

**MARK SCHEME for the May/June 2012 question paper
for the guidance of teachers**

0580 MATHEMATICS

0580/21

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.

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

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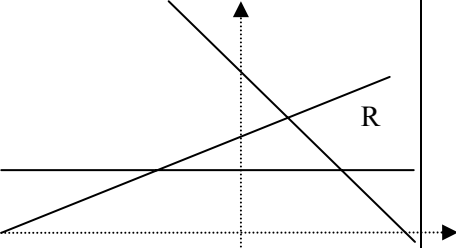
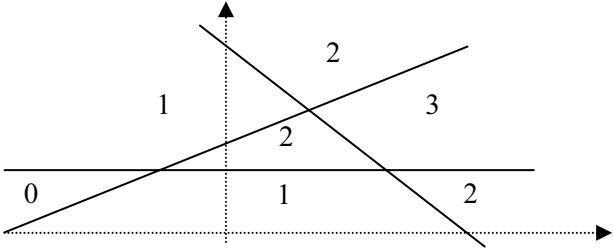
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Abbreviations

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
soi	seen or implied

Qu	Answers	Mark	Part marks
1	(a) 9486000	1	
	(b) 9.486×10^6	1ft	
2	495.36	2	M1 for $700 \div 1.4131$
3	$3p(5p + 8t)$ final answer	2	B1 for answer of $3(5p^2 + 8pt)$ or $p(15p + 24t)$ or SC1 for correct answer seen in working
4	$\tan 25 < \sqrt{0.22} < 0.47 < \frac{8}{17}$	2	M1 correct conversion to decimals 0.466, 0.469, 0.471
5	23.2	2	M1 for $\sin 53.2 = \frac{x}{29}$ implicit form or better
6	7	2	M1 $\frac{8+4+8+9+y}{5} = 7.2$ oe
7	30.7975 cao	2	M1 6.35 and 4.85 seen
8	9	2	M1 $125 = 5^3$
9	(a) angle of 67° at B	1	B1 C marked on AD unless the line stops at AD and also correct ruled line
	(b) perpendicular bisector of AB	2	B1 correct arcs B1 correct ruled line
10	843.75	3	M2 for $\frac{750 \times 5 \times 2.5}{100} + 750$ oe or M1 for $\frac{750 \times 5 \times 2.5}{100}$ oe or SC2 for answer 93.75

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11	$x = -7$ $y = 9$	3	M1 for consistent multiplication and addition/ subtraction as appropriate. Allow computational errors A1 for $x = -7$ or $y = 9$
12	$\frac{55}{30} + \frac{27}{30}$ oe or (1) $\frac{25}{30} + \frac{27}{30}$ oe $\frac{82}{30}$ oe or (1) $\frac{52}{30}$ oe $2\frac{11}{15}$ M2 must be scored	M1 M1 A1	for denominator of $30k$ for denominator of $30k$ dependent on previous M1 If M0 scored then SC1 for common denominator of $30k$ seen
13	1.92	3	M1 $y = \frac{k}{x^2}$ oe B1 for $k = 48$
14		3	
15 (a)	34.4	2	SC1 figs 344 seen
(b)	300	2	SC1 figs 3 seen
16 (a)	$\begin{pmatrix} -1 & 2 \\ 11 & 30 \end{pmatrix}$	2	B1 any two entries correct
(b)	$\frac{1}{26} \begin{pmatrix} 4 & -2 \\ 3 & 5 \end{pmatrix}$ oe	2	B1 $\frac{1}{26} \begin{pmatrix} a & b \\ c & d \end{pmatrix}$ or $k \begin{pmatrix} 4 & -2 \\ 3 & 5 \end{pmatrix}$
17	$w = \frac{4-3c}{c-1}$ www	4	M1 clearing denominator and removing brackets M1 correctly collecting terms in w on one side only M1 factorising correctly M1 divide by coefficient of w
18 (a)	0.8	1	
(b)	1850	4	M1 for area = distance travelled M1 for two correct area statements M1 for complete correct area statement

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19	(a)	$-\mathbf{p} + \mathbf{t}$	1	
	(b)	$\mathbf{p} + 2\mathbf{t}$	2	M1 for a correct route from P to R or unsimplified answer
	(c)	$2(\mathbf{p} + \mathbf{t})$ or $2\mathbf{p} + 2\mathbf{t}$	2ft	M1 for OR or a correct route or ft $\mathbf{p} +$ their (b) unsimplified provided their (b) is a vector
20		64.8 to 64.9	6	M2 $5 \tan 78$ soi by 23.5 or M1 $\tan 78 = \frac{PT}{5}$ or $\frac{5}{\tan 12}$ or $\frac{5 \sin 78}{\sin 12}$ M2 $\frac{360 - 2 \times 78}{360} \times 2 \times \pi \times 5$ soi by 17.8 or M1 for $2\pi 5$ seen used M1 for their arc + 2 (their <i>PT</i>)
21	(a)	$\frac{1}{12}$	2	M1 $\frac{3}{3+2+4} \times \frac{2}{(\text{their } 9) - 1}$
	(b)	$\frac{5}{18}$	3	M2 $\text{their}(a) + \frac{4 \times 3}{\text{their } 72} + \frac{2(\times 1)}{\text{their } 72}$ or M1 $\frac{4 \times 3}{\text{their } 72}$ or $\frac{2(\times 1)}{\text{their } 72}$
	(c)	$\frac{5}{9}$	3	M2 $2 \times \frac{4}{3+2+4} \times \frac{5}{(\text{their } 9) - 1}$ or M1 $\frac{4}{3+2+4} \times \frac{5}{(\text{their } 9) - 1}$