UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the May/June 2011 question paper

for the guidance of teachers

0607 CAMBRIDGE INTERNATIONAL MATHEMATICS

0607/42   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.

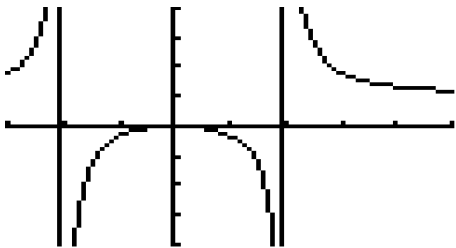Mark schemes must be read in conjunction with the question papers and the report on the examination.

* Cambridge will not enter into discussions or correspondence in connection with these mark schemes.

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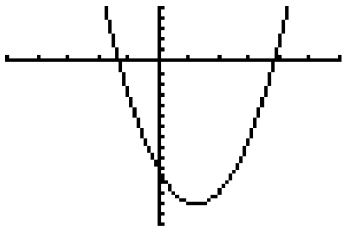
UNIVERSITY *of* **CAMBRIDGE**
International Examinations

1	(a)	(i)	$4620 \div 20$ $\times 7$ oe	M1 M1	Either order for the M's. 231 or 32340 imply M1 Also M2 for $1617 \div 7 \times 20 = 4620$ oe or $\dfrac{7}{20}$ of $4620 = 1617$
		(ii)	9.63 $(9.627….)$	B3	If B0, M2 for $(1617 - 1475) \div 1475$ $(\times 100)$ oe M1 for $1617 - 1475$ soi (142) or $\dfrac{1617}{1475}$
	(b)		4389	B2	Accept 4390. If B0, M1 for 4620×0.95 oe
	(c)		700	B3	If B0, M2 for $1155 \div 1.65$ oe M1 for $165\% = 1155$ **[10]**
2	(a)	(i)	Translation $\begin{pmatrix} -7 \\ 3 \end{pmatrix}$	B1 B1	B's independent Accept other notation for vector.
		(ii)	Reflection $x = 3.5$	B1 B1	B's independent
	(b)		Quadrilateral with vertices $(-1, -7)$, $(5, -4)$, $(2, -1)$, $(-1, -1)$	B2	B1 for three correct vertices
	(c)		Similar	B1	**[7]**
3	(a)	(i)	7	B1	
		(ii)	52	B1	
		(iii)	3	B1	
		(iv)	14	B1	
	(b)	(i)	88	B1	
		(ii)	15	B1	
	(c)		0.4 oe	B1	
	(d)		$\dfrac{37}{85}$	B2	B1 for $\dfrac{k}{85}$ $(k < 85)$ (0.435 or 0.4352 to 0.4353) **[9]**
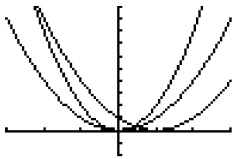
4 (a) (i)	32	B2	If B0, M1 for $80 \div 2.5$	
(ii)	15 07 ft	B2 ft	ft is 15 06 28 + their **(i)**. Accept different notations of time. If B0, B1 for 12 (mins) or 720 (seconds)	
(b)	$(\cos (Q)) = \dfrac{80^2 + 100^2 - 130^2}{2 \times 80 \times 100}$	M2	M1 for correct implicit expression with 80, 100 and 130 but becomes M2 if answer is 91.79…	
	91.79….	A1	SC2 for 91.79… without working	
(c)	$0.5 \times 80 \times 100 \sin$ (91.8 or 91.78 to 91.79….) oe	M1	Must see method when only answer is 4000	
	4000 (3998. ….) ft	A1	SC1 for 3998. …. Without working	
(d) (i)	*PS* sketched with *S* labelled	B1	Can be freehand *S* just needs to be on *QR*.	
(ii)	68.2 to 68.22 cao	B1		
(iii)	$\dfrac{80}{\sin(\text{their}\textbf{(d)(ii)})} \times \sin 20$	M2	M1 for $\dfrac{QS}{\sin 20} = \dfrac{80}{\sin(\text{their}\textbf{(d)(ii)})}$	
	29.5 (29.46 to 29.47) ft www 3	A1 ft	ft $27.36 \div \sin$ (their **(d)(ii)**) **[14]**	
5 (a)	Positive	B1		
(b)	(4.5, 4.4)	B1 B1		
(c)	$0.719x + 1.16$ (0.7191…, 1.164….)	B2	B1 for $0.719x + c$ or $mx + 1.16$ If B0, SC1 for $0.72x + 1.2$	
(d) (i)	3	B1		
(ii)	$\dfrac{6}{90}$ oe ft	B3 ft	ft their **(d)(i)** if > 1 If B0, M1 for $\dfrac{\text{their }\textbf{(d)(i)}}{10}$ used with one other fraction, M1 for second fraction in form $\dfrac{j-1}{9}$ oe following first fraction $\dfrac{j}{10}$ oe in a product **[9]**	
6 (a)		B1 B1 B1 B1 B1	Branch to left of $x = -2$ (or close to it) and above *x*-axis Branch roughly correct shape between $x = -2$ and $x = 2$ and not above *x*-axis. Branch to right of $x = 2$ (or close to it) and above *x*-axis (Condone slight turning back up on outside branches) Outside branches approaching approx $y = 1$ i.e. not *x*-axis Centre branch approaching $x = -2$ and $x = 2$ Penalty of -1 (max) if branches joined	
(b)	$x = -2, x = 2$ $y = 1$	B1B1 B1		
(c)	(0, 0)	B1		
(d) (i)	$y \leq 0, y > 1$ oe	B1 B1	Allow words for inequality signs. Allow f(*x*) or *x* for *y*	
(ii)	Any *k* in the interval $0 < k \leq 1$	B1	Accept a correct inequality **[12]**	

7	(a)	(i)	1020 (1017 to 1018 ….)	B3	If B0, M1 for $4 \times \pi \times 6^2$ oe (144π or 452 to 452.50 and M1 for $\pi \times 12 \times 15$ (180π or 565 to 566 (M's indep) Allow 324π
		(ii)	10.2 (10.17 to 10.18….) ft	B1 ft	ft their **(i)** ÷ 100. Allow 3.24π
	(b)	(i)	2600 (2599 to 2602)	B3	If B0, M1 for $\frac{4}{3}\pi \times 6^3$ oe (288π or 904 to 905) and M1 for $\pi \times 6^2 \times 15$ (540π or 1695 to 1697) (M's indep) Allow 828π
		(ii)	1600 (1595 to 1597) ft	B3 ft	ft their **(b)(i)** × 0.61374 M1 their **(b)(i)** × 0.0193 (50.16 to 50.22). M1 for × 31.8 either order **[10]**
8	(a)		70, 80, 108 ft	B1B1 B2 ft	ft is $180 - 2(116 - q)$. If B0, M1 for angle $TDA = 36°$ft oe (may be on diagram)
	(b)	(i)	26	B1	
		(ii)	64	B1	**[6]**
9	(a)		2.57 (2.571….)	B4	If B0, M3 for $\dfrac{9}{\frac{5}{2}+\frac{4}{4}}$ or better (M2 for $\frac{5}{2}+\frac{4}{4}$, M1 for $\frac{5}{2}$ or $\frac{4}{4}$)
	(b)	(i)	$\dfrac{5}{x}+\dfrac{4}{x+2}$	B2	Allow correct single fraction, simplified or unsimplified if $\dfrac{5}{x}+\dfrac{4}{x+2}$ not seen. B1 for one correct fraction
		(ii)	$\dfrac{5}{x}+\dfrac{4}{x+2}=\dfrac{9}{4.5}$ oe	M1	
			$5(x+2)+4x=2x(x+2)$ oe $5x+10+4x=2x^2+4x$ $2x^2-5x-10=0$	M1 E1	Must be still equivalent to three terms (each part could be expanded) but could be all over common denominator Correctly established with at least one intermediate line and no errors or omissions
		(iii)	 oe	M1	oe fully correct substitution into formula $\dfrac{-(-5)\pm\sqrt{(-5)^2-4(2)(-10)}}{2(2)}$ or better allowing recovery of $(-5)^2$ and full line – can be implied by correct answer **If M0, or other GDC applications SC2 for – 1.31 and 3.81**
			−1.31, 3.81	A1A1	SC1 for −1.3 **and** 3.8 or −1.312 to −1.311 **and** 3.811 to 3.812 from M1 or M0.
		(iv)	1.31 (1.311 to 1.312) ft	B1 ft	ft 5 ÷ their positive answer in **(iii)** **[13]**

10 (a)	$250 \le d < 300$	B1	Condone absence of inequality signs
(b)	270.5 or 271 or 270	B2	If B0, M1 for at least two correct mid-values seen
(c) (i)	1.12	B1	
(ii)	0.1	B1	**[5]**
11 (a)	$y = \dfrac{6}{\sqrt{x}}$	B2	If B0, M1 for $\dfrac{k}{\sqrt{x}}$ oe $(k \ne 1)$
(b)	1 ft	B1 **ft**	ft only if inverse of square or direct of square root used in **(a)**
(c)	$\dfrac{36}{y^2}$ oe ft		ft only if inverse of square or direct of square root used in **(a)** so only two M's will be available k must be numerical
		M1 **ft**	Squaring correctly
		M1 **ft**	Multiplying or dividing out fractions correctly
		M1 **ft**	Dividing by y term correctly
			SC2 for $\left(\dfrac{k}{y}\right)^2$ oe
(d)	4 cao	B2	If B0, M1 for using $\dfrac{y}{2}$ in their expression oe (may use numbers) **[8]**
12 (a)	12.2 (12.24 to 12.25)	B3	If B0, M2 for $10^2 + 5^2 + 5^2$ (M1 for $10^2 + 5^2$ or $5^2 + 5^2$) Allow $5\sqrt{6}$
(b)	23.59 to 24.2 cao	B2	If B0, M1 for inv sin $\left(\dfrac{5}{\text{their (a)}}\right)$ or inv tan $\dfrac{5}{\sqrt{125}}$ or invcos $\left(\dfrac{\sqrt{125}}{\text{their (a)}}\right)$ oe
(c)	26.6 (26.56 to 26.57) cao	B2	If B0, M1 for inv tan $\dfrac{5}{10}$ oe **[7]**
13 (a)	4	B1	
(b)	–3 and 3	B1	
(c)		B1 B1 B1	Clear graph of $y = x^2$ Parabola vertex (1, 0) approx. Parabola inside first graph, vertex (0, 0) Condone the absence of labels if clear
(d) (i)	Translation $\begin{pmatrix} 1 \\ 0 \end{pmatrix}$	B1 B1	B's independent. Accept other forms of vector or in words.
(ii)	Stretch	B1	B's independent
	x-axis invariant, factor 2	B1 B1	or y-axis invariant **and** factor $\sqrt{2}$ **[10]**