CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the October/November 2013 series

0607 CAMBRIDGE INTERNATIONAL MATHEMATICS

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

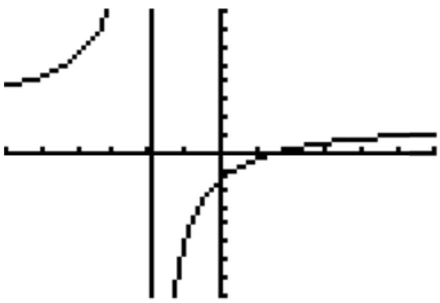
This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, 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.

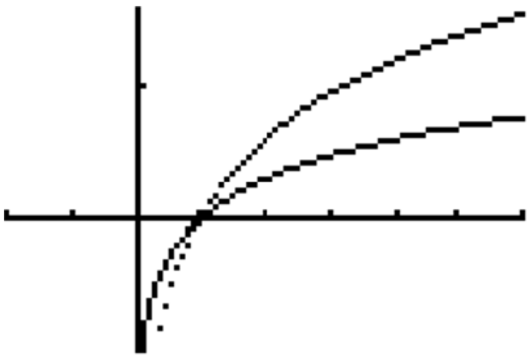
Cambridge will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the October/November 2013 series for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level components and some Ordinary Level components.

1 (a) (i)	5272.65 (allow 5270, 5272 to 5273)	**2**	**M1** for 8000×0.92^5 oe
(ii)	4 (allow 3.31, 3.312 to 3.313) nfww	**2**	**M1** for $8000 \times 0.92^n = 4000$ oe or **SC1** for 9 or 8.31 or 8.312 to 8.313
(b) (i)	72.3 (72.30 to 72.31)	**2**	**M1** for 235 ÷ 3.25 oe
(ii)	8.38 (8.382 to 8.383)	**1**	
2 (a) (i)	Triangle at (1, –1), (4, –1), (4, –2)	**2**	**SC1** for reflection in *y*-axis
(ii)	Triangle at (–1, –1), (–1, –4), (–2, –4)	**2 FT**	FT SC case only **SC1** for anti-clockwise rotation of 90° about (0, 0)
(iii)	Reflection $y = -x$ oe	**B1FT** **B1FT**	**FT** the transformation **FT** full description B's independent but both marks lost if more than one transformation stated
(b)	Enlargement (or reduction) (0, 2) [factor] 0.5	**B1** **B1** **B1**	B's independent but all 3 marks lost if more than one transformation stated No ratios
3 (a)	147 nfww	**4**	**B3** for [*A* =] 31.9 to 32.1 nfww or **M2** for [cos angle *A* =] $\frac{346^2 + 493^2 - 271^2}{2 \times 346 \times 493}$ oe or **M1** for correct implicit expression with angle *A* **B1 FT** 179 – *their* angle *A*
(b)	4.52 (4.519 to 4.520)	**3**	**M2** for 0.5 × 4.93 × 3.46 × sin (*their A*) oe e.g. 0.5 × 493 × 346 × sin (*their A*) ÷ 100^2 or use of Hero's formula or **M1** for scale correctly applied **or** correct use of $0.5ab\sin C$ **or** correct use of Hero's formula figs 4519 to 4520 imply **M1**

4 (a) (i)	7.21 (7.211..) or $2\sqrt{13}$	**3**	**M2** for $\sqrt{14^2-12^2}$ or **M1** for $r^2+12^2=14^2$ oe
(ii)	653 (653.2 to 653.5…) or 208π	**2FT**	**FT** *their* (a)(i) **M1** for $\frac{1}{3}\pi(their(a)(i))^2(12)$
(b) (i)	317.1 to 317.2…	**2**	**M1** for $\pi(their(a)(i))(14)$
(ii)	185 (185.3 to 185.5)	**3**	**M2** for $\frac{their(b)(i)}{\pi(14)^2}\times 360$ oe or **M1** for $\frac{their(b)(i)}{\pi(14)^2}$ oe or correct implicit statement e.g. $\frac{x}{360}\times\pi\times14^2=317$ or 317.1 to 317.2
5 (a) (i)	20	**1**	
(ii)	16	**1**	
(iii)	9	**1**	
(iv)	29	**1**	
(v)	180	**2**	**M1** for 20 indicated e.g. on *y*-axis or **SC1** for answer of 20
(b) (i)	60, 50	**1, 1**	
(ii)	20.125 (or 20.1 or 20.12 to 20.13)	**2FT**	**FT** *their (b)(i)* only if answers add to 110 **M1** for at least 3 mid-values seen or implied
(iii)	2.67 (2.666 to 2.667) oe 12 5	**1** **1FT** **1FT**	**FT** *their (b)(i)* **FT** *their (b)(i)*
6 (a)		**3**	**M1** for reasonable rectangular hyperbola shape **A1** for asymptotes approximately $x=-2$ and $y=2$ (soi) **A1** for *x*-intersection positive and *y*-intersection negative
(b)	– 1.5 oe	**1**	Do not allow co-ordinates
(c)	1.5 oe	**1**	Do not allow co-ordinates
(d)	$x=-2$, $y=2$	**1, 1**	

(e)	$-1.5 \leqslant f(x) \leqslant 1.3$ oe	**2**	Strict inequality at either end or both ends scores only 1 Allow in words but "between – 1.5 and 1.3" scores only 1 **B1** for – 1.5 and 1.3 seen or for $f(x) \geqslant -1.5$ or for $f(x) \leqslant 1.3$
(f) (i)	Reasonable $y = 3 - x$ added to sketch	**1**	
(ii)	–3.54 (–3.541…), 2.54 (2.541…)	**1, 1**	
(iii)	$2x - 3 = (x+2)(3-x)$	**M1**	Allow $2x - 3 = 3(x-2) - x(x-2)$ or $2x - 3 = x(3-x) + 2(3-x)$
	$[(x+2)(3-x)] = 3x - x^2 + 6 - 2x$	**B1**	Allow $x + 6 - x^2$
	$x^2 + x - 9 = 0$	**E1**	No errors or omissions
(iv)	37	**2**	**M1** for $b^2 - 4ac = 1^2 - 4(1)(-9)$ seen or $\left(x + \frac{1}{2}\right)^2 - \frac{1}{4} = 9$ or better
7 (a)	5.66 (5.656 to 5.657) or $4\sqrt{2}$	**3**	**M2** for $\sqrt{(5-1)^2 + (6-2)^2}$ oe or better or **M1** for 5 – 1 and 6 – 2 (or 2 – 6) soi
(b)	$x + y = 7$ oe	**3**	**M1** for gradient = $\frac{2-6}{5-1}$ oe **M1** for using (1, 6) or (5, 2) in $y = mx + c$ oe
(c) (i)	$y = x$	**2 FT**	**M1** for gradient = $\frac{-1}{\textit{their gradient in}\,(b)}$
(ii)	(3.5, 3.5) oe cao	**1**	
8 (a)	$25 - 4n$ oe	**2**	**M1** for answer of $-4n + c$
(b)	$3 \times 2^{n-1}$ oe	**2**	**M1** for 3×2^q seen and with no other terms
(c)	$\frac{n^2}{n+3}$ oe	**2**	**B1** for fraction with either numerator or denominator correct
(d)	$n^3 - n$ oe	**4**	**M3** for comparing sequence with values of n^3 or $an^3 + bn^2 + cn + d$ with 4 values of n substituted correctly oe or **M2** for attempting cubic expression oe or listing values of n^3 or **M1** for reaching equal third differences

9 (a)	$\frac{5}{6}, \frac{1}{6}, \frac{9}{10}, \frac{1}{10}, \frac{3}{10}, \frac{7}{10}$ oe all correctly placed	**3**	**B1** for each pair correctly placed
(b)	$\frac{48}{60}$ oe ($\frac{16}{20}$, 0.8 etc.)	**3**	isw any cancelling or converting **M2** for $\frac{5}{6}\times\frac{9}{10}+\frac{1}{6}\times\frac{3}{10}$ or **M1** for one of the products by itself
(c)	Fine weather but Alex does not go to the beach	**1**	
10 (a)	$x+3x+6x=180$ or $10x = 180$ $x = 18$ angles in the same segment oe	**B1** **B1** **B1**	Allow angles subtended by the same arc or same chord
(b) (i)	similar	**1**	No alternatives
(ii)	3[.00] or 2.990 to 3.002	**2**	**M1** for $\frac{8.55}{9.23}=\frac{2.78}{BX}$ oe allow s.f = 1.08 or 1.079 to 1.080
(iii)	0.86	**2**	**M1** for $\left(\frac{8.55}{9.23}\right)^2$ oe (implied by 0.857 to 0.859 or 1.16 to 1.17) or $\frac{0.5\times 2.78\times 8.55\sin 54}{0.5\times \mathit{their}BX\times 9.23\sin 54}$ $\left(\frac{9.61476.}{11.2008....}\right)$
11 (a)		**2**	**M1** for shape **A1** for through (1, 0) and positive y-values approx. double those on log x graph

(b)	$\log(x^5) = \log(16)$ or $x^5 = 16$ or $\log x^3 = \log\left(\frac{16}{x^2}\right)$ or $x^3 = \frac{16}{x^2}$ or appropriate sketch	M2	M1 for using a rule of logarithms once correctly
	1.74 (1.741…) or $\sqrt[5]{16}$ or $2^{0.8}$ oe	B1	
(c)	$y\log 5 = \log 100$ or $y = \log_5 100$ or $\frac{\log 100}{\log 5}$ or sketch	M1	e.g. for sketch $y = 5^x$ with $y = 100$
	2.861	B2	**B1** for 2.86 or 2.8613 to 2.8614
12 (a)	$10x^2 + \frac{1}{2}\pi x^2$ oe final answer	2	**B1** for $10x^2$ or $\frac{1}{2}\pi x^2$ seen
(b)	$A = x^2(10 + \frac{1}{2}\pi)$ or $2A = x^2(20 + \pi)$ $x^2 = \frac{A}{10 + \frac{1}{2}\pi}$ or $\frac{2A}{20+\pi}$ $\sqrt{\frac{A}{10 + \frac{1}{2}\pi}}$ or $\sqrt{\frac{2A}{20+\pi}}$ final answer	3	**M1** for correctly taking x^2 as a factor from two terms, one containing π **M1** for correct division by other factor which has two terms and no x in it **M1** for correct square root to give x
(c)	4.16 (4.157 to 4.158) cao	B1	
13 (a) (i)	$(2x+1)(x-1)$	2	**SC1** for $(ax+1)(bx-1)$ where $ab = 2$ or $b - a = -1$ or for answer $x = -\frac{1}{2}$, $x = 1$ but only from factors
(ii)	$\frac{8x+5}{(2x+1)(x-1)}$ oe final answer	3	**B2** for $8x + 5$ seen or **M1** for $x - 1 + 4(2x^2 - x - 1)$ or better seen e.g. $1 + 4(2x + 1)$ **B1** for denominator $(2x+1)(x-1)$ oe in final answer
(b)	$\frac{p-5q}{1-t}$ oe nfww final answer	4	**B1** for $(p+5q)(p-5q)$ **B2** for $(p+5q)(1-t)$ or **B1** for $p + 5q - t(p+5q)$ or $p(1-t) + 5q(1-t)$