

CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International General Certificate of Secondary Education

MARK SCHEME for the May/June 2015 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.

Cambridge will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the May/June 2015 series for most Cambridge IGCSE[®], Cambridge International A and AS Level components and some Cambridge O Level components.

Page 2	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – May/June 2015	0580	23

Abbreviations

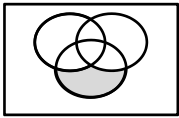
cao	correct answer only
dep	dependent
FT	follow through after error
isw	ignore subsequent working
oe	or equivalent
SC	Special Case
nfw	not from wrong working
soi	seen or implied

Question	Answer	Mark	Part Marks
1	168	2	M1 for $240 \div (7 + 3)$ or better
2	$3x(3x - 2)$ final answer	2	B1 for $3(3x^2 - 2x)$ or $x(9x - 6)$
3	66.4[2...]	2	M1 for $\cos [\dots] = \frac{2}{5}$ oe
4	18.45 18.75	1 1	If 0 scored, SC1 for 6.15 and 6.25 seen or for correct answers reversed
5	$(2x + 1)(x - 3)$	2	B1 for $(2x + a)(x + b)$, where $ab = -3$ or $a + 2b = -5$
6	$\begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}$	2	B1 for one correct column
7	1.60 cao	3	B2 for 1.597... or 1.6 or M1 for $2 \div 1.252$
8	$\frac{15}{8}$ their $\frac{15}{8} \times \frac{9}{5}$ oe $\frac{27}{8}$ or $3\frac{3}{8}$ cao	B1 M1 A1	or $\frac{135}{72}$ or $\frac{135}{72} \div \frac{40}{72}$ or equivalent division with fractions with common denominators
9	2.8 oe	3	M2 for $12 + 2 = 8x - 3x$ or better or M1 for $3x + 12$ or $8x - 2$
10	20.6 or 20.58 to 20.59	3	M2 for $\frac{85 - 67.5}{85} \times 100$ or $\left(1 - \frac{67.5}{85}\right) \times 100$ or M1 for $\frac{85 - 67.5}{85}$ or $\frac{67.5}{85} \times 100$ If zero scored SC1 for $\frac{67.5 - 85}{85} \times 100$

Page 3	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – May/June 2015	0580	23

Question	Answer	Mark	Part Marks
11	12.2 or 12.18 to 12.19	3	M2 for $\frac{24 \sin 30}{\sin 100}$ or M1 for correct implicit equation e.g. $\frac{\sin 100}{24} = \frac{\sin 30}{BC}$
12 (a)	5	3	M2 for $\frac{u \times 10}{2} + 2u \times 10 = 125$ oe or M1 for evidence that area represents distance e.g. $\frac{u \times 10}{2}$, $2u \times 10$ or $3u \times 10$
(b)	2	1FT	FT $10 \div$ <i>their</i> u correctly evaluated
13 (a)	$4x^9$ final answer	2	B1 for answer kx^9 or $4x^k$ ($k \neq 0$)
(b)	$2y^{32}$ final answer	2	B1 for answer ky^{32} or $2y^k$ ($k \neq 0$)
14	$\sqrt{1^2 - 4(2)(-2)}$ If in form $\frac{p + \sqrt{q}}{r}$ or $\frac{p - \sqrt{q}}{r}$ $p = -1$, $r = 2(2)$ or 4 – 1.28 0.78	B1 B1 B1 B1	If completing the square B1 for $\left(x + \frac{1}{4}\right)^2$ oe B1 for $x = -\frac{1}{4} + \sqrt{1 + \left(\frac{1}{4}\right)^2}$ or $x = -\frac{1}{4} - \sqrt{1 + \left(\frac{1}{4}\right)^2}$ If 0 scored for the last two B marks then SC1 for – 1.3 and 0.8 or – 1.281 to – 1.280 and 0.781 or 0.7807 to 0.7808 or 1.28 and – 0.78 or – 1.28 and 0.78 seen in the working
15 (a)	4.77 or 4.774 to 4.775	2	M1 for $30 \div [2]\pi$
(b)	35.7 or 35.8 or 35.74 to 35.82	2	M1 for $0.5 \times \pi \times (\text{their (a)})^2$ or $0.5 \times \pi \times (30 \div 2\pi)^2$

Page 4	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – May/June 2015	0580	23

Question	Answer	Mark	Part Marks
16			
(a) (i)	14	2	M1 for any two of 1, 11, 14, 4 correctly placed on Venn diagram or for $1 + 25 - x + x + 18 - x = 30$ oe
(ii)	$\frac{11}{30}$ oe	1FT	FT $\frac{25 - \text{their (a)(i)}}{30}$ or $\frac{\text{their } 11}{30}$ from diagram
(iii)	$\frac{11}{12}$ oe	1FT	FT their diagram e.g. $\frac{\text{their } 11}{12}$ or $\frac{25 - \text{their (a)(i)}}{12}$
(b)		1	
17			
(a)	6	1	
(b)	2	2	M1 for 7 identified as the UQ or 5 identified as the LQ or both lines drawn from the 150 and 50 across and down to the horizontal axis
(c)	180	2	M1 for answer 20 or line or mark on graph indicating 20
18	912 or 912.2...	5	M4 for $4 \times 0.5 \times 20 \times \sqrt{8^2 + 10^2} + 20 \times 20$ or better or M3 for $4 \times 0.5 \times 20 \times \sqrt{8^2 + 10^2}$ or better or M1 for $\sqrt{8^2 + 10^2}$ and M1 for $0.5 \times 20 \times \sqrt{8^2 + 10^2}$ and M1 for 20×20

Page 5	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – May/June 2015	0580	23

Question	Answer	Mark	Part Marks	
19	(a) (i) $-\mathbf{b} + \mathbf{a}$	1		
	(ii) $\mathbf{b} + \frac{1}{2}\mathbf{a}$	1		
	(b)	$[\overrightarrow{OX} =] \mathbf{b} + \frac{1}{3}(-\mathbf{b} + \mathbf{a})$ oe		M1
		$\frac{1}{3}\mathbf{a} + \frac{2}{3}\mathbf{b}$ oe		A1
	2 statements from: $\overrightarrow{OM} = \mathbf{b} + \frac{1}{2}\mathbf{a}$ oe or $[\overrightarrow{OX} =] \frac{2}{3}(\mathbf{b} + \frac{1}{2}\mathbf{a})$ oe or $\overrightarrow{OX} = \frac{2}{3}\overrightarrow{OM}$ oe	B2	B1 for any one of these statements	
20	9.37 or 9.370 to 9.371	6	<p>M2 for $\sin[P] = \frac{38.5}{0.5 \times 9 \times 10}$</p> <p>or M1 for $0.5 \times 10 \times 9 \times \sin = 38.5$</p> <p>M3 for $\sqrt{9^2 + 10^2 - 2 \times 9 \times 10 \times \cos(\text{their } P)}$ or M2 for $9^2 + 10^2 - 2 \times 9 \times 10 \times \cos(\text{their } P)$ or M1 for a correct implicit expression</p> <p>e.g. $\cos(\text{their } P) = \frac{9^2 + 10^2 - RQ^2}{2 \times 9 \times 10}$</p> <p>Note: 87.8, 87.81[...] or 87.7[55...] score 4 marks</p> <p>or</p> <p>M is foot of perpendicular from R to PQ</p> <p>M2 for perp.ht = $38.5 \div \frac{1}{2} \times 10$ or 7.7</p> <p>or M1 for $\frac{1}{2} \times 10 \times [...] = 38.5$</p> <p>M1 for $PM = \sqrt{9^2 - 7.7^2} [= 4.659... \text{ or } 4.66]$</p> <p>M1 for $QM = 10 - \text{their } 4.659... [= 5.34...]$</p> <p>M1 for $QR = \sqrt{((\text{their } QM)^2 + 7.7^2)}$</p>	