

**MARK SCHEME for the October/November 2011 question paper  
for the guidance of teachers**

**0580 MATHEMATICS**

**0580/33**

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.

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<b>Page 2</b>	<b>Mark Scheme: Teachers' version</b>	<b>Syllabus</b>	<b>Paper</b>
	<b>IGCSE – October/November 2011</b>	<b>0580</b>	<b>33</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

Qu.	Answers	Mark	Part Marks
<b>1</b>	<p>(a) 1.64 3.6(0) 1.68</p> <p>(b) (i) 9.47 ft (ii) 0.53 ft</p> <p>(c) (i) 10 31 (ii) 2 : 5 cao</p> <p>(d) 34.9</p>	<p><b>B1</b> <b>B1</b> <b>B1</b> <b>1ft</b> <b>1ft</b> <b>2</b> <b>2</b> <b>1</b></p>	<p>ft their table ft their (i) <b>B1</b> for 43 seen <b>B1</b> for 18 : 45 oe</p>
<b>2</b>	<p>(a) (i) 11 (ii) 15 (iii) 14.5 (iv) 14</p> <p>(b) (i) 3, ..., 2 (ii) Angles of 90° and 60° Correct labels</p> <p>(c) <math>\frac{5}{6}</math> cao</p>	<p><b>1</b> <b>1</b> <b>2</b> <b>2</b> <b>1</b> <b>1ft</b> <b>1</b> <b>2</b></p>	<p><b>M1</b> for ordering list or substantial part of list or 14 &amp; 15 <b>M1</b> for (9 + 11 + 11 + 12 + 13 + 14 + 15 + 15 + 15 + 15 + 18 + 20) ft only if total equals 12 (Dependent) <b>M1</b> for <math>\frac{10}{12}</math> or <math>\frac{\text{their } 3 + 7}{\text{their } 12}</math> from table</p>
<b>3</b>	<p>(a) 5 (b) 150 (c) 1.8 (d) Straight line (09 25, 600) to (10 00, 600) Straight line (10 00, 600 to 10 10, 0) ft</p>	<p><b>1</b> <b>2</b> <b>3</b> <b>1</b> <b>2ft</b></p>	<p><b>B1</b> for 450 seen or implied <b>M2</b> for <math>\frac{0.45}{0.25}</math> oe (<b>M1</b> for correct distance ÷ correct time) <b>M1</b> for 600 ÷ 60 oe ft their graph 10 mins to time axis</p>

Page 3	Mark Scheme: Teachers' version	Syllabus	Paper
	IGCSE – October/November 2011	0580	33

4	(a) (i) Correct reflection	2	<b>B1</b> if reflected in other vertical line
	(ii) Correct rotation	2	<b>B1</b> if rotated about $C$ but clockwise through $90^\circ$ or correct rotation about their reflected $C$
	(b) (i) Translation, $\begin{pmatrix} -9 \\ -1 \end{pmatrix}$	2	<b>B1</b> for translation <b>B1</b> for column vector
	(ii) Enlargement, (centre) $(0, 0)$ , (sf) $\frac{1}{2}$	3	<b>B1 B1 B1</b>
5	(a) (i) 104	2	<b>M1</b> for $360 - (52 + 140 + 92)$ implied by 76
	(ii) Parallel Angle $YBX = 52^\circ$ oe	1	Dependent on (i) correct
	(b) 36	3	<b>M2</b> for $360 = 90 + 90 + x + 4x$ oe ( <b>B1</b> if angle $T$ or $U = 90^\circ$ soi)
	(c) 18	2	<b>M1</b> if angle sum = 360 soi or long method
6	(a) $-4, \dots, 4, \dots, 4, \dots, -4$	2	<b>B1</b> for both $-4s$ <b>B1</b> for both $4s$
	(b) 7 points plotted ft Reasonable curve through at least 6 points	3ft 1ft	<b>P2</b> for 5 or 6 points plotted ft <b>P1</b> for 3 or 4 Only ft if shape parabola
	(c) (i) The line $x = 1$ drawn	1ft	
	(ii) $x = 1$	1ft	
	(d) $-1.4$ to $-1.1$ , $3.1$ to $3.4$	2ft	<b>B1 B1ft</b> if not in these ranges
7	(a) $\dots, 5, 8, 7, 6, 4, 5, \dots$	2	<b>B1</b> for 4 or 5 correct
	(b) 40	1ft	
	(c) 4.5375 or 4.537 or 4.538 or 4.54 www3 Allow 4.5 but only with working	3	<b>M1</b> for $4 \times 3 + 5 \times 3.5 + 8 \times 4 + 7 \times 4.5 + 6 \times 5 + 4 \times 5.5 + 5 \times 6 + 1 \times 6.5$ <b>M1</b> dependent for dividing their 181.5 by their 40 ( <b>M1 + M1</b> implied by 175(.1625))

Page 4	Mark Scheme: Teachers' version	Syllabus	Paper
	IGCSE – October/November 2011	0580	33

8	<p>(a) Correct construction with arcs</p> <p>(b) (i) Correct construction with arcs</p> <p>(ii) 4.2 to 4.5</p> <p>(c) (i) Correct construction with arcs</p> <p>(ii) <math>129^\circ</math> to <math>133^\circ</math></p> <p>(d) Correct quadrilateral shaded</p>	<p>2</p> <p>2ft</p> <p>1ft</p> <p>2ft</p> <p>1ft</p> <p>1</p>	<p><b>B1</b> for two correct lines without arcs or <b>B1</b> for accurate arcs seen or <b>B1</b> for 1 correct line with 2 arcs seen <b>SC1</b> for <math>AC = 8</math> and <math>BC = 10</math> correct with arcs</p> <p>ft their (a) <b>B1ft</b> for accurate line drawn without arcs or <b>B1ft</b> for accurate arcs seen or <b>B1ft</b> for accurate line with arcs bisecting another angle</p> <p><b>Strict</b> ft their <b>b(i)</b> with intersection on opposite side of triangle</p> <p>ft their (a) <b>B1ft</b> for accurate line drawn without arcs or <b>B1ft</b> for two pairs of accurate arcs seen or <b>B1ft</b> for accurate line with arcs, bisecting <math>AB</math> or <math>AC</math></p> <p><b>Strict</b> ft from their <math>C</math> on triangle, their <math>Y</math> on one side of triangle and their <math>Z</math> on their intersection of <b>b(i)</b> and <b>c(i)</b></p> <p>From their triangle</p>
9	<p>(a) (i) 750</p> <p>(ii) 0.72</p> <p>(b) (i) <math>5^2 + 12^2</math> <math>\sqrt{169}</math></p> <p>(ii) 64.8(0) www4</p>	<p>3</p> <p>2ft</p> <p>M1</p> <p>M1</p> <p>4</p>	<p><b>M2</b> for <math>0.5 \times 12 \times 5 \times 25</math> seen or implied (<b>M1</b> for <math>0.5 \times 12 \times 5</math> or <b>M1</b> for their area of cross-section <math>\times 25</math>)</p> <p>ft their (i) <math>\times 0.00096</math> <b>SC1</b> for 720 (or ft their (i) <math>\times 0.96</math>)</p> <p><b>M2</b> for <math>2 \times \frac{1}{2} \times 12 \times 5 + 25 \times 13 + 25 \times 12 + 25 \times 5</math> (<b>M1</b> for any three correct) <b>M1</b> for their area <math>\times 0.08</math></p>
10	<p>(a) (i) 1200</p> <p>(ii) <math>1200 + pw</math></p> <p>(iii) <math>\frac{1200 + pw}{15 + p}</math></p> <p>(b) (i) 96</p> <p>(ii) 7</p>	<p>1</p> <p>1ft</p> <p>2ft</p> <p>2</p> <p>3</p>	<p>ft their (i) <math>+ pw</math></p> <p>ft their (ii) <math>\div (15 + p)</math></p> <p><b>M1</b> for <math>\div (15 + p)</math></p> <p><b>M1</b> for <math>3(4)(5 + \frac{1}{2} \times 6)</math> or better</p> <p><b>M1</b> for <math>84 = 3b(3 + \frac{1}{2} \times 2)</math> or better</p> <p><b>A1</b> for equation <math>12b = 84</math> oe correct <math>kb = l</math></p>

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	<b>IGCSE – October/November 2011</b>	<b>0580</b>	<b>33</b>

<b>11</b>	<b>(a)</b> 36, 48, 25, 24 ft	<b>4</b>	<b>B1</b> each ft their 25 – 1
	<b>(b) (i)</b> $n^2$ oe	<b>1</b>	
	<b>(ii)</b> $n^2 - 1$ oe	<b>1ft</b>	ft their <b>(i)</b> – 1, if expression in $n$
	<b>(c) (i)</b> 25	<b>1</b>	
	<b>(ii)</b> 85	<b>2</b>	<b>M1</b> for $7n - 3 = 592$ or better
<b>(d)</b> 8192, 2 097 152	<b>2</b>	<b>B1</b> each <b>SC1ft</b> $256 \times$ their 8192	