UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the May/June 2010 question paper for the guidance of teachers

0580 MATHEMATICS

0580/22

Paper 22 (Extended), maximum raw mark 70

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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Qu.	Answers	Mark	Part Marks
1	(a) 1	1	Allow none
	(b) 1	1	
2	0	2	M1 4sin ³ 120 evaluated and rounding to 2.6 or
			better (2.598) or $\frac{3\sqrt{3}}{2}$
3	$2-\sqrt{3}$, $2-\frac{\sqrt{3}}{2}$, $\frac{2}{\sqrt{3}}$, $\sqrt{3}$	2	M1 correct decimals seen
4	$\frac{15a+32}{40}$ oe	2	B1 15 <i>a</i> + 32 seen
			or SC1 $\frac{15a}{40} + \frac{32}{40}$ on answer line
5	2 ¹⁰	2	$\mathbf{M1} \ 2^6 \text{ or } 2^{-4} \text{ seen}$
6	6.4×10^7	2	M1 $64 \times 100^2 \times 10^2$ or 64 000 000 oe
7	$(A \cup B \cup C)' (A \cup C)' \cap B$	1 1	or $A' \cap B' \cap C'$ or $A' \cap (B \cup C)'$ or $A' \cap C' \cap B$
8	(a) 43 to 47	1	
	(b) 64 to 68	2	SC1 23 to 27
9	63.84 <u>cao</u>	3	M1 figs 1995 M1 32 × their lower bound
10	$x = \frac{3}{P - 1}$	4	M1 for each of the four moves completed correctly
11	(a) 10(.0)	1	
	(b) 9.80	3	M2 $\sqrt{(\mathbf{a})^2 - 2^2}$ or M1 PT ² + 2 ² = $(\mathbf{a})^2$
12	(a) 440	2	M1 sin 37.1 or cos 52.9 = $\frac{h}{730}$ oe
	(b) 3 min 20 sec	2	M1 $\frac{730}{3.65}$
13	(a) $\begin{pmatrix} 6x-3\\4x+5 \end{pmatrix}$ but not $\begin{pmatrix} 6x & -3\\4x & (+)5 \end{pmatrix}$	2	B1 $6x - 3$ or B1 $4x + 5$ in a (2×1) matrix on answer line
	(b) $(6x^2 + x + 5)$ cao	2	M1 any 1 × 1 matrix in answer space
14	R	4	Mark the position of the letter R (or the worst unshaded region if R is missing) as follows 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 2 3 4 1 3 4 1 4 1 4 1 4 1 4 1 4 1 4 1 4 1

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15	(a) (2, 4)	1	
	(b) (6, 0)	1	
	(c) (i) (4, 2) ft	1 ft	From (a) and (b)
	(ii) $y = -3x + 14$ oe	2	M1 sub their (c)(i) into $y = -3x + c$ oe
16	$16\frac{1}{4}$ or 16.3	5	M1 finding the area under graph A1 130
	4		$\mathbf{M1} \ \frac{1}{2} \times 16 \times v$
			M1 equating and solving
17	(a) 201	2	M1 $\pi \times 8^2$
	(b) 87.9 or 88.0	4	$\mathbf{M1} \ \frac{45}{360} \times 2 \times \pi \times 12 \ \dots d$
			$\mathbf{M1} \ 2 \times \pi \times 8 \dots e$
			M1 ft for their $(4d + e)$ which must come from
			multiples of π SC2 43.9 or 44.0
10	(-) (2) 11	1	SC2 13.7 01 11.0
18	(a) (i) 11	1	
	(ii) $1-6x$	2	M1 $3(1-2x)-2$
	(b) -1.65, 6.65	4	M1 $\frac{5 \pm k}{2}$ M1 $\sqrt{(-5)^2 - 4 \times 1 \times (-11)}$
			or better
			A1 A1
19	(a) 6, 30, 70	2	B1 for 2 correct
	(b) graph	3	P2 7 plots correct from table
			P1 5 or 6 plots correct from table
			C1 smooth curve through the points in the given range within one small square of the plots or the correct position
	(c) 82.5 or ft ±1	1 ft	
	(d) 108 or ft ±1	1 ft	