

**CAMBRIDGE INTERNATIONAL EXAMINATIONS**

International General Certificate of Secondary Education

**MARK SCHEME for the November 2003 question papers**

**0580/0581 MATHEMATICS**

|                         |   |
|-------------------------|---|
| <b>0580/01, 0581/01</b> | <b>Paper 1 (Core), maximum raw mark 56</b>      |
| <b>0580/02, 0581/02</b> | <b>Paper 2 (Extended), maximum raw mark 70</b>  |
| <b>0580/03, 0581/03</b> | <b>Paper 3 (Core), maximum raw mark 104</b>     |
| <b>0580/04, 0581/04</b> | <b>Paper 4 (Extended), maximum raw mark 130</b> |

These mark schemes are published as an aid to teachers and students, to indicate the requirements of the examination. They show the basis on which Examiners were initially instructed to award marks. They do not indicate the details of the discussions that took place at an Examiners' meeting before marking began. Any substantial changes to the mark scheme that arose from these discussions will be recorded in the published *Report on the Examination*.

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 November 2003 question papers for most IGCSE and GCE Advanced Level syllabuses.

**Grade thresholds** taken for Syllabus 0580/0581 (Mathematics) in the November 2003 examination.

|             | maximum mark available | minimum mark required for grade: |    |    |    |
|-------------|------------------------|----------------------------------|----|----|----|
|             |                        | A                                | C  | E  | F  |
| Component 1 | 56                     | -                                | 46 | 35 | 28 |
| Component 2 | 70                     | 51                               | 28 | 16 | -  |
| Component 3 | 104                    | -                                | 68 | 44 | 38 |
| Component 4 | 130                    | 101                              | 59 | 36 | -  |

The threshold (minimum mark) for B is set halfway between those for Grades A and C.  
The threshold (minimum mark) for D is set halfway between those for Grades C and E.  
The threshold (minimum mark) for G is set as many marks below the F threshold as the E threshold is above it.  
Grade A\* does not exist at the level of an individual component.

| Notes | Mark Scheme                        | Syllabus  |
|-------|------------------------------------|-----------|
|       | IGCSE EXAMINATIONS – NOVEMBER 2003 | 0580/0581 |

## TYPES OF MARK

Most of the marks (those without prefixes, and 'B' marks) are given for accurate results, drawings or statements.

- **M** marks are given for a correct method.
- **B** marks are given for a correct statement or step.
- **A** marks are given for an accurate answer following a correct method.

## ABBREVIATIONS

|        |   |
|--------|---|
| a.r.t. | Anything rounding to  |
| b.o.d. | Benefit of the doubt has been given to the candidate        |
| c.a.o. | Correct answer <b>only</b> (i.e. no 'follow through')       |
| e.e.o. | Each error or omission                                      |
| o.e.   | Or equivalent   |
| SC     | Special case  |
| s.o.i. | Seen or implied   |
| ww     | Without working   |
| www    | Without wrong working                                       |
| √      | Work followed through after an error: no further error made |
| ⊥      | Work followed through and another error found               |

**CAMBRIDGE**  
INTERNATIONAL EXAMINATIONS

**November 2003**

INTERNATIONAL GCSE

**MARK SCHEME**

**MAXIMUM MARK: 56**

**SYLLABUS/COMPONENT: 0580/01, 0581/01**

**MATHEMATICS**

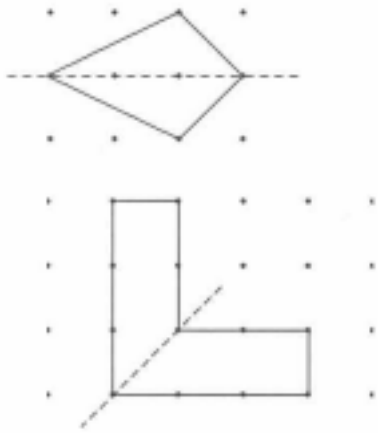
**Paper 1 (Core)**



|        |                                    |           |       |
|--------|------------------------------------|-----------|-------|
| Page 1 | Mark Scheme                        | Syllabus  | Paper |
|        | IGCSE EXAMINATIONS – NOVEMBER 2003 | 0580/0581 | 1     |

| Question Number | Mark Scheme Details |                                |  | Part Mark |
|-----------------|---------------------|--------------------------------|--|-----------|
| 1               |                     | 400 (grams)                    | 1  | 1         |
| 2               |                     | (\$)2.7(0)                     | 2  | 2         |
|                 |                     |                                | <b>M1</b> for $\frac{15}{100} \times 18$ o.e.<br><b>SC1</b> for $\frac{85}{100} \times 18 = 15.3$  |           |
| 3               | (a)                 | $\frac{2}{5}$                  | 1  | 2         |
|                 | (b)                 | 0                              | 1  |           |
|                 |                     |                                | accept $\frac{0}{5}, \frac{0}{k}$ do not accept, none, not but condone it with 0   |           |
| 4               | (a)                 | 126°                           | 1  | 3         |
|                 | (b)                 | 40(%)                          | 2  |           |
|                 |                     |                                | <b>M1</b> for $\frac{144}{360} \times 100$ o.e.  |           |
| 5               |                     | 1.71(01...)                    | 2  | 2         |
|                 |                     |                                | <b>M1</b> for $5 \sin 20^\circ$ or $5 \cos 70^\circ$ or 1.7  |           |
| 6               |                     | 6 or $\frac{6}{1}$             | 2  | 2         |
|                 |                     |                                | <b>M1</b> for $\frac{60}{10}, \frac{1}{6}, \frac{1}{60}$   |           |
| 7               |                     | 144°                           | 3  | 3         |
|                 |                     |                                | <b>M2</b> for $\frac{(2 \times 10 - 4) \times 90}{10}$ or $\frac{(10 - 2) \times 180}{10}$ or $180 - \frac{360}{10}$ .<br>After 0, <b>SC1</b> for answer 36° |           |
| 8               |                     | $1250 \leq \text{r.l.} < 1350$ | 1 + 1  | 2         |
|                 |                     |                                | <b>SC1</b> if reversed   |           |
| 9               | (a)                 | $10x^2 - 15xy$                 | 2  | 4         |
|                 | (b)                 | $6x(x + 2)$                    | 2  |           |
|                 |                     |                                | <b>M1</b> for $6(x^2 + 2x)$ or $x(6x + 12)$ or $2(3x^2 + 6x)$ or $2x(3x + 6)$ or $3(2x^2 + 4x)$ or $3x(2x + 4)$  |           |
| 10              | (a)                 | 87°                            | 1  | 3         |
|                 | (b)                 | 28°                            | 1  |           |
|                 | (c)                 | $62^\circ \sqrt{\quad}$        | 1  |           |
|                 |                     |                                | f.t. is $(90 - y)$   |           |

| Page 2 | Mark Scheme                        | Syllabus  | Paper |
|--------|------------------------------------|-----------|-------|
|        | IGCSE EXAMINATIONS – NOVEMBER 2003 | 0580/0581 | 1     |

|    |   |  |   |  |                             |
|----|---|--|---|--|-----------------------------|
| 11 |  | 1  | Lines may be freehand but must go completely through the shape  | 3  |                             |
|    |   | 1  |   |  |                             |
|    |   | 1  |   |  | Any line through the centre |
| 12 | $x = 4, y = 12$   | 3  | <b>M1</b> for attempting to eliminate one unknown by a correct method<br><b>A1</b> for one correct value (x or y) | 3  |                             |
| 13 | (a)   | (i) 2.4096...  | 1   | f.t. from (i)  | 4                           |
|    |   | (ii) 2.41 $\checkmark$   | 1   |  |                             |
|    | (b)   | 19.3 or 19.32(16...)   | 2   | <b>B1</b> for 2.68 seen or implied by 19.2...            |                             |
| 14 | (a)   | Monday, Tuesday and Saturday                                       | 1   | All three and no extras                                  | 4                           |
|    |   | (b)  | -20   | 3  |                             |
| 15 | (a)   | (i) 0.28   | 1   |  | 4                           |
|    |   | (ii) 0.275   | 1   |  |                             |
|    |   | (iii) 0.2857... or 0.286   | 1   |  |                             |
|    | (b)   | $\frac{275}{1000}$ , 28%, $\frac{2}{7}$ or equivalent $\checkmark$ | 1   | f.t. from (a)  |                             |
| 16 | (a)   | 4.58(m)  | 2   | <b>M1</b> for $\sqrt{5^2 - 2^2}$ s.o.i. e.g. $\sqrt{21}$ | 4                           |
|    |   | (b)  | 66.40 or 66.30 – 66.450   | 2  |                             |

|               |   |                  |              |
|---------------|---|------------------|--------------|
| <b>Page 3</b> | <b>Mark Scheme</b>                        | <b>Syllabus</b>  | <b>Paper</b> |
|               | <b>IGCSE EXAMINATIONS – NOVEMBER 2003</b> | <b>0580/0581</b> | <b>1</b>     |

|            |                |            |  |  |          |               |
|------------|----------------|------------|--|--|----------|---------------|
| <b>17</b>  | <b>(a)</b>     | 3          | 1  | 10 <sup>8</sup> etc. penalise once only                    | <b>4</b> |               |
|            | <b>(b)</b>     | -4         | 1  | accept -04   |          |               |
|            | <b>(c)</b>     | 0          | 1  |  |          |               |
|            | <b>(d)</b>     | -2         | 1  |  |          |               |
| <b>18</b>  | <b>(a)</b>     | 0.4 or 2.6 | 2  | <b>B1</b> for one correct<br><b>SC1</b> if (0.4,0) (2.6,0) | <b>6</b> |               |
|            | <b>(b)</b>     | (i)        | 0  | 1  |          | Must be ruled |
|            |                | (ii)       | Correct line from $x = -1$ to $x = 4$                  | 1  |          |               |
| <b>(c)</b> | (0,1), (4,5) ✓ | 2          | <b>B1</b> for one correct<br>f.t. from <b>(b) (ii)</b> |  |          |               |

**CAMBRIDGE**  
INTERNATIONAL EXAMINATIONS

**November 2003**

INTERNATIONAL GCSE

**MARK SCHEME**

**MAXIMUM MARK: 70**

**SYLLABUS/COMPONENT: 0580/02, 0581/02**

**MATHEMATICS**

**Paper 2 (Extended)**





| Page 1 | Mark Scheme                        | Syllabus  | Paper |
|--------|------------------------------------|-----------|-------|
|        | IGCSE EXAMINATIONS – NOVEMBER 2003 | 0580/0581 | 2     |

\* indicates that it is necessary to look in the working following a wrong answer

|    |   |                          |   |
|----|---|--------------------------|---|
| 1  | 0.5 or $\frac{1}{2}$ c.a.o.                         | 1                        |   |
| 2  | (-)4504   | 1                        | Allow (-)4500   |
| 3  | (a) 121<br>(b) $(n + 1)^2$                          | 1<br>1                   | Allow 49, 64, 81, 100, 121<br>$n^2 + 2n + 1$  |
| 4  | 3/2500, 1/8, 0.00126                                | 2*                       | <b>M1</b> for all 3 evaluated as decimals (or fractions or percentages or stand. form)<br><b>SC1</b> reversed order                     |
| 5  | (a) -1, $\sqrt{36}$<br>(b) $\sqrt{2}$ , $\sqrt{30}$ | 1<br>1                   | Allow -1, $\pm 6$<br><b>SC1 (a) -1 and (b) <math>\sqrt{36}</math>, <math>\sqrt{2}</math>, <math>\sqrt{30}</math></b>                    |
| 6  | $l = mr/5$  | 2*                       | <b>M1</b> for $\frac{240 \times r \times m}{100 (\times 12)}$ o.e.  |
| 7  | 66.7  | 2                        | <b>M1</b> for $\frac{2.4}{3.6} \times 100$ o.e.   |
| 8  | (a) -1<br>(b) 5k                                    | 1<br>1                   |   |
| 9  | (a) 32000<br>(b) <u>25450</u> <u>25550</u>          | 1<br>1, 1                | <b>SC1</b> both correct and reversed  |
| 10 | 11.5(2)   | 3*                       | <b>M1</b> $F = kv^2$ <b>M1</b> $k = 18/40^2$ or better  |
| 11 | (a) 3110<br><br>(b) 322                             | 2*<br><br>1 $\checkmark$ | <b>M1</b> for $1936 \div 0.623$ or $1936 \times 1.61$<br>Allow 3107.54, 3107.5, 3108 or 3107.3<br><b>SC1</b> 3107<br>$1000000 \div$ (a) |
| 12 | (a) 45, 225<br>(b) 157.5                            | 1, 1<br>1                | Allow 158   |
| 13 | (a) 5.5 or $5\frac{1}{2}$<br>(b) 21.5               | 1<br>2*                  | <b>M1</b> $172 \div 8$  |
| 14 | (a) $\frac{x+3}{x(x+1)}$<br><br>(b) -3              | 3*<br><br>1 $\checkmark$ | <b>M1</b> $3(x+1) - 2x$<br><b>M1</b> denominator $x(x+1)$   |

| Page 2 | Mark Scheme                        | Syllabus  | Paper |
|--------|------------------------------------|-----------|-------|
|        | IGCSE EXAMINATIONS – NOVEMBER 2003 | 0580/0581 | 2     |

|                 |                                   |           |  |
|-----------------|-----------------------------------|-----------|--|
| 15              | (a) angle bisector of angle P     | 2*        | <b>M1</b> correct construction method <b>A1</b> $\pm 1^\circ$<br><b>SC1</b> for accurate line but no arcs<br><b>M1</b> radius drawn, meets (a) and O labelled. <b>A1</b> $\pm 1^\circ$ |
|                 | (b) radius from T or U            | 2*        |  |
| 16              | (a) A(2,0) B(0,-6)                | 1, 1      | <b>SC1</b> correct and reversed<br><b>M1</b> $(AB^2) = "(0 - 2)^2 + (-6 - 0)^2"$ from (a)  |
|                 | (b) 6.32                          | 2*        |  |
|                 | (c) (1,-3)                        | 1 $\sqrt$ |  |
| 17              | (a) 20                            | 1         | <b>(b) – (c)</b>   |
|                 | (b) 98                            | 1         |  |
|                 | (c) 62                            | 1         |  |
|                 | (d) 124                           | 1         |  |
|                 | (e) 36                            | 1 $\sqrt$ |  |
| 18              | (a) $5.8 \times 10^8$             | 1         | <b>M1</b> figs 58 $\div$ figs 59 or figs 9830508<br><b>M1</b> figs 59 $\div$ figs $58 \times 10^n$ or $\frac{1}{(b)} \times 10^n$<br>$n = 3$ or $6$                                    |
|                 | (b) 98                            | 2*        |  |
|                 | (c) 10200                         | 2*        |  |
| 19              | (a) -6                            | 2         | <b>M1</b> $1 - 2(7/2)$<br><b>M1</b> $\frac{5x}{2}$ o.e., $2 - 4x = x$ or better  |
|                 | (b) (i) 0.4                       | 2         |  |
|                 | (ii) (0.4, 0.2)                   | 1         |  |
| 20              | (a) (i) $-\frac{2}{3}p + q$       | 2*        | <b>M1</b> use of <b>AQ</b> = $\pm \frac{2}{3}p \pm q$ or <b>AO</b> + <b>OQ</b><br><b>M1</b> use of <b>BQ</b> = $\pm \frac{3}{4}q \pm p$ or <b>BO</b> + <b>OP</b>                       |
|                 | (ii) $-\frac{3}{4}q + p$          | 2*        |  |
|                 | (b) $\frac{1}{3}p - \frac{1}{2}q$ | 2*        |  |
| 21              | (a) $60x + 80y \leq 1200$ seen    | 1         | Allow $0.6x + 0.8y \leq 12$<br><b>M1</b> intention <b>A1</b> accurate<br>Dep. on both lines<br>Allow 20, 0 or $20 + 0$   |
|                 | (b) $x \geq y$                    | 1         |  |
|                 | (c) line $y = x$                  | 1         |  |
|                 | line through (20,0) and (0,15)    | 2*        |  |
|                 | shading out or R labelled         | 1         |  |
| (d) 20 c.a.o.   | 1                                 |           |  |
| <b>Total 70</b> |                                   |           |  |

**TOTAL MARKS 70**

**November 2003**

INTERNATIONAL GCSE

**MARK SCHEME**

**MAXIMUM MARK: 104**

**SYLLABUS/COMPONENT: 0580/03, 0581/03**

**MATHEMATICS**

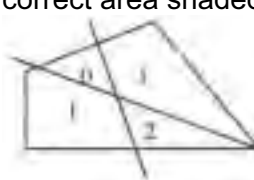
**Paper 3 (Core)**



|        |                             |           |       |
|--------|-----------------------------|-----------|-------|
| Page 1 | Mark Scheme                 | Syllabus  | Paper |
|        | MATHEMATICS – NOVEMBER 2003 | 0580/0581 | 3     |

| Question Number | Mark Scheme                                      | Part Marks                          | Notes   | Question Total |
|-----------------|--|-------------------------------------|---|----------------|
| 1 a)            | 24   | 1                                   |   |                |
| b)              | 25 or $5^2$                                      | 1                                   |   |                |
| c)              | 27 or $3^3$                                      | 1                                   |   |                |
| d)              | 23   | 1                                   |   |                |
|                 | 29   | 1                                   |   |                |
| e)              | 26   | 1                                   | condone 6, 26 or $6 \times 26$  |                |
| f)              | 28 cao   | 1                                   |   |                |
| g)              | 21 and 27  | 1                                   | condone $21 \times 27$  | <b>8</b>       |
| 2 a) i)         | 1300 or 1 pm                                     | 1                                   |   |                |
| ii)             | 1030   | 1                                   | allow 10.30, 10:30 etc  |                |
| iii)            | 9  | 2                                   | <b>B1</b> for either 24 or 33 seen or <b>M1</b> for 2 correct horizontal lines drawn or 24 and 33 marked on axis  |                |
| b) i)           | 4.35, 8.7(0)                                     | 2                                   | <b>B1</b> for one correct   |                |
| ii)             | Correct straight line (through (10, 8.6 to 8.8)) | 2                                   | <b>P1</b> for (5, 4.2 to 4.4) or (10, 8.6 to 8.8)   |                |
| iii)            | 9.2(0) ( $\pm 0.1$ )                             | 1                                   | no ft.  |                |
| iv)             | 575 ( $\pm 5$ )                                  | 1                                   | no ft.  | <b>10</b>      |
|                 |  |                                     |   | <b>18</b>      |
| 3 a)            | 6000   | 2                                   | <b>M1</b> for $25 \times 30 \times 8$   |                |
| b) i)           | art 4400   | 3                                   | <b>M2</b> for $\pi \times 10^2 \times 14$ or <b>SC1</b> for $\pi \times 5^2 \times 14$  |                |
| ii)             | art 10400  | 1 $\checkmark$                      | ft <i>their a + bi</i>  |                |
| iii)            | art 13.9   | 3 $\checkmark$                      | ft for ( <i>their bii</i> ) $\div (25 \times 30)$<br><b>M2</b> for ( <i>their bii</i> ) $\div (25 \times 30)$ oe or <b>M1</b> for ( <i>their bi</i> ) $\div (25 \times 30)$ | <b>9</b>       |
| 4 a)            | 4, 7, 6, 4, 4, 2, 3                              | 2                                   | <b>SC1</b> for 5 or 6 correct or 7 correct tallies  |                |
| b)              | 1 cao  | 1                                   |   |                |
| c)              | 2 cao  | 2                                   | <b>M1</b> for attempt at ranking list seen  |                |
| d)              | 2.5 cao  | 2                                   | <b>M1</b> <i>their</i> $\sum f(x) \div \sum f$ imp by 2.5 seen  |                |
| e) i)           | 0.23(3....) or $\frac{7}{30}$                    | 1 $\checkmark$                      | allow 23%<br>ft from their table  |                |
| ii)             | 0.3 or $\frac{3}{10}$ or $\frac{9}{30}$          | 1 $\checkmark$                      | ft from their table   |                |
| f)              | 40   | 1 $\checkmark$                      | ft <i>their</i> table $\times 10$ . Allow 40/300  | <b>10</b>      |
|                 |  |                                     |   | <b>19</b>      |
| 5 a)            | 6<br>-4  | 1<br>1                              |   |                |
| b) i)           | Rotation through $180^\circ$ about (2.5, 6) o.e. | <b>M1</b><br><b>A1</b><br><b>A1</b> | Half turn <b>M1 AI</b> , -1 for "symmetry"<br>allow correct description of point  |                |
| ii)             | Enlargement s.f. 3 centre (1,7)                  | <b>B1</b><br><b>B1</b><br><b>B1</b> | accept scale 3, x3 etc<br>accept 'B' for (1,7)  |                |
| c) i)           | 3 cao  | 1                                   | ignore units  |                |
| ii)             | 1 : 9 cao  | 2                                   | <b>SC1</b> for 27 seen<br><b>M1</b> for correct answer nlt  |                |
| d)              | $\frac{-2, -6}{3, 9}$ , -0.66 or better          | 2                                   | <b>SC1</b> for $\frac{2}{3}$ oe or -k   | <b>13</b>      |

| Page 2 | Mark Scheme                 | Syllabus  | Paper |
|--------|-----------------------------|-----------|-------|
|        | MATHEMATICS – NOVEMBER 2003 | 0580/0581 | 3     |

|         |   |                |   |    |
|---------|---|----------------|---|----|
| 6 a) i) | 27  | 1              |   |    |
| ii)     | 6   | 2              | M1 for $(39 - 3) \div 6$  |    |
| iii)    | $\frac{P-3}{6}$ oe  | 2              | M1 for P-3 seen or $\frac{P}{6} = \frac{6x+3}{6}$ oe<br>seen  |    |
| b) i)   | $4x + 3$  |                | M1 for $9x + 4 - 2x - (3x + 1)$ oe<br>allow $9x + 4 - 2x - 3x + 1$ oe for M1<br>or SC1 for $4x$ or $(+)3$ in answer<br>space  |    |
| ii)     | 10, 16 and 23   | 3              | M1 for $9x + 4 = 49$ oe A1 for $x = 5$  | 10 |
|         |   |                |   | 23 |
| 7 a) i) | 44  | 2              | SC1 for 40 to 48  |    |
| ii)     | 52  | 3              | B1 for 6 or 8 or 12 or 9 or 21 or 28<br>or 32 or 112 seen<br>+M1 for adding 6 rectangles o.e.   |    |
| iii)    | cuboid or rectangular<br>prism  | 1              | allow rectangular cuboid but not<br>cube or cubical   |    |
| iv)     | 52  | 1 $\checkmark$ | ft from <i>their aii</i> (not strict ft)  |    |
| v)      | 24  | 2              | M1 for $2 \times 3 \times 4$  |    |
| b) i)   | $2(pq + qr + pr)$ oe as final<br>answer   | 2              | SC1 for $pq$ or $qr$ or $pr$ seen or imp.<br>for both parts. Other letters used<br>consistently MR-1  |    |
| ii)     | $pqr$ as final answer   | 2              | M1 for $pqr$ seen   | 13 |
| 8 a)    | 12.5<br>NB 4021 answer 12.5<br>working uses 75 and<br>800   | 3              | M1 for $7.5 \times 12$ oe or $80/12$ oe seen<br>+M1 for $\frac{90-80}{80} \times 100$ (explicit) or<br>$\frac{7.50 - 6.66\dots}{6.66\dots} \times 100$ (explicit)<br>after M0 SC2 for <i>figs</i> 124 to 126<br>ww or SC1 for 112.5 |    |
| b)      | 120 minutes   | 3              | B1 for $\frac{2}{5}$ or 180 or $\frac{3}{5} \times 300$ seen<br>+M1 for $\frac{2}{5} \times 300$ oe or $300-180$  |    |
| c) i)   | Accurate $\perp$ bisector of<br>AB, with arcs $\pm 1^\circ \pm 1\text{mm}$<br>complete inside figure<br>Accurate bisector of $\angle C$<br>with arcs as above | 2<br>2         | SC1 if accurate without arcs <u>or</u><br>incomplete line. Ignore extra lines<br>SC1 if accurate without arcs <u>or</u><br>incomplete line as above   |    |
| ii)     | correct area shaded<br>  | 2 $\checkmark$ | Areas marked as diagram<br>ft from clear intention to draw perp.<br>bisector and angle bisector   | 12 |
| 9 a) i) | 150 (km)  | 1              |   |    |
| ii)     | 15 000 000 oe ( $\checkmark$ )  | 2              | M1 for <i>their a)i</i> ) $\times 100 \times 1000$<br>or SC1 for <i>their a)i</i> ) $\times 10^n$ when $n > 0$  |    |
| b) i)   | 1270 to 1320  | 2              | M1 for <i>their</i> $8.6 \times \text{their } 150$ must<br>have some evidence for <i>their</i> 8.6  |    |
| ii)     | (0)45 to (0)48 oe   | 1              |   |    |
| iii)    | 245 to 248  | 2              | SC1 for any answer in the range<br>$180 < x < 270$  | 8  |
|         |   |                |   | 20 |

|               |                                    |                  |              |
|---------------|------------------------------------|------------------|--------------|
| <b>Page 3</b> | <b>Mark Scheme</b>                 | <b>Syllabus</b>  | <b>Paper</b> |
|               | <b>MATHEMATICS – NOVEMBER 2003</b> | <b>0580/0581</b> | <b>3</b>     |

|       |  |                  |  |            |
|-------|--|------------------|--|------------|
| 10 a) | 1 6 15 20 15 6 1<br>Sum 64<br>1 7 21 35 35 21 7 1<br>Sum 128       | 1<br>1<br>2<br>1 | <b>SC1</b> if 6 or 7 correct                 |            |
| b) i) | 512 accept $2^9$   | 2                | <b>SC1</b> for 256                           |            |
| ii)   | $2^n$  | 2                | <b>SC1</b> for 2 x 2 x 2 seen or description |            |
| c)    | 165 330 462<br>The first 6 numbers<br>repeated in reverse<br>order | 1<br>1           |  | <b>11</b>  |
|       |  |                  |  | <b>11</b>  |
|       |  |                  | <b>TOTAL</b>                                 | <b>104</b> |

**CAMBRIDGE**  
INTERNATIONAL EXAMINATIONS

**November 2003**

INTERNATIONAL GCSE

**MARK SCHEME**

**MAXIMUM MARK: 130**

**SYLLABUS/COMPONENT: 0580/04, 0581/04**

**MATHEMATICS**

**Paper 4 (Extended)**




| Page 1 | Mark Scheme                        | Syllabus  | Paper |
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Marks in brackets are totals for questions or part questions.

|   |     |  |                                      |  |
|---|-----|--|--------------------------------------|--|
| 1 | (a) | 144:96<br><u>Final</u> answer 3:2 or 1.5:1 or 1:0.667  | B1<br>B1<br>(2)                      | After <b>B0</b> , allow <b>SC1</b> for reversed "correct" final ans. www2  |
|   | (b) | (i) 32 (children)<br>(ii) 54 (adults off)<br>(iii) 110 (adults on)<br>(iv) 26 (=x) w.w.w.  | B1<br>B1<br>B1<br>B1<br>(4)          |  |
|   | (c) | $300 \times \frac{4}{thier(6+5+4)}$<br>80 children   | M1<br>A1<br>(2)                      | www2   |
|   | (d) | (i) <u>Final Ans.</u> 21 13 or (0)9 13 pm<br>(ii) 7 h 20 min (o.e) $\times \frac{10}{110}$ (or $\times \frac{100}{110}$ )<br>40 min                    | B1<br>M1<br>A1<br>(3)<br><b>(11)</b> | Condone hrs but hrs and <u>minutes</u> $\Rightarrow$ <b>BO</b><br>Implied by 6 h 40 min or 400 min<br>www2   |
| 2 | (a) | (i) 1.8(02..)<br>(ii) $1.99^2 = \frac{80h}{3600}$ o.e.<br>(h =) 178(.2 )<br>(iii) $A^2 = \frac{hm}{3600}$<br>$3600A^2 = hm$<br>$\frac{3600A^2}{m} = h$ | B1<br>M1<br>A1<br>M1<br>M1<br>(6)    | Throughout (a)(i)(ii)(iii) <b>NO</b> misreads allowed.<br>Must be <i>h</i> , not $\sqrt{h}$<br>ww2 ( <b>Must</b> be correct – e.g. 178.4 $\Rightarrow$ <b>MO</b> ww)<br>(First step must be correct from correct formula for <u>first M1</u> .)<br>Correctly squares at any stage<br>Correctly multiplies at any stage<br>Correctly divides at any stage<br>Only a correct answer in this form can get <b>M3</b> . |
|   | (b) | (i) $(x+4)(x-4)$<br>(ii) $x(x-16)$<br>(iii) $(x-8)(x-1)$   | B1<br>B1<br>B2<br>(4)                | i.s.w. solutions in all (b)<br>Condone loss of <b>final</b> bracket in any (b)   |



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|           |   |                        |   |
|-----------|---|------------------------|---|
| (c) (i)   | $x(3x - 9) = 2x^2 - 8$ o.e.<br>$2x^2 - 8 = 3x^2 - 9x$<br>$x^2 - 9x + 8 = 0$   | M1                     | No error seen and some working to reach final quoted equation. Must have = 0. (E = established)   |
| (ii)      | $x = 1$<br>$x = 8$  | B1<br>B1               |   |
| (iii)     | time = 15 (sec)      c.a.o.<br>distance = 120 (m)      c.a.o.   | B1<br>B1               |   |
|           |   | (6)                    |   |
|           |   | <b>(16)</b>            |   |
| 3 (a) (i) | $17^2 + 32^2 - 2.17.32 \cos 40^\circ$<br><br>$\sqrt{\text{their } 479.54}$<br><br>Answer in range 21.89 to 21.91 (m)  | M2<br><br>M1<br><br>A1 | Allow <b>M1</b> for sign error or correct implicit eqn<br><br>Dep M2. <u>NOT</u> for $\sqrt{225 \cos 40^\circ}$ or $\sqrt{2146}$<br><br>www4  |
| (ii)      | $\frac{\sin T}{17} = \frac{\sin 40^\circ}{\text{their } 21.9}$<br><br>$\sin T = \frac{17 \sin 40^\circ}{\text{their } 21.9}$ (0.499)<br><br>$29.9^\circ$              | M1<br><br>M1<br><br>A1 | or $17^2 = 32^2 + (\text{their } 21.9)^2 - 2.32. (\text{their } 21.9) \cos T$<br><br>$\cos T = \frac{32^2 + (\text{their } 21.9)^2 - 17^2}{2.32. (\text{their } 21.9)}$<br><br>Accept $29.93^\circ$ to $29.94^\circ$ . www3                                     |
| (b) (i)   | $125^\circ$ c.a.o.  | B1                     | <u>All</u> bearings must be $0^\circ \leq \theta \leq 360^\circ$ to score   |
| ** (ii)   | $305^\circ$   | B1√                    | $\sqrt{(180^\circ + \text{their } 125^\circ)}$ correct  |
| ** (iii)  | $335^\circ$ or $334.9^\circ$  | B1√                    | $\sqrt{(\text{their } 305^\circ + \text{their } T)}$ correct  |
|           |   | (3)                    |   |
| (c)       | $\tan(\hat{F}) = \frac{30}{32}$ o.e. <br><br>$43.2^\circ$                          | M1<br><br>A1           | or $F\hat{X}T = \tan^{-1} \frac{30}{32}$ <u>clearly</u> identified.<br><br>°<br><br>(43.15239°) www2 <u>NOT</u> 43.1  |
|           |   | (2)                    |   |
|           |   | <b>(12)</b>            |   |
| 4 (a)     | Scale correct<br><br>8 correct plots (0, 0), (1, 25),<br>(2, 37.5), (3, 43.8), (4, 46.9),<br>(5, 48.4), (6, 49.2), (7, 49.6)<br><br>Reasonable curve through 8 points | S1<br><br>P3<br><br>C1 | $0 \leq t \leq 7$ (14 cm) and $0 - 60 \uparrow$ (12 cm)<br><br>Allow <b>P2</b> for 6 or 7 correct<br><br><b>P1</b> for 4 or 5 correct<br><br>Accuracy better than 2mm horizontally.<br>In correct square $\uparrow$<br><br>Not for linear or <u>bad</u> quality |
|           |   | (5)                    |   |

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|   |   |                 |  |
|---|---|-----------------|--|
| (b) (i)   | $f(8) = 49.8$ or $49\frac{103}{128}$ o.e.                               | B1              | Do not accept improper fractions   |
|   | $f(9) = 49.9$ or $49\frac{231}{256}$ o.e.                               | B1              |  |
| (ii)  | $f(t \text{ large}) \approx 50$   | B1              |  |
| (c) (i)   | Tangent drawn at $t = 2$<br>Uses vert/horiz using scale                 | B1<br>M1        | Not a chord and not daylight<br>Can be given after <b>B0</b> if line not too far out |
| **  | Answer correct for their tangent  | A1 ✓            |  |
| (ii)  | Acceleration or units   | B1<br>(4)       | Accept $\text{ms}^{-2}$ , $\text{m/s}^2$ , $\text{m/s/s}$ .                          |
| (d) (i)   | Straight line through (0, 10)<br>Straight line gradient 6               | B1<br>B1        | } Must be ruled and full length to earn B2   |
| **  | (ii) one $\sqrt{\quad}$ intersection value for $t$                      | B1 ✓            |  |
| **  | Second $\sqrt{t}$ <u>and</u> range                                      | B1 ✓            |  |
| (iii)   | Distance = area (under curve)<br>First particle ( $f(t)$ ) goes further | M1<br>A1<br>(6) |  |
|   |   | <b>(18)</b>     |  |
| <u>Marking final answers throughout this question</u> |   |                 |  |
| 5 (a) (i)   | 0.2 o.e.  | B1              | Accept 2/10, 1/5, 20%  |
| (ii)  | 0.4 o.e.  | B1              | After first <b>B0</b> , condone "2 in 10" type answers.                              |
| (iii)   | 0.5 o.e.  | B1              | Never condone 2 : 10 type  |
| (iv)  | 0.1 o.e.  | B1              |  |
| (v)   | 0   | B1<br>(5)       | Accept "none", "nothing", 0/10, nil, zero  |
| (b) (i)   | $2/10 \times 1/9$<br>$1/45$ o.e.  | M1<br>A1        | Accept 2/90, 0.0222 2.22% www2   |
| (ii)  | $3/10 \times 2/9$<br>$1/15$ o.e.  | M1<br>A1        | Accept 6/90 etc, 0.0666(or 7), 6.66 or 6.67% www2                                    |
| (iii)   | (their) $1/45 +$ (their) $1/15$<br>$4/45$ o.e.                          | M1<br>A1        | Accept 8/90 etc, 0.0888(or 9), 8.88 or 8.89% www2                                    |
| (iv)  | <u>Clearly</u> $1 -$ (their) $4.45$ o.e.<br>$41/45$                     | M1<br>A1<br>(8) | Alternative method must be complete<br>Accept 82/90 etc, 0.911, 91.1% www2           |
|   |   | <b>(13)</b>     |  |

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|   |     |   |   |  |      |
|---|-----|---|---|--|------|
| 6 | (a) | $\pi(30)^2$ (50)<br>141 000 (cm <sup>3</sup> )  | M1<br>A1<br>(2)                                   | (141 300 to 141 430)   | www2 |
|   | (b) | (i) 18 (cm)<br>(ii) $\cos\left(\frac{1}{2}\angle AOB\right) = (\text{their } 18)/30$<br>x2<br>$\angle AOB = 106.26^\circ$ c.a.o   | M1<br>M1dep<br>A1<br>(4)                          | Allow M1 or M2 at similar stages for other methods e.g. $\sin A = 18/30$ then $(180^\circ - 2A)$<br>Must have 2 decimal places seen.<br>ww1 (condone = 106.3 afterwards) |      |
|   | (c) | (i) (their) $\frac{106.3}{360}$ used<br>$\pi(30)^2$ used<br>834 to 835.3 (cm <sup>2</sup> )<br>(ii) $\frac{1}{2} \cdot 30 \cdot 30 \sin$ (their) $106.3^\circ$ or<br>$\frac{1}{2} \cdot 48.18$<br>431.8 to 432 (cm <sup>2</sup> )<br>(iii) Ans. Rounds to 403 cm <sup>2</sup> | M1<br>M1<br>A1<br>M1<br>A1<br>A1<br>(6)           | www3<br>www2   |      |
|   | (d) | (i) 50 x (their) 403<br>** 20 100 to 20 200 (cm <sup>3</sup> )<br>** (ii) 20.1 to 20.2 (litres)   | M1<br>A1√<br>B1√<br>(3)                           | √ correct for their "403"<br>√ their previous answer ÷ 1000  | www2 |
|   | (e) | $k\left[\frac{1}{2}\text{their (a)} - \text{their (d)}\right]$ (i)<br>50.3 to 51 (litres)   | M1<br>A1<br>(2)<br><b>(17)</b>                    | $k = 1$ (cm <sup>3</sup> ) $k = .001$ (litres) $k = \text{other} \Rightarrow$ consistent conversion error.<br>Marking final answer                                       | www2 |
| 7 | (a) | (i) $F \begin{pmatrix} 2 \\ -4 \end{pmatrix}$<br>(ii) D x = 1<br>(iii) E (2, -1)<br>(iv) C (s.f.) 3<br>(v) A Shear  | M1 A1<br>M1 A1<br>M1 A1<br>M1 A1<br>M1 A1<br>(10) | M marks for letters, A marks for descriptions. If <u>no</u> letter given, allow <b>SC1</b> for correct description   |      |

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|           |   |  |  |
|-----------|---|--|--|
| (b)       | $(-1 \ -2) \begin{pmatrix} 1 & 3 \\ 5 & 7 \end{pmatrix}$ or QP<br>$(-11 \ -17)$ <u>final</u> ans<br>$(1 \ 2 \ 3) \begin{pmatrix} -1 \\ 2 \\ 3 \end{pmatrix}$ or RS<br>$(12)$  | M1<br>A2<br>M1<br>A2<br>(6)<br><b>(16)</b> | Penalty –1 for <u>each</u> wrong one thought possible.<br>Allow <b>SC1</b> for one correct<br>Brackets essential here.<br>Allow SC1 for 12 or $-1 + 4 + 9$   |
| 8 (a) (i) | $10 < M \leq 15$<br>(ii) Midpoints 5, 12.5, 17.5, 22.5, 32.5<br>$\sum fx$ (60 + 400 + 490 + 540 + 780)<br>(their) $2270 \div 120$<br>18.9 (2) (kg)<br>(1)<br>(iii) $36^\circ$ | B1<br>M1<br>M1<br>M1<br>A1<br>B1<br>(6)    | Must clearly mean this and not 32<br>Allow for 3 or 4 correct<br>(2270) Needs previous <b>M1</b> or only marginally out<br>dep previous <b>M1</b><br>www4  |
| (b)       | Horizontal scale 2 cm $\equiv$ 5 units<br>(numbered or used correctly)<br>Heights 3k, 16k, 14k, 12k, 4k cm<br>Their k = 1   | S1<br>B5<br>B1<br>(7)<br><b>(13)</b>       | $0 \leq M \leq 40$ . Accuracy < 2 mm.<br>If <b>S0</b> (e.g. 1 cm $\equiv$ 5 units) can score <b>B5</b><br>If <b>S0</b> (e.g. 0, 10, 15) can only score on correct width bars. Penalty –1 for polygon superimposed.<br>If not scored, decide on their “k” and allow SC1 for each “correct” bar. (Needs $\geq 2$ bars to decide on value of k if $k \neq 1$ .) |
| 9 (a) (i) | (Diagram) 5 only  | B1   |  |
| (ii)      | (Diagram) 4 only  | B1   |  |
| (iii)     | (Diagram) 2 only  | B1   |  |
|           |   | (3)  |  |

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|     |  |             |  |
|-----|--|-------------|--|
| (b) | Diagram 1 9 (cm <sup>2</sup> )                   | B1          | 9.00 to 3 s.f.   |
|     | Diagrams 2 and 3 have same area                  | B1          |  |
|     | One of them $\frac{1}{2} \times 3 \times 3$      | M1          |  |
|     | $4\frac{1}{2}$ (cm <sup>2</sup> )                | A1          | www2   |
|     | Diagram 4 $\frac{1}{4} \pi 3^2$ s.o.i.           | M1          | (7.07 cm <sup>2</sup> )  |
|     | $\frac{1}{2} \times 6 \times 6$ – their $9\pi/4$ | M1          | indep. i.e. $18 - k\pi$ where k numerical                          |
|     | 10.9 (cm <sup>2</sup> )                          | A1          | www3   |
|     | Diagram 5 $22\frac{1}{2}^\circ$ s.o.i.           | M1          | <br>$(bc = \sqrt{72})$   |
|     | $6 \tan 22\frac{1}{2}^\circ$                     | M1          | (2.485) (This is AD <u>or</u> DE)                                  |
|     | $\frac{1}{2} (6 - \text{their } 2.485) \times 6$ | dep.M1      | or $18 - \frac{1}{2} \times 6 \times \text{their } 2.485$ . (o.e.) |
|     | 10.5 (cm <sup>2</sup> )                          | A1          | www4   |
|     |  | (11)        |  |
|     |  | <b>(14)</b> |  |