

MARK SCHEME for the May/June 2013 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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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	£ or pound[s] Correct working must be shown	2	M1 for $425 \div 1.14$ or 365×1.14
2	$\frac{30}{300}$ oe www	2	M1 for 30 seen or $\frac{k}{300}$ seen
3	1500 or 3 pm	2	B1 for 1h50 or 2h[0]5 or SC1 for 1255 + <i>their</i> 1h50 + 15mins correctly evaluated
4 (a)	[±] 2.28 or 2.282 to 2.2822	1	
(b)	0.109 or 0.1094[3...]	1	
5	$\left(\frac{2}{3}\right)^{1.5}$ $\left(-\frac{2}{3}\right)^{\frac{2}{3}}$ $(1.5)^{\frac{2}{3}}$ $\left(\frac{2}{3}\right)^{-1.5}$	2	M1 for at least 2 correct decimals seen 1.3[1..] 0.5[4..] 1.8[3..] or 1.84 0.7[6..]
6	6	3	M2 for $3 \times \sqrt[3]{\frac{288\pi}{36\pi}}$ or M1 for $3 \times \sqrt[3]{\frac{288\pi}{36\pi}}$ or $3 \times \sqrt[3]{\frac{36\pi}{288\pi}}$
7	260	3	M2 for $[2 \times](4 \times 10 + 18 \times 5)$ oe or M1 for a correct area statement
8	2500	3	M1 for $m = kr^3$ A1 for $k = 20$
9 (a)	1.1×10^5	2	B1 for 110 000 oe e.g. 11×10^4
(b)	5×10^3	2	B1 for 5000 oe e.g. 0.5×10^4

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10	25	4	<p>M1 for correct method to eliminate variable</p> <p>A1 for $x = 11$</p> <p>A1 for $y = 3$</p> <p>B1 FT for $2 \times \text{their } x + \text{their } y$ correctly evaluated</p>
11 (a)	77	2	<p>M1 for 11,13,17,19 clearly identified, ignore numbers less than 8 with no other numbers greater than or equal to 8 besides possibly an extra 17</p>
(b)	either 18 or 19 or both	2FT	<p>M1 for 11,13,17 clearly identified, ignore numbers less than 8 with no other numbers greater than or equal to 8 besides possibly an extra 17</p> <p>or for <i>their</i> (a) – 58</p>
12 (a)	$\frac{5}{25}$ oe	2	<p>B1 for answer $\frac{5}{k}$ or $\frac{k}{25}$</p>
(b)	$\frac{4}{25}$ oe	2	<p>B1 for answer $\frac{4}{k}$ or $\frac{k}{25}$</p>
13	$\frac{8x}{(x-3)(x+1)}$	4	<p>B1 for common denominator $(x-3)(x+1)$ seen</p> <p>B1 for $(x+3)(x+1) - (x-1)(x-3)$ soi</p> <p>B1 for $x^2 + 3x + x + 3$ or $x^2 - 3x - x + 3$ soi</p>
14 (a)	$n < 9$	2	<p>M1 for $2n < 18$ or $2n - 18 < 0$ oe</p> <p>If 0 scored SC1 for 9 with incorrect inequality.</p>
(b)	$(b+d)(a+c)$	2	<p>B1 for $b(a+c) + d(a+c)$</p> <p>or $a(b+d) + c(b+d)$</p>
15 (a)	4	2	<p>M1 for attempt at sum of all numeric and x terms equated to 74</p>
(b)	26	1FT	<p>=18 + 2 × <i>their</i> (a)</p>
(c)	8	1	
16 (a)	1.5	2	<p>B1 for $[g(18) =] 4$</p>
(b)	$2(x+5)$ or $2x+10$	2	<p>M1 for correct first step e.g. $x = \frac{y}{5} - 5$ or</p> <p>$\frac{x}{2} = y + 5$ or $2y = x - 10$</p>

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17 (a)	$\begin{pmatrix} 7 & 23 & 16 \\ 12 & 45 & 27 \end{pmatrix}$	2	B1 for any one row or column correct be in a 2 by 3 matrix
(b)	$\frac{1}{3} \begin{pmatrix} 6 & -3 \\ -3 & 2 \end{pmatrix}$	2	B1 for $k \begin{pmatrix} 6 & -3 \\ -3 & 2 \end{pmatrix}$ or $\frac{1}{3} \begin{pmatrix} a & b \\ c & d \end{pmatrix}$
18	15.4 or 15.35 to 15.36	4	M1 for $\frac{120}{360} \times \pi \times 5^2$ oe M1 for $\frac{1}{2} \times 5^2 \times \sin 120$ oe M1 for $\frac{120}{360} \times \pi \times 5^2 - \frac{1}{2} \times 5^2 \times \sin 120$ oe
19 (a)	hexagon	1	
(b) (i)	$-\mathbf{b} + \mathbf{c}$	1	
(ii)	$\mathbf{b} - \frac{1}{2}\mathbf{c}$	2	B1 for OB + BA or any correct route
(iii)	$-\mathbf{b} + \mathbf{c}$	1FT	= <i>their</i> (b)(i)
20 (a)	$[\pm] 3.1623$ cao	2	M1 for $\sqrt{10}$ seen
(b)	$\frac{4}{y^2 - 8}$ oe final answer	4	M1 first move completed correctly M1 second move completed correctly M1 third move completed correctly M1 final move completed correctly on answer line