

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

0580 MATHEMATICS

0580/42

Paper 42 (Extended), maximum raw mark 130

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.

- CIE will not enter into discussions or correspondence in connection with these mark schemes.

CIE is publishing the mark schemes for the May/June 2010 question papers for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level syllabuses and some Ordinary Level syllabuses.

| | | | |
|---------------|---------------------------------------|-----------------|--------------|
| Page 2 | Mark Scheme: Teachers' version | Syllabus | Paper |
| | IGCSE – May/June 2010 | 0580 | 42 |

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) | $240 \div 8 \times 3$ or $240 \div 8 \times 5$ or $\frac{3}{8}$ of 240 or $\frac{5}{8}$ of 240 oe | 1 | Accept reverse e.g. $90 : 150 = 3 : 5$ and $90 + 150 = 240$ |
| (b) (i) | 5 www 2 | 2 | M1 for $\frac{100 \times 9}{90 \times 2}$ oe |
| (ii) | 165 www 2 | 2 | M1 for $99 \div 0.6$ oe |
| (c) | 162.24 final answer cao | 2 | M1 for $150 \times 1.04 \times 1.04$ oe implied by answer 162.2 |
| (d) (i) | 58.67 final answer cao | 3 | SC2 for 58.7 or M1 for $\frac{150 \times 4 \times 20}{100}$ oe (120) then M1 (dependent on the first M1) $328.67 - 150 -$ their 120 oe Answers of 208.67 or 208.7 imply first M1 |
| (ii) | 219 (.1....) www 2 | 2 | M1 for $\frac{328.67}{150} \times 100$ oe |
| 2 (a) (i) | $\begin{pmatrix} 15 \\ 8 \end{pmatrix}$ | 2 | B1 each component |
| (ii) | 17 www 2 | 2ft | ft their 15 and their 8. M1 for $(\text{their } 15)^2 + (\text{their } 8)^2$ |
| (b) (i) | $\frac{1}{2}\mathbf{v} - \frac{1}{2}\mathbf{c}$ or $\frac{1}{2}(\mathbf{v} - \mathbf{c})$ cao | 2 | M1 for $\frac{1}{2}\overrightarrow{CV}$ soi |
| (ii) | $\frac{1}{2}\mathbf{c} + \frac{1}{2}\mathbf{v}$ again allowing brackets cao | 2 | M1 for \overrightarrow{OM} e.g. $\overrightarrow{OC} + \overrightarrow{CM}$ or better seen or $\mathbf{v} -$ their (i) or $\mathbf{c} +$ their (i) |
| (iii) | $\frac{1}{6}\mathbf{v} - \frac{1}{2}\mathbf{c}$ again allowing brackets cao | 2 | M1 for any correct route e.g. $\overrightarrow{MV} + \overrightarrow{VL}$ or their (i) $-\frac{1}{3}\mathbf{v}$ or $\frac{2}{3}\mathbf{v} -$ their (b)(ii) |

| | | | |
|--------|--------------------------------|----------|-------|
| Page 3 | Mark Scheme: Teachers' version | Syllabus | Paper |
| | IGCSE – May/June 2010 | 0580 | 42 |

| | | | |
|---|---------|--|--|
| 3 | | | Throughout this question isw any cancelling or changing to other forms, after correct answer seen. Penalty of –1 for 2 sf decimals or percentages. Do not accept ratio or worded forms. |
| | (a) (i) | $\frac{4}{6}$ oe (0.667) | 1 Allow 0.6666 – 0.6667 |
| | (ii) | $\frac{3}{6}$ oe | 1 |
| | (iii) | $\frac{2}{6}$ oe (0.333) | 1 Allow 0.3333... |
| | (iv) | $\frac{5}{6}$ oe (0.833) | 1 Allow 0.8333... |
| | (b) (i) | $\frac{1}{36}$ oe (0.0278) | 2 Allow 0.02777 – 0.02778, M1 for $\frac{1}{6} \times \frac{1}{6}$ |
| | (ii) | $\frac{6}{36}$ oe (0.167) www 2 | 2 Allow 0.1666 – 0.1667, M1 for $\frac{3}{6} \times \frac{1}{6} \times 2$ oe |
| | (c) (i) | $\frac{1}{4}$ oe | 1 |
| | (ii) | $\frac{1}{2}$ oe | 1 |
| | (d) | 5 (but not from rounding) | 2 M1 for repeating $\times \frac{4}{6}$ oe e.g. $\left(\frac{2}{3}\right)^n$ |
| 4 | (a) (i) | Triangle with vertices (–4, 4), (–1, 4), (–1, 6) | 2 SC1 for translation $\begin{pmatrix} -7 \\ k \end{pmatrix}$ or $\begin{pmatrix} k \\ 3 \end{pmatrix}$ |
| | (ii) | Triangle with vertices (1, –3), (1, –6), (3, –6) | 2 SC1 two correct vertices or 90° anticlockwise about (0, 0) |
| | (b) (i) | Reflection only $y = -x$ oe | 1 1 Marks independent but must be single transformation to score any marks |
| | (ii) | Stretch only x -axis oe invariant (factor) 3 | 1 1 1 Marks independent but must be single transformation to score any marks |

| Page 4 | Mark Scheme: Teachers' version | Syllabus | Paper |
|--------|--------------------------------|----------|-------|
| | IGCSE – May/June 2010 | 0580 | 42 |

| | | | |
|---------|---|----------|--|
| (c) (i) | $\begin{pmatrix} 0 & -1 \\ -1 & 0 \end{pmatrix}$ | 2 | B1 each column |
| (ii) | $\begin{pmatrix} 1 & 0 \\ 0 & 3 \end{pmatrix}$ ft | 2ft | ft factor in (b)(ii) only if stretch and can recover to correct matrix SC1ft for right-hand column |
| (iii) | $\begin{pmatrix} 1 & 0 \\ 0 & \frac{1}{3} \end{pmatrix}$ ft | 1ft | ft $\begin{pmatrix} 1 & 0 \\ 0 & n \end{pmatrix}$ to $\begin{pmatrix} 1 & 0 \\ 0 & \frac{1}{n} \end{pmatrix}$ or $\begin{pmatrix} n & 0 \\ 0 & 1 \end{pmatrix}$ to $\begin{pmatrix} \frac{1}{n} & 0 \\ 0 & 1 \end{pmatrix}$ $n \neq 0, \pm 1$ for $\frac{1}{3}$, allow 0.33 or better |
| 5 (a) | $(\cos) \frac{180^2 + 115^2 - 90^2}{2 \times 180 \times 115}$ 24.98 – 24.99 | M2 A2 | M1 for correct implicit expression $90^2 = \dots\dots$ A1 for $(\cos) = 0.9064\dots$ |
| (b) (i) | 125(.0....) ft | 1ft | ft 150 – their (a) |
| (ii) | 305(.0....) ft | 1ft | ft 180 + their (b)(i) |
| (c) | 180sin (54.98 to 55) or 180cos (35 to 35.02) oe or 180sin (360 – their (b)(ii)) or 180cos(their (b)(i) – 90) oe 147(.4....) cao www 3 | M2 A1 | B1 for 54.98 to 55 or 35 to 35.02 soi in correct position. Provided either angle is acute |
| (d) | $\frac{90 \sin 30}{\sin 70}$ 47.9 (47.88 – 47.89) cao www 3 | M2 A1 | M1 for $\frac{TR}{\sin 30} = \frac{90}{\sin 70}$ or other correct implicit equation |
| (e) | 2 000 000 oe | 2 | Allow 1 : 2 000 000 as answer. SC1 figs 2 in answer which could be a ratio. |
| 6 (a) | $\frac{4}{3} \pi \times 2.4^3$ 57.87 – 57.92 to at least 4 figures | M1 A1 | Must see method |
| (b) (i) | 14.4, 9.6, 4.8 | 1, 1, 1 | Any order |
| (ii) | 664 (663.5 – 663.6) ft | 1ft | |
| (iii) | 315 or 316 or 317 (315.2 – 316.8) ft | 1ft | ft their (b)(ii) – $6 \times '57.9'$ (only if positive) |
| (iv) | 507 (506.8 – 506.9) ft | 2ft | M1 for $(14.4 \times 9.6 + 14.4 \times 4.8 + 9.6 \times 4.8) \times 2$ or their 3 lengths. |

| | | | |
|--------|--------------------------------|----------|-------|
| Page 5 | Mark Scheme: Teachers' version | Syllabus | Paper |
| | IGCSE – May/June 2010 | 0580 | 42 |

| | | | |
|---------|---|--------------------------------|---|
| (c) (i) | Height seen or implied as 6×4.8 or better $\pi \times 2.4^2 \times$ their height 521 (520.8 – 521.3) www 3 | M1 M1 A1 | Indep |
| (ii) | 174 or 173 (173.2 – 174.1) ft | 1ft | ft their (c)(i) – $6 \times '57.9'$ only if positive |
| (iii) | 470 – 471 cao www 3 | 3 | M1 for $2 \times \pi \times 2.4^2$ (36.17 to 36.2), and M1 indep for $\pi \times 4.8 \times$ their height from (c)(i) |
| 7 (a) | $12 \times 2.5 + 15 \times 7.5 + 23 \times 12.5 + 30 \times 17.5 + 40 \times 22.5 + 35 \times 27.5 + 25 \times 32.5 + 20 \times 37.5$ $\div 200$ 21.9 www 4 | M1 M1 M1 A1 | mid-values any three soi Use of Σfx dep on x anywhere in each interval (including lower bound) – allow 2 slips or omissions Depend on second M |
| (b) | 155, 180 | 1 | |
| (c) | 8 points plotted ft, ignoring (0, 0) Reasonable <u>increasing</u> curve or polygon through their 8 points | P3ft C1ft | P2ft for 6 or 7 plotted, P1ft for 4 or 5 plotted Condone starting at (5, 12) and ft only if shape correct. |
| (d) | Either horizontal or vertical line at least 1 cm long at $y = 50$ on the curve | 1 | |
| (e) (i) | 22 – 23 | 1 | |
| (ii) | 13.5 – 14.5 | 1 | |
| (iii) | 25.5 – 26.5 | 1 | |
| (iv) | 136 – 140 must be integer | 2 | SC1 for 60 – 64 seen and must be integer |
| 8 (a) | $(p + q)^2 - 5$ oe final answer | 2 | SC1 for $(p + q)^2$ oe seen |
| (b) | $6x + 9(x - 3) = 51$ or better 5.2(0) final answer | B3 B1 | B2 for $6x + 9(x - 3)$ or B1 for $6x$ or $9(x - 3)$ 5.2(0) ww is B1 only |
| (c) | $a + c = 52$ oe $3a + 2c = 139$ oe Correctly eliminating a or c . 35 17 | B1 B1 M1 A1 A1 | Condone consistent use of other variables or M3 for $3a + 2(52 - a) = 139$ or $3(52 - c) + 2c = 139$ o.e. Allow one numerical slip. If A0, SC1 for 17, 35 |

| Page 6 | Mark Scheme: Teachers' version | Syllabus | Paper |
|--------|--------------------------------|----------|-------|
| | IGCSE – May/June 2010 | 0580 | 42 |

| | | | | |
|----|---------|--|-----------|---|
| 9 | (a) (i) | Similar | 1 | Allow enlargement |
| | (ii) | 4.5 | 2 | M1 for $\frac{AX}{3} = \frac{9}{6}$ oe |
| | (iii) | 13.5 cao | 2 | M1 for $\left(\frac{3}{2}\right)^2$ or $\left(\frac{2}{3}\right)^2$ oe e.g. using base and height but other methods must be complete |
| | (iv) | $180 - x - y$ oe $180 - x$ oe | B1 B1 | |
| | (b) (i) | 96 | 1 | |
| | (ii) | 48 ft | 1ft | ft 0.5 their (b)(i) |
| | (iii) | 97 ft | 1ft | ft 145 – their (b)(ii) |
| | (iv) | 35 | 1 | |
| | (c) | $20n = 360$ oe or $\frac{180(n-2)}{n} = 160$ oe or $180(n-2) = 8 \times 360$ oe or $8\left(\frac{360}{n}\right) = 180 - \frac{360}{n}$ | M2 | M1 for $9e = 180$ oe allow diagram to show this if reasonably clear or M1 for 8×360 or $\frac{8 \times 360}{n}$ |
| | | 18 www 3 | A1 | |
| 10 | (a) | Pentagon Octagon 20 | 1 1, 1 | |
| | (b)(i) | 35 | 1 | |
| | (ii) | 54 | 1 | |
| | (c)(i) | $p = 2, q = 3$ | 3 | M1 for substituting a value of n e.g. $\frac{1}{p}4(4-q) = 2 \quad n \geq 3$ or M1 for number of diagonals from one vertex is $n - 3$ (allow in words) and B1 for one correct value. If 0, SC1 for $\frac{n}{2}(n-3)$ seen. |
| | (ii) | 4850 ft | 1ft | ft their (c)(i) allow only if ft calculates to a positive integer. |
| | (iii) | 20 cao | 2 | SC1 for answer of 17 or M1 for their formula = 170 |
| | (d) | 31 cao | 1 | |