UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the October/November 2011 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

Qu.	Answers	Mark	Part Marks
1	**(a)** 25 000 000 cao	1	
	(b) $0.6 < 65\% < \frac{2}{3}$	1	
	(c) 20%	3	**B1** for 50 seen **M1** for $\frac{\text{their } 50}{250} \times 100$ or **B1** for 0.8 or 80 seen **M1** for 1 – their 0.8 or 100 – their 80
	(d) **(i)** 30	1	
	(ii) 40	2	**M1** for 360 – (90 + 150) implied by 120 seen
2	**(a)** $1.5(0) \times 10^2$ cao	1	
	(b) 100 cao	1	
	(c) 2 hours 15 minutes cao	1	
	(d) 16(:) 25 (pm) or (0)425 **pm**	2	**M1** for 2.5 (oe), 2hrs 30 min
	(e) $145 \leq d < 155$	2	**B1** for each value in correct place
3	**(a)** **(i)** 36, 10	1	
	(ii) 29, 41, 13 any two	2	**B1** for each
	(iii) 36	1	
	(iv) 45, 15, 10 any two	2	**B1** for each
	(b) **(i)** 27	2	**B1** for 36 + 29 + … + 13 seen implied by 189
	(ii) 29	2	**M1** for attempting to order the numbers
	(iii) 35 cao	1	
	(c) **(i)** $\frac{2}{7}$ oe	1	
	(ii) $\frac{3}{7}$ oe	1ft	Their denominator from **(c)(i)**

4	**(a) (i)** 70 cao	**1**	
	(ii) 1.11(11…)	**2**	**B1** for $100 \div 90$, $10 \div 9$, $1\frac{1}{9}$
	(b) (i) 15 cao	**1**	
	(ii) $(1500 - 15) \times 1.04$	**2**	**B1** for $\times 1.04$, 1560, 15.60
	(c) 561.92	**3**	**M1** for $1544.40 - 950 - 10$ (584.40) oe **M1** indep for $\div 1.04$
5	**(a)** $\frac{-4}{3}$ oe, –1.2 to –1.4	**2**	**B1** for attempt at $\frac{\text{rise}}{\text{run}}$
	(b) (i) 3, 2, 6	**3**	**B1** for each value
	(ii) Correct continuous line	**2ft**	Minimum length (0,3) to (6,0) **B1** for plotting their 3 points
	(c) $x = -2$, $y = 4$	**2ft**	**B1** for their x, **B1** for their y from their intersections
6	**(a) (i)** Correct construction	**2**	**B1** for two lines or **B1** for accurate arcs seen or **B1** for one correct line with two arcs **SC1** for $AC = 6$ and $BC = 7$ with arcs
	(ii) 47° (45 – 49)	**1ft**	**Strict** ft their **(a)(i)**
	(iii) Correct construction	**2ft**	Their **(a)(i) B1** for accurate arcs no line or **B1** for accurate line drawn no arcs or **B1** for accurate line with arcs bisecting another angle
	(iv) 4 (3.8 – 4.2)	**1ft**	**Strict** ft their **(iii)** with intersection on opposite side of triangle
	(v) Correct construction	**2ft**	**B1** for accurate arcs no line or **B1** for accurate line drawn no arcs or **B1** for accurate line with arcs, bisecting AB or AC
	(vi) Correct region shaded	**1ft**	ft is for boundaries of correct perpendicular bisector of **their *BC*** and correct angle bisector of **their *ABC***, with or without arcs
	(b) (i) Correct scale drawing of PQ	**2**	**B1** for accurate angle 40°, **B1** for PQ 8cm
	(ii) Correct scale drawing of their QR	**2**	**B1** for accurate angle 160°, **B1** for QR 6cm
	(iii) 35 to 37	**1ft**	Measure $\times 5$ $\pm$ 1km
	(iv) 264 to 268	**1ft**	

7	**(a)** −6 www	**3**	**M2** for $8 = x + 6 + 8$ or better or $–x + 8 = 6 + 8$ or better **M1** for $2x + 8$ or $3x + 6$ or $3x + 14$
	(b) $\frac{3-b}{a}$ or $\frac{3}{a} - \frac{b}{a}$	**2**	**B1** for $3 – b$ seen or $z + \frac{b}{a} = \frac{3}{a}$
	(c) 3	**2**	**B1** for $\frac{54}{2}$ or better **SC1** for embedded answer ie $2 \times 3^3 = 54$ or $2 \times 3 \times 3 \times 3 = 54$
	(d) **(i)** $x + x + 2x − 5 + 2x − 5 = 6x – 10$	**2**	**M1** accept $2x + 2(2x – 5)$ or $2(x + 2x – 5)$ **E1** dep
	(ii) 10	**2**	**M1** for $6x – 10 = 50$
8	**(a)** Translation $\begin{pmatrix} 0 \\ -6 \end{pmatrix}$	**2**	**B1** for translation **B1** for column vector
	(b) Correct line drawn	**1**	Continuous full line. Accept freehand.
	(c) **(i)** Correct reflection	**1ft**	Their **(b)**
	(ii) Correct enlargement	**2**	**B1** for any other enlargement scale factor 2
9	**(a)** $3x(x + 4)$	**2**	**B1** for $3(x^2 + 4x)$ or **B1** for $x(3x + 12)$ or **B1** for $3x(x + 4)$ seen (if not final answer)
	(b) 20	**2**	**B1** for 8 or 12 seen
	(c) $6x^7$	**2**	**B1** for kx^7 or for $6x^k$, $k \neq 0$
10	**(a)** 5.4 cao	**3**	**M1** for $2^2 + 5^2$ ($= x^2$) implied by 29 **A1** 5.38(51..) or $\sqrt{29}$ or 5.39 **B1** indep for rounding their answer to 1 decimal place
	(b) 5	**2**	**M1** for $0.5 \times 5 \times 2$ oe
	(c) 50	**1ft**	$10 \times$ their **(b)**
	(d) 134	**3ft**	**M2** for $2 \times$ their **(b)** $+ 10 \times$ their **(a)** $+ 2 \times 10 + 5 \times 10$ or better **M1** for any 3 faces correct
	(e) 301.5(0)	**1ft**	Their **(d)** $\times$ 2.25
11	**(a)** Correct shape drawn	**1**	
	(b) 16, 21, 26	**3**	**B1** for each **SC1** "their 16" + 5 **SC1** "their 21" + 5
	(c) 41	**1**	
	(d) $5n + 1$	**2**	**B1** for $5n$, **B1** for $+1$
	(e) 501	**1ft**	Their **(d)** if linear
	(f) 13	**2ft**	Their **(d)** if linear **B1** for their **(d)** = 66