MARK SCHEME for the October/November 2013 series

0580 MATHEMATICS

0580/22 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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Cambridge is publishing the mark schemes for the October/November 2013 series for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level components and some Ordinary Level components.

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	19% 0.719^5 $\sqrt{0.038}$ sin 11.4 1/5	2	**B1** for decimals [0.19], [0.2], 0.194…, 0.197…, 0.192… seen Or for four in correct order
2	**(a)** –447	1	
	(b) 2	1	
3	15.7 or 15.70 to 15.71	2	**M1** for $2 \times \pi \times 2.5$
4	160	2	**M1** for $\dfrac{8}{18} \times 360$ oe
5	**(a)** ▭	1	
	(b) Some possible answers:	1	
6	$[\pm]\sqrt{y-4}$ final answer	2	**M1** for first move completed correctly **M1** for second move completed correctly on answer line
7	170	2	**M1** for $\dfrac{1}{2} \times (12 + 22) \times 10$ oe
8	3619 to 3620	2	**M1** for $\dfrac{1}{2} \times \dfrac{4}{3} \times \pi \times 12^3$ or better
9	decagon	3	**M1** for $360 \div 36$ oe **A1** for 10
10	10.1[0]	3	**M1** for 1.3199 and 1.3401 seen and **M1** for 500×1.3199 or 500×1.3401 or for $500 \times$ (*their* highest – *their* lowest) oe
11	120	3	**M1** for $v = \dfrac{k}{\sqrt{d}}$ **A1** for $k = 600$

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12	$p = 71.4025$ cao $q = 73.1025$ cao	3	**B1** for 8.45 and 8.55 seen **M1** for *their* LB^2 [π] or *their* UB^2 [π] If 0 scored, **SC1** for one correct.
13	10[.00]	3	**M2** for 1.90 and 2.90 and 5.20 only or **M1** for two of 1.90, 2.90, 5.20 in a list of three or two values from the table or **SC1** FOR 1.90, 2.90, 4.30 $\left[\text{from } \dfrac{3.40 + 5.20}{2} \right]$
14	52	3	**B2** for $AOB = 104$ or **B1** for OAB or $OBA = 38$
15	(8, 2)	3	**M1** for correctly eliminating one variable **A1** for $x = 8$ **A1** for $y = 2$ If 0 scored, **SC2** for correct substitution and correct evaluation to find the other value.
16	$x < 6.8$	4	**B3** for 6.8 with wrong inequality or equal as answer. Or **M1** for first move completed correctly and **M1** for second move completed correctly and **M1** for third move completed correctly
17	**(a)** $\begin{pmatrix} 11 & 5 \\ 26 & 30 \end{pmatrix}$	2	**SC1** for one correct row or column
	(b) $\dfrac{1}{8}\begin{pmatrix} 6 & -1 \\ -4 & 2 \end{pmatrix}$ oe	2	**B1** for $k\begin{pmatrix} 6 & -1 \\ -4 & 2 \end{pmatrix}$ or **B1** for $\dfrac{1}{8}\begin{pmatrix} a & b \\ c & d \end{pmatrix}$
18	**(a)** (1.5, 12.5) oe	2	**B1** for either coordinate
	(b) $y = 3x + 8$ oe	3	**B2** for $y = mx + 8$ or $y = 3x + c$ or $3x + 8$ or **B1** for gradient (or m) = 3 and **B1** for $c = 8$ If 0 scored, **SC1** for 23 = *their* $m \times 5 + c$ or for 2 = *their* $m \times -2 + c$ or for 12.5 = *their* $m \times 1.5 + c$
	(c) Most common methods: Correctly substituting P (3, 17) into $y = 3x + 8$ Showing the gradient of AP or $BP = 3$ Other methods possible.	1	

19	(a)	$-2\mathbf{a} - 2\mathbf{c}$ oe	2	M1 for $\mathbf{BO} = -\mathbf{a} - \mathbf{c}$ or for any correct route or correct unsimplified expression
	(b)	$2\mathbf{a} + \mathbf{c}$	2	M1 for any correct route or correct unsimplified expression
	(c)	$-\mathbf{a} - \mathbf{c}$ oe	2FT	FT *their* (a) or correct answer Or M1 for a correct non direct route from O to E or for correct unsimplified expression or for correct FT unsimplified
20	(a)	4.05 to 4.2	1	
	(b)	2.6 to 2.75	2	B1 for 9.6 seen
	(c)	2.05 to 2.25	2	B1 for [UQ] 5.0 to 5.1 and [LQ] 2.85 to 2.95 seen
	(d)	$\dfrac{5}{48}$	2	M1 for 5
21	(a)	37.2 or 37.17 to 37.19	3	M2 for $\sin[\ ] = \dfrac{4 \times \sin 65}{6}$ or M1 for $\dfrac{4}{\sin[\ ]} = \dfrac{6}{\sin 65}$ oe
	(b)	11.7 or 11.72 to 11.74	3	M1 for [B =] $160 - 65 -$ *their* (a) M1 for $\dfrac{1}{2} \times 4 \times 6 \times \sin$ *their* 77.8