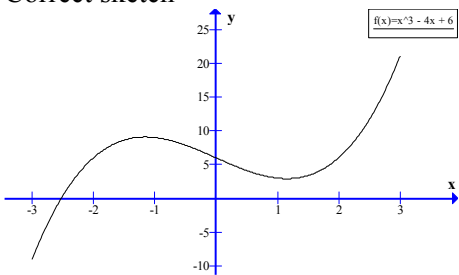
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Abbreviations

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)	43	1	
(ii)	14.5 or 14.54 to 14.55	1	
(b) (i)	3.16×10^{11} or $3.158... \times 10^{11}$	2	B1 for figs 316 or 3158... or $k \times 10^{11}$ where $1 \leq k < 10$
(ii)	8.23×10^7 or $8.228... \times 10^7$	2	B1 for figs 823 or 8228... or $k \times 10^7$ where $1 \leq k < 10$
2 (a) (i)	276480×0.25 oe $0.75 \times 276480 \times 0.055 \times 10$ oe adding with no errors	M1 M1 M1	Dependent on M1 M1
(ii)	19 nfww	4	B3 for 18.2 or 18.18... or 18 (with correct working) or M2 for $0.055 \times 276480 \times n = 0.25 \times 276480 + 0.055 \times 0.75 \times 276480 \times n$ oe or M1 for $0.055 \times 276480 \times n$ or $0.25 \times 276480 + 0.055 \times 0.75 \times 276480 \times n$
(b)	256 000	3	M2 for $276\,480 \div 1.08$ oe or M1 for $108\% = 276\,480$
3 (a)	Reflection $x = -2$	1 1	In all three parts of (a) give 0 for any indication of second transformation.
(b)	Rotation 90° [anticlockwise] oe (5, 1)	1 1 1	
(c)	Stretch x -axis oe invariant [stretch factor] 3	1 1 1	

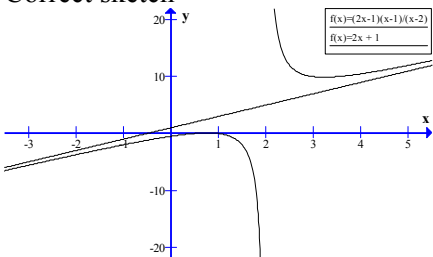
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Question	Answer	Mark	Part Marks
4			
(a) (i)	96	2	M1 for $\frac{1}{3} \times 6 \times 6 \times 8$
(ii)	8.54 or 8.544...	2	M1 for $8^2 + 3^2$
(b) (i)	84	3FT	M2 for $\frac{7}{8} \times \text{their (a)(i)}$ oe or M1 for $96 \times (\frac{1}{2})^3$ or $\frac{1}{3} \times 3 \times 3 \times 4$ soi by 12
(ii)	122 or 121.8 to 121.9	5	M3 for $4 \times \frac{3}{4} \times \frac{1}{2} \times 6 \times \text{their (a)(ii)}$ oe or $4 \times \frac{1}{2} \times (6 + 3) \times \frac{1}{2} \text{their (a)(ii)}$ oe or M2 for $\frac{3}{4} \times \frac{1}{2} \times 6 \times \text{their (a)(ii)}$ oe or $\frac{1}{2} \times (6 + 3) \times \frac{1}{2} \text{their (a)(ii)}$ oe or M1 for $\frac{1}{2} \times 6 \times \text{their (a)(ii)}$ or $\frac{1}{2} \times 3 \times \frac{1}{2} \text{their (a)(ii)}$ and M1 for $36 + 9 + 4 \times \text{their trapezium area}$ oe
5			
(a)	Correct sketch 	2	B1 for correct cubic shape with maximum on left of minimum
(b)	-2.67 or -2.669 ... 0.524 or 0.5239 to 0.5240 2.15 or 2.145...	1 1 1	
(c) (i)	Maximum (-1.15, 9.08) Minimum (1.15, 2.92)	3	or (-1.155 to -1.154, 9.079...) or (1.154 to 1.155, 2.920 to 2.921) B2 for either maximum or minimum or B1 for 1 correct value
(ii)	$k < 2.92$ and $k > 9.08$	1FT	or above accuracy.
(d)	Rotational Order 2 (0, 6)	1 1 1	

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Question	Answer	Mark	Part Marks
6 (a)	$(4, -1), (-6, -1), (8, 7)$	3	B1 for each
(b)	$(13, 7)$	2	B1 for each co-ordinate
(c)	$y = -\frac{7}{4}x - \frac{11}{4}$ oe	4	isw correct 3 term equation B1 for $\frac{4}{7}$ B1FT for $-\frac{7}{4}$ M1 for correct method of finding 'c'.
7 (a) (i)	$[6], 18, 40, 77, 97, 114, [120]$	1	
(ii)	Correct curve	3	All marks in (a) dependent on increasing cumulative frequencies B2FT for 6 points correctly plotted B1FT for 4 or 5 points correctly plotted If 0 scored SC1 for 'correct' curve translated consistently to left.
(iii)	7100 to 7400	1FT	FT <i>their</i> graph
(iv)	750 to 1150	2	B1 for $LQ = 6700$ to 6900 or $UQ = 7650$ to 7850
(v)	9 or 10 or 11	1	
(b)	Correct graph	4	B3 for 6 correct heights or B2 for 4 or 5 correct heights or B1 for 2 or 3 correct heights B1 for correct widths If 0 scored B1 for correct frequency densities $[0.006], 0.024, 0.044, 0.074, 0.04, 0.017, 0.006$
8 (a)	$360 - (155 + 115)$ oe	1	e.g. $25 + 65$ with those angles marked on diagram
(b)	36.9 or 36.86 to 36.87	2	M1 $\tan [C] = \frac{60}{80}$ oe
(c)	100 or 99.93 to 100.04	2	M1 for $60^2 + 80^2$ oe
(d)	94.0 or 94.1 or 94.01 to 94.06	4	B1FT for $ACD = 63.1$ to 63.13 M1 for $75^2 + (their\ 100)^2 - 2 \times 75 \times$ <i>their</i> $100 \times \cos$ <i>their</i> 63.1 A1 for 8838 to 8846

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Question	Answer	Mark	Part Marks
(e)	123 or 123.4 to 123.5	4	<p>M2 for $\frac{75 \sin(\text{their } 63.1)}{\text{their } 94.1}$</p> <p>or for $[\cos =] \frac{(\text{their } 100)^2 + (\text{their } 94.1)^2 - 75^2}{2 \times (\text{their } 100) \times (\text{their } 94.1)}$</p> <p>or M1 for $\frac{\sin CAD}{75} = \frac{\sin(\text{their } 63.1)}{\text{their } 94.1}$</p> <p>or for $75^2 = (\text{their } 100)^2 + (\text{their } 94.1)^2 - 2(\text{their } 100)(\text{their } 94.1)$</p> <p>A1 for 45.3 or 45.4 or 45.29 to 45.37</p>
9 (a)	9 hours 52 mins	3	<p>B2 for 9.870...</p> <p>or M1 for $760 \div 77$</p>
(b) (i)	$\frac{270}{x}$	1	
(ii)	$\frac{270}{x} + \frac{490}{x+4} = 62$ oe $270(x+4) + 490x = 62x(x+4)$ oe Completion with no errors	M1 M1 A1	<p>Could be over common denominator</p> <p>Must be at least one intermediate step</p>
(iii)	$(31x + 54)(x - 10)$ 10 and $-\frac{54}{31}$ or 10 because x cannot be negative 14 cao	M1 B2 B1	<p>or correct substitution into formula or reasonable sketch</p> <p>or B1 for either</p> <p>10 without support scores only the B1</p>
10 (a) (i)	$(2x - 1)(x - 1)$	2	<p>SC1 for $(2x + a)(x + b)$ where $ab = 1$ and $a + 2b = -3$</p>
(ii)	$\frac{(2x+1)(x-2)+3}{x-2}$ oe $\frac{2x^2 - 4x + x - 2 + 3}{x-2}$ $\frac{2x^2 - 3x + 1}{x-2}$	M1 A1 A1	<p>Allow $-3x$ for $-4x + x$</p>
(b) (i)	Correct sketch 	2	<p>With no undue overlap at $x = 2$ or serious curving back</p> <p>B1 for either branch correct</p>

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Question	Answer	Mark	Part Marks																
(ii)	Correct line	2	Not intersecting either branch B1 for line with positive gradient and positive y intercept																
(iii)	$y = 2x + 1$ $x = 2$	1 1																	
(iv)	0.5 1	1 1																	
11 (a)	<table border="1"> <tr> <td></td><td>Walking</td><td>Cycling</td><td>Total</td></tr> <tr> <td>Male</td><td>[16]</td><td>13</td><td>[29]</td></tr> <tr> <td>Female</td><td>12</td><td>9</td><td>21</td></tr> <tr> <td>Total</td><td>28</td><td>[22]</td><td>[50]</td></tr> </table>		Walking	Cycling	Total	Male	[16]	13	[29]	Female	12	9	21	Total	28	[22]	[50]	2	B1 for 3 or 4 correct
	Walking	Cycling	Total																
Male	[16]	13	[29]																
Female	12	9	21																
Total	28	[22]	[50]																
(b)	$\frac{462}{2450}$ oe	2	M1 for $\frac{22}{50} \times \frac{21}{49}$ oe																
(c)	$\frac{384}{756}$ oe	3	M2 for $\frac{16}{\text{their } 28} \times \frac{\text{their } 12}{\text{their } 28 - 1} + \frac{\text{their } 12}{\text{their } 28} \times \frac{16}{\text{their } 28 - 1}$ oe or M1 for one of above products																
12 (a)	$y = \frac{10}{\sqrt{x}}$	2	M1 for $y = \frac{k}{\sqrt{x}}$																
(b)	$\frac{100}{9}$ oe	2FT	M1 for $3\sqrt{x} = \text{their } k$																
(c)	$a = 4000, n = -\frac{3}{2}$	3	B2 for either or M1 for $z = c \left(\frac{\text{their } k}{\sqrt{x}} \right)^3$ oe																