CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the October/November 2012 series

0607 CAMBRIDGE INTERNATIONAL MATHEMATICS

0607/04 Paper 4 (Extended), maximum raw mark 120

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.

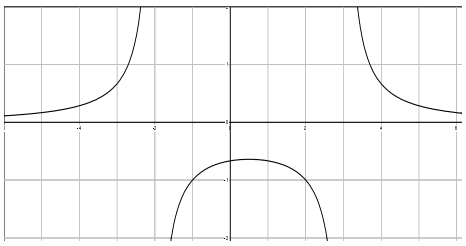
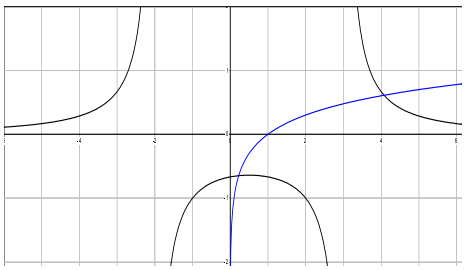
Cambridge will not enter into discussions about these mark schemes.

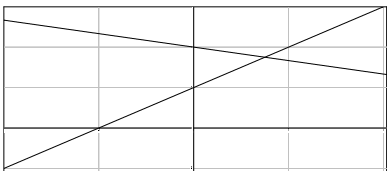
Cambridge is publishing the mark schemes for the October/November 2012 series for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level components and some Ordinary Level components.

CAMBRIDGE
International Examinations

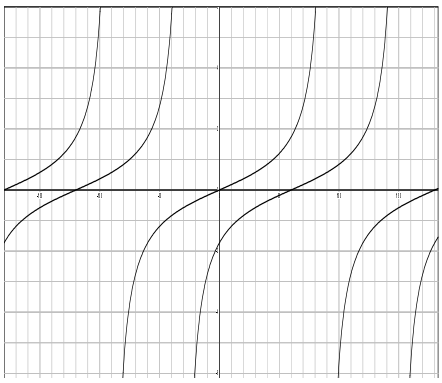
1	**(a)**	50	**1**	
	(b)	2	**1**	
	(c)	1.88 o.e.	**1**	**Seen** and not spoiled
	(d)	3	**1**	
	(e)	6	**1**	
	(f)	1	**1**	
2	**(a) (i)**	1.5 o.e.	**1**	
	(ii)	$200 \div (3+2) \times 3$ o.e.	**1**	If work backwards **M1** for 3:2 = 120:80 and for 120 + 80 = 200, either order. Allow 5 for 3 + 2.
	(iii)	129.6(0) final answer	**2**	**M1** for $\frac{120 \times 4 \times 2}{100}$ o.e. (9.6)
	(iv)	86.44 (or 86.4(0) or 86.444 to 86.445)	**2**	**M1** for $80(1.0395)^2$ o.e. not spoiled
	(v)	$1.0395^2 = 1.08056\ldots$ i.e. 8.056.. interest > 8% o.e.	**2**	Any full and **accurate** explanation – will often use values from earlier working. Must compare interest with interest or amount with amount. If **0**, **M1** for method but lacking accuracy or full details and methods may be seen in **(iii)** and/or **(iv)**. Use of different principals **0** (unless finding interest or amount as percentage of each principal)
	(b) (i)	19 440	**2**	**M1** for $24\,000 \times 0.9^2$ o.e. Allow 19 400 full marks
	(ii)	9	**M1** **A1**	**M1** for $24000 \times 0.9^n = 10000$ o.e. including repeated multiplication by 0.9 8.31 or 8.309… or 10330 to 10331 or 9298 imply **M1** **SC1 for answer 9 without working or without wrong working**
3	**(a) (i)**	1947	**4**	**M1** for $\frac{2}{3}\pi 4.8^3$, **M1** for $\pi 4.8^2.23.7$, **A1** for 1947. ... or 1950, **B1** for *their* volume rounded to nearest cubic centimetre.
	(ii)	0.001947 (0.00195 or 0.001947…)	**1 FT**	**FT** *their* **(i)** $\div 100^3$
	(iii)	1.6[0] (1.596 to 1.599)	**1 FT**	**FT** *their* **(ii)** × 820

	(b)	1.40 www	**5**	**M1** for $2\pi 4.8^2$ (144.7 to 144.8 or 145) **M1** for $\pi 9.6 \times 23.7$ o.e. (714.7 to 714.9 or 715) **M1** for $\pi 4.8^2$ (72.38 to 72.40) **not subtracted** **M1** for × 0.15 and ÷ 100 1.4 or 1.397 to 1.400... implies **M4** figs 14 or 1397 to 1400… or total surface area = 931.4 to 932.4 or 296.64π or $296.6...\pi$ or 297π implies **M3**
4	**(a)**	72	**2**	**M1** for 360 ÷ *their* (180 – 175) (not 175 or negative) or for $\frac{180(n-2)}{n} = 175$ o.e.
	(b) (i)	58	**3**	**B1** for $x = 32$, **M1** for 0.5(180 – 2 *their x*) Allow on diagram
	(ii)	Clear explanation using correct vocabulary supported by values in working or on diagram. allied o.e. angles not 180˚, alternate angles not equal, corresponding angles not equal etc. e.g $74 + 96 \neq 180$, $74 \neq 64$ etc.	**2 FT**	**FT** *x* only **B1** for values of angles being used stated or seen in diagram.
	(c) (i)	75	**1**	Allow on diagram **B1** for angle *CAB* = 27 . Allow on diagram.
	(ii)	12	**3**	**B1** for angle *OAB* or angle *OBA* = 15. Allow on diagram
5	**(a)**	16.9 (16.87…)	**2**	**M1** for 0.5 × 7 × 7.5 sin40 Any other method must be complete Must see method if grads or radians used.
	(b)	4.98 (4.981….)	**3**	**M1** for $7^2 + 7.5^2 - 2 \times 7 \times 7.5 \cos 40$ **A1** for 24.81 to 24.82… or 24.8 Must see method if grads or radians used.

6	(a)		5	**B1** for branch approx to left of $x = -2$, correct shape **B1** for branch approx to right of $x = 3$, correct shape **B1** for branch approx between $x = -2$, $x = 3$ correct shape **B1dependent** if outside branches approach x-axis from above **B1dependent** if middle branch below x-axis Allow touching x-axis at ends **Pen – 1 if branches joined**
	(b)	$x = -2$, $x = 3$, $y = 0$	3	**B1 B1 B1**
	(c)	$y \leqslant -0.64$ $y > 0$	3	**M1** for finding max point, implied by –0.64. condone < Allow f(x) or x for y and ignore inclusion of – 2 and/or 2 condone $\geqslant$
	(d)	$y > 0$	1	Condone $\geqslant$
	(e) (i)		2	**B1** for correct shape cutting x-axis **B1dependent** for nothing to left of y-axis
	(ii)	0.225 (0.2249 to 0.2250), 4.08 (4.078...)	2	**B1 B1**
	(iii)	4.08 (4.078…)	1 FT	**B1 FT** *their* relevant root from **(e)(ii)**
7	(a) (i)	$\in$	1	
	(ii)	$\subset$ or $\subseteq$	1	
	(iii)	ϕ or { }	1	
	(iv)	$\cup$	1	
	(b) (i)	t, u, v, w, x	1	Lists can be in any order
	(ii)	t, w	1	
	(iii)	l, m	1	
	(iv)	n, t, u, w, y	1	

8	**(a)**			
	(i)		**1**	line through approx (0, 1) and (1, 2) condone freehand
	(ii)		**1**	line through approx (0, 2) and (1, $1\frac{2}{3}$) condone freehand
	(b)	(0.75, 1.75) o.e.	**1**	
	(c)	0.375 o.e.	**2 FT**	**M1** for $0.5 \times (1) \times$ *their* 0.75 o.e. FT their x-coordinate only
	(d)	$y = -x + 2.5$ o.e. (e.g. $2x + 2y = 5$) cao	**3 FT**	**FT** *their* **(b)** **B1** for gradient = – 1 , implied by $y = -x + c$ **M1** for correct use of *their* (0.75, 1.75) in linear equation e.g. $\frac{y - \textit{their}\,1.75}{x - \textit{their}\,0.75} = -1$ or *their* 1.75 = – 1(*their* 0.75) + c
9	**(a)**	330 (330.125, 330.1, 330.12, 330.13)	**2**	**M1** for at least 3 mid-values soi (100, 250, 325, 375, 450)
	(b)	4 correct widths Heights 0.065, 0.19, 1.66, 1.4	**1** **3**	**B2** for 3 correct, **B1** for 2 correct. Accuracy – touching line of 1.4 and $0.05 \leqslant h < 0.1$, $0.15 < h \leqslant 0.2$, $1.65 \leqslant h < 1.7$ i.e. only touching nearest horizontal line. Condone freehand If no diagram, **SC2** for 4 correct frequency densities.
10	**(a)**	– 4.37 (– 4.372…), 1.37 (1.372…) or $\frac{-3 \pm \sqrt{33}}{2}$ o.e. Mark final answer	**M1** **B1B1**	Full method e.g. graph showing intersections with x-axis or full explicit formula correctly applied **No working can only score B1B1**
	(b)	$x \leqslant -4.37$ (– 4.372…), $x \geqslant 1.37$ (1.372…)	**2 FT**	**FT** only if outside parts of a parabola. Condone <, >. Allow in words if clear. If **B0**, **SC1** for region shown on sketch

11	**(a)**	19	**2**	**B1** for [g(2)] = $2^2 + 2 + 2$ soi e.g. f(8)
	(b)	$4x^2 + 14x + 14$ o.e. final answer	**3**	**M1** for $(2x+3)^2 + (2x+3) + 2$ soi **B1** for $(2x+3)^2 = 4x^2 + 6x + 6x + 9$ soi
	(c)	$\frac{x-3}{2}$ o.e. final answer	**2**	**M1** for swapping x and y or $y - 3 = 2x$ or $\frac{y}{2} = x + \frac{3}{2}$ i.e. correct first step
	(d) (i)	13	**1**	
	(ii)	– 3	**2**	**M1** for $2(2x+3) + 3 = 2x + 3$ or f(x) = x or $2x + 3 = x$
12	**(a) (i)**	Reflection only, $y = -x$ o.e.	**2**	Extra transformations invalidate all marks
	(ii)	Stretch only, y-axis o.e. invariant, (factor) 3	**3**	**B1 B1 B1** Extra transformations invalidate all marks
	(b)	Correct rotation	**2**	**SC1** for rotation clockwise 90˚ about other point or 90˚ anti-clockwise about (1, – 1)
13	**(a) (i)**	$\frac{10}{x+3}$	**1**	
	(ii)	$\frac{10}{x+3} + \frac{4}{x} = 1$ o.e. $10x + 4(x+3) = x(x+3)$ or $10x + 4x + 12 = x^2 + 3x$ o.e.	**M1**	Final equation reached with at least 1 intermediate step with brackets or 5 terms without any errors or omissions
		$x^2 - 11x - 12 = 0$	**E2**	**E1** if one error or omission but still at least 1 intermediate step with brackets or 5 terms
	(b)	$(x-12)(x+1)$	**2**	**SC1** for $(x+a)(x+b)$ where $ab = -12$ or $a + b = -11$ isw solutions
	(c)	40	**2 FT**	**FT** 10 ÷ (a positive x + 3) × 60 but x from *their* **factors**. **M1** for 10 ÷ (a positive x + 3) × 60 but must be correct from **(b)** If two positive roots, allow either. If only negative roots **M0**

14 (a) (i)		**2**	Translated by approx 60 ° to right **B1** for translation of middle branch approx. 60° to right
(ii)	Translation only $\begin{pmatrix} 60 \\ 0 \end{pmatrix}$ o.e.	**B1** **B1**	**B**'s independent Allow in words e.g. $60^{(\circ)}$ to right
(b)	$-120^{(\circ)}$, $60^{(\circ)}$ final answers	**2**	– 1 each incorrect extra but isw any answers outside domain **SC1** for $(-120, \sqrt{3})$ **and** $(60, \sqrt{3})$ o.e.