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

0607/43 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.

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UNIVERSITY of CAMBRIDGE
International Examinations

1	**(a)**	510	**2**	**M1** for 0.85×600
	(b) (i)	12.5	**2**	**M1** for $\frac{17500}{20000} \times 100$ soi or $\frac{20000 - 17500}{20000}$
	(ii)	155 www 3	**3**	**M2** for $\frac{161.2}{1.04}$ oe **or M1** for 1.04 or 104 seen
	(c)	3000	**2**	**M1** for $\div 14 \times 5$ **[9]**
2	**(a) (i)**	125	**1**	
	(ii)	35	**1**	
	(b) (i)	35	**1**	
	(ii)	80 www 2	**2**	**M1** line extended from *R* parallel to *ST* **or** for line extended from *TS* parallel to *QP* **with** one extra angle found **or** extending *PQ* and one angle found
	(c) (i)	40	**2**	**M1** for recognising *OAT* or *OBT* = 90°
	(ii)	110	**2**	**M1** for 220° seen at centre **or** 70° seen as angle on circumference in alternate segment
	(iii)	9.40 (9.396 – 9.397)	**3**	**M2** for $2 \times 5 \times \sin 70°$ or $5^2 + 5^2 - 2.5.5\cos 140$ oe **or M1** for identifying correct trig ratio or implicit cosine formula oe **[12]**
3	**(a)**	9.95×10^{-5}	**1**	
	(b)	1.1×10^{-5}	**1**	
	(c)	9.9×10^{-5}	**2**	**M1** for figs 595 seen (can be implied by 9.92 or 9.916 to 9.917)
	(d)	1.05×10^{-4} or 1.06×10^{-4}	**3**	**M2** for $(1.0 \times 10^{-4}) \times 7 -$ their Σx **or M1** for $(1.0 \times 10^{-4}) \times 7$ soi or (sum of 6 values + *x*) ÷ 7 = 1.0×10^{-4} **[7]**

4	**(a)**	-1	**1**	
	(b)	$3, -3$	**2**	**B1** for 3, **B1** for -3
	(c)	$(x-2)^2 - 5$ or $(x-2)(x-2)-5$	**M1**	
		$x^2 - 2x - 2x + 4 - 5$	**A1**	$-4x$ can be allowed for $-2x - 2x$
	(d)	1	**2**	**B1** for $-4x - 1 = -5$ or better **or M1** for using intersection on reasonable sketch **[7]**
5	**(a) (i)**	13.4 (13.41 to 13.42)	**2**	**M1** for $18^2 - 12^2$ soi
	(ii)	48.1 or 48.2 (48.11 − 48.19)	**2**	**M1** for $\cos[A] = \frac{12}{18}$ oe
	(b)	Angle $FBE = \frac{1}{2}$ their **(a)(ii)**	**M1**	
		tan (their FBE or $\frac{1}{2}$ their **(a)(ii)**) = $\frac{\text{their (a)(i)}}{BE}$ oe	**M1**	
		BE = 29.95 to 30.05 **at least 4 figs**	**A1**	
	(c)	art 32.8 or 32.9	**2**	**M1** for $[FB^2 =]$ their $13.4(16..)^2 + 30.0^2$ oe
	(d)	14.3 (14.28 to 14.30….)	**3**	**M1** for $20^2 + 30^2 - 2\times20\times30\cos(\frac{1}{2}$ their**(a)(ii)**$)$ **A1** for 204.1 to 204.6 **[12]**

6	**(a)**	Correct sketch	**3**	**B1** for two branches with correct shape **B1** for lower crossing y-axis at approximately $(0, -6)$ **B1** for upper crossing or touching x-axis to right of $(1, 0)$ and left of $(4, 0)$
	(b)	$x = 1$	**1**	
	(c)	$y \leq -5.83$ ($-5.828..$) $y \geq -0.172$ (-0.1716 to -0.1715)	**B1** **B1**	If **B0**, **SC1** for $y \leq -5.8$ and $y \geq -0.17$
	(d)	2, 3	**1**	
	(e)	Correct sketch	**2**	**B1** for straight line with positive gradient, **B1** for line crossing y-axis at approximately -2
	(f)	$(-1.414, -6.243)$ $(1.414, 2.243)$	**2**	**B1, B1** for each correct pair of co-ordinates If **B0** award **SC1** for answers given to other accuracy at least 2 or 4 or more decimal places **[11]**
7	**(a)**	4 www	**3**	**B1** for interest = 63 soi **M1** for correctly substituted simple interest formula oe **or** **M1** for $\frac{588}{525}$ **A1** for 112% soi
	(b)	14800	**3**	**M1** for 10000×1.05^n where n is an integer >1 oe **A1** for 14770 to 14780 **[6]**
8	**(a) (i)**	12	**1**	
	(ii)	5	**1**	
	(iii)	10	**1**	
	(b) (i)	Correct Venn diagram	**3**	**B1** for 0 in centre **B1** for 7, 2, 12 in correct positions **B1** for 5, 10, 4 in correct positions
	(ii)	40	**1ft**	ft from their Venn diagram **[7]**

9 (a)	2410 (2411 to 2414)	**2**	**M1** for $\pi \times 8^2 \times 12$
(b)	804 (803.8 to 804.4)	**3**	**M1** for $\pi \times 8^2$ (200.9 to 201.1) **M1** for $\pi \times 16 \times 12$ oe (602.8 to 603.3)
(c)	2.5 www 3	**3**	**M1** for $500 = \pi \times 8^2 \times h$ or better or $\frac{x}{500} = \frac{12}{\text{their (a)}}$ oe **A1** for 2.486 to 2.488 or 2.49
(d)	4	**2**	**M1** for scale factor $\sqrt[3]{\frac{1}{8}}$ oe **[10]**
10 (a)	29 www 2	**2**	**M1** for 18 or 47 seen
(b)	Frequency 4, 5, 10, 5, 6 Frequency density 1, 0.5, 0.5, 0.3	**2** **2ft**	**B1** for at least 3 correct ft from their frequency values **B1** for at least 2 correct ft
(c)	Correct histogram	**3ft**	**B1** for correct widths with vertical lines consistently placed from 9 to 10, 14 to 15 etc. **B2** for their heights ft dep on 5 columns **B1** for 3 or 4 heights ft dep on 5 cols **[9]**
11 (a)	$\frac{1}{4}$ (0.25, 25%)	**1**	
(b)	$\frac{1}{6}$ oe (0.167, 16.7%) www 2	**2**	**M1** for $\frac{2}{4} \times \frac{1}{3}$ oe
(c)	$\frac{1}{4}$ oe (0.25, 25%) www 3	**3**	**M2** for $\frac{3}{4} \times \frac{1}{3}$ oe or **M1** for $\frac{a}{b} \times \frac{1}{3}$
(d)	$\frac{1}{12}$ oe (0.0833…, 8.33…%) www 2	**2**	**M1** for $\frac{1}{4} \times \frac{1}{3}$ oe **[8]**

12 (a)	Correct quadrilateral drawn	**1**	
(b) (i)	Correct reflection	**1ft**	ft their **(a)**
(ii)	Correct translation	**2ft**	**SC1** for any other translation $\begin{pmatrix}2\\k\end{pmatrix}$ **or** $\begin{pmatrix}k\\-3\end{pmatrix}$
(iii)	Correct enlargement	**3ft**	**SC2** for other enlargement scale factor $\frac{1}{2}$ with correct orientation **or SC1** for any other enlargement centre (0,0) **[7]**
13 (a)	$\frac{x}{360}\times\pi\times10^2$ or better	**2**	**M1** for $\frac{x}{360}$ used **SC1** for $\frac{360-x}{360}\times\pi\times10^2$ or better
(b)	$0.5\times10\times10\times\sin x$ or better	**2**	**M1** for expression from more complicated method
(c)	$\frac{x}{360}\times\pi\times10^2-0.5\times10\times10\times\sin x$	**1ft**	Both expressions must have 10 (not just *r*) for the radius
(d)	their (b) = 25 $\sin x=\frac{1}{2}$ oe $x=180-30$ oe	**M1** **A1** **E1**	ft**M1** for equating their area of triangle to 25 **SC2** for $0.5\times10\times10\sin150$ (or $50\sin150$) = $50\times0.5=25$
(e)	106 (105.8 – 105.9….)	**2ft**	ft from their **(c)** (or their **(a)** – **(b)**) if working seen. Could re-start. ft only if answer positive **M1** ft for 150 substituted in their **(c)** (or their **(a)** – **(b)** or re-start) **[17]**
14 (a)	Sketch drawn	**1**	Allow freehand
(b)	3.4(0) (3.402 − 3.403) www 4	**4**	**M3** for $r=\frac{2}{\sin 36}$ or $\frac{4\sin 54}{\sin 72}$ or $\sqrt{\frac{8}{1-\cos 72}}$ oe i.e explicit expression **or M2** for correct implicit expression **If M0, B1** for 72, 36, 54 or 108 seen in correct position **[5]**