

**CAMBRIDGE INTERNATIONAL EXAMINATIONS**

Cambridge International General Certificate of Secondary Education

**MARK SCHEME for the October/November 2014 series**

**0580 MATHEMATICS**

**0580/23**

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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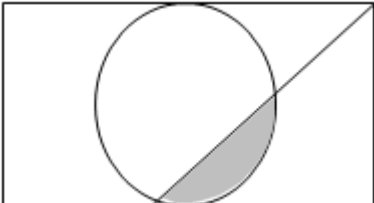
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### Abbreviations

cao	correct answer only
dep	dependent
FT	follow through after error
isw	ignore subsequent working
oe	or equivalent
SC	Special Case
nfww	not from wrong working
soi	seen or implied

Qu.	Answers	Mark	Part Marks
1	2870	2	<b>M1</b> for $350 \times 8.2$
2	0.34 $0.7^3$ $0.6^2$ $\sqrt{0.6}$	2	<b>M1</b> for decimal conversion: 0.7 [7...] or 0.8 for $\sqrt{0.6}$ and 0.36 for $0.6^2$ and 0.343 for $0.7^3$ or <b>B1</b> for three in the correct order
3	$2.4 \times 10^8$	2	<b>B1</b> for 240 000 000 oe or <b>B1</b> for $k \times 10^8$ or $2.4 \times 10^k$
4	30	2	<b>M1</b> for $2x + 3x + 4x + 90 = 360$ oe
5	48	2	<b>M1</b> for $52 \div 65$ [ $\times 60$ ] oe implied by 0.8
6	9.5 or $\frac{19}{2}$	3	<b>M2</b> for $2x = (8 \times 3) - 5$ or better oe or <b>M1</b> for $2x + 5 = 8 \times 3$ or better
7	160	3	<b>M2</b> for $180 - \frac{360}{18}$ or $\frac{180 \times (18 - 2)}{18}$ oe or <b>M1</b> for $180 \times (18 - 2)$ or $\frac{360}{18}$
8	$8 + (y - 2)^2$ oe final answer	3	<b>M1</b> for $y - 2 = \sqrt{x - 8}$ <b>M1</b> for squaring both sides completed correctly <b>M1</b> for adding <i>their</i> 8 completed correctly on answer line
9	4	3	<b>M2</b> for $6(3 + 5) = y(7 + 5)$ oe or <b>M1</b> for $y = \frac{k}{x + 5}$ oe <b>A1</b> for $k = 48$
10	13891.5[0]	3	<b>M2</b> for $12000 \times \left(1 + \frac{5}{100}\right)^3$ oe or <b>M1</b> for $12000 \times \left(1 + \frac{5}{100}\right)^n$ oe $n \geq 2$

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11 (a)	608 400 cao	2	M1 for $\frac{1}{4} \times 39^2 \times (39 + 1)^2$
(b)	$2n^2(n + 1)^2$ oe	1	
12 (a)	Complete circle centre <i>E</i> radius 3cm	1	
(b)	Correct ruled bisector with two pairs of correct arcs	2	B1 for correct bisector with no/wrong arcs
(c)		1	dep on attempt at bisector of <i>C</i> and enclosed region
13	$\frac{16x^2 + 18x + 9}{6x}$ final answer	4	M2 for 9 [+] $4x^2$ [+] $18x$ [+] $12x^2$ or better or M1 for 2 of these and M1FT for adding their four ‘numerators’ together correctly and B1 for denominator $6x$ to a maximum of 3 marks
14 (a)	$\frac{1}{2}\mathbf{b} - \frac{1}{2}\mathbf{a}$ oe	2	M1 for $\frac{1}{2}(\overrightarrow{AO} + \overrightarrow{OB})$ oe or correct unsimplified route e.g. $\overrightarrow{AO} + \overrightarrow{OB} + \overrightarrow{BP}$ or $-\mathbf{a} + \mathbf{b} + \frac{1}{2}\overrightarrow{BA} = -\mathbf{a} + \mathbf{b} + \frac{1}{2}(\mathbf{a} - \mathbf{b})$
(b)	$\frac{1}{4}\mathbf{a} + \frac{3}{4}\mathbf{b}$ oe	2	M1 for $\overrightarrow{OA} + \overrightarrow{AQ}$ oe or correct unsimplified route
15 (a)	19 2 1 8	2	B1 for any two correct
(b)	1 8 19 2	2FT	B2FT for a correct fit from (a) or B1FT for any two correct or for any correct two fit from (a)
16 (a)	64	2	B1 for $[f(1) =] 4$ or M1 for $((x - 3)^2)^3$ or better
(b)	$4x + 1$ oe	2	M1 for $x = \frac{y - 1}{4}$ or $4y = x - 1$
(c)	$\frac{x^3 - 1}{4}$ oe final answer	1	
(d)	3 nfww	1	

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17	(a)	3.08 to 3.22 nfw	2	<b>B1</b> for 502.5 to 502.62 or 505.7 to 505.8
	(b)	$\frac{16}{200}$ oe	2	<b>B1</b> for 16 soi or <b>M1</b> for $\frac{their 16}{200}$
	(c)	18.5 26 3	2	<b>B1</b> for 18.5 and 26 <b>B1</b> for 3
18	(a)	3	4	<b>B3</b> for 3.536 to 3.54 as an answer or <b>M2</b> for $2000 \div \frac{1}{3}\pi \times 6^2 \times 15$ or <b>M1</b> for $\frac{1}{3}\pi \times 6^2 \times 15$ and <b>SC1</b> for truncating <i>their</i> 3.54 to a whole number
	(b)	303 to 304	3	<b>M2</b> for $2000 - their 3 \times their$ volume or <b>M1</b> for $their 3 \times their$ volume
19	(a)	rotation 90 clockwise [about] origin oe	3	<b>B1</b> for each
	(b)	$\begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$	2	<b>M1</b> for any one column or row correct
	(c)	Triangle at (3, 3), (6, 3) and (3, 5)	2	<b>M1</b> for any two vertices correct or correct answer translated horizontally