

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

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

0580 MATHEMATICS

0580/41

Paper 41 (Extended), maximum raw mark 130

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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 |

| Qu. | Answers | Mark | Part Marks |
|------------------|--|------|--|
| 1 (a) | 11:14 | 1 | |
| (b) | 50 | 2 | M1 for $(220 + 280) \div 10$ o.e. |
| (c) | 12 | 2 | M1 for $21 \div (4 + 3) \times 4$ (or 3) o.e. |
| (d) | 280 | 3 | M1 for $0.35 \times$ their 500 (175) M1 dependent $\times 1.60$ |
| (e) | 240 | 2 | M1 for dividing 264 by 1.1 oe |
| 2 (a) (i) | 4 | 1 | |
| (ii) | 5 | 1 | |
| (iii) | 4.75 | 3 | M1 for $1 \times 2 + 1 \times 3 + 17 \times 4 + 12 \times 5 + 6 \times 6 + 3 \times 7$ condone one slip then M1 dependent result $(190) \div 40$ |
| (b) | $\frac{190 + 3n}{40 + n}$ | 2 | SC1 for their $190 + 3n$ |
| 3 (a) | Triangle drawn with co-ords at (1, 4), (4, 2), (4, 4) | 2 | SC1 for 2 correct vertices or an enlargement sf $\frac{1}{2}$ with wrong centre |
| (b) (i) | $\begin{pmatrix} -8 & -8 & -2 \\ 4 & 8 & 8 \end{pmatrix}$ | 2 | B1 each row |
| (ii) | Triangle drawn at (-8, 4), (-8, 8), (-2, 8) ft (i) | 2ft | SC1 for 2 correct ft vertices. Can also be correct regardless of (i) |
| (iii) | Reflection cao y – axis or $x = 0$ cao | 2 | B1 Independent of (i) or (ii) Extra transformations lose all marks B1 Independent of (i) or (ii) |
| (c) (i) | Translation $\begin{pmatrix} -10 \\ -10 \end{pmatrix}$ o.e. | 2 | B1 Extra transformations lose all marks |
| (ii) | Rotation (0, 0) 90° clockwise oe | 3 | B1 Extra transformations lose all marks B1 Allow word origin for (0, 0) B1 Allow – 90° or 270° (anti-clockwise) |
| (d) | $\begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}$ | 2 | B1 each column |

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|-----|-----------------------|--|-------|---|--|
| 4 | (a) | B and $\frac{2}{5}, \frac{1}{4}$ oe | | 1 | In (b) and (c) 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. Allow any reasonable explanation, e.g. 2 out of 5 greater than 1 out of 4. |
| | (b) (i) | $\frac{1}{3}, \frac{3}{4}, \frac{2}{5}, \frac{3}{5}$ | | 4 | B1 B1 B1 B1 |
| | (ii) | $\frac{6}{12}$ oe cao | www 2 | 2 | $\frac{1}{2}, 0.5$ etc M1 for $\frac{2}{3} \times$ their $\frac{3}{4}$ i.e. product of correct branches on their tree |
| | (iii) | $\frac{42}{60}$ oe cao | www2 | 2 | $\frac{7}{10}, 0.7$ etc M1 for their (ii) + their $\frac{1}{3} \times$ their $\frac{3}{5}$ from their tree |
| (c) | $\frac{2}{60}$ oe cao | www2 | 2 | $\frac{1}{30}, 0.0333(3\dots\dots)$ etc M1 for $\left(\frac{2}{3} \times \frac{1}{4} \times 0\right) + \frac{1}{3} \times \frac{2}{5} \times \frac{1}{4}$ | |
| 5 | (a) | 200.5... to 201 | www 2 | 2 | M1 for $0.5 \times 24 \times 26 \sin 40$ oe A1 |
| | (b) | 17.2 (0....) | www 4 | 4 | M2 for $26^2 + 24^2 - 2 \times 26 \times 24 \cos 40$ or M1 for $\cos 40 = \frac{26^2 + 24^2 - BD^2}{2 \times 24 \times 26}$ A2 or A1 for 295.976.. |
| | (c) | 12.8 (12.77...) | www 4 | 4 | B1 for Angle $C = 110$ soi accept on diagram M2 for $(BC) = \frac{24 \sin 30}{\sin 110}$ oe or M1 $\frac{\sin 110}{24} = \frac{\sin 30}{BC}$ oe i.e. a correct implicit statement soi A1 |
| | (d) | 8.208 to 8.230 | www 2 | 2 | M1 for their (c) $\times \sin 40$ oe |

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|-----------|---|--------------|---|
| 6 (a) | 32.5 cao www4 | 4 | M1 for mid-values seen M1 for use of Σfx with x 's anywhere in each interval ($10 \times 15 + 30 \times 30 + 20 \times 45$) M1 $\div 60$ dependent on second M1 |
| (b) | Histogram drawn | 3 | B1 Bars correct positions and widths – no gaps B2 Heights of bars 1, 1.5 and 2 (B1 for any two correct or for heights in the ratio 2:3:4) |
| 7 (a) | 4.53 or 4.526 – 4.530.... | 3 | SC2 for figs 453 or 4526 – 4530 If SC0, M1 for $\pi \times (\text{figs } 31)^2 \times 15$ |
| (b) | 3.62 to 3.624 ft | 2ft | M1 for their (a) \times figs 8 oe |
| (c) (i) | $360 - 2 \times 90 - 60$ oe | 2 | E2 The 90's and the 60 must be clearly justified. Accept in diagram. SC1 for 60 or two 90's soi in correct positions oe e.g $360 \div 3$ scores 0 |
| (ii) | 0.649 (0.6492 to 0.6493) | 2 | M1 for $\pi \times \text{figs } 62 \div 3$ |
| (iii) | 7.53 (7.527 or 7.528....) | 3 | M1 for their (ii) $\times 3$ M1 (indep) for $18 \times \text{figs } 31$ This M is spoiled by extra lengths. |
| (iv) | 112.9 to 113 ft | 1ft | ft their (iii) $\times 15$ |
| 8 (a) | 0.25, 8, 16 | 3 | B1 B1 B1 |
| (b) | - 5, 4 | 2 | B1 B1 |
| (c) (i) | 7 points plotted ft Curve through all 7 points exponential shape | P2ft C1ft | P1 for 5 or 6 points ft ft only if exponential shape |
| (ii) | 6 points plotted ft Curve through all 6 points parabola shape | P2ft C1ft | P1 for 5 points ft ft only if parabola shape |
| (d) (i) | 3.2 to 3.4 | 1 | |
| (ii) | 0.3 to 0.4 and 2 | 2 | B1 B1 |
| (iii) | 3.1 to 3.4 | 1 | |
| 9 (a) (i) | -2.5 oe | 2 | M1 for $5(w + 1) = 3w$ |
| (ii) | -3 or 1 | 2 | B1 B1 (If 0, SC1 for $y + 1 = \pm 2$) |
| (iii) | 9.5 oe | B3 | M2 for $5x + 5 - 3x + 6 = 2 \times 15$ Condone one slip (sign or numerical) on left hand side or M1 for $\frac{5(x+1)}{15} - \frac{3(x-2)}{15}$ or better, condoning one sign or numerical slip. |

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| (b) (i) | $(u - 10)(u + 1)$ | 2 | SC1 for $(u + a)(u + b)$ where $ab = -10$ or $a + b = -9$ |
| (ii) | -1, 10 | 1ft | Only ft B2 or SC1 in (i) but can recover to correct answer only if new working or if (i) not attempted |
| (c) (i) | $\frac{(x+1)(x+2)}{2} = x^2$ oe | M1 | |
| | $((x+1)(x+2) =)x^2 + x + 2x + 2$ | B1 | Allow $3x$ for $x + 2x$ |
| | $x^2 + x + 2x + 2 = 2x^2$ | | |
| | $x^2 - 3x - 2 = 0$ | E1 | Established without any omissions or errors |
| (ii) | $\frac{-(-3) \pm \sqrt{(-3)^2 - 4(1)(-2)}}{2(1)}$ | 2 | B1 for $\sqrt{(-3)^2 - 4(1)(-2)}$ or better seen anywhere. If in form $\frac{p + \sqrt{q}}{r}$ or $\frac{p - \sqrt{q}}{r}$ then B1 for $-(-3)$ and $2(1)$ or better Brackets and full line may be implied later |
| | -0.56, 3.56 | 2 | B1 B1 SC1 for -0.6 or -0.562 to -0.561 and 3.6 or 3.561 to 3.562 |
| (iii) | 12.7 or 12.67 to 12.69 ft | 1ft | ft their positive x squared |
| 10 (a) | $20x + 100y \leq 1200$ | 1 | |
| (b)(i) | $x + y \geq 40$ | 1 | |
| (ii) | $y \geq 2$ | 1 | |
| (c) | $x + y = 40$ cao | L1 | Each line ruled and long enough to enclose required region. |
| | $y = 2$ cao | L1 | If L0 , SC1 if freehand but otherwise accurate and enclose region |
| | Required region only region left not shaded or otherwise clearly indicated cao | R2 | SC1 if one boundary error – see diagrams |
| (d) | 5 cao | 1 | |
| (e) | 50 cao, 2 cao 270 ft | 2 1ft | B1 B1 ft $5 \times$ their $x + 10 \times$ their y |
| 11 (a) | Reasonable diagram, 25, 13, 62 | 4 | B1 B1 B1 B1 diagram may be freehand |
| (b) | 64, 19, 146 | 3 | B1 B1 B1 |
| (c) | n^2 oe $2n + 3$ oe | 2 | B1 B1 |
| (d)(i) | 2 | 1 | |
| (ii) | 20202 ft | 1ft | ft 10101 \times their k |