CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the May/June 2013 series

0607 CAMBRIDGE INTERNATIONAL MATHEMATICS

0607/43 Paper 4 (Extended), maximum raw mark 120

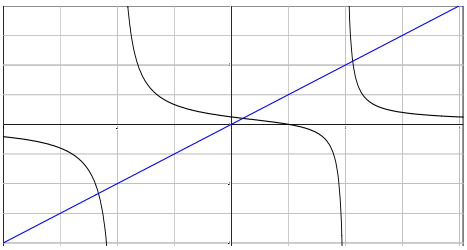
This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began,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

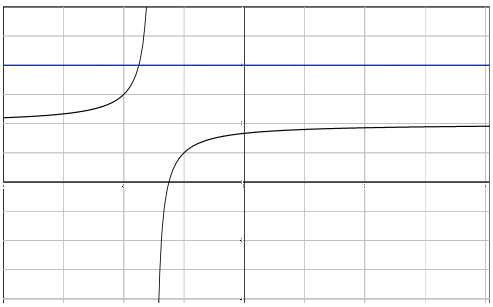
Cambridge will not enter into discussions about these mark schemes.

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

1	(a)	8	3	**M1** for $\frac{k}{\sqrt{x}}$ **A1** for k = 32
	(b)	0.25 o.e.	2	**B1FT** for $\sqrt{x} = \frac{their\ 32}{64}$
	(c)	$\frac{1024}{y^2}$ or $\left(\frac{32}{y}\right)^2$	3FT	**FT** k or incorrect k only ($k \neq 1$) for answer but the Ms still available **M1** for multiplication by $\sqrt{x}$ o.e. **M1** for division by o.e. **M1** for squaring
2	(a)	250	3	**B2** for $4x = 10^3$ or $\log x = 2.3979\ldots$ **B1** for $\log\left(\frac{36x}{9}\right)$ o.e. or 1.5563… $-0.9542\ldots + \log x = 3$ o.e.
	(b)	Attempt to get 2 equations for elimination Correct addition/subtraction of their equations $x = -2$ $y = -4$	**M1** **M1** **B1** **B1**	Allow one numerical error in one of these two lines.
		or		
		Equation $x =$ or $y =$ from one equation Correct substitution into other equation $x = -2$ $y = -4$	**[M1** **M1** **B1** **B1]**	Allow one numerical error in one of these two lines.
		or		
		Sketch of both lines $x = -2$ $y = -4$	**[M2** **B1** **B1]**	**Answers without any working must be both correct and score B2 only.**
3	(a)	$A \cap B \cap C$ o.e.	1	
	(b)	$A \cap C \cap B'$ o.e.	1	
	(c)	$(A \cup B)' \cap C$ o.e. e.g. $A' \cap B' \cap C$	1	
	(d)	$(B \cap C \cap A') \cup (A \cap (B \cup C)')$ o.e.	2	**B1** for either bracket correct
4	(a)	$\frac{4.5}{7} = \frac{x}{(x+8)}$ o.e. $4.5(x + 8) = 7x$ o.e. $2.5x = 36$ $[x = 14.4]$ (Answer Given)	**M1** **E1**	Must see a correct middle line

(b)	211 or 210.6 to 211.1 www 3	**3**	**M1** for $\frac{1}{3}\pi \times 3.5^2 \times 22.4$ (287 o… 287.4) **M1** for $\frac{1}{3}\pi \times 2.25^2 \times 14.4$ (76.4 or 76.3… to 76.35…) (**M2** for $67.16\,\pi$ to $67.17\,\pi$ or $\frac{403}{6}\pi$ or $67\frac{1}{6}\pi$)
5 (a)	$[y] = 10x^2 + x - 5\ [= 0]$ o.e.	**B1**	
	Correct graph sketched or $\frac{-1 \pm \sqrt{(1)^2 - 4(10)(-5)}}{2(10)}$	**B1**	**B2** for sketch of $10x^2$ and $5 - x$ together or $\pm\sqrt{\frac{201}{400}} - \frac{1}{20}$ from completing the square
	– 0.76, 0.66	**B1,B1**	If **B0**, **SC1** for – 0.759 or – 0.7589 to – 0.7588 **and** 0.659 or 0.6588 to 0.6589
(b)	$x > 0.66$, $x < -0.76$	**2FT**	**B1FT** for each part, if two solutions to part **(b)**
6 (a)	(–6, –2)	**1**	
(b)	(2, 6)	**1**	
(c)	Reflection $y = -x$	**1, 1**	
7 (a)		**4**	**B1** Correct graph for $x > 2$ **B1** Correct graph for $x < -2$ **B1** Correct graph for $-2 < x < 2$ **B1** Approx correct intercepts **pen – 1** if branches joined.
(b)	$x = -2$, $x = 2$, $y = 0$	**1, 1, 1**	
(c)	–2.33 (–2.330…), 0.202 (0.2016…), 2.13 (2.128…)	**1, 1, 1**	
8 (a)	75.5 (75.52….)	**3**	**M2** for [cos =] $\frac{7^2 + 6^2 - 8^2}{2.6.7}$ (0.25) or **M1** for $8^2 = 7^2 + 6^2 - 2 \times 6 \times 7 \times \cos x$
(b)	20.33	**3**	**M1** for $0.5 \times 6 \times 7 \times \sin(\textit{their}\ 75.5)$ **A1** 20.3 or 20.33….
(c)	6.78 or 6.776 to 6.778	**2**	**M1** for $\sin(\textit{their}\ 75.5) = \frac{h}{7}$ or $0.5 \times 6 \times h = \textit{their}\ 20.33$ o.e.

9 (a) (i)	$\frac{5}{40}$ o.e.	**1**	**For all parts accept decimals percentages with the usual rules 3sf** **Do not penalise incorrect cancelling converting** **Do not accept ratios or words**
(ii)	$\frac{27}{40}$ o.e.	**1**	
(b)	$\frac{3}{21}$ o.e.	**2**	**B1** for $\frac{k}{21}$
(c)	$\frac{120}{5814}$ o.e. (0.0206 or 0.02063 to 0.02064) $(\frac{20}{969})$	**3**	**M2** for $\frac{6}{19}\times\frac{5}{18}\times\frac{4}{17}$ or **B1** for $\frac{5}{18}$ seen
10 (a) (i)	2.51 (or 2.513 to 2.514) www 2	**2**	**M1** for $\pi\times1.2^2$ or $\pi\times0.8^2$ 4.523 to 4.524… or 2.010 to 2.011
(ii)	0.502 or 0.503 (or 0.5026 – 0.5028)	**2FT**	**M1** for (*their* 2.51) × figs 2
(b) (i)	3020 (or 3020 to 3021)	**2**	**M1** for $\frac{4}{3}\pi\times16^3$ (17150 to 17160 or 17200) or $\frac{4}{3}\pi\times15^3$ (14130 to 14140 or 14100) **SC1** for 24100 to 24200
(ii)	166 cao www 3	**3**	**M2** for $\frac{\textit{their}\ \textbf{(a)(ii)}\times1000\,000}{\textit{their}\ \textbf{(b)(i)}}$ or **M1** for *their* **(a)(ii)** × 1 000 000 or 1 000 000 ÷ *their* **(b)(i)**
11 (a)	$\frac{720}{x}-\frac{720}{(x+10)}=1$	**2**	**B1** for $720/x$ **B1** for $720/(x+10)$
	$720(x + 10) – 720x = x(x + 10)$	**M1**	Correct multiplication for equation in correct form i.e. the three terms in first line (can be all over $x(x + 10)$) Must see a correct third line and no errors or omissions
	$7200 = x^2 + 10x$		
	$x^2 + 210x – 7200 = 0$	**E1**	No omissions or errors
(b) (i)	$(x + 90)(x – 80)$	**2**	**SC1** for $(x + a)(x + b)$ if $ab = –7200$ or $a + b = 10$
(ii)	80, –90	**1 FT**	**FT** their **(b)(ii)** only if **SC1**
(iii)	9	**1FT**	**FT** from **(b)(ii)**, but must only be one positive root

12 (a) (i)		**2**	**B1** for rectangular hyperbola in quadrants **B1** for approx. correct asymptotes.
(ii)	$(-\frac{5}{4}, 0)$ o.e. $(0, \frac{5}{3})$ o.e.	**1** **1**	
(iii)	1.71 or 1.714… o.e.	**1**	
(b)	$x > -\frac{3}{2}$	**2**	**B1** for sight of $-\frac{3}{2}$ (may be shown on graph)
	$x < -\frac{7}{4}$	**2**	**B1** for sight of $-\frac{7}{4}$ (may be shown on graph)
(c)	$\frac{1}{2}\left(\frac{1}{2-x} - 3\right)$ o.e. e.g. $\frac{3x-5}{4-2x}$	**4**	**M1** Swap x and y **M1** Correct re-arrangement or single fraction with denom. $2x + 3$ or $2y + 3$ **M1** Multiply by $(2x + 3)$ or $(2y + 3)$ **M1** correct division by 2
(d)	$\frac{9}{5}$ o.e. cao	**2**	**M1** for *their* **(c)** = 1 or x = f(1)
13 (a)	38 www	**3**	**B2** for 38.475 or 38.48 or 38.47 or 38.5 or 7695 ÷ 200 or **M1** for correct use of mid-pts at least 4 of (10, 25, 35, 42.5, 47.5, 65)
(b) (i)	0.6, 3.4, 4, 12, 8.4, 0.4	**2**	**B1** for 4 correct
(ii)	Suitable scale Correct column widths Correct heights	**1** **1** **2 FT**	 **B1** for 4 correct **FT**

14 (a) (i)	Points correctly plotted	**3**	**B2** for 5 correct points or **B1** for 3 or 4 correct points
(ii)	Positive	**1**	
(b) (i)	22.3	**1**	
(ii)	436	**1**	
(c) (i)	$19.8x - 4.78$	**2**	**B1** for $kx - 4.78$ or **B1** for $19.8x + k$ **SC1** for $20x - 4.8$
(ii)	410 or 411 or 410.1 to 411.0….	**1FT**	(19.76 to 19.77, –4.778 to –4.777)
(iii)	628 or 629 or 627.5 to 628.8…..	**1FT**	
(iv)	**(c)(ii)** **AND** this is within the data range o.e.	**2**	**E1** for reasonable statement
15 (a)	1458 2×3^n o.e.	**1** **2**	 **B1** for $k \times 3^n$ or $k \times 2^{n-1}$
(b)	29 $n^2 - n - 1$ o.e.	**1** **3**	 **M2** for $an^2 + bn + c$ with a $\neq 0$ and both b and c not 0. or **M1** for differences of 2 seen or an^2