

**MARK SCHEME for the October/November 2012 series**

**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 should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

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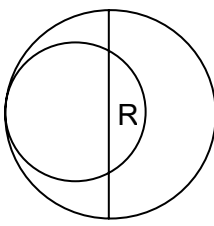
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### Abbreviations

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

Qu.	Answers	Mark	Part Marks
1	-16	2	<b>M1</b> for $4 \times 6.5$
2	[0].852 or $\frac{23}{27}$	2	<b>B1</b> for 85.56 or $\frac{2139}{25}$
3	(a) 3 (b) 4	1 1	
4	$\frac{17}{\frac{9}{5}}$ or $\frac{17}{9} \div \frac{5}{2}$  $\frac{17}{9} \times \frac{2}{5} = \frac{34}{45}$	<b>M1</b>  <b>M1</b>	$\frac{34}{\frac{18}{45}}$ or $\frac{34}{18} \div \frac{45}{18}$  $\frac{34}{18} \times \frac{18}{45} = \frac{34}{45}$
5	$a^{(1)} - b^{(1)}$ www cao	2	<b>M1</b> for $a^{\frac{1}{2}} a^{\frac{1}{2}} - a^{\frac{1}{2}} b^{\frac{1}{2}} + a^{\frac{1}{2}} b^{\frac{1}{2}} - b^{\frac{1}{2}} b^{\frac{1}{2}}$ oe
6	144	2	<b>M1</b> for $ABC = 72$ or $AOC$ reflex = 216 Angles must be fully stated or marked in correct place on diagram
7	16	2	<b>M1</b> for $768 \div 48$
8	543.19	3	<b>M2</b> for $500 \times 1.028^3$ oe or long method or <b>M1</b> for $500 \times 1.028^n$ , $n = 2$ or 4
9	$x \leq 39$ www	3	<b>M1</b> correct first move <b>M1</b> correct 2nd move <b>M1</b> correct move to answer line
10	70	3	<b>B1</b> 24.5 or 0.35 seen <b>M1</b> their LB $\div$ their UB
11	2.5	3	<b>M1</b> $R = k/d^2$ <b>A1</b> $k = 40$ or <b>M1</b> $Rd^2 = k$ <b>A1</b> $k = 40$
12	112 or 112.3 to 112.33	3	<b>M2</b> for $\pi \times 6^2 - \pi \times 0.5^2$ or <b>M1</b> for $\pi \times 6^2$ or $\pi \times 0.5^2$ seen

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13	$\begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}$ cao	3	M2 for $\begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$ $\begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}$ or B1 for one matrix seen
14	114.6 or 114.57(67027..) to 114.59(1155..)	3	M2 $2 \times \pi \times 4 \times x / 360 = 8$ or M1 $2 \times \pi \times 4 \times x / 360$ M2 $x/360 = 8/2\pi 4$ or B1 $8/2\pi 4$ or $2\pi 4/8$ seen
15	180 www	3	M1 $\frac{1}{2} \times 60 \times 14$ oe M1 their $420 - 4 \times 60$
16	$\frac{4y+2}{y-1}$ oe	4	M1 $xy - 4y = x + 2$ M1 collecting terms in $x$ on one side M1 factorising M1 dividing by coeff of $x$
17	(a)   (b)	2  1  1	B1 for correct line, on each side of $AB$ (longer than dash at $C$ ) B1 for 2 pairs of intersecting arcs  Intention to draw a full correct circle  R shaded must be a closed region
18	(a) $\frac{7}{25}$ or $\frac{84}{300}$ oe  (b) (i) 62  (ii) 52  (iii) 19 to 20  (iv) 125	1  1  1  1  2	       B1 for 175 seen
19	(a) $\begin{pmatrix} 17 & -32 \\ 16 & 1 \end{pmatrix}$  (b) $\begin{pmatrix} 10 & -8 \\ 4 & 6 \end{pmatrix}$  (c) 23 cao  (d) $\frac{1}{23} \begin{pmatrix} 3 & 4 \\ -2 & 5 \end{pmatrix}$	2  1  1  2	M1 any 2 entries correct     M1 $\begin{pmatrix} 3 & 4 \\ -2 & 5 \end{pmatrix}$ or $\frac{1}{23} \begin{pmatrix} a & b \\ c & d \end{pmatrix}$ seen (c)

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20	(a) 12	1	
	(b) $2x^3$ cao	2	<b>M1</b> clear evidence of adding 1 then multiplying by 4 to $g(x)$
	(c) $\sqrt[3]{2(x+1)}$ oe	3	<b>M1</b> each correct move
21	(a) triangle at (1, 1), (1, -1), (2, -1)	2	<b>SC1</b> triangle at (-1, -1), (-1, 1), (-2, 1)
	(b) triangle at (-1, -1)(1, -1), (1, -2)	2ft	correct or reflection of their triangle in $y = -x$
	(c) reflection in the $x$ axis	2	<b>B1</b> reflection <b>B1</b> $x$ axis or $y = 0$
		70	