



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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Page 2	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – May/June 2016	0607	42

Abbreviations

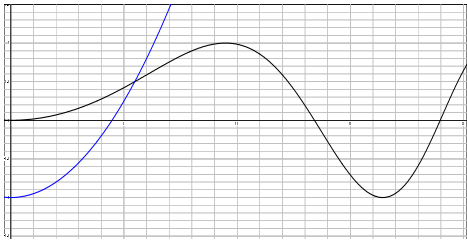
awrt	answers which round to
cao	correct answer only
dep	dependent
FT	follow through after error
isw	ignore subsequent working
oe	or equivalent
SC	Special Case
nfww	not from wrong working
soi	seen or implied

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 $630 \div 9$ [=70] or $\frac{5 \times 630}{9}$ or $\frac{3150}{9}$ or $\frac{4 \times 630}{9}$ or $\frac{2520}{9}$
(b) (i)	120	3	M2 for $98.4[0] \div [0].82$ 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 $\frac{30}{98.4[0]} \times 100$
(iii)	211.6[0] cao final answer	1	If 0 scored, SC1 for answer 75%

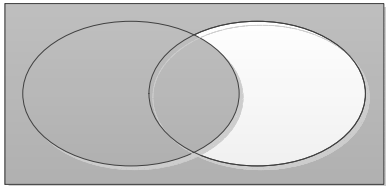
Page 3	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – May/June 2016	0607	42

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 nfw	5	B4 for 2035 or 19 years and 9 or 10 or 9.96 or 9.961 to 9.962 months nfw or B3 for 19.8 or 19.83... seen or M2 for $\frac{\log\left(\frac{500}{350}\right)}{\log(1.0015)}$ oe or $350 \times 1.0015^n = 500$ and at least two valid trials or sketch of appropriate graph or M1 for $350 \times 1.0015^n [= 500]$ or $350 \times \left(1 + \frac{0.15}{100}\right)^n [= 500]$ 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 $50 \times \frac{2.4}{1.75}$ oe or M1 for <i>their</i> distance $\div 1.75$ 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 Sketch of appropriate graph or correct use of formula or completing square 4.48 or 4.49	B2 M1 dep B2	i.e. a correct simplified quadratic equation M1 for $x^2 + (x + 1)(x + 3) [= 10]$ oe Dep on a quadratic from addition of two areas. Must see some valid method B1 for 4.484 to 4.485... or $6\sqrt{2} - 4$ or 1.12 or 1.121... or $1.5\sqrt{2} - 1$

Page 4	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – May/June 2016	0607	42

Question	Answer	Mark	Part Marks
5 (a)	Any 2 of the following Angle $ADX = \text{Angle } BCX$ and same segment oe Angle $DAX = \text{Angle } CBX$ and same segment oe Angle $AXD = \text{Angle } BXC$ 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 nfw	3	M2 for $[\cos =] \frac{2^2 + 5^2 - 4.61^2}{2 \times 2 \times 5}$ or M1 for $4.61^2 = 2^2 + 5^2 - 2 \times 2 \times 5 \cos(\text{AXD})$
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)	$-1 \leq f(x) \leq 1$	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 $\frac{2}{3}\pi \times 5^3$ (262 or 261.7 to 261.8...) M1 for $\frac{1}{3}\pi \times 5^2 \times 12$ (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) $\times 0.95 \div 1000$
(iii)	1827 or 1828	2FT	FT with consistent units usual accuracy and truncated M1 for $1000 \div \text{their (a)(ii)}$

Page 5	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – May/June 2016	0607	42

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 $\sqrt{\frac{377}{\pi(1+\sqrt{10})}}$ or M3 for $\frac{377}{\pi(1+\sqrt{10})}$ or M2 for $\pi r^2 + \pi r(\sqrt{(3r)^2 + r^2}) = 377$ or M1 for $r^2 + (3r)^2$ oe
8 (a)	[a, b, c =] -2, 1, 2 [d =] 0	1, 1, 1 1	In any order
(b)	-1	1	
(c)	-1	1	
(d)	Parabola vertex downwards and vertex below x-axis Cuts given graph in 5 places	M1 A1	
9 (a)	11	1	
(b)	$\frac{7}{23}$ oe	1	
(c)	$\frac{110}{182}$ oe	3	M2 for $\frac{\text{their(a)}}{\text{their(a)+3}} \times \frac{\text{their(a)-1}}{\text{their(a)+2}}$ or M1 for a single product of two fractions with first fraction $\frac{\text{their(a)}}{\text{their(a)+3}}$
(d)		1	

Page 6	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – May/June 2016	0607	42

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 nfw	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... nfw	5	B1 for angle $D = 146$ M2 for $[\sin C =] \frac{8 \sin(\text{their}D)}{19}$ or M1 for $\frac{8}{\sin C} = \frac{19}{\sin(\text{their}D)}$ oe A1 for [angle $C =] 13.6$ or 13.61 to 13.63 OR B1 for angle $A = 56$ M2 for $[\sin C =] \frac{\text{their } AB \times \sin(\text{their}A)}{19}$ or M1 for $\frac{\text{their } AB}{\sin C} = \frac{19}{\sin(\text{their}A)}$ 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 $0.5 \times \text{their}(a) \times 19 \times \sin(90 + \text{their}(b))$ 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