

## **MARK SCHEME for the October/November 2013 series**

### **0580 MATHEMATICS**

**0580/32**

Paper 3 (Core), maximum raw mark 104

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 should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

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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

| Question. | Answers   | Mark                             | Part Marks  |
|-----------|---|----------------------------------|---|
| <b>1</b>  | <b>(a)</b> Scalene [triangle]   | <b>1</b>                         |   |
|           | <b>(b)</b> Congruent  | <b>1</b>                         |   |
|           | <b>(c) (i)</b> translation<br>$\begin{pmatrix} -6 \\ 2 \end{pmatrix}$ | <b>1</b><br><b>1</b>             | Accept 6 left and 2 up.   |
|           | <b>(ii)</b> rotation<br>180°<br>[Centre] (0,0)                        | <b>1</b><br><b>1</b><br><b>1</b> | <b>SC1, 1, 1</b> for<br>Enlargement, [SF=] -1,(0,0)                         |
|           | <b>(d)</b> Image (1, -2), (4, -2), (2, -3)                            | <b>1</b>                         |   |
|           | <b>(e)</b> Image (2, 4), (8, 4), (4, 6)                               | <b>2</b>                         | <b>B1</b> for 2 times enlargement, incorrect centre                         |
|           | <b>(f)</b> 6  | <b>2FT</b>                       | <b>M1</b> for $0.5 \times \textit{their base} \times \textit{their height}$ |

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|   |  |  |   |
|---|--|--|---|
| 2 | <p>(a) (i) <math>\frac{5}{9}</math></p> <p>(ii) 60</p> <p>(b) 1080</p> <p>(c) <math>0.85 \times 3450</math><br/>Or <math>3450 - 0.15 \times 3450</math></p> <p>(d) 32</p>  | 2<br><br>2<br><br>3<br><br>2<br><br>3  | <p><b>B1</b> for <math>\frac{80}{144}</math> or better or 0.556 or 0.555... or answer <math>\frac{4}{9}</math></p> <p><b>M1</b> for <math>144 \div (6+5+1)</math> or <math>144 \div 12</math></p> <p><b>M1</b> for <math>2 \div 5 \times 5200</math> soi by 2080<br/>And <b>M1</b> for <i>their</i> <math>2080 + 24 \times 175 - 5200</math> or better</p> <p><b>B1</b> for 0.85 or for <math>0.15 \times 3450</math></p> <p><b>M2</b> for <math>\frac{3300-2500}{2500} \times 100</math> oe<br/>or <math>(\frac{3300}{2500} - 1) \times 100</math> oe</p> <p><b>Or</b><br/><b>B1</b> for 800 or <math>\frac{3300-2500}{2500}</math> or <math>\frac{3300}{2500}</math> or 1.32 or 132 or 0.32</p> |
| 3 | <p>(a) (i) <math>4n + 21</math>, final answer</p> <p>(ii) <math>5n + 3 = 3n + 27</math><br/>[<math>n =</math>] 12</p> <p>(iii) 126</p> <p>(b) (i) yellow</p> <p>(ii) arrow pointing at 0.5</p> <p>(iii) <math>\frac{4}{20}</math> o.e. or 0.2 or 20%</p> <p>(iv) <math>\frac{16}{20}</math> o.e. or 0.8 or 80%</p> | 1<br><br>1<br><br>2<br><br><b>1FT</b><br><br>1<br><br>1<br><br>1<br><br><b>1FT</b> | <p><b>M1</b> for <math>5n - 3n = 27 - 3</math> or better</p> <p><b>SC1</b> for 4 out of 20 and 16 out of 20</p>   |

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|                               |   |                              |   |   |
|-------------------------------|---|------------------------------|---|---|
| 4                             | (a) (i) 370 to 380  | 2                            | <b>B1</b> for 7.4 to 7.6 seen<br><br><b>B1</b> for one correct arc<br>or C correct with no arcs   |   |
|                               | (ii) [0]36 to [0]40   | 1                            |   |   |
|                               | (iii) Intersecting arcs:<br>Arc centre A radius 10.5 cm<br>Arc centre B radius 7 cm                                     | 2                            |   |   |
|                               | (iv) 300 to 310   | 1FT                          |   |   |
|                               | (b) 11 25   | 3                            |   |   |
|                               | (c) 4200  | 1                            |   |   |
| 5                             | (d) 13.1  | 2                            | <b>M2</b> for $525 \div 700 \times 60$ or better soi<br>Or <b>M1</b> for $525 \div 700$ soi by 0.75<br><br><b>B1</b> for 13 100 or 13.107 or 13.100<br>Or <b>B1FT</b> <i>their</i> conversion to 4 or more sig<br>figs seen and then correctly rounded to 3 sig<br>figs |   |
|                               | (e) 8515  | 1                            |   |   |
|                               | (a) -1 -1.25 2.5 1  | 2                            |   | <b>B1</b> for two correct<br><br><b>P2FT</b> for 8 or 9 correctly plotted<br><b>P1FT</b> for 6 or 7 correctly plotted |
|                               | (b) 10 correctly plotted points<br><br>Two correct smooth curves through<br>all correct points and not across<br>y-axis | <b>P3FT</b><br><br><b>C1</b> |   |   |
|                               | (c) 1.15 to 1.35  | 1FT                          |   |   |
| (d) (i) Line $x = -3.5$ ruled | 1   |                              |   |   |
| (ii) (5, -3) plotted          | 1   |                              |   |   |
| (iii) line $y = -3$ ruled     | 1FT   |                              |   |   |

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|   |   |   |   |  |
|---|---|---|---|--|
| 6   | (a) (i) 26                                  | 1   | <b>B1</b> for each  |  |
|   | (ii) 16                                     | 1   |   |  |
|   | (iii) 17 –3                                 | 2   |   |  |
|   | (b) (i) 9 17                                | 2   |   | <b>B1</b> for one correct in correct position or FT for fourth term                |
|   | (ii) odd                                    | 1   |   |  |
|   | (c) (i) 23                                  | 1   |   | <b>B1</b> for $5n + k$ , $jn + 3$ $j \neq 0$<br>Or $5n + 3$ oe not as final answer |
| (ii) $5n + 3$ oe final answer                             | 2   |   |   |  |
| (iii) 19  | 2   | <b>M1FT</b> for <i>their</i> (c)(ii) = 98 if linear soi |   |  |
| 7   | (a) 23                                      | 2   | <b>M1</b> for clear attempt to find middle<br>If zero scored then <b>SC1</b> for 40   |  |
|   | (b) [Affected by an] extreme value oe       | 1   |   |  |
|   | (c) 40.9                                    | 2   | <b>M1</b> for<br>$(36+38+42+36+45+42+32+40+40+46+56+38) \div 12$ implied by $491 \div 12$<br>If zero scored then <b>SC1</b> for 26.25 or 26.3 |  |
|   | (d) (i) 6 points correctly plotted          | <b>P2</b>   |   | <b>P1</b> for 4 or 5 correctly plotted   |
|   | (ii) positive                               | 1   | dep on at least 11 points on graph  |  |
|   | (iii) line of best fit ruled and continuous | 1   |   |  |
| (iv) No, [estimate unreliable as] outside range [of data] | 1   |   |   |  |

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|    |   |        |  |
|----|---|--------|--|
| 8  | (a) 7<br>Pentagon   | 1<br>1 |  |
|    | (b) (i) trapezium   | 1      |  |
|    | (ii) $125^\circ$  | 1      |  |
|    | (iii) $32^\circ$  | 2      | <b>M1FT</b> for $180 - 125 - 23$ or better<br>or $180 - \textit{their } 125 - 23$ or better                          |
|    | (c) (i) $90^\circ$<br>angle [in a] semicircle [= $90^\circ$ ] | 1<br>1 |  |
|    | (ii) $55^\circ$   | 1      |  |
|    | (iii) $93^\circ$  | 3      | <b>M2</b> for $90 - 52$ or $180 - 90 - 52$ or 38<br>If <b>M0</b> then <b>B1</b> for angle $CAD = 90^\circ$ indicated |
| 9  | (a) (i) 7   | 1      | Allow -7   |
|    | (ii) -32  | 1      |  |
|    | (iii) -11   | 1      |  |
|    | (b) (i) $1.05 \times 10^7$                                    | 1      |  |
|    | (ii) 4 580 000  | 1      |  |
|    | (iii) Kaliningrad   | 1      |  |
|    | (iv) $2.7 \times 10^5$  | 2      | <b>B1</b> for figs 27  |
| 10 | (a) 3.5   | 2      | <b>M1</b> for $6x - 12 = 9$ or better<br>or $x - 2 = \frac{9}{6}$ or better  |
|    | (b) $2n - 18$ or $2(n - 9)$ final answer                      | 2      | <b>B1</b> for $8n - 8$ or $-6n - 10$ or $2n$ or $-18$  |
|    | (c) $5p^2(2 + p)$ final answer                                | 2      | <b>M1</b> for any correct incomplete factorisation<br>or $5p^2(2 + p)$ seen in working                               |