Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/42**

Paper 4 (Extended) **May/June 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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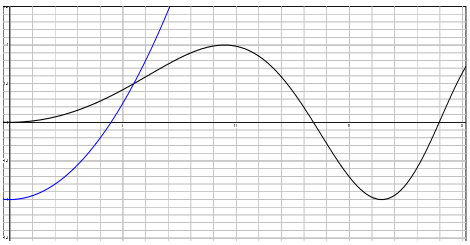
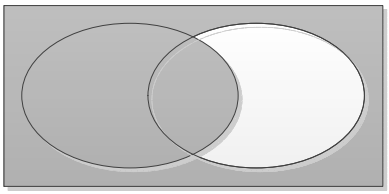
Abbreviations

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)	Image at (5, 5), (7, 5), (6, 6), (5, 6)	**2**	If 0 scored **SC1** for translation $\begin{pmatrix}3\\k\end{pmatrix}$ or $\begin{pmatrix}k\\4\end{pmatrix}$
(b)	Image at (–1, –2), (–1, –4), (–2, –3), (–2, –2)	**2**	If 0 scored **SC1** for reflection in line $y = x$
(c)	Image at (–2, 5), (–2, 7), (–3, 5), (–3, 6)	**3**	If 0 scored **SC2** for 90° clockwise about (–2, 1) or **SC1** for 90° anticlockwise about other centre
(d) (i)	Enlargement [scale factor] 3 [centre] (2, 4)	**B1** **B1** **B1**	If combined transformations, all three marks lost
(ii)	Stretch [factor] 2 *y*-axis oe invariant	**B1** **B1** **B1**	If combined transformations, all three marks lost
2 (a)	$\frac{630}{9}\times 5$ and $\frac{630}{9}\times 4$ oe	**M2**	**M1** for 630 ÷ 9 [=70] or $\frac{5\times 630 \text{ or } 3150}{9}$ or $\frac{4\times 630 \text{ or } 2520}{9}$
(b) (i)	120	**3**	**M2** for 98.4[0] ÷ [0].82 oe or **M1** for recognising 98.4[0] is 82%
(ii)	69.5 or 69.51…	**3**	**M2** for $\frac{98.4[0]-30}{98.4[0]}\times 100$ oe or **M1** for $\frac{98.4[0]-30}{98.4[0]}$ oe or $\frac{30}{98.4[0]}\times 100$ If 0 scored, **SC1** for answer 75%
(iii)	211.6[0] cao final answer	**1**	

Question	Answer	Mark	Part Marks
(iv)	183	4	**B3** for answers 182.8 or 182.84 to 182.85 or **M2** for $150(1.02)^{10}$ seen oe or **M1** for $150(1.02)^n$ seen oe where $n > 1$
(c)	September or October 2035 nfww	5	**B4** for 2035 or 19 years and 9 or 10 or 9.96 or 9.961 to 9.962 months nfww or **B3** for 19.8 or 19.83… seen or **M2** for $\dfrac{\log\left(\frac{500}{350}\right)}{\log(1.0015)}$ oe or $350\times1.0015^n = 500$ **and** at least two valid trials or sketch of appropriate graph or **M1** for $350\times1.0015^n[=500]$ or $350\times\left(1+\dfrac{0.15}{100}\right)^n[=500]$ If 0 scored **SC2** for 24[.0] or 23.95 to 23.98 or 2.55 or 2.552 to 2.554… seen
3 (a) (i)	60	1	
(ii)	8	2	**B1** for [lq =] 56 or [uq =] 64
(iii)	12	2	**M1** for 188 seen
(b)	68.6 or 68.57...	3	**M2** for $50\times\dfrac{2.4}{1.75}$ oe or **M1** for *their* distance ÷ 1.75 or **B1** for distance = 120 or for 2.4 and 1.75 or 144 and 105 or 8640 and 6300 seen If 0 scored, **SC1** for 77.2 or 77.24…
4 (a)	24	3	**M2** for $6w+5(w+30)=414$ oe or better or **B1** for $6w$ and $5(w+30)$ oe
(b)	$2x^2+4x-7\ [=0]$ oe	B2	i.e. a correct simplified quadratic equation **M1** for $x^2+(x+1)(x+3)\ [=10]$ oe
	Sketch of appropriate graph or correct use of formula or completing square	M1 dep	Dep on a quadratic from addition of two areas. Must see some valid method
	4.48 or 4.49	B2	**B1** for 4.484 to 4.485… or $6\sqrt{2}-4$ or 1.12 or 1.121… or $1.5\sqrt{2}-1$

Question	Answer	Mark	Part Marks
5 (a)	Any 2 of the following Angle *ADX* = Angle *BCX* and same segment oe Angle *DAX* = Angle *CBX* and same segment oe Angle *AXD* = Angle *BXC* and vertically opp oe	**2**	**B1** for one of the three pairs or for at least two pairs of angles without reasons or with incorrect reasons
(b)	7.5 oe	**2**	**M1** for $\frac{2}{3}=\frac{5}{BX}$ oe
(c)	67.2 or 67.20 to 67.21 nfww	**3**	**M2** for [cos =] $\frac{2^2+5^2-4.61^2}{2\times2\times5}$ or **M1** for $4.61^2=2^2+5^2-2\times2\times5\cos(AXD)$
6 (a)	Correct sketch 	**2**	**M1** for shape i.e. starting at origin then one maximum then one minimum **A1** for two zeros to right of $x = 10$ and to the left of $x = 20$
(b)	13.4 or 13.41 to 13.42 19[.0] or 18.97…	**1** **1**	
(c)	(9.49, 1) or (9.486 to 9.487, 1)	**B1 B1**	
(d)	(16.4, –1) or (16.43…, –1)	**B1 B1**	
(e)	$-1 \leqslant f(x) \leqslant 1$	**1**	
(f)	Correct sketch of parabola shape from approximately $y = -1$ 5.48 or 5.477…	**B1** **B1**	
7 (a) (i)	576 or 575.8 to 576.0…	**3**	**M1** for $\frac{2}{3}\pi\times5^3$ (262 or 261.7 to 261.8…) **M1** for $\frac{1}{3}\pi\times5^2\times12$ (314 or 314.1 to 314.2)
(ii)	0.547 or 0.5470 to 0.5472	**2FT**	**FT** *their* (a)(i) **M1** for *their* (a)(i) × 0.95 ÷ 1000
(iii)	1827 or 1828	**2FT**	**FT** with consistent units usual accuracy and truncated **M1** for 1000 ÷ *their* (a)(ii)

Question	Answer	Mark	Part Marks
(iv)	361 or 361.2 to 361.3…	4	**M1** for $2\pi \times 5^2$ (157 or 157.0 to 157.1) **M2** for $\pi \times 5 \times \sqrt{5^2 + 12^2}$ (204 or 204.2…) or **M1** for $\sqrt{5^2 + 12^2}$ (13)
(b)	5.37 or 5.369…	5	**M4** for $\sqrt{\dfrac{377}{\pi(1+\sqrt{10})}}$ or **M3** for $\dfrac{377}{\pi(1+\sqrt{10})}$ or **M2** for $\pi r^2 + \pi r\left(\sqrt{(3r)^2 + r^2}\right) = 377$ or **M1** for $r^2 + (3r)^2$ oe
8 (a)	$[a, b, c =]$ –2, 1, 2	1, 1, 1	In any order
	$[d =]$ 0	1	
(b)	– 1	1	
(c)	– 1	1	
(d)	Parabola vertex downwards and vertex below x-axis	M1	
	Cuts given graph in 5 places	A1	
9 (a)	11	1	
(b)	$\dfrac{7}{23}$ oe	1	
(c)	$\dfrac{110}{182}$ oe	3	**M2** for $\dfrac{their(a)}{their(a)+3} \times \dfrac{their(a)-1}{their(a)+2}$ or **M1** for a single product of two fractions with first fraction $\dfrac{their(a)}{their(a)+3}$
(d)		1	

Question	Answer	Mark	Part Marks
10 (a)	31	**2**	**B1** for [f(7) =] 12 or **M1** for $2(x^2 - x - 30) + 7$
(b)	$\frac{x-7}{2}$ oe	**2**	**M1** for $y - 7 = 2x$ or $x = 2y + 7$ or $\frac{y}{2} = x + \frac{7}{2}$
(c)	$(2x+13)(2x+1)$ final answer	**3**	**B2** for $(2x + 7 + 6)(2x + 7 - 6)$ or for $4x^2 + 28x + 13$ or **M1** for $(2x + 7)^2 - 36$
(d)	$\frac{x+5}{x+6}$ final answer nfww	**4**	**B2** for $(x - 6)(x + 5)$ or **SC1** for $(x + a)(x + b)$ where $ab = -30$ or $a + b = -1$ and **B1** for $(x + 6)(x - 6)$
11 (a)	5.4[0] or 5.396…	**2**	**M1** for $\tan 34 = \frac{AB}{8}$ oe or better
(b)	20.4 or 20.38… nfww	**5**	**B1** for angle $D = 146$ **M2** for [$\sin C$ =] $\frac{8\sin(theirD)}{19}$ or **M1** for $\frac{8}{\sin C} = \frac{19}{\sin(theirD)}$ oe **A1** for [angle C =] 13.6 or 13.61 to 13.63 OR **B1** for angle $A = 56$ **M2** for [$\sin C$ =] $\frac{their\ AB \times \sin(theirA)}{19}$ or **M1** for $\frac{their\ AB}{\sin C} = \frac{19}{\sin(theirA)}$ oe **A1** for [angle C =] 13.6 or 13.61 to 13.63
(c)	48[.0] or 48.1 or 48.04 to 48.12 cao	**2**	**M1** for $0.5 \times their(\text{a}) \times 19 \times \sin(90 + their(\text{b}))$ oe
12 (a)	n^3 cao	**1**	
(b) (i)	392	**2**	**B1** for second differences 14, 20, 26 and 32
(ii)	$n^3 + n^2$ oe	**2**	**M1** for cubic expression but not n^3 or kn^3 only