

**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**

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| <p><b>0581 MATHEMATICS</b></p> <p><b>0581/31</b>      Paper 31 (Core), maximum raw mark 104</p> |
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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      |
| art | anything rounding to       |
| soi | seen or implied            |

| Qu.              | Answers   | Mark | Part Marks  |
|------------------|---|------|---|
| <b>1 (a)</b>     | 720   | 2    | M1 $\frac{32 \times 2250}{100}$   |
| <b>(b) (i)</b>   | 80  | 2    | M1 $\frac{2}{2+7} \times 360$   |
| <b>(ii)</b>      | $\frac{4}{25}$  | 2    | W1 for 180/1125, 120/750, 72/450, 60/375, 36/225, 24/150, 12/75, 20/125, 8/50                     |
| <b>(c)</b>       | 2655  | 3    | M2 $\frac{118}{100} \times 2250$ oe<br>If M0 then M1 for $\frac{18}{100} \times 2250$ or 405 seen |
| <b>(d)</b>       | $2.25 \times 10^3$ cao  | 1    |   |
| <b>(e)</b>       | 1765 cao  | 1    |   |
| <b>2 (a) (i)</b> | 122   | 2    | M1 for $2 \times 19 + 2 \times 42$ oe   |
| <b>(ii)</b>      | 160   | 3    | M2 for $\frac{1}{2}(19+13) \times 10$ oe<br>SC1 for rectangle 130 or triangle 30, 65, 95          |
| <b>(iii)</b>     | 6720 or their <b>(a)(ii)</b> $\times 42$ evaluated              | 2ft  | M1 their <b>(a)(ii)</b> $\times 42$   |
| <b>(b)</b>       | 26.88 or their <b>(a)(iii)</b> $\times 0.004$ evaluated or 26.9 | 3ft  | M1 their <b>(a)(iii)</b> $\times 4$ soi<br>M1 division by 1000 soi                                |

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|                  |  |   |  |
|------------------|--|---|--|
| <b>3 (a)</b>     | 6 points correctly plotted                     | 3 | P2 for 4 or 5 points, P1 for 2 or 3 points   |
| <b>(b)</b>       | negative cao                                   | 1 |  |
| <b>(c) (i)</b>   | 8 cao  | 1 |  |
| <b>(ii)</b>      | art 5.92                                       | 3 | M1 for attempt to add the 12 values (for time) implied by 71<br>M1 dep for division by 12<br>SC1 for 23.4  |
| <b>(d) (i)</b>   | 26 cao   | 1 |  |
| <b>(ii)</b>      | 23.5 cao                                       | 1 |  |
| <b>(e) (i)</b>   | $\frac{2}{12}$ oe                              | 1 | 0.166 or 0.167 or 16.6% or 16.7%   |
| <b>(ii)</b>      | $\frac{3}{12}$ oe                              | 2 | 0.25 or 25%<br>SC1 for (4,28) (2,26) (3,30) listed or ringed on diagram or table   |
| <b>4 (a) (i)</b> | art 4.77                                       | 3 | M2 for $BN = 8.6 \times \tan 29$ oe<br>or M1 for $\frac{BN}{8.6} = \tan 29$ oe   |
| <b>(ii)</b>      | art 50.1°                                      | 2 | M1 for $\cos CAN = 8.6 \div 13.4$  |
| <b>(b)</b>       | 10.2 to 10.3                                   | 3 | M1 for $13.4^2 - 8.6^2$ (105.6)<br>M1 dep for $\sqrt{13.4^2 - 8.6^2}$  |
| <b>5 (a) (i)</b> | correct image                                  | 2 | B1 for translation by $\begin{pmatrix} 4 \\ k \end{pmatrix}$ or $\begin{pmatrix} k \\ -3 \end{pmatrix}$ or $\begin{pmatrix} -3 \\ 4 \end{pmatrix}$ |
| <b>(ii)</b>      | correct image                                  | 2 | B1 for figure of correct size and orientation in wrong position  |
| <b>(iii)</b>     | correct image                                  | 2 | B1 for reflection in $y$ -axis or in any horizontal line.  |
| <b>(b)</b>       | Reflection, $x = -2$                           | 2 | B1 each  |
| <b>(c)</b>       | Rotation, origin, 90° (anti-clockwise or +90°) | 3 | B1 each<br>accept 270° clockwise, -270°, 1/4   |

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|           |   |                  |  |
|-----------|---|------------------|--|
| 6 (a)     | -1.5 -10 10 6 1.2   | 3                | B2 for 3 or 4 correct, B1 for 2 correct  |
| (b)       | 14 points plotted accurately<br>2 smooth correct curves<br>No part across $y$ -axis | P3ft<br>C1<br>B1 | P2ft for 11, 12 or 13 points, P1ft for 8, 9 or 10<br><br>Indep   |
| (c)       | 0.4 to 0.5  | 1                |  |
| (d)       | -3 -1 1   | 2                | B1 for 2 correct   |
| (e)       | Ruled line from (-3, -3) to (3, 1)  | 2                | SC1 for freehand or short ruled line – must meet curve twice or P1 for their 3 points plotted  |
| (f)       | (-1.5, -2) and (3, 1)   | 1, 1             |  |
| 7 (a)     | -3  | 2                | 1 for correct substitution seen  |
| (b)       | 8   | 2                | M1 for $37-5=4d$ oe  |
| (c)       | $\frac{S-a}{4}$   | 2                | M1 for one correct step seen   |
| 8 (a)     | 314.60  | 3                | M1 for $\frac{275 \times 4 \times 3.6}{100}$ or 39.6<br>M1 dep for their interest added to 275   |
| (b)       | 703.04  | 3                | M2 for $650 \times 1.04^2$<br>or M1 for $650 \times 1.04$ oe (implied by 676)<br>and M1 dep for second year  |
| (c) (i)   | 314.28  | 2                | M1 for $400 \times 0.7857$   |
| (ii)      | 627.55 or 627.54  | 3                | M1 for $400 \div 0.6374$ soi<br>A1 627.54..., 628, 627.5<br>B1 <b>indep</b> for their visible answer <b>corrected</b><br>to 2dp<br>Penalise accuracy only once in the question |
| 9 (a) (i) | 9 or 8.9 to 9.1   | 1                |  |
| (ii)      | 53 – 55   | 1                |  |
| (b)       | compass drawn circle centre $C$ radius<br>7 cm                                      | 2                | SC1 incomplete accurate circle<br>SC1 any complete circle centre $C$   |
| (c)       | correct line drawn with angle $BCX = 67^\circ$                                      | 2ft              | SC1 for $BCX = 113^\circ$ or $BCX = 67^\circ$ inside triangle or $BCX = 67^\circ$ , $CX$ not = 7   |
| (d)       | in range 9.3 – 9.9  | 1ft              | Strict ft from (c)   |
| (e)       | ruled accurate angle bisector of <b>their</b><br>$CBX$ with 2 pairs of arcs         | 2ft              | SC1 if accurate but without arcs<br>or M1 for 2 pairs of arcs  |

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|-------------------|--|-----|--|
| <b>10 (a) (i)</b> | 5  | 1   |  |
| <b>(ii)</b>       | 10   | 1   |  |
| <b>(iii)</b>      | $n$  | 1   |  |
| <b>(b) (i)</b>    | 9  | 1   |  |
| <b>(ii)</b>       | 19   | 1   |  |
| <b>(iii)</b>      | $2n - 1$ oe                                  | 2   | SC1 for $2n + k$ oe or $jn - 1, j \text{ not } = 0$  |
| <b>(c) (i)</b>    | 45   | 1   |  |
| <b>(ii)</b>       | $5 \times 9$                                 | 1   | Accept height $\times$ width                         |
| <b>(iii)</b>      | $n(2n - 1)$ oe or $n(\text{their (b)(iii)})$ | 1ft | Their <b>(a)(iii)</b> $\times$ their <b>(b)(iii)</b> |