

**MARK SCHEME for the May/June 2011 question paper**  
**for the guidance of teachers**

**0580 MATHEMATICS**

**0580/22**

Paper 2 (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.

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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 Mark
1	53.1	2	<b>B1</b> $C = 36.9$ seen, must have $C$ stated or marked on the diagram or <b>M1</b> $\sin A = \frac{4}{5}$ or $\tan A = \frac{4}{3}$ but must have $A$ stated
2	$\sqrt{3} + \sqrt{6}, \pi$	2	–1 for each error or omission
3	Working must be shown	2	<b>M1</b> $\frac{14}{9}$ and $\frac{16}{9}$ <b>M1</b> $\frac{14}{16} = \frac{7}{8}$ oe or visible cancelling
4	$0.8^2$	2	<b>M1</b> conversion of $\frac{16}{27}$ ( $= 0.5(9\dots)$ ) and $0.8^2$ ( $= 0.64$ ) to decimals seen
5	(6)€ or euros (with correct working)	2	<b>M1</b> one of $6 \times 1.9037$ or $11.5 \div 1.9037$ or $11.5 \div 6$ seen
6	3.322 cao	2	<b>B1</b> 3.3219(...) or 3.32(20) seen
7	$1.85 \times 10^4$	3	<b>B2</b> 18500 oe seen or <b>M1</b> $4x = 74000$ or $x = 2 \times 10^4 - 1.5 \times 10^3$
8	16	3	<b>M1</b> $p = k\sqrt{q}$ <b>A1</b> $k = 1.6$ or $8/5$
9	1275, 1425	3	<b>B1</b> 85 or 95 or 0.85 or 0.95 <b>M1</b> their LB or UB $\times 1500$ where $85 \leq \text{LB} < 90$ $90 < \text{UB} \leq 95$
10	(a) (0)700 or 7 am (b) 1700 or 5 pm	2 1	<b>M1</b> $100 - (5 \times \text{their}(22 - 6) + \text{their}(13 - 8))$ or better soi
11	$\frac{4+bc}{c}$ or $\frac{4}{c} + b$ cao	3	<b>M1</b> correct move completed <b>M1</b> second correct move completed <b>M1</b> third correct move completed
12	$x = 1$ $y = 0.2$ or $\frac{1}{5}$ only	3	<b>M1</b> consistent mult and add/subtraction <b>A1</b> one value correct after <b>M</b> awarded
13	(a) 72 (b) 36 (c) 54	1 1 2ft	ft 90 – (b) <b>M1</b> $POQ = 108$

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14	(a) 84	1	
	(b) 15	1	
	(c) 6.28	2	<b>M1</b> $\frac{120}{360} \times 2 \times \pi \times 3$ oe
15	$\frac{1-3x}{(x+1)(x+5)}$ www	4	<b>M1</b> $(x+1)^2 - x(x+5)$ oe <b>B1</b> $x^2 + x + x + 1$ <b>B1</b> denominator(s) $(x+1)(x+5)$ or $x^2 + 6x + 5$
16	(a) $\frac{1}{2}a - \frac{1}{2}c$ oe	2	<b>M1</b> correct but unsimplified e.g. $\frac{1}{2}a + -\frac{1}{2}c$
	(b) $\frac{3}{4}a + \frac{3}{4}c$ oe	2	<b>M1</b> correct but unsimplified
17	(a) $4x^{-24}$ or $\frac{4}{x^{24}}$	2	<b>B1</b> $4x^n$ <b>B1</b> $\frac{k}{x^{24}}$ or $kx^{-24}$ for any numerical $k, n$
	(b) $\frac{x^2}{16}$	2	<b>B1</b> $\frac{x^2}{k}$ or <b>B1</b> $\frac{x^n}{16}$ <b>SC1</b> $(\frac{x}{4})^2$
18	(a) (6, 1½)	1	
	(b) $y = -\frac{1}{5}x + 4$ oe	3	<b>B1</b> correct numerical format <b>B1</b> correct $m$ <b>B1</b> correct $c$
19	(a) 8	1	
	(b) $4x - 9$	2	<b>M1</b> $2(2x - 3) - 3$ seen
	(c) $2^{2(x+1)}$ or $2^{2x+2}$ or $4^{x+1}$	2	<b>M1</b> $(2^{x+1})^2$ seen
20	(a) (i)	2	<b>B1</b> correct line <b>B1</b> 2 sets of correct arcs
	(ii)	2	<b>B1</b> correct line <b>B1</b> two sets of correct arcs
	(b)	1	correct region, shaded or shown by the letter R
21	(a) (i) (0) brackets essential	2	<b>M1</b> $6 \times 2 + 3 \times -4$ or $12 + -12$
	(ii) $\begin{pmatrix} 12 & 18 \\ -8 & -12 \end{pmatrix}$	2	<b>M1</b> any $2 \times 2$ matrix with 2 elements correct
	(b) $\frac{1}{2} \begin{pmatrix} 1 & -1 \\ -1 & 3 \end{pmatrix}$	2	<b>B1</b> $\frac{1}{2} \begin{pmatrix} a & c \\ b & d \end{pmatrix}$ seen or <b>B1</b> $k \begin{pmatrix} 1 & -1 \\ -1 & 3 \end{pmatrix}$ seen