

**MARK SCHEME for the May/June 2012 question paper**  
**for the guidance of teachers**

**0580 MATHEMATICS**

**0580/42**

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, 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.

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

Cambridge is publishing the mark schemes for the May/June 2012 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: Teachers' version</b> | <b>Syllabus</b> | <b>Paper</b> |
|               | <b>IGCSE – May/June 2012</b>          | <b>0580</b>     | <b>42</b>    |

### 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</b>                | <b>(a) (i)</b> 6 correct plots  | <b>2</b>  | <b>P1</b> for 4 or 5 correct plots.   |
|                         | <b>(ii)</b> Positive  | <b>1</b>  |   |
|                         | <b>(iii)</b> Line of best fit   | <b>1</b>  | <b>Ruled</b> line at least from $x = 5$ to $x = 48$ , with at least 3 points on each side and cuts axes between (5, 0) and (0, 20)  |
|                         | <b>(iv)</b> English (integer) value on line at $M = 22$               | <b>1ft</b>  | <b>Strict ft</b> from their single ruled line $5 \leq x \leq 48$ .  |
|                         | <b>(b)</b> $(26 + 39 + 35 + 28 + 9 + 37 + 45 + 33 + 16 + 12) \div 10$ | <b>M2</b>   | <b>M1</b> for $26 + 39 + 35 + 28 + 9 + 37 + 45 + 33 + 16 + 12$ , condone one slip<br><b>or SC1</b> , for at least 2 values<br>eg $(26 + 39 + \dots) \div 10$  |
| <b>(c)</b> 46 cao www 3 | <b>3</b>  | <b>M2</b> for $(31 \times 12 - 28 \times 10) \div 2$ soi by $92 \div 2$<br><b>or M1</b> for $31 \times 12$ soi by 372 or 92 |   |
| <b>2</b>                | <b>(a)</b> 445 final answer www 3                                     | <b>3</b>  | <b>M2</b> for $351.55 \div (1 - 0.21)$ oe<br>or <b>M1</b> for $351.55 = (100 - 21) (\%)$  |
|                         | <b>(b)</b> 640 or 4640<br>4622.5 or 622.5                             | <b>2</b><br><b>2</b>  | <b>M1</b> for $4000 \times 0.08 \times 2$ oe<br><b>M1</b> for $4000 \times (1.075)^2$ oe<br>or $4000 \times 0.075 (= 300)$ <b>and</b> $(4000 + \text{their } 300) \times 0.075$ <b>and</b> total interest = the sum of their 2 interests. |
|                         | Alex by 17.5(0) cao final answer<br>www 6                             | <b>2</b>  | <b>M1</b> for S I amount – C I amount or reverse<br>or simple interest – compound interest or reverse   |

|               |                                       |                 |              |
|---------------|---------------------------------------|-----------------|--------------|
| <b>Page 3</b> | <b>Mark Scheme: Teachers' version</b> | <b>Syllabus</b> | <b>Paper</b> |
|               | <b>IGCSE – May/June 2012</b>          | <b>0580</b>     | <b>42</b>    |

|          |                |                              |          |  |
|----------|----------------|------------------------------|----------|--|
| <b>3</b> | <b>(a) (i)</b> | $x > 4$                      | <b>1</b> |  |
|          | <b>(ii)</b>    | $y > 9$                      | <b>1</b> |  |
|          | <b>(iii)</b>   | $x + y < 20$                 | <b>1</b> |  |
|          | <b>(b)</b>     | $5x + 10y < 170$ seen        | <b>1</b> |  |
|          | <b>(c) (i)</b> | $x = 4$ ruled                | <b>1</b> | Each line long enough to enclose their region<br>Condone good freehand or dotted<br>$y = 9$ must be <b>between</b> 8.8 and 9.2 |
|          |                | $y = 9$ ruled                | <b>1</b> |  |
|          |                | $x + y = 20$ ruled           | <b>2</b> | <b>B1</b> for gradient = $-1$ or $y$ intercept = 20 or $x$ intercept = 20. Exclude lines parallel to either axis.              |
|          |                | $x + 2y = 34$ ruled          | <b>2</b> | <b>B1</b> for $y$ intercept = 17 or $x$ intercept = 34. Exclude lines parallel to either axis.                                 |
|          |                | Correct region indicated cao | <b>1</b> | <b>Dependent</b> on all 6 marks for the 4 lines.   |
|          | <b>(ii)</b>    | 145 cao (from 11, 9) www 2   | <b>2</b> | <b>M1</b> for using $5x + 10y$ when $x + y = 20$ and integers $(x, y)$ is in their region                                      |

|               |                                       |                 |              |
|---------------|---------------------------------------|-----------------|--------------|
| <b>Page 4</b> | <b>Mark Scheme: Teachers' version</b> | <b>Syllabus</b> | <b>Paper</b> |
|               | <b>IGCSE – May/June 2012</b>          | <b>0580</b>     | <b>42</b>    |

|          |                |   |   |
|----------|----------------|---|---|
| <b>4</b> |                |   | In all parts of <b>(a)</b> candidates may refer to angles marked in diagram. Allow if clear even if reason is more complicated as long as it is full.<br>Reasons dependent on correct answers   |
|          | <b>(a) (i)</b> | 42<br>Alternate oe  | <b>1</b><br><b>1</b><br>Not <b>alternate segment</b>  |
|          | <b>(ii)</b>    | 90<br>semicircle oe   | <b>1</b><br><b>1</b><br>Allow <b>diameter</b>   |
|          | <b>(iii)</b>   | 42<br>same segment oe   | <b>1</b><br><b>1</b><br><b>same arc</b>   |
|          | <b>(iv)</b>    | 138<br>cyclic quad oe   | <b>1</b><br><b>1</b><br><b>key words must not be spoiled</b>  |
|          | <b>(b)</b>     | 10.9 (10.90 to 10.91) www 3   | <b>3</b><br><b>M2</b> for $\sqrt{12^2 - 5^2}$ oe i.e explicit<br>or <b>M1</b> for $12^2 = 5^2 + PQ^2$ oe i.e implicit<br>Allow full marks for $\sqrt{119}$ as final answer<br>Use of trig method must be complete to explicit expression for possible <b>M2</b>                             |
|          | <b>(c) (i)</b> | $AD = CD$ and $DE = DG$<br>(Angle) $CDG = (\text{angle})ADE$<br>(Sides of) square or $90^\circ + \text{angle } ADG$<br>oe | <b>1</b><br><b>1</b><br><b>R1</b><br>Extra pair of sides loses this mark.<br>Extra pair of angles loses this mark<br>As in <b>(a)</b> , for all 3 marks allow references to diagram if completely clear.<br><b>R</b> mark dep on at least one pair of sides stated or pair of angles stated |
|          | <b>(ii)</b>    | Congruent   | <b>1</b>  |

| Page 5 | Mark Scheme: Teachers' version | Syllabus | Paper |
|--------|--------------------------------|----------|-------|
|        | IGCSE – May/June 2012          | 0580     | 42    |

|   |   |   |   |
|---|---|---|---|
| <p><b>5 (a)</b></p> <p><b>(b)</b></p> <p><b>(c) (i)</b></p> <p><b>(ii)</b></p>  | <p>(£) 2.37 or 2.371 to 2.372 www 2</p> <p>154 days 4 hours cao</p> <p>9.25</p> <p>Lower = 51.3375 final answer<br/>Upper = 52.8275 final answer</p>  | <p><b>2</b></p> <p><b>3</b></p> <p><b>1</b></p> <p><b>1</b></p> <p><b>1</b></p>                                       | <p><b>M1</b> for <math>34.95 \div 1.17</math> implied by 29.87...or 29.9 or <b>SC1</b> for 2.77 or 2.78 or 2.775</p> <p><b>M1</b> for <math>4.07 \times 10^{12} \div (1.1 \times 10^9)</math> implied by figs 37 or 154. (...)</p> <p><b>A1</b> for 3700 seen or <math>3.7 \times 10^3</math> seen or <math>154\frac{1}{6}</math> oe or 154 rem 4</p> <p>After 0 scored</p> <p><b>SC1</b> for answers reversed or 9.35 <b>and</b> 5.65 seen or 51.3375 <b>and</b> 52.8275 seen</p>    |
| <p><b>6 (a)</b></p> <p><b>(b) (i)</b></p> <p><b>(ii)</b></p> <p><b>(c)</b></p>  | <p><math>(x =) 64</math> www 3</p> <p>-1<br/><math>n^2</math> oe<br/><math>5n</math> oe<br/><math>n^2 + 5n</math> oe</p> <p>20</p> <p><b>Final answer</b> <math>\frac{x-4}{2x-1}</math> cao www 4</p>   | <p><b>3</b></p> <p><b>1</b></p> <p><b>1</b></p> <p><b>1</b></p> <p><b>1</b></p> <p><b>2</b></p> <p><b>4</b></p>       | <p><b>B2</b> for <math>x + 2x + x = 360 - 114 + 10</math> or better or <b>M1</b> for <math>x + 2x + 114 + x - 10 = 360</math></p> <p><b>M1</b> for their <math>n^2 + 5n = 500</math> or 20 <b>and</b> 25 seen</p> <p><b>B1</b> for <math>(x - 4)(x + 4)</math><br/><b>B2</b> for <math>(2x - 1)(x + 4)</math><br/>or <b>SC1</b> for <math>(2x + a)(x + b)</math> where either <math>a + 2b = 7</math> or <math>ab = -4</math></p>   |
| <p><b>7 (a)</b></p> <p><b>(b) (i)</b></p> <p><b>(ii)</b></p> <p><b>(iii)</b></p> <p><b>(iv)</b></p> <p><b>(c)</b></p> | <p>(5, 3)</p> <p><math>3a + c</math></p> <p><math>3a + \frac{1}{2}c</math> or <math>\frac{1}{2}(6a + c)</math></p> <p><math>a + c</math></p> <p><math>\frac{3}{2}a + \frac{1}{2}c</math> or <math>\frac{1}{2}(3a + c)</math></p> <p>(CD) parallel (to OB) oe cao<br/><math>CD = \frac{1}{2}OB</math> oe cao</p> | <p><b>1</b></p> <p><b>1</b></p> <p><b>2</b></p> <p><b>1</b></p> <p><b>2</b></p> <p><b>1dep</b></p> <p><b>1dep</b></p> | <p><b>M1</b> for <math>\overrightarrow{OM}</math> oe e.g. <math>OA + AM</math> or correct unsimplified answer</p> <p><b>M1</b> for <math>-c + \frac{3}{2} \times</math> their (iii) or <math>a + \frac{1}{2} \times</math> their (iii) or correct unsimplified answer or any correct route e.g. <math>CE + ED</math></p> <p>Part (c) dependent on simplified (i) and (iv)<br/>Dep on (i) = <math>k \times</math> (iv)<br/>Dep on (i) = <math>2 \times</math> (iv) must be scalars</p> |

| Page 6 | Mark Scheme: Teachers' version | Syllabus | Paper |
|--------|--------------------------------|----------|-------|
|        | IGCSE – May/June 2012          | 0580     | 42    |

|  |  |   |   |
|--|--|---|---|
| <p><b>8</b></p> <p><b>(a) (i)</b> <math>\frac{2}{3}</math></p> <p><b>(ii)</b> <math>\frac{1}{3}, \frac{2}{3}, \frac{2}{5}, \frac{3}{5}, \frac{1}{6}, \frac{5}{6}</math><br/>correctly placed</p> <p><b>(b)</b> <math>\frac{4}{9}</math> cao www 3</p> <p><b>(c)</b> <math>\frac{14}{45}</math> cao www 3</p> |  | <p><b>1</b></p> <p><b>2</b></p> <p><b>3</b></p> <p><b>3</b></p> | <p><b>Throughout question, penalise non-reduced fraction only once;</b> isw any conversion and allow decimals in working and on branches but not final answers if fractions not seen.</p> <p><b>B1</b> for <math>\frac{1}{3}</math> and <math>\frac{2}{3}</math> and <math>\frac{3}{5}</math> or <math>\frac{5}{6}</math> correctly placed</p> <p>For method marks in <b>(b)</b> and <b>(c)</b>, ft tree with each probability <math>0 &lt; p &lt; 1</math></p> <p><b>M2</b> for <math>1 - \frac{2}{3} \times \frac{5}{6}</math> or <math>\frac{1}{3} + \frac{2}{3} \times \frac{1}{6}</math><br/>or <math>\frac{1}{3} \times \frac{2}{5} + \frac{1}{3} \times \frac{3}{5} + \frac{2}{3} \times \frac{1}{6}</math></p> <p><b>M1</b> for <math>\frac{1}{3} + \frac{2}{3} \times \frac{5}{6}</math><br/>or <b>two</b> of <math>\frac{1}{3} \times \frac{2}{5}, \frac{1}{3} \times \frac{3}{5}, \frac{2}{3} \times \frac{1}{6}</math> <b>added</b></p> <p><b>M2</b> for <math>\frac{1}{3} \times \frac{3}{5} + \frac{2}{3} \times \frac{1}{6}</math> or their <math>\frac{4}{9} - \frac{1}{3} \times \frac{2}{5}</math></p> <p><b>M1</b> for one of <math>\frac{1}{3} \times \frac{3}{5}</math> or <math>\frac{2}{3} \times \frac{1}{6}</math> from a maximum of two products added.</p> |
| <p><b>9</b></p>  | <p>Accurate ruled perp. bisector with correct intersecting arcs</p> <p>Accurate ruled angle bisector with correct intersecting arcs</p> <p>Compass drawn arc centre <math>F</math> radius 5.5 cm long enough to enclose region</p> <p>Correct region indicated cao</p> | <p><b>2</b></p> <p><b>2</b></p> <p><b>2</b></p> <p><b>1</b></p> | <p><b>B1</b> for accurate with no/wrong arcs or <b>M1</b> for correct intersecting arcs<br/>Ignore one extra perp. bisector</p> <p><b>B1</b> for accurate with no/wrong arcs or <b>M1</b> for correct intersecting arcs<br/>Ignore one extra angle bisector</p> <p><b>M1</b> for compass drawn arc centre <math>F</math></p> <p>Accept dotted lines but not freehand for all three</p>  |

| Page 7 | Mark Scheme: Teachers' version | Syllabus | Paper |
|--------|--------------------------------|----------|-------|
|        | IGCSE – May/June 2012          | 0580     | 42    |

|  |  |   |   |
|--|--|---|---|
| <p><b>10 (a) (i)</b></p> <p><b>(ii)</b></p> <p><b>(b)</b></p> <p><b>(c) (i)</b></p> <p><b>(ii)</b></p> <p><b>(d)</b></p> | <p><math>8x^6y^9</math> <b>final answer</b></p> <p><math>\frac{x^2}{3}</math> oe but not <math>\frac{1}{3x^{-2}}</math> oe <b>final answer</b></p> <p><math>6x^2 + 11xy - 10y^2</math> <b>final answer</b></p> <p><math>\frac{V - \pi r^3}{2\pi r^2}</math> or <math>\frac{V}{2\pi r^2} - \frac{r}{2}</math> oe but not triple fractions <b>final answer</b></p> <p><math>\frac{V^2}{3}</math> <b>final answer</b></p> <p><math>\frac{5x}{12}</math> <b>final answer</b></p> | <p><b>2</b></p> <p><b>3</b></p> <p><b>3</b></p> <p><b>2</b></p> <p><b>2</b></p> <p><b>2</b></p> | <p><b>B1</b> for any two of <math>8, x^6, y^9</math> in a single term in answer</p> <p><b>B2</b> for <math>\frac{3}{x^2}</math> or <math>3x^{-2}</math> or <math>\frac{1}{3x^{-2}}</math> as answer</p> <p>or <b>B1</b> for <math>\frac{x^6}{27}</math> oe as answer or <math>\frac{1}{\sqrt[3]{27}}</math> seen</p> <p>or <b>SC1</b> for 3 or <math>x^2</math> or <math>x^{-2}</math> seen in answer</p> <p><b>B2</b> for 3 of <math>6x^2 - 4xy + 15xy - 10y^2</math> (<math>11xy</math> implies 2 terms)</p> <p>or <b>B1</b> for 2 of <math>6x^2 - 4xy + 15xy - 10y^2</math></p> <p><b>M1</b> for correct subtraction or correct division by <math>2\pi r^2</math> <b>seen</b></p> <p><b>B1</b> for <math>V^2 = 3h</math> or <math>\frac{V}{\sqrt{3}} = \sqrt{h}</math> or <math>h = \left(\frac{V}{\sqrt{3}}\right)^2</math></p> <p><b>B1</b> for 2 of <math>\frac{6x}{12}, \frac{20x}{12}, \frac{-21x}{12}</math> oe implied by <math>\frac{10x}{24}</math> ie 2 with common denominator = at least 6</p> |
| <p><b>11 (a)</b></p> <p><b>(b)</b></p> <p><b>(c)</b></p>   | <p>452 or 452.1 to 452.4...</p> <p>59.9 or 59.86 to 59.91 cao www 5</p> <p>11 <math>\div</math> cos50 soi by 17.(11...) oe<br/>(their <math>AC</math>)<sup>2</sup> + 31<sup>2</sup> –<br/>2 <math>\times</math> their <math>AC</math> <math>\times</math> 31cos100<br/>art 37.9 cao www 6</p>  | <p><b>2</b></p> <p><b>5</b></p> <p><b>M2</b></p> <p><b>M2</b></p> <p><b>A2</b></p>              | <p><b>M1</b> for <math>\pi \times 12^2</math> Allow full marks for <math>144\pi</math> as final answer</p> <p><b>M1</b> for <math>\pi \times 24 \times 7</math> (soi by 527 to 528) oe or <math>\frac{22}{360} \times \pi \times 24</math> oe (soi by 4.60 to 4.61)</p> <p><b>and M1 dep</b> for <math>\frac{22}{360} \times \pi \times 24 \times 7</math> (soi by 32.2 to 32.3)</p> <p><b>and M1</b> for <math>\frac{22}{360} \times</math> their (a) oe may restart (soi by 27.6 to 27.7)</p> <p><b>and M1 dep on M3</b> for adding two areas</p> <p><b>M1</b> for <math>\cos 50 = \frac{11}{AC}</math> oe i.e. implicit</p> <p><b>M1</b> for implicit cos rule</p> <p><b>A1</b> for 1433 to 1443</p>   |

|               |                                       |                 |              |
|---------------|---------------------------------------|-----------------|--------------|
| <b>Page 8</b> | <b>Mark Scheme: Teachers' version</b> | <b>Syllabus</b> | <b>Paper</b> |
|               | <b>IGCSE – May/June 2012</b>          | <b>0580</b>     | <b>42</b>    |

|                      |  |                               |   |
|----------------------|--|-------------------------------|---|
| <p><b>12 (a)</b></p> | <p><math>10x + 4y = 10.7</math> oe<br/> <math>8x + 6y = 10.1</math> oe</p> <p>Multiplying or dividing equation(s) by number(s) suitable for elimination</p> <p>Elimination of one variable</p> <p><math>x = 0.85</math> cao<br/> <math>y = 0.55</math> cao</p> | <p><b>1</b><br/> <b>1</b></p> | <p><b>M1</b> Allow one arithmetic error. If substitution, correctly making one variable the subject of one equation.</p> <p><b>M1</b> Allow one arithmetic error. If substitution method then M is for the actual substitution.</p> <p><b>A1</b> <b>SC1</b> for correct fractions<br/> <b>A1</b> After <b>M0</b>, <b>SC2</b> for <b>both</b> correct answers</p> <p>If working in cents, likely mark is 0 for equations, <b>M2</b> for method, <b>A2</b> if answers converted to dollars, <b>A1</b> if left in cents</p>  |
| <p><b>(b)</b></p>    | $\frac{- -5 \pm \sqrt{(-5)^2 - 4.2. - 8}}{2.2}$ <p>3.61 or -1.11 <b>final answer</b></p>   | <p><b>B2</b></p>              | <p><b>B1</b> for <math>\sqrt{(-5)^2 - 4.2. - 8}</math> (<math>\sqrt{89}</math>)</p> <p><b>B1</b> for <math>\frac{p + \sqrt{\quad}}{r}</math> or <math>\frac{p - \sqrt{\quad}}{r}</math> with <math>p = -5</math> or <math>5</math> and <math>r = 2 \times 2</math> or <math>4</math></p> <p>Completing the square <b>B1</b> for <math>\left(x - \frac{5}{4}\right)^2</math> and</p> <p><b>B1</b> for <math>\sqrt{4 + \frac{25}{16}}</math></p> <p><b>B1B1</b> After B0 B0 for answers, <b>SC1</b> for 3.6 or 3.608... and -1.1 or -1.108 or 3.61 and -1.11 seen<br/> <b>Correct answers without working score max 2</b></p> |