

**MARK SCHEME for the May/June 2010 question paper**  
**for the guidance of teachers**

**0580 MATHEMATICS**

**0580/23**

Paper 23 (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.

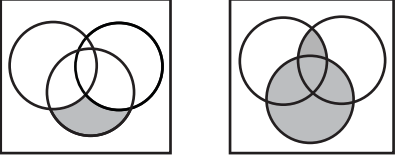
Mark schemes must be read in conjunction with the question papers and the report on the examination.

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|--------|--------------------------------|----------|-------|
| Page 2 | Mark Scheme: Teachers' version | Syllabus | Paper |
|        | IGCSE – May/June 2010          | 0580     | 23    |

| Qu. | Answers   | Mark        | Part Marks  |
|-----|---|-------------|---|
| 1   | (a) -5<br>(b) 11  | 1<br>1      |   |
| 2   | $\frac{53}{11} > 4.80 > \sqrt{23} > 48\%$   | 2           | M1 for decimals seen<br>4.7958... 0.48 (4.80) 4.81(...)   |
| 3   | 500   | 2           | M1 for $600 \times 0.6 \div 0.72$ seen  |
| 4   | 70  | 2           | M1 for $252 \times 1000 \div 60 \div 60$ oe   |
| 5   | 18  | 2           | M1 for $21.6 \div 1.2$ oe   |
| 6   | $x + 8$   | 2           | M1 $3^8$ seen   |
| 7   |  | 2           | B1 for one correct Venn diagram   |
| 8   | $\frac{5x-3}{6}$  | 2           | B1 for $5x-3$ seen<br>SC1 $\frac{5}{6}x - \frac{3}{6}$ on answer line   |
| 9   | $5(.00) \times 10^5$  | 2           | SC1 for $5 \times 10^k$ or 500 000 on answer line   |
| 10  | 220.5 cao   | 2           | M1 for 73.5 seen  |
| 11  | 16.8  | 3           | M2 $\tan 17 = \frac{h}{55}$ or $\tan 73 = \frac{55}{h}$<br>or M1 $\tan 17 = \frac{55}{h}$ or $\tan 73 = \frac{h}{55}$ if angle seen in wrong place at P   |
| 12  | $9 - 2x^2$  | 3           | B1 for $x^2 - 3x - 3x + 9$ or $2x^2 - 6x - 6x + 18$<br>B1 for $4x^2 - 6x - 6x + 9$ or $-4x^2 + 6x + 6x - 9$   |
| 13  | (a) 0<br>(b) 2<br>(c) plane across centre of shape                                | 1<br>1<br>1 | Three possibilities   |
| 14  | 6   | 3           | M1 for one correct first step which leads towards simplifying<br>$3y - 12 + \frac{y}{2} = 9$<br>or $6(y - 4) + y = 18$<br>or $y - 4 + \frac{y}{6} = 3$<br>M1 correctly collecting their terms to $py = q$ |

| Page 3 | Mark Scheme: Teachers' version | Syllabus | Paper |
|--------|--------------------------------|----------|-------|
|        | IGCSE – May/June 2010          | 0580     | 23    |

|    |  |     |  |
|----|--|-----|--|
| 15 | (a) $g - h$  | 1   | <b>M1</b> for $\overrightarrow{OH} + \overrightarrow{HN}$ or $h + \frac{1}{4} (a)$<br>$\overrightarrow{OG} + \overrightarrow{GN}$ or $g - \frac{3}{4} (a)$ |
|    | (b) $\frac{1}{4}g + \frac{3}{4}h$  | 2   |  |
| 16 | $\frac{5A}{r} - 2$ or $\frac{5A - 2r}{r}$  | 3   | <b>M1</b> for correctly multiplying by 5<br><b>M1</b> for correctly dividing by $r$<br><b>M1</b> for correct subtraction in any order                      |
| 17 | (a) 10.9   | 2   | <b>M1</b> for $\frac{40}{360} \times \pi \times 5.6^2$   |
|    | (b) 15.1   | 2   | <b>M1</b> for $\frac{40}{360} \times \pi \times 2 \times 5.6 (= 3.91..)$   |
| 18 | (a) 64   | 2   | <b>B1</b> for evidence of $f(-2) = 6$  |
|    | (b) 9  | 2   | <b>M1</b> for $3x - 5 = 22$ or $\frac{x+5}{3}$ seen  |
| 19 | (a) $\frac{3}{4}$ or 0.75  | 1   | <b>M1</b> for finding the area under the graph or<br><b>M1</b> for their $39 \div 15$  |
|    | (b) 2.6  | 3   |  |
| 20 | $x \geq 0$   | 1   | <b>L1</b> $x$ <b>R</b> 0   |
|    | $y \geq \frac{1}{2}x$ oe   | 2   | <b>L1</b> $y$ <b>R</b> $\frac{1}{2}x$  |
|    | $x + y \leq 4$ oe  | 2   | <b>L1</b> $x + y$ <b>R</b> 4 where <b>R</b> is any one of $= < > \leq \geq$<br><b>B2</b> all inequalities correct or <b>B1</b> 2 correct                   |
| 21 | (a) 18.7   | 3   | <b>M2</b> for $\sin R = 50 \times \frac{\sin 140}{100} (= 0.3219...)$<br>or <b>M1</b> for $\frac{\sin R}{50} = \frac{\sin 140}{100}$ oe                    |
|    | (b) 261(.3)  | 2ft | <b>M1</b> $360 - 80 - \text{their (a)}$  |
| 22 | Perpendicular bisector of $AC$   | 2   | <b>B1</b> accurate line<br><b>B1</b> two pairs of correct construction arcs  |
|    | Bisector of angle $A$  | 2   | <b>B1</b> accurate line<br><b>B1</b> two pairs of correct construction arcs  |
|    | Shaded region inside triangle <b>and</b> to left of perp bisector of $AC$ <b>and</b> above bisector of angle $A$ | 1   | <b>B1 dep</b> on first <b>B1</b> being scored for <b>both</b> lines  |
| 23 | (a) $(-5 \quad 7)$   | 2   | <b>B1</b> either correct in a $(1 \times 2)$ matrix  |
|    | (b) $\frac{1}{4} \begin{pmatrix} 2 & 1 \\ 2 & 3 \end{pmatrix}$ oe  | 2   | <b>M1</b> for $\begin{pmatrix} 2 & 1 \\ 2 & 3 \end{pmatrix}$ seen or $2 \times 3 - -1 \times -2 (= 4)$   |
|    | (c) $\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$ or I cao  | 1   |  |