

## **MARK SCHEME for the October/November 2012 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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Page 2	Mark Scheme	Syllabus
	IGCSE – October/November 2012	0580

### 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

Qu.	Answers	Mark	Part Marks
1	(a) 8000 cao	1	
	(b) 0.08 cao	1	
2	1.4 cao	2	M1 1.44(...) or 1.45
3	118.75 or $118\frac{3}{4}$ cao	2	M1 $3(20)^2 + 8(20)(-5) + 3(-5)^2$ or better
4	60	2	M1 $360 \div 6$
5	96	2	M1 $72 / 0.75$ oe or M1 $0.75x = 72$ oe
6	(a) 4	1	
	(b) 2	1	
	(c) 1 cao	1	
7	$2.119 \times 10^8$ cao	3	M1 81500 oe M1 their LB $\times 2600$
8	113000 or 112795 to 112840	3	B1 for 85000 M1 for $\pi \times 0.65^2 \times \text{figs } 85$
9	(a) 5 30 pm	1	
	(b) 67	2	M1 for 10h45min and 3h 15min oe seen
10	3.4 or $3\frac{2}{5}$	3	M1 $22 - 6x$ M1 $4x + 6x = 22 + 12$
11	11, 13, 17, 19, 23	3	B2 3 or 4 correct or B1 2 correct If B0 then M1 for $x > 10.5$ and M1 for $x < 26.5$ or M1 for 10.5 and 26.5 seen
12	12 by 30 by 42	3	B1 for $10 \times 25 \times 35$ or 8750 M1 $\sqrt[3]{\frac{15120}{8750}}$ (= 1.2)

Page 3	Mark Scheme	Syllabus
	IGCSE – October/November 2012	0580

13	686	3	<b>M1</b> $m = k L^3$ <b>A1</b> $k = 2$
14	(a) $p = \frac{3}{8}$ $q = \frac{1}{2}$ (b) $k = 6$	2 2	<b>B2</b> $p = \frac{9}{64}$ and $q = \frac{1}{4}$ or <b>B1</b> $p = \frac{3}{8}$ $q \neq \frac{1}{2}$ <b>M1</b> for a correct statement for k e.g. $\frac{5^{-3} + 5^{-4}}{5^{-4}}$ or for the factorisation $5^{-4}(5 + 1) = k \times 5^{-4}$ or $\frac{1}{625}(5 + 1) = \frac{k}{625}$
15	(a) 3 (b) 637.5	1 3	<b>M1</b> finding area under graph <b>M1dep</b> all correct area statements
16	(a) Points plotted correctly (b) Positive (c) Line of best fit ruled	2 1 1	<b>B1</b> 6 or 7 points correct
17	(a) Shear x axis invariant sf 3 (b) $\begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}$	3 2	<b>B1</b> shear <b>B1</b> x axis invariant oe <b>B1</b> 3 <b>M1</b> $\begin{pmatrix} 1 & 0 \\ 0 & k \end{pmatrix}$ $k \neq 0$ or $k \neq 1$
18	trapezium at $(-2, -1), (-4, -1), (-4, -2), (-3, -2)$ <b>www</b>	5	<b>SC4</b> for correct co-ordinates or vectors or matrix seen with no diagram or with an incorrect diagram. <b>SC3</b> for correct diagram with wrong working or one other incorrect trapezium which is not part of a correct method. If 0 then <b>B2</b> for $\begin{pmatrix} -1 & 0 \\ 0 & -1 \end{pmatrix}$ or <b>M1ft</b> “BA” $\begin{pmatrix} 2 & 4 & 4 & 3 \\ 1 & 1 & 2 & 2 \end{pmatrix} = \begin{pmatrix} -2 & -4 & -4 & -3 \\ -1 & -1 & -2 & -2 \end{pmatrix}$ <b>A1ft</b>
19	(a) 5 (b) $3x^2 + 1$ (c) $3x - 2$	2 3 2	<b>M1</b> $f(2) =$ seen <b>M1</b> $9x^2 + 1$ <b>M1</b> $(“9x^2 + 1” + 2)/3$ seen <b>M1</b> for $3y = x + 2$ or $x = \frac{y+2}{3}$
20	(a) 10 (b) $y = -4x + 5$ oe (c) $y = -4x + 24$ oe	2 2 3	<b>M1</b> $x = -4$ and $x = 6$ seen <b>B1</b> $y = mx + 5$ ( $m \neq 0$ ) or $y = -4x + k$ ( $k \neq 0$ ) or $y = -4x + 5$ <b>M1</b> $m = -4$ or gradient $= -4$ or $y = -4x + c$ <b>M1</b> $(5, 4)$ substituted into $y = mx + c$