

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.

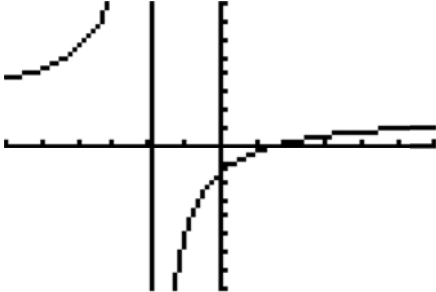
Cambridge will not enter into discussions about these mark schemes.

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.

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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) nfw	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 $235 \div 3.25$ 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 nfw	4	B3 for $[A =] 31.9$ to 32.1 nfw or M2 for $[\cos \text{ angle } A =]$ $\frac{346^2 + 493^2 - 271^2}{2 \times 346 \times 493}$ 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 $0.5 \times 4.93 \times 3.46 \times \sin(\text{their } A)$ oe e.g. $0.5 \times 493 \times 346 \times \sin(\text{their } A) \div 100^2$ 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

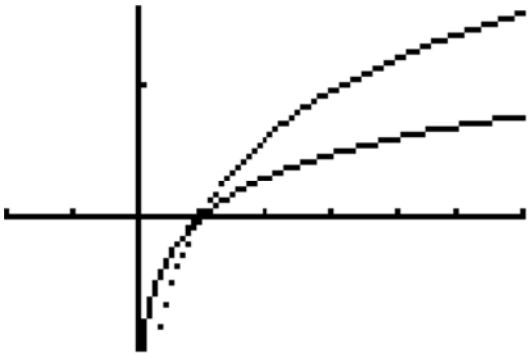
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<p>4 (a) (i)</p> <p>(ii)</p> <p>(b) (i)</p> <p>(ii)</p>	<p>7.21 (7.211..) or $2\sqrt{13}$</p> <p>653 (653.2 to 653.5...) or 208π</p> <p>317.1 to 317.2...</p> <p>185 (185.3 to 185.5)</p>	<p>3</p> <p>2FT</p> <p>2</p> <p>3</p>	<p>M2 for $\sqrt{14^2 - 12^2}$ or M1 for $r^2 + 12^2 = 14^2$ oe</p> <p>FT their (a)(i)</p> <p>M1 for $\frac{1}{3}\pi(\text{their}(a)(i))^2$ (12)</p> <p>M1 for $\pi(\text{their}(a)(i))(14)$</p> <p>M2 for $\frac{\text{their}(b)(i)}{\pi(14)^2} \times 360$ oe</p> <p>or M1 for $\frac{\text{their}(b)(i)}{\pi(14)^2}$ oe or correct implicit statement e.g.</p> <p>$\frac{x}{360} \times \pi \times 14^2 = 317$ or 317.1 to 317.2</p>
<p>5 (a) (i)</p> <p>(ii)</p> <p>(iii)</p> <p>(iv)</p> <p>(v)</p> <p>(b) (i)</p> <p>(ii)</p> <p>(iii)</p>	<p>20</p> <p>16</p> <p>9</p> <p>29</p> <p>180</p> <p>60, 50</p> <p>20.125 (or 20.1 or 20.12 to 20.13)</p> <p>2.67 (2.666 to 2.667) oe</p> <p>12</p> <p>5</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>2</p> <p>1, 1</p> <p>2FT</p> <p>1</p> <p>1FT</p> <p>1FT</p>	<p>M1 for 20 indicated e.g. on y-axis or SC1 for answer of 20</p> <p>FT their (b)(i) only if answers add to 110</p> <p>M1 for at least 3 mid-values seen or implied</p> <p>FT their (b)(i)</p> <p>FT their (b)(i)</p>
<p>6 (a)</p> <p>(b)</p> <p>(c)</p> <p>(d)</p>	 <p>-1.5 oe</p> <p>1.5 oe</p> <p>$x = -2, y = 2$</p>	<p>3</p> <p>1</p> <p>1</p> <p>1, 1</p>	<p>M1 for reasonable rectangular hyperbola shape</p> <p>A1 for asymptotes approximately $x = -2$ and $y = 2$ (so1)</p> <p>A1 for x-intersection positive and y-intersection negative</p> <p>Do not allow co-ordinates</p> <p>Do not allow co-ordinates</p>

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(e)	$-1.5 \leq f(x) \leq 1.3$ 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 $f(x) \geq -1.5$ or for $f(x) \leq 1.3$
(f) (i)	Reasonable $y = 3 - x$ added to sketch	1	
(ii)	-3.54 ($-3.541\dots$), 2.54 ($2.541\dots$)	1, 1	
(iii)	$2x - 3 = (x + 2)(3 - x)$ $[(x + 2)(3 - x)] = 3x - x^2 + 6 - 2x$ $x^2 + x - 9 = 0$	M1 B1 E1	Allow $2x - 3 = 3(x - 2) - x(x - 2)$ or $2x - 3 = x(3 - x) + 2(3 - x)$ Allow $x + 6 - x^2$ No errors or omissions
(iv)	37	2	M1 for $b^2 - 4ac = 1^2 - 4(1)(-9)$ seen or $(x + \frac{1}{2})^2 - \frac{1}{4} = 9$ 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 = $\frac{-1}{\text{their gradient in (b)}}$
(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

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

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(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 2.861	M1	e.g. for sketch $y = 5^x$ with $y = 100$
		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 $2A = x^2(20 + \pi)$	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
	$x^2 = \frac{A}{10 + \frac{1}{2}\pi}$ or $\frac{2A}{20 + \pi}$ $\sqrt{\frac{A}{10 + \frac{1}{2}\pi}}$ or $\sqrt{\frac{2A}{20 + \pi}}$ final answer		
(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
	$\frac{8x+5}{(2x+1)(x-1)}$ oe final answer	3	
(b)	$\frac{p-5q}{1-t}$ oe nfw final answer	4	B1 for $(p+5q)(p-5q)$ B2 for $(p+5q)(1-t)$ or B1 for $p+5q-t(p+5q)$ or $p(1-t)+5q(1-t)$