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

0580 MATHEMATICS

0580/31 Paper 3 (Core), maximum raw mark 104

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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Abbreviations

cao	correct answer only
cso	correct solution only
dep	dependent
ft	follow through after error
isw	ignore subsequent working
oe	or equivalent
SC	Special Case
www	without wrong working
soi	seen or implied

Qu.	Answers	Mark	Part Mark
1 (a)	950	**2**	**M1** for 2000 ÷ (19 + 21)
(b)	7 cao	**2**	**M1** for $\frac{265}{37}$ seen oe e.g. adding up 37s
(c)	66	**3**	**M1** for 54 seen **M1** indep for 80 seen Or **M2** for $\frac{33}{100} \times 200$ or **M1** for $\frac{67}{100} \times 200$
(d)	41	**4**	**M1** for (500 × 1.04) × (1.04) oe **A1** for 540.8 **M1** dep for 'their 540.8' – 500 **B1** ft for 'their 40.8' rounded to 41 Alt Method **M1** for [500 + (500×0.04)] × 0.04 **M1** dep 'their 20' + 'their 20.8' **A1** for 40.8 **B1** ft for 'their 40.8' rounded to 41
2 (a) (i)	Image at (–5,2), (–2,2), (–2,4), (–3,4), (–3,3), (–5,3)	**2**	**B1** correct reflection in $x = k$, $k \neq 0$ **SC1** for totally correct reflection in x axis
(ii)	Image at (2,4), (2,6), (–1,6), (–1,5), (1,5), (1,4)	**2**	**SC1** for 180° rotation not about (2,4)
(iii)	Image at (1,1), (3,1), (3, –1), (7, –1), (7, –3), (1, –3)	**2**	**SC1** for correct size and orientation
(b) (i)	Reflection, $y = 0$ or x axis	**1ft, 1ft**	Ft their (a)(i)
(ii)	Translation, $\begin{pmatrix} 4 \\ 8 \end{pmatrix}$	**1ft, 1ft**	Strict ft Allow 4 right and 8 up

3 (a) (i)	$\frac{1}{6}$ oe	**1**	Accept 0.167 or 16.7**%** or better
(ii)	$\frac{2}{6}$ oe	**1**	Accept $\frac{1}{3}$ or 0.333 or 33.3**%** or better
(iii)	1	**1**	Accept "one" or 100**%**
(b)	(2,2,2), 4,4,4,4,5,5,7,7,9 seen on spinner	**3**	**B1** for 4,4,4,4 seen **B1** for 5,5 AND 7,7 seen **B1** for ONE 9 seen.
(c)	Felix's probability is $\frac{3}{12}$ which is less than Jon's probability (of $\frac{2}{6}$) which is $\frac{4}{12}$ oe	**1**	Accept equivalent reasoning
(d) (i)	(90°, 120°, 30°), 72°, 48°	**3**	**M1** for $\frac{360}{60}$ × f for one 'Number' correct **A1** for 1 correct answer If zero scored **SC1** for their two answers totalling 120°
(ii)	30° angle correct 72°, 48°	**1** **1ft**	
(iii)	4	**1**	
(iv)	4.85	**3**	**M1** 2 × 15 + 4 × 20 + 5 × 5 + 7 × 12 + 9 × 8 (allow 1 error) **M1** dep for their $\frac{\Sigma fx}{60}$
4 (a)	If x is more than 11 then $11 - x$ would be negative oe	**1**	
(b)	$14 + 4x$ cao accept $2(2x + 7)$	**2**	**M1** for $2x + 3 + 11 - x + 3x$
(c) (i)	4.5 cao	**3**	**B1**ft for "their (b)" = 32 **M1**ft for collecting their like terms correctly to give simplified expression of form $ax = b$ OR **M1**ft $x = \frac{b}{a}$
(ii)	6.5	**2ft**	**M1**ft for clear attempt at substituting their (c)(i) into 2 or more sides of triangle

5 (a)	Correct diagram: 4 rows & 6 columns	**1**	
(b)	35	**1**	
(c) (i)	$n + 2$ cao	**1**	
(ii)	$n(n + 2)$ oe	**1 ft**	Ft 'their (c)(i)' × n if (c)(i) linear
(iii)	440	**1 ft**	Ft substitution of 20 into 'their (c)(ii)'
6 (a)	2 cao	**2**	**M1** for $(\frac{\text{change in } y}{\text{change in } x})$ with their values
(b)	$–0.5x + 6$	**2**	**B1** for $(y =) –0.5x + k$ or $jx + 6$ $(j \neq 0)$
(c)	1:4	**2**	**M1** for 3:12 **SC1** for final answer of 4:1 or –1:4 or 1:–4
(d)	25°–29°	**1**	
(e)	(Corresponding) angles equal oe (Corresponding) lengths in same ratio oe	**2**	
(f)	45	**3**	**B1** for '6' and '15' or '6.5–6.9' and '13.2–13.6' seen **M1** for 0.5 × 6 ×15 or 0.5 × "6.7" × "13.4"
(g) (i)	D correctly marked on grid	**1**	
(ii)	(9, –6)	**1ft**	Ft their point D
7 (a) (i)	10	**1**	
(ii)	Toni passes Poppy oe	**1**	E.g. They are both half way between café and home.
(iii)	18	**2**	**M1** for 3km in 10 mins oe seen or $\frac{3}{10}$ or $\frac{1.5}{5}$ or $\frac{3}{\frac{1}{6}}$
(b) (i)	Straight line (10.30, 3) to (10.50, 3) Straight line (10.50, 3) to (11.10, 5)	**1** **1**	**SC1** for (10.30,3) to (10.50,5) on its own
(ii)	Straight line (10.50, 3) to (10.55, 1.5) Straight line (10.55, 1.5) to (11.15, 0)	**1** **1**	
(iii)	7.2 cao	**3**	**B1** Correct time seen from their diagram **M1**ft $(\frac{3}{\text{'their 25'}}) \times 60$ oe

8 (a) (i)	170	**1**	
(ii)	130	**2**	**M1** $50^2 + 120^2$
(b)	5	**1ft**	Ft is $\frac{\text{'their (a)(i)'}}{34}$
(c)	**Said** by **1.5** secs	**3ft**	**M1**ft $\frac{\text{'their (a)(ii)'}}{4}$ (= 32.5) **M1**ft $34 - \frac{\text{'their (a)(ii)'}}{4}$ (34 – 32.5)
(d) (i)	67.4°	**2**	**M1** 'tan'$=\frac{120}{50}$ or 'sin'$=\frac{120}{\text{their } 130}$ or 'cos'$= \frac{50}{\text{their } 130}$
(ii)	113° or 112.6°	**1ft**	180 – 'their (d)(i)'
(e)	6×10^{-3}	**4**	**M1** '50' × '120' figs seen in area calculation **A1** for 6000 seen (implied by 0.006 later) **M1** for dividing by 1000^2, 0.05 & 0.12 seen or $\times 10^{-6}$ oe somewhere **B1** ft from 'their 0.006' provided SF power is –ve Or **SC1** for 0.6×10^{-2} oe
9 (a) (i)	226 to 226.224 **cm³**	**3**	**M1** $\pi \times 3^2 \times 8$ **B1** for units : cm³
(ii)	8 cao www	**4**	**B1** 1500 used **M1**ft $\frac{3}{4}$ × their (a)(i) **M1**ft $\frac{\text{their } 1500}{\frac{3}{4} \times \text{their (a)(i)}}$
(b)	5.09 (5.092 to 5.10)	**2**	**M1** $\frac{16}{\pi}$
(c)	148 cm²	**3**	**M2** for $2 \times 4 \times 5 + 2 \times 4 \times 6 + 2 \times 5 \times 6$ **SC1** for $2 \times 4 \times 5$ oe or $4 \times 5 + 4 \times 6 + 5 \times 6$ implied by 40, 48, 60 or 74, or list of 20, 20, 24, 24, 30, 30
(d) (i)	*mv* oe	**1**	
(ii)	*msv* oe	**1ft**	Ft (d)(i) × *s*
(iii)	1000 *msv* oe	**1ft**	Ft (d)(ii) × 1000