

## **MARK SCHEME for the May/June 2008 question paper**

### **0580, 0581 MATHEMATICS**

**0580/04, 0581/04** Paper 4 (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.

All Examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

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 2008 question papers for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level syllabuses and some Ordinary Level syllabuses.

|               |                              |                   |              |
|---------------|------------------------------|-------------------|--------------|
| <b>Page 2</b> | <b>Mark Scheme</b>           | <b>Syllabus</b>   | <b>Paper</b> |
|               | <b>IGCSE – May/June 2008</b> | <b>0580, 0581</b> | <b>04</b>    |

|                  |  |                           |  |
|------------------|--|---------------------------|--|
| <b>1 (a) (i)</b> | <b>250</b>   | <b>B1</b>                 |  |
| <b>(ii)</b>      | their <b>(a)(i)</b> $\div 5 \times 52$ o.e.<br><b>2600</b> ft<br>www2  | <b>M1</b><br><b>A1</b> ft | SC1 for $12.5 \div 5 \times 52$ , implied by 130   |
| <b>(iii)</b>     | $\frac{\text{their (a)(ii)} - 2450}{2450} \times 100$ o.e.<br><b>6.1(22.....)</b> ft<br>www2                 | <b>M1</b><br><b>A1</b> ft | $\frac{\text{their (a)(ii)}}{2450} \times 100 - 100, \frac{2450}{100} = \frac{150}{x}$<br>ft M & A only if their <b>(a)(ii)</b> > 2450 |
| <b>(b) (i)</b>   | $20 \div 5 \times 3$<br><b>12</b><br>www2  | <b>M1</b><br><b>A1</b>    | Accept 12, 8 or 8, 12  |
| <b>(ii)</b>      | their <b>(b)(i)</b> $\div 3$ and $(20 - \text{their (b)(i)}) \div 2.5$<br><b>7 hours 12 mins</b> cao<br>www2 | <b>M1</b><br><b>A1</b>    | 4 and 3.2 or 7.2 or 7h 20 mins seen imply<br><b>M1</b><br>Condone poor notation e.g. 7-12  |
| <b>(iii)</b>     | <b>2.78</b> (2.777–2.778) o.e. cao<br>o.e. in other units  | <b>B1</b>                 | o.e. must have units stated e.g.<br>0.7716..m/s, 46.29 – 46.30 m/min   |
| <b>(iv)</b>      | <b>16 07</b> o.e. ft   | <b>B1</b> ft              | ft their <b>(b)(ii)</b> + 08 55 iff finishes on same day and <b>(b)(ii)</b> has hours <b>and</b> mins                                  |
| <b>(c)</b>       | $20 \times 100000 \div 80$ o.e.<br><b>25 000 or <math>2.5 \times 10^4</math></b><br>www2                     | <b>M1</b><br><b>A1</b>    | 25 000 seen in final ans. After M0, <b>SC1</b> for figs 25 or 0.00004 final answer <b>[13]</b>   |

|                  |  |                                     |  |
|------------------|--|-------------------------------------|--|
| <b>2 (a) (i)</b> | $(x + 4)(x - 5)$   | <b>B2</b>                           | If B0, <b>SC1</b> if of form $(x \pm 4)(x \pm 5)$ ,  |
| <b>(ii)</b>      | <b>-4, 5</b> ft  | <b>B1</b> ft                        | Only ft the SC<br>-4, and 5 <b>not</b> from $(x - 4)(x + 5)$ .   |
| <b>(b)</b>       | $\frac{-(-2) \pm \sqrt{(-2)^2 - 4.3 - 2}}{2.3}$<br><br><b>-0.55, 1.22</b> cao  | <b>B1,B1</b><br><br><b>B1,B1</b>    | <b>B1</b> for $(-2)^2 - 4(3)(-2)$ (or better) seen inside a square root.<br>The expression must be in the form<br>$\frac{p + (\text{or}-)\sqrt{q}}{r}$ then <b>B1</b> for $p = -(-2)$ and<br>$r = 2.3$ or better<br>Allow recoveries from incomplete lines<br><br>If B0, <b>SC1</b> for <b>-0.5 and 1.2</b> or <b>both</b> answers correct to 2 or more decimal places (rounded or truncated).<br>-0.54858, 1.21525... |
| <b>(c) (i)</b>   | $(m - 2n)(m + 2n)$   | <b>B1</b>                           |  |
| <b>(ii)</b>      | <b>-12</b>   | <b>B1</b>                           |  |
| <b>(iii)</b>     | <b>20x + 5</b> o.e. cao final ans  | <b>B2</b>                           | <b>B1</b> for $(4x^2 + 6x + 6x + 9)$ <b>or</b><br>$(x^2 - x - x + 1)$ <b>or</b><br>$(2x + 3 - 2(x - 1))(2x + 3 + 2(x - 1))$  |
| <b>(iv)</b>      | $4n^2 = m^2 - y$ o.e.<br>$n^2 = \frac{m^2 - y}{4}$ o.e.<br>$(n) = \sqrt{\frac{m^2 - y}{4}}$ o.e.<br><b>Mark final answer</b><br>www3 | <b>M1</b><br><b>M1</b><br><b>M1</b> | <b>M1</b> for correct re-arrangement for $n^2$ term (may be $-n^2$ )<br><b>M1</b> for correct division by 4 or $-4$<br><b>M1</b> for correctly taking square root of $n^2$ term<br><br><b>SC2</b> for $\sqrt{\frac{y \pm m^2}{4}}$ or $\sqrt{\frac{m^2 - y}{4}}$ o.e. ww   |
| <b>(d) (i)</b>   | <b>4 or -4 or <math>\pm 4</math></b>   | <b>B1</b>                           |  |
| <b>(ii)</b>      | $n(m^4 - 16n^4)$ or<br>$(m^2n - 4n^3)(m^2 + 4n^2)$ or<br>$(m^2n + 4n^3)(m^2 - 4n^2)$ or<br>$n(m - 2n)(m + 2n)(m^2 + 4n^2)$           | <b>M1</b><br><b>A1</b>              | <b>Correctly</b> taking out $n$ or a <b>correct</b> factor with $n$ still in one bracket<br><br>Must be final answer <b>[17]</b>   |

|               |                              |                   |              |
|---------------|------------------------------|-------------------|--------------|
| <b>Page 3</b> | <b>Mark Scheme</b>           | <b>Syllabus</b>   | <b>Paper</b> |
|               | <b>IGCSE – May/June 2008</b> | <b>0580, 0581</b> | <b>04</b>    |

|                |  |                        |  |
|----------------|--|------------------------|--|
| <b>3</b>       |  |                        | <p>Accept all probability answers as fractions (non-reduced or reduced), decimals or percentages.<br/>         –1 once for 2 sf answers or correct words.<br/>         Condone numerical errors in simplifying or converting after correct answers seen.<br/>         Ratio answers score zero throughout.</p> |
| <b>(a) (i)</b> | $\frac{1}{3}, \frac{3}{8}, \frac{6}{8}, \frac{2}{8}$ o.e.                            | <b>B3</b>              | –1 each error bod if no letters given  |
| <b>(ii)</b>    | $\frac{2}{3} \times \frac{5}{8}$<br>$\frac{5}{12}$ o.e. www2                         | <b>M1</b><br><b>A1</b> | $\frac{10}{24}$ , etc., 0.416(6...)  |
| <b>(iii)</b>   | their $\frac{5}{12} + \frac{1}{3} \times \frac{6}{8}$<br>$\frac{2}{3}$ o.e. cao www2 | <b>M1</b><br><b>A1</b> | $\frac{16}{24}, \frac{8}{12}$ , etc., 0.666(6...)  |
| <b>(b) (i)</b> | $\frac{3}{10} \times \frac{2}{9} \times \frac{1}{8}$<br>$\frac{1}{120}$ o.e. www2    | <b>M1</b><br><b>A1</b> | $\frac{6}{720}$ , etc., 0.00833(3...)  |
| <b>(ii)</b>    | $\frac{119}{120}$ o.e.   | <b>B1ft</b>            | $\frac{714}{720}$ , etc., 0.991(6...) ft 1 – their <b>(i) not</b> for 7/10<br>Could start again and have a correct answer independently <b>[10]</b>  |

|                  |  |              |   |
|------------------|--|--------------|---|
| <b>4 (a) (i)</b> | <b>36</b> (36.0–36.4)                              | <b>B1</b>    |   |
| <b>(ii)</b>      | <b>50</b> (50.0–50.4)                              | <b>B1</b>    |   |
| <b>(iii)</b>     | <b>29</b> (28.6–29.4)                              | <b>B1</b>    |   |
| <b>(iv)</b>      | <b>20</b>  | <b>B2</b>    | If B0, <b>SC1</b> for 19 or 21 or 180 seen  |
| <b>(b) (i)</b>   | <b><math>p = 16, q = 4</math></b>                  | <b>B1,B1</b> | If B0, <b>SC1</b> if $p$ and $q$ add up to 20   |
| <b>(ii)</b>      | $\left(\frac{7220}{200}\right) = 36.1$ cso www4    | <b>B4</b>    | <p>Answer 36 scores 4 marks after some correct working shown with no incorrect working seen</p> <p><b>M1</b> for using mid-values at least four correct from 5, 15, 25, 35, 45, 55, 65, 75</p> <p><b>M1</b> (dep on correct mid values or mid-values <math>\pm 0.5</math>) for <math>\sum fx</math> (at least four correct products)</p> <p><b>M1</b> (dependent on 2<sup>nd</sup> M1) for dividing sum by 200 or 180 + their <math>p</math> + their <math>q</math></p> |
| <b>(c)</b>       | <b>8.2</b> (8.19–8.20), <b>11.4, 5</b> (5.00–5.01) | <b>B4</b>    | <p><b>B3</b> for 2 correct<br/>         or <b>B2</b> for 1 correct</p> <p>After B0, <b>SC2</b> for fd's 2.7(3...) o.e., 3.8 o.e, 1.6(6...) o.e.<br/>         or <b>SC1</b> for 2 of fd's correct <b>(15)</b></p>  |
| <b>5 (a) (i)</b> | $360 \div 8$ or $(8 - 2) \times 180$               | <b>M1</b>    | allow $6 \times 180$  |

| Page 4 | Mark Scheme           | Syllabus   | Paper |
|--------|-----------------------|------------|-------|
|        | IGCSE – May/June 2008 | 0580, 0581 | 04    |

|         |  |                |   |
|---------|--|----------------|---|
|         | 180 – their (360 ÷ 8) o.e. ÷ 8   | M1             | dependent   |
| (ii)    | 45° used or use implied o.e.   | E1             | Accept sketch with values   |
| (b) (i) | $\frac{l}{12} = \cos 45$ o.e.<br>(PH =) <b>8.49</b> (8.485....) www2   | M1<br>A1       | For o.e. allow implicit expression<br>Accept $\sqrt{72}$ , $2\sqrt{18}$ , $3\sqrt{8}$ , $6\sqrt{2}$     |
| (ii)    | (PQ =) 2 × their PH + 12 o.e.<br>(PQ =) <b>29.0</b> (28.96–29.00) ft www2  | M1<br>A1 ft    | ft their PH accept surd form  |
| (iii)   | their PH × their PH ÷ 2 o.e.<br>(Area APH =) <b>36</b> (35.95–36.1) ft www2  | M1<br>A1 ft    | ft their PH   |
| (iv)    | (their PQ) <sup>2</sup> – 4 × their area of triangle o.e.<br>(Area octagon =) <b>695</b> (694.0–697.1) cao www3                                      | M2<br>A1       | If M0, M1 for a clear collection of areas leading to the octagon possibly without any calculation shown |
| (c) (i) | 0.5 of their PQ o.e.<br><b>14.5</b> (14.47–14.53) cao www2   | M1<br>A1       | e.g. 6 + PH, 6tan67.5°<br>accept surd form  |
| (ii)    | $\pi \times (\text{their } r)^2$<br>$\frac{\text{their circle area}}{\text{their octagon area}} \times 100$<br><b>94.8</b> (94.35 to 95.60) cao www3 | M1<br>M1<br>A1 | (660.5...)<br>Dependent on first M1 and circle smaller than the octagon                                 |

[17]

|           |  |                      |  |
|-----------|--|----------------------|--|
| 6 (a) (i) | $\begin{pmatrix} 2 \\ 1 \end{pmatrix}$                                       | B1                   | Allow (2 1), condone omission of brackets  |
| (ii)      | $\begin{pmatrix} 2 \\ 1 \end{pmatrix}$ ft                                    | B1ft                 | Allow (2 1), condone omission of brackets<br>ft their (i) if a vector  |
| (b)       | Translation $\begin{pmatrix} 0 \\ -4 \end{pmatrix}$ o.e.                     | B1, B1               | Allow (0 –4), condone omission of brackets, allow in words<br>Any extra transformation spoils both marks   |
| (c)       | $y > 0$ o.e.<br>$x < 2$ o.e.<br>$y > \frac{1}{2}x$ o.e.<br>$y < 2x + 4$ o.e. | B1<br>B1<br>B1<br>B2 | <b>For all four, condone strict inequalities and only penalise first incorrect sign, which may be = or an inequality sign</b><br>If B0, B1 for 2x or for 4 if other co-efficient is not zero<br>$y < \frac{1}{2}x + 4$ gets zero |

[9]

|           |  |                |  |
|-----------|--|----------------|--|
| 7 (a) (i) | <b>cyclic</b>  | B1             | Condone concyclic  |
| (ii)      | Any one of <b>40, 45, 50</b><br>Any one of <b>20, 25, 30</b><br>Any one of <b>105, 110, 115</b>            | B1<br>B1<br>B1 | <b>Angle BCT = 40° is inconsistent with ST parallel to OB. So different values of angles x, y, z, OCT and AOC can be arrived at, depending on route taken.</b> |
| (iii)     | Any one of <b>80, 85, 90</b>   | B1             |  |
| (iv)      | Any one of <b>210, 215, 220, 225, 230</b>  | B1             |  |
| (b) (i)   | <b>Similar</b> (or enlargement)  | B1             |  |
| (ii)      | $\left(\frac{7}{10}\right)^2$ or $\left(\frac{10}{7}\right)^2$ o.e. seen<br><b>9.8</b> (9.79 to 9.81) www2 | M1<br>A1       | (0.49), (2.04)<br>It is possible to do (iii) then (ii) and full marks can still be scored  |
| (iii)     | $\frac{1}{2} \times 10 \times \text{height} = 20$<br><b>4</b> www2   | M1<br>A1       |  |

[11]

|               |                              |                   |              |
|---------------|------------------------------|-------------------|--------------|
| <b>Page 5</b> | <b>Mark Scheme</b>           | <b>Syllabus</b>   | <b>Paper</b> |
|               | <b>IGCSE – May/June 2008</b> | <b>0580, 0581</b> | <b>04</b>    |

|                |   |   |  |
|----------------|---|---|--|
| <b>8 (a)</b>   | <b>108(.16)</b> (allow 108.2(0))      www2  | <b>M1</b><br><b>A1</b>                    | <b>M1</b> for method of compound interest used   |
| <b>(b)</b>     | <b>148(.02...)</b> <b>324(.3...)</b>  | <b>B1</b> <b>B1</b>                       |  |
| <b>(c)</b>     | Correct axes full domains<br>5 correct pts 100, 148 ft, 219, 324ft, 480<br><br>Smooth exponential curve, correct shape through 5 points | <b>S1</b><br><b>P3ft</b><br><br><b>C1</b> | Condone absence of labels<br><b>P2ft</b> for 4 correct, <b>P1ft</b> for 3 correct<br>Points must be in correct square vertically, including on line<br>Scale error – remove that part and try to mark the rest |
| <b>(d) (i)</b> | <b>265 – 270</b>  | <b>B1ft</b>                               | If out of range, then ft their graph at 25 years   |
| <b>(ii)</b>    | <b>17 or 18</b> cao   | <b>B1</b>                                 |  |
| <b>(e) (i)</b> | $\frac{(100) \times 7 \times 20}{(100)}$ o.e.<br>100 + 7 × 20 or better   | <b>M1</b><br><b>E1</b>                    | No errors  |
| <b>(ii)</b>    | <b>380</b>  | <b>B1</b>                                 |  |
| <b>(iii)</b>   | Correct straight ruled line for x – range 0 to 35   | <b>L2</b>                                 | <b>P1ft</b> for 2 of (0,100), (20,240) (40,380)ft correctly plotted  |
| <b>(f)</b>     | <b>27 – 29</b> cao  | <b>B1</b>                                 | <b>[17]</b>  |

|                  |   |                           |   |
|------------------|---|---------------------------|---|
| <b>9 (a) (i)</b> | <b>p + r</b>  | <b>B1</b>                 | <b>Answers in bracketed column form penalise only once throughout</b>         |
| <b>(ii)</b>      | <b>-p + r</b>   | <b>B1</b>                 |   |
| <b>(iii)</b>     | $-p + \frac{2}{3}r$   | <b>B1</b>                 |   |
| <b>(iv)</b>      | $p + \frac{1}{2}r$  | <b>B1</b>                 |   |
| <b>(b) (i)</b>   | $\frac{3}{2} \times (-p + \frac{2}{3}r)$ or $-\frac{3}{2}p + r$ isw after correct answer seen | <b>B1 ft</b>              | ft only $\frac{3}{2} \times$ their <b>(a)(iii)</b>                            |
| <b>(ii)</b>      | $\overrightarrow{QP} + \overrightarrow{PS}$ o.e.<br>$-\frac{3}{2}p$ www 2                     | <b>M1</b><br><b>A1 ft</b> | o.e. is any correct route of at least 2 vectors<br>ft their <b>(b)(i) – r</b> |
| <b>(c)</b>       | lie on a straight line  | <b>B1</b>                 | dependent on their <b>(b)(ii)</b> being a multiple of <b>p</b> <b>[8]</b>     |

|                  |  |                            |   |
|------------------|--|----------------------------|---|
| <b>10(a) (i)</b> | <b>4</b>   | <b>B1</b>                  |   |
| <b>(ii)</b>      | <b>24</b>  | <b>B1</b>                  |   |
| <b>(b) (i)</b>   | $x + 12, x + 14$ o.e.  | <b>B1,B1</b>               | Any order ignore ref to <i>g</i> and <i>i</i>   |
| <b>(ii)</b>      | $(x + 14 - x)$ and $(x + 12 - (x + 2))$<br>14 – 10 or 14 – 12 + 2 or 4 | <b>E1</b>                  | $x + 12$ and $x + 14$ must be seen to be used<br>No errors seen                         |
| <b>(iii)</b>     | $(x + 2)(x + 12) - x(x + 14)$<br><br><b>24</b>                         | <b>B1</b><br><br><b>E1</b> | Subtraction can be implied later<br><br>Dep on B1 and no errors anywhere for the E mark |
| <b>(c) (i)</b>   | <b>4</b>   | <b>B1</b>                  |   |
| <b>(ii)</b>      | <b>20</b>  | <b>B1</b>                  |   |
| <b>(d) (i)</b>   | <b>4</b>   | <b>B1</b>                  |   |
| <b>(ii)</b>      | $x + 2n$ o.e., $x + 2 + 2n$ o.e.                                       | <b>B1,B1</b>               |   |
| <b>(iii)</b>     | <b>4n</b>  | <b>B1</b>                  | Allow $4 \times n, n \times 4, n4$ <b>[13]</b>  |