

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

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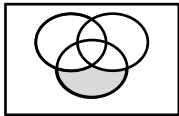
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Abbreviations

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

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 $\frac{67.5 - 85}{85} \times 100$

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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 $10 \div \text{their } u$ 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 $0.5 \times \pi \times (30 \div 2\pi)^2$	

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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	

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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	M2 for $\sin[P] = \frac{38.5}{0.5 \times 9 \times 10}$ or M1 for $0.5 \times 10 \times 9 \times \sin = 38.5$ 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 e.g. $\cos(\text{their } P) = \frac{9^2 + 10^2 - RQ^2}{2 \times 9 \times 10}$ Note: 87.8, 87.81[...] or 87.7[55...] score 4 marks or M is foot of perpendicular from R to PQ M2 for $\text{perp.ht} = 38.5 \div \frac{1}{2} \times 10$ or 7.7 or M1 for $\frac{1}{2} \times 10 \times [...] = 38.5$ M1 for $PM = \sqrt{9^2 - 7.7^2} [= 4.659... \text{ or } 4.66]$ M1 for $QM = 10 - \text{their } 4.659... [= 5.34...]$ M1 for $QR = \sqrt{((\text{their } QM))^2 + 7.7^2}$