

**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.

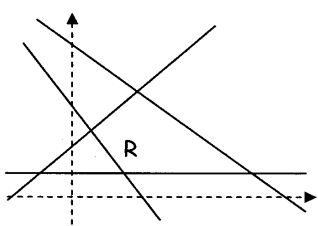
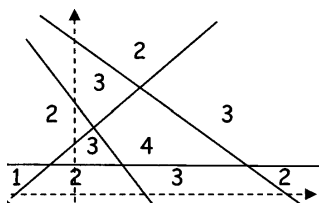
Mark schemes must be read in conjunction with the question papers and the report on the examination.

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Qu.	Answers	Mark	Part Marks
1	(a) 1 (b) 1	1 1	Allow none
2	0	2	M1 $4\sin^3 120$ 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 $15a + 32$ seen or SC1 $\frac{15a}{40} + \frac{32}{40}$ 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	$(A \cup B \cup C)'$ $(A \cup C)' \cap B$	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 (b) 64 to 68	1 2	SC1 23 to 27
9	63.84 cao	3	M1 figs 1995 M1 $32 \times$ their lower bound
10	$x = \frac{3}{P-1}$	4	M1 for each of the four moves completed correctly
11	(a) 10(.0.) (b) 9.80	1 3	M2 $\sqrt{((a)^2 - 2^2)}$ or M1 $PT^2 + 2^2 = (a)^2$
12	(a) 440 (b) 3 min 20 sec	2 2	M1 $\sin 37.1$ or $\cos 52.9 = \frac{h}{730}$ oe M1 $\frac{730}{3.65}$
13	(a) $\begin{pmatrix} 6x-3 \\ 4x+5 \end{pmatrix}$ but not $\begin{pmatrix} 6x & -3 \\ 4x & (+)5 \end{pmatrix}$ (b) $(6x^2 + x + 5)$ cao	2 2	B1 $6x - 3$ or B1 $4x + 5$ in a (2×1) matrix on answer line 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 

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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	