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.

Mark schemes must be read in conjunction with the question papers and the report on the examination.

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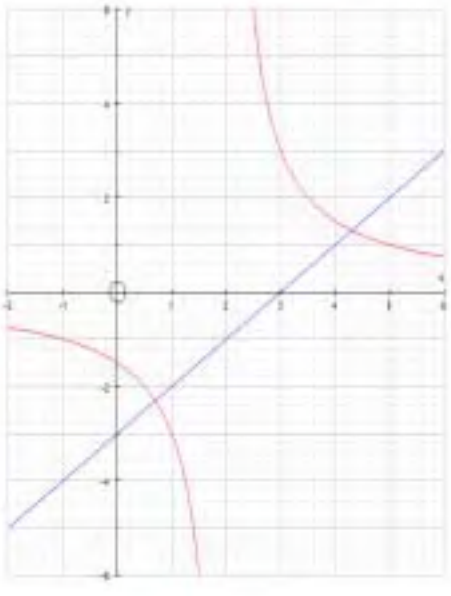
UNIVERSITY of CAMBRIDGE
International Examinations

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

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

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 30×18 **[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]**

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

13	(a)		2	**B1** for reasonable shape with each part of graph in approximately the correct place. One branch above and one branch below x-axis Top branch not touching y-axis Bottom branch cutting y-axis Penalty of 1 if branches connected.
	(b)	$x = 2, y = 0$	**B1 B1 ft**	ft $\frac{3}{x} - 2$ only $x = 0, y = -2$
	(c)	Line on graph	**1**	Ruled line must have positive gradient and negative y-intercept
	(d)	(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)	**B1** **B1**	ft $\frac{3}{x} - 2$ only (–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…) **[7]**