

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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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 (b) 2	1 1	
3	15.7 or 15.70 to 15.71	2	M1 for $2 \times \pi \times 2.5$
4	160	2	M1 for $\frac{8}{18} \times 360$ oe
5	(a)  (b) Some possible answers: 	1 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 $\frac{1}{2} \times (12 + 22) \times 10$ oe
8	3619 to 3620	2	M1 for $\frac{1}{2} \times \frac{4}{3} \times \pi \times 12^3$ 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 $500 \times$ (<i>their</i> highest – <i>their</i> lowest) oe
11	120	3	M1 for $v = \frac{k}{\sqrt{d}}$ 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 <i>their</i> LB^2 [π] or <i>their</i> 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 $\left[\text{from } \frac{3.40 + 5.20}{2} \right]$
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) $\begin{pmatrix} 11 & 5 \\ 26 & 30 \end{pmatrix}$ (b) $\frac{1}{8} \begin{pmatrix} 6 & -1 \\ -4 & 2 \end{pmatrix}$ oe	2 2	SC1 for one correct row or column B1 for $k \begin{pmatrix} 6 & -1 \\ -4 & 2 \end{pmatrix}$ or B1 for $\frac{1}{8} \begin{pmatrix} a & b \\ c & d \end{pmatrix}$
18	(a) (1.5, 12.5) oe (b) $y = 3x + 8$ oe (c) Most common methods: Correctly substituting $P(3, 17)$ into $y = 3x + 8$ Showing the gradient of AP or $BP = 3$ Other methods possible.	2 3 1	B1 for either coordinate 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 $23 = \text{their } m \times 5 + c$ or for $2 = \text{their } m \times -2 + c$ or for $12.5 = \text{their } m \times 1.5 + c$

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19	(a) $-2a - 2c$ oe	2	M1 for BO = $-a - c$ or for any correct route or correct unsimplified expression
	(b) $2a + c$	2	M1 for any correct route or correct unsimplified expression
	(c) $-a - c$ oe	2FT	FT <i>their (a)</i> 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) $\frac{5}{48}$	2	M1 for 5
21	(a) 37.2 or 37.17 to 37.19	3	M2 for $\sin[] = \frac{4 \times \sin 65}{6}$ or M1 for $\frac{4}{\sin[]} = \frac{6}{\sin 65}$ oe
	(b) 11.7 or 11.72 to 11.74	3	M1 for [B =] $160 - 65 - \text{their (a)}$ M1 for $\frac{1}{2} \times 4 \times 6 \times \sin$ <i>their</i> 77.8