

**UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS**  
International General Certificate of Secondary Education

**MARK SCHEME for the May/June 2012 question paper**  
**for the guidance of teachers**

**0607 CAMBRIDGE INTERNATIONAL MATHEMATICS**

**0607/31**

Paper 3 (Core), maximum raw mark 96

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.

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Page 2	Mark Scheme: Teachers' version	Syllabus
	IGCSE – May/June 2012	0607

1	(a) A, B, C, D, K, L, M (b) 6 (c) 10% (d) $\frac{5}{20}$ oe isw any cancelling or converting (e) $\frac{6}{13}$ o.e isw any cancelling or converting (0.462 or 0.4615...)	1 1 2 1 1	M1 for 2/20 seen	[6]
2	(a) (i) $7000 \div 100 \times 33$ (ii) Mr Ray \$2450, Dr Surd \$2240 (b) 105 (c) 920 ft (d) 1715 ft	M1 M1 B1 B1 1 1ft 2ft	or M1 for 2310 and $7000 \div 70$ seen o.e (allow 231 and $700 \div 7$ ) then M1 ratio 33 : 100 <i>their</i> 2240 – 1320, ft positive answers only M1 for $70/100 \times$ <i>their</i> 2450 oe	[8]
3	(a) $x = -1, y = 2$ with working  (b) (i) $2\pi r(r + h)$ final answer (ii) $h = \frac{s - 2\pi r^2}{2\pi r}$ oe final answer (c) $6x^3$	3  2 2 2	M1 for attempt to get 2 equations for elimination. Condone one numerical slip. OR M1 for equations in the form $y =$ or $x =$ . Condone one numerical slip. OR M1 for sketch. A1 each answer Trial and improvement with <b>both</b> answers correct scores 3, otherwise 0. <b>SC1 for correct answers without working</b>  M1 for any correct partial factorisation or $2\pi r( )$  M1 for correct re-arrangement seen M1 for correct division by $2\pi r$ seen  B1 for $kx^3$ or $6x^k$	[9]


Page 3	Mark Scheme: Teachers' version	Syllabus
	IGCSE – May/June 2012	0607

4	(a)	Points plotted correctly	<b>B1B1</b>	
	(b)	(3, 5)	<b>1</b>	
	(c)	$\begin{pmatrix} 2 \\ 4 \end{pmatrix}$	<b>1</b>	condone poor notation
	(d)	2 oe	<b>2</b>	<b>M1</b> for change in $y$ over change in $x$ . Allow 4/2
	(e)	2 ft	<b>1ft</b>	ft (d) only
	(f)	$y = 2x - 7$ oe	<b>2ft</b>	<b>M1</b> for $y = \textit{their} 2x + c$ or for substituting (5, 3) into formula
5	(a) (i)	24	<b>1</b>	
	(ii)	56 – 57 kg	<b>1</b>	
	(iii)	9 (allow +/- 0.5) www	<b>2</b>	<b>M1</b> for 59 (+/- 0.5) or 50 to 51 seen
	(b)	$\frac{8}{24}$ or $\frac{9}{24}$ oe ft	<b>2ft</b>	<b>M1</b> for 8 or 9 seen ft from (a)
6	(a) (i)	trapezium	<b>1</b>	
	(ii)	51	<b>1</b>	
	(iii)	82	<b>1</b>	
	(iv)	129	<b>1</b>	
	(b)	108	<b>3</b>	<b>M2</b> for 540/5 seen or 180 – 360/5 <b>M1</b> for $(5 - 2) \times 180$ oe or 360/5

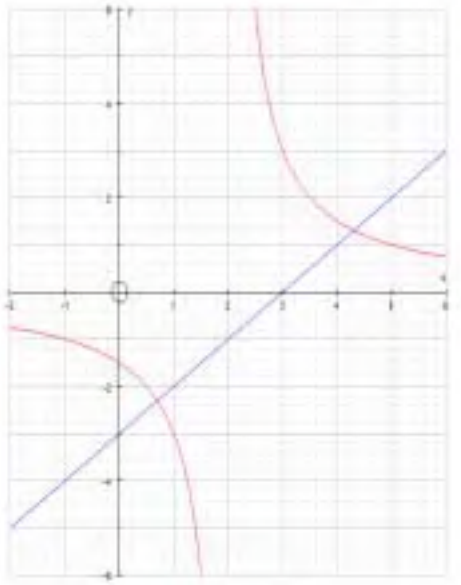
Page 4	Mark Scheme: Teachers' version	Syllabus
	IGCSE – May/June 2012	0607

7	(a) (i)	90	1	
	(ii)	90	1	
	(iii)	110	1	
	(b)	10.2 (accept 10.17 – 10.18)	2	Allow 2 for other arc = 23.1 or 23.11 – 23 13... M1 for $110/360 \times 2\pi \times 5.3$ or $250/360 \times 2\pi \times 5.3$
(c)	6.08 (accept 6.079 – 6.080)	2	M1 for $\sin 35 = CB/10.6$ oe (i.e. all steps, apart from final one) [7]	
8	(a) (i)	6	1	
	(ii)	108	2ft	M1 for full perimeter seen
	(b)	571 or 571.2	2	M1 for $30 \times 18$ [5]
9	(a)	46(.0) (accept 45.95 – 46.0)	2	M1 for $\frac{2}{3} \times \pi \times 2.8^3$ or $\frac{4}{3} \times \pi \times 2.8^3$
	(b)	49.2 or 49.3 (accept 49.23 – 49.27)	2	M1 for using $2\pi 2.8^2$ or $4\pi 2.8^2$
	(c)	10.2 (accept 10.19...)	2	M1 for $9.8^2 + 2.8^2$
	(d)	89.6 or 89.7 (accept 89.59 – 89.74)	2 ft	M1 for $\pi \times 2.8 \times$ their 10.2 ft their (c)
	(e)	7	2	M1 for $\frac{2}{2.8}$ or $\frac{2.8}{2}$ or $\frac{9.8}{2.8}$ [10]
10	(a)	Diagram	B1B1	1 mark for roughly the correct shape 1 indep mark for the information (at least 3 out of 4 correct)
	(b)	(0)51.8 accept (0)52 but only with working	4	M1 for recognizing the 90 angle – may be marked on diagram. M1 for $\tan = \frac{80}{200}$ or better (first M1 is implied) 21.8 seen implies first 2 M's M1 for adding 30. [6]

Page 5	Mark Scheme: Teachers' version	Syllabus
	IGCSE – May/June 2012	0607

<p>11 (a)</p>  <p>(b) <math>(-2, 1)</math> and <math>(1, -0.35)</math></p> <p>(c) <math>x = 0, 1.81</math> (1.811 to 1.812)</p> <p>(d) their graph moved up 3</p>		<p>3</p> <p><b>B1 B1</b></p> <p><b>B1 B1</b></p> <p>1</p>	<p><b>B1</b> for cubic shape with a max and a min  <b>B1</b> for turning points in the correct quadrants.  <b>B1</b> for <math>x</math>-axis intercepts: one negative, one positive and one at origin.</p> <p><b>SC1</b> for correct points in wrong order</p> <p>their graph with vertical translation of 3</p> <p>[8]</p>
<p>12 (a)</p> <p>(b)</p> <p>(c)</p> <p>(d) (i)</p> <p>(ii)</p> <p>(iii)</p>	<p>3820 (accept 3817...)</p> <p>3800</p> <p><math>\frac{3}{7}</math></p> <p>Positive</p> <p>Ruled line drawn through <math>(180, \text{their } 3820)</math></p> <p>3300 – 3500</p>	<p>1</p> <p>1</p> <p>2</p> <p>1</p> <p>2 ft</p> <p>1</p>	<p><b>M1</b> for 15/35</p> <p><b>B1</b> for passing through mean, <b>B1</b> for positive gradient.</p> <p>[8]</p>

Page 6	Mark Scheme: Teachers' version	Syllabus
	IGCSE – May/June 2012	0607

<p>13 (a)</p>		<p>2</p> <p><b>B1</b> for reasonable shape with correct asymptotes  graph in approximately the correct position  One branch above and one branch below the  x-axis  Top branch not touching y-axis  Bottom branch cutting y-axis  Penalty of 1 if branches connected.</p>
<p>(b)</p>	<p><math>x = 2, y = 0</math></p>	<p><b>B1 B1</b>  ft <math>\frac{3}{x} - 2</math> only <math>x = 0, y = -2</math>  ft</p>
<p>(c)</p>	<p>Line on graph</p>	<p><b>1</b>  Ruled line must have positive gradient and  negative y-intercept</p>
<p>(d)</p>	<p>(0.697, -2.3(0))  (0.6972....., -2.303 to -2.302),  (4.3(0), 1.3(0))  (4.302 to 4.303, 1.302 to 1.303)</p>	<p><b>B1</b>  ft <math>\frac{3}{x} - 2</math> only  <b>B1</b>  (-1.3(0), -4.3(0))  (-1.303 to -1.302, -4.303 to -4.302)  (2.3(0), -0.697)  (2.302 to 2.303, -0.6972...)</p>
		<p>[7]</p>