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

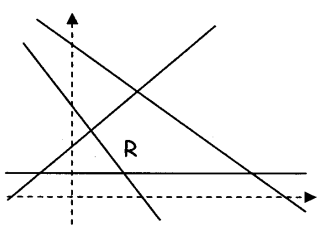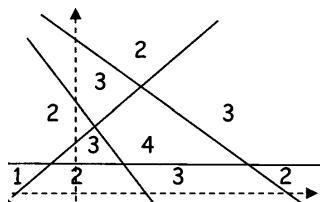0580/22   Paper 22 (Extended), maximum raw mark 70

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** $4\sin^3 120$ evaluated and rounding to 2.6 or better (2.598…) or $\dfrac{3\sqrt{3}}{2}$
3	$2 - \sqrt{3}$, $2 - \dfrac{\sqrt{3}}{2}$, $\dfrac{2}{\sqrt{3}}$, $\sqrt{3}$	2	**M1** correct decimals seen
4	$\dfrac{15a + 32}{40}$ oe	2	**B1** $15a + 32$ seen or **SC1** $\dfrac{15a}{40} + \dfrac{32}{40}$ on answer line
5	2^{10}	2	**M1** 2^6 or 2^{-4} seen
6	6.4×10^7	2	**M1** $64 \times 100^2 \times 10^2$ or 64 000 000 oe
7	$(A \cup B \cup C)'$	1	or $A' \cap B' \cap C'$ or $A' \cap (B \cup C)'$
	$(A \cup C)' \cap B$	1	or $A' \cap C' \cap B$
8	**(a)** 43 to 47	1	
	(b) 64 to 68	2	**SC1** 23 to 27
9	63.84 **cao**	3	**M1** figs 1995 **M1** $32 \times$ their lower bound
10	$x = \dfrac{3}{P - 1}$	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 $\cos 52.9 = \dfrac{h}{730}$ oe
	(b) 3 min 20 sec	2	**M1** $\dfrac{730}{3.65}$
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		4	Mark the position of the letter R (or the worst unshaded region if R is missing) as follows

15	(a) (2, 4)	1	
	(b) (6, 0)	1	
	(c) (i) (4, 2) ft	1ft	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 **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	**M1** $\frac{45}{360} \times 2 \times \pi \times 12$ ….. d **M1** $2 \times \pi \times 8$ ……………..e **M1 ft** for their (4d + e) which must come from multiples of π **SC2** 43.9 or 44.0
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	1ft	
	(d) 108 or ft ±1	1ft	