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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.

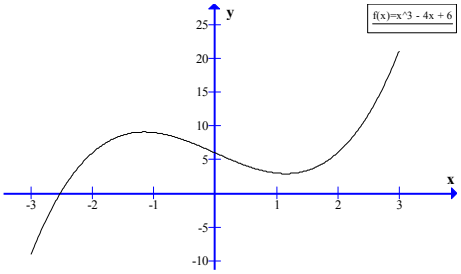
Cambridge will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the October/November 2016 series for most Cambridge IGCSE®, Cambridge International A and AS Level components and some Cambridge O Level components.

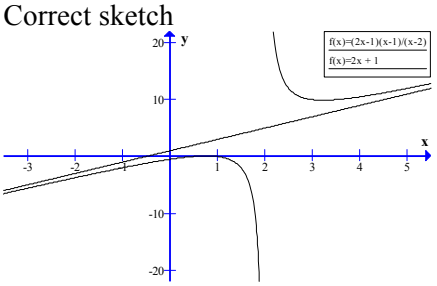
Abbreviations

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 or14.54 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× 276480 × 0.055 × 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 ÷ 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	

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 $\frac{7}{8}$ × *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 to121.9	5	**M3** for $4 \times \frac{3}{4} \times \frac{1}{2} \times 6 \times$ *their* (a)(ii) oe or $4 \times \frac{1}{2} \times (6 + 3) \times \frac{1}{2}$ *their* (a)(ii) oe or **M2** for $\frac{3}{4} \times \frac{1}{2} \times 6 \times$ *their* (a)(ii) oe or $\frac{1}{2} \times (6 + 3) \times \frac{1}{2}$ *their* (a)(ii) oe or **M1** for $\frac{1}{2} \times 6 \times$ *their* (a)(ii) or $\frac{1}{2} \times 3 \times \frac{1}{2}$ *their* (a)(ii) and **M1** for 36 + 9 + 4 × *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	

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** *their* 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 $75^2 + (\textit{their}\ 100)^2 - 2 \times 75 \times$ *their* 100 × cos *their* 63.1 **A1** for 8838 to 8846

Question	Answer	Mark	Part Marks
(e)	123 or 123.4 to 123.5	4	**M2** for $\frac{75\sin(their63.1)}{their94.1}$ or for [cos =] $\frac{(their100)^2+(their94.1)^2-75^2}{2\times(their100)\times(their94.1)}$ or **M1** for $\frac{\sin CAD}{75}=\frac{\sin(their63.1)}{their94.1}$ or for $75^2=(their100)^2+(their94.1)^2-2(their100)(their94.1)$ **A1** for 45.3 or 45.4 or 45.29 to 45.37
9 (a)	9 hours 52 mins	3	**B2** for 9.870… or **M1** for 760 ÷ 77
(b) (i)	$\frac{270}{x}$	1	
(ii)	$\frac{270}{x}+\frac{490}{x+4}=62$ oe	M1	
	$270(x+4)+490x=62x(x+4)$ oe	M1	Could be over common denominator
	Completion with no errors	A1	Must be at least one intermediate step
(iii)	$(31x+54)(x-10)$	M1	or correct substitution into formula or reasonable sketch
	10 and $-\frac{54}{31}$ or 10 because x cannot be negative 14 cao	B2 B1	or **B1** for either 10 without support scores only the **B1**
10 (a) (i)	$(2x-1)(x-1)$	2	**SC1** for $(2x+a)(x+b)$ where $ab=1$ and $a+2b=-3$
(ii)	$\frac{(2x+1)(x-2)+3}{x-2}$ oe	M1	
	$\frac{2x^2-4x+x-2+3}{x-2}$	A1	Allow $-3x$ for $-4x+x$
	$\frac{2x^2-3x+1}{x-2}$	A1	
(b) (i)	Correct sketch 	2	With no undue overlap at $x=2$ or serious curving back **B1** for either branch correct

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><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>	2	**B1** for 3 or 4 correct
(b)	$\frac{462}{2450}$ oe	2	**M1** for $\frac{22}{50}\times\frac{21}{49}$ oe
(c)	$\frac{384}{756}$ oe	3	**M2** for $\frac{16}{\textit{their } 28}\times\frac{\textit{their } 12}{\textit{their } 28-1}+\frac{\textit{their } 12}{\textit{their } 28}\times\frac{16}{\textit{their } 28-1}$ 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 $3\sqrt{x} = \textit{their } k$
(c)	$a = 4000, n = -\frac{3}{2}$	3	**B2** for either or **M1** for $z = c\left(\frac{\textit{their } k}{\sqrt{x}}\right)^3$ oe