

**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.

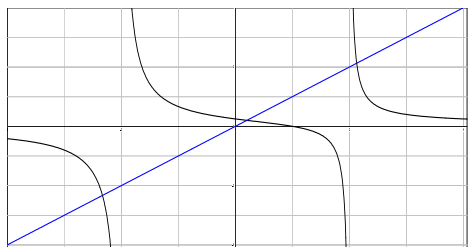
Cambridge will not enter into discussions about these mark schemes.

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.

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1 (a)	8	3	M1 for $\frac{k}{\sqrt{x}}$ A1 for $k = 32$
(b)	0.25 o.e.	2	B1FT for $\sqrt{x} = \frac{\text{their } 32}{64}$
(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 $\log x = 2.3979\dots$ B1 for $\log\left(\frac{36x}{9}\right)$ o.e. or $1.5563\dots$ $-0.9542\dots + \log x = 3$ o.e.
(b)	Attempt to get 2 equations for elimination Correct addition/subtraction of their equations $x = -2$ $y = -4$  Equation $x =$ or $y =$ from one equation Correct substitution into other equation $x = -2$ $y = -4$  Sketch of both lines $x = -2$ $y = -4$	M1 M1 B1 B1  or  [M1 M1 B1 B1]  or  [M2 B1 B1]	Allow one numerical error in one of these two lines.  Allow one numerical error in one of these two lines.  <b>Answers without any working must be both correct and score B2 only.</b>
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

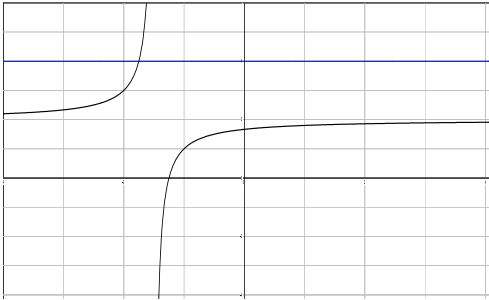
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(b)	211 or 210.6 to 211.1 www 3	3	<b>M1</b> for $\frac{1}{3}\pi \times 3.5^2 \times 22.4$ (287 or 287.3 to 287.4) <b>M1</b> for $\frac{1}{3}\pi \times 2.25^2 \times 14.4$ (76.4 or 76.34 to 76.35...) <b>(M2</b> for $67.16\pi$ to $67.17\pi$ or $\frac{403}{6}\pi$ or $67\frac{1}{6}\pi$ )
5 (a)	$[y] = 10x^2 + x - 5 [= 0]$ o.e. Correct graph sketched or $\frac{-1 \pm \sqrt{(1)^2 - 4(10)(-5)}}{2(10)}$ $-0.76, 0.66$	<b>B1</b>  <b>B1</b>  <b>B1,B1</b>  <b>2FT</b>	<b>B2</b> for sketch of $10x^2$ and $5 - x$ together or $\pm \sqrt{\frac{201}{400}} - \frac{1}{20}$ from completing the square <b>If B0, SC1</b> for $-0.759$ or $-0.7589$ to $-0.7588$ <b>and</b> $0.659$ or $0.6588$ to $0.6589$ <b>B1FT</b> 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	<b>B1</b> Correct graph for $x > 2$ <b>B1</b> Correct graph for $x < -2$ <b>B1</b> Correct graph for $-2 < x < 2$ <b>B1</b> Approx correct intercepts <b>pen - 1</b> if branches joined.
(b)	$x = -2, x = 2, y = 0$	1, 1, 1	
(c)	$-2.33$ ( $-2.330\dots$ ), $0.202$ ( $0.2016\dots$ ), $2.13$ ( $2.128\dots$ )	1, 1, 1	
8 (a)	75.5 (75.52...)	3	<b>M2</b> for $[\cos = ] \frac{7^2 + 6^2 - 8^2}{2 \cdot 6 \cdot 7}$ (0.25) or <b>M1</b> for $8^2 = 7^2 + 6^2 - 2 \times 6 \times 7 \times \cos x$
(b)	20.33	3	<b>M1</b> for $0.5 \times 6 \times 7 \times \sin(\text{their } 75.5)$ <b>A1</b> 20.3 or 20.33...
(c)	6.78 or 6.776 to 6.778	2	<b>M1</b> for $\sin(\text{their } 75.5) = \frac{h}{7}$ or $0.5 \times 6 \times h = \text{their } 20.33$ o.e.

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<p>9 (a) (i)</p> <p>(ii)</p> <p>(b)</p> <p>(c)</p>	<p><math>\frac{5}{40}</math> o.e.</p> <p><math>\frac{27}{40}</math> o.e.</p> <p><math>\frac{3}{21}</math> o.e.</p> <p><math>\frac{120}{5814}</math> o.e. (0.0206 or 0.02063 to 0.02064) (<math>\frac{20}{969}</math>)</p>	<p>1</p> <p>1</p> <p>2</p> <p>3</p>	<p><b>For all parts accept decimals or percentages with the usual rules for 3sf</b> <b>Do not penalise incorrect cancelling or converting</b> <b>Do not accept ratios or words</b></p> <p><b>B1</b> for <math>\frac{k}{21}</math></p> <p><b>M2</b> for <math>\frac{6}{19} \times \frac{5}{18} \times \frac{4}{17}</math> or <b>B1</b> for <math>\frac{5}{18}</math> seen</p>
<p>10 (a) (i)</p> <p>(ii)</p> <p>(b) (i)</p> <p>(ii)</p>	<p>2.51 (or 2.513 to 2.514) www 2</p> <p>0.502 or 0.503 (or 0.5026 – 0.5028)</p> <p>3020 (or 3020 to 3021)</p> <p>166 cao www 3</p>	<p>2</p> <p>2FT</p> <p>2</p> <p>3</p>	<p><b>M1</b> for <math>\pi \times 1.2^2</math> or <math>\pi \times 0.8^2</math> 4.523 to 4.524... or 2.010 to 2.011</p> <p><b>M1</b> for (<i>their</i> 2.51) <math>\times</math> figs 2</p> <p><b>M1</b> for <math>\frac{4}{3}\pi \times 16^3</math> (17150 to 17160 or 17200) or <math>\frac{4}{3}\pi \times 15^3</math> (14130 to 14140 or 14100) <b>SC1</b> for 24100 to 24200</p> <p><b>M2</b> for <math>\frac{\text{their (a)(ii)} \times 1000000}{\text{their (b)(i)}}</math> or <b>M1</b> for <i>their</i> (a)(ii) <math>\times</math> 1 000 000 or 1 000 000 <math>\div</math> <i>their</i> (b)(i)</p>
<p>11 (a)</p> <p>(b) (i)</p> <p>(ii)</p> <p>(iii)</p>	<p><math>\frac{720}{x} - \frac{720}{(x+10)} = 1</math></p> <p><math>720(x+10) - 720x = x(x+10)</math></p> <p><math>7200 = x^2 + 10x</math></p> <p><math>x^2 + 210x - 7200 = 0</math></p> <p><math>(x+90)(x-80)</math></p> <p>80, -90</p> <p>9</p>	<p>2</p> <p>M1</p> <p>E1</p> <p>2</p> <p>1 FT</p> <p>1FT</p>	<p><b>B1</b> for <math>720/x</math> <b>B1</b> for <math>720/(x+10)</math></p> <p>Correct multiplication for equation in correct form i.e. the three terms in first line (can be all over <math>x(x+10)</math>) Must see a correct third line and no errors or omissions</p> <p>No omissions or errors</p> <p><b>SC1</b> for <math>(x+a)(x+b)</math> if <math>ab = -7200</math> or <math>a+b = 10</math></p> <p><b>FT</b> their (b)(ii) only if <b>SC1</b></p> <p><b>FT</b> from (b)(ii), but must only be one positive root</p>

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12 (a) (i)		2	<b>B1</b> for rectangular hyperbola in correct quadrants <b>B1</b> 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	<b>B1</b> for sight of $-\frac{3}{2}$ (may be shown on graph)
	$x < -\frac{7}{4}$	2	<b>B1</b> 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	<b>M1</b> Swap $x$ and $y$ <b>M1</b> Correct re-arrangement or single fraction with denom. $2x + 3$ or $2y + 3$ <b>M1</b> Multiply by $(2x + 3)$ or $(2y + 3)$ <b>M1</b> correct division by 2
(d)	$\frac{9}{5}$ o.e. cao	2	<b>M1</b> for <i>their</i> (c) = 1 or $x = f(1)$
13 (a)	38 www	3	<b>B2</b> for 38.475 or 38.48 or 38.47 or 38.5 or $7695 \div 200$ or <b>M1</b> 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	<b>B1</b> for 4 correct
(ii)	Suitable scale Correct column widths Correct heights	1 1 2 FT	<b>B1</b> for 4 correct FT

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