

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

**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.

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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

Qu.	Answers	Mark	Part Marks
<b>1</b>	<b>(a) (i)</b> 15 35	<b>1</b>	Accept 3.35 <b>pm</b> Condone 1535 pm
	<b>(ii)</b> (0)4 20 <b>pm</b> cao	<b>1</b>	
	<b>(b) (i)</b> 16(.00)	<b>1</b>	
	<b>(ii)</b> 96(.00)	<b>2</b>	<b>M1</b> for $2 \times 24 + 3 \times$ their <b>(b)(i)</b> seen or implied
<b>2</b>	<b>(a)</b> 52.2(%) or 52.17...	<b>1</b>	
	<b>(b)</b> 11000 – $(32 \div 100 \times 11000)$ or $(68 \div 100 \times 11000)$ (=) 7480	<b>M1</b>	
	<b>(c)</b> 8293 or 8290 or 8293.2 or 8293.21 as final answer	<b>E1</b>	Must see this for the second mark.
		<b>3</b>	Either <b>M1</b> for $7480 \times 1.035^2$ oe or <b>M1</b> for $7480 \times 1.035 = 7741.8$ and their $7741.8 \times 1.035$ ( <b>M1</b> implied by 8012.76...) Then <b>M1</b> dep for completion of method for the third year If zero <b>SC1</b> for answer 813.(2...)
	<b>(d) (i)</b> 4 400	<b>1</b>	
	<b>(ii)</b> 4 950	<b>1</b>	
	<b>(iii)</b> 1 650	<b>1ft</b>	11 000 – their <b>(d)(i)</b> – their <b>(d)(ii)</b>
<b>(e)</b> 8 : 9 : 3 cao	<b>2</b>	<b>B1</b> for 40 : 45 : 15 oe seen or correct non-integer ratio	

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3	<p>(a) (i) <math>(r =) \begin{pmatrix} -2 \\ -4 \end{pmatrix}</math></p> <p>(ii) <math>(1, -2)</math></p> <p>(iii) <math>\begin{pmatrix} 2 \\ 4 \end{pmatrix}</math></p> <p>(b) (i) Enlargement (Scale Factor) 3 (Centre) <math>(0, 0)</math></p> <p>(ii) Reflection in <math>x = 0</math> drawn</p> <p>(iii) Rotation <math>180^\circ</math> about <math>(0, 0)</math> drawn</p> <p>(iv) Reflection <math>x</math> axis or <math>y = 0</math></p>	<p>1</p> <p>1ft</p> <p>1ft</p> <p>1</p> <p>1</p> <p>1</p> <p>2</p> <p>2</p> <p>1ft</p> <p>1ft</p>	<p><math>(3 + \text{their } -2, 2 + \text{their } -4)</math></p> <p>Inverse of their (a)(i)</p> <p>All independent</p> <p>SC1 Reflection in <math>y = 0</math></p> <p>SC1 <math>180^\circ</math> rotation about any other point</p> <p><b>Strict follow through</b> Independent marks</p>
4	<p>(a) <math>11x - 2y</math> final answer</p> <p>(b) <math>3x^3 - 2x^2y</math> final answer</p> <p>(c) <math>2y(2y - 5x)</math> final answer</p> <p>(d) (i) 12</p> <p>(ii) <math>(x) = \sqrt{\frac{3y}{4}}</math> final answer oe</p>	<p>2</p> <p>2</p> <p>2</p> <p>2</p> <p>3</p>	<p>B1 for <math>6x + 3y</math> or <math>5x - 5y</math> or <math>11x</math> or <math>-2y</math> in working</p> <p>B1 for <math>3x^3 \pm jx^2y</math> or <math>kx^3 - 2x^2y</math></p> <p>B1 for <math>y(4y - 10x)</math> or <math>2(2y^2 - 5xy)</math> or SC1 for <math>2y(2y + 5x)</math> or SC1 for <math>2y(2y - 5x)</math> in working but then spoilt</p> <p>M1 for <math>\frac{4 \times (-3)^2}{3}</math> or better in working.</p> <p><b>Maximum of M2 from</b> M1 for <math>\times</math> by 3 M1 for <math>\div</math> by 4 M1 for square root</p>
5	<p>(a) 56.6 or 56.56...</p> <p>(b) 529 (km/h) or 528.6 or 528.57...</p> <p>(c) (i) 3700(m)</p> <p>(ii) 14.3 or 14.2(8...)</p>	<p>2</p> <p>2</p> <p>1</p> <p>2ft</p>	<p>M1 for <math>\tan 22 = \frac{h}{140}</math> or better</p> <p>or M1 for <math>\tan(90-22) = \frac{140}{h}</math> or better</p> <p>M1 for <math>\frac{(1850)}{3.5}</math> or better.</p> <p>M1 for <math>\sin(BAC) = \frac{\text{their (c)(i)}}{15000}</math></p>

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6	<p>(a) (i) 240 (ii) 5760</p> <p>(b) (i) 34 (ii) 6</p> <p>(c) 6 by 4 rectangle above 6 by their 8.5 rectangle below Correct triangle on <i>AB</i></p> <p>(d) 2400</p>	<p>2 1ft 2 3 1 1ft 1 3cao</p>	<p>M1 for <math>0.5 \times 30 \times 16</math> ft is (a)(i) <math>\times 24</math> M1 for <math>(FB^2) = 16^2 + 30^2</math> M1 for (circumference) <math>= 1.6 \times \pi</math> M1 dep their (b)(i) <math>\div</math> their <math>1.6\pi</math> (6.76 implies M1, M1) If 0 scored either SC1 for their (b)(i) <math>\div 3.2 \times \pi</math> and then SC1 for truncating correctly If M1 or still 0 scored then SC1 for truncating correctly any number with at least 1 decimal place</p> <p>ft (b)(i) <math>\div 4</math></p> <p>M2 for <math>\frac{1}{2} \times 30 \times 16 + \frac{1}{2} \times 30 \times 16 + 16 \times 24 +</math> <math>30 \times 24 +</math> their <math>34 \times 24</math> (M1 for any 3 areas) If 0, SC2 for 150 or SC1 for 120 (3 rectangles) or SC1 for 30 (2 triangles)</p>
7	<p>(a) (i) -3, -6, 9, 6, 2 (ii) Graph</p> <p>(iii) -3.7 to -3.5</p> <p>(b) (i) -3, 9 (ii) Ruled continuous line <math>y = 2x + 3</math> (iii) (2.2 to 2.5, 7.5 to 7.8) (-4.0 to -3.7, -4.8 to -4.5)</p>	<p>2 P3ft C1 1ft 1, 1 1 1ft 1ft</p>	<p>B1 for 4 correct P2ft for 8 or 9 points correct P1ft for 6 or 7 points correct Correct curve and not crossing axis ft their curve Line long enough to intersect both parts ft their line intersection with the curves</p>
8	<p>(a) heights 11, 13, 15, 16</p> <p>(b) (i) 84.8(3...) (ii) 81.5</p> <p>(c) (i) 8 values correctly plotted (ii) Line of best fit (iii) Negative</p>	<p>2 2 2 P3 1 1</p>	<p>B1 for 3 correct M1 addition of 12 rainfall values Either M1 for evidence of ordering values or substantial part of list (at least first 7 or last 7) or M1 for answers of 81 and 82 P2 for 6 or 7 correct P1 for 4 or 5 correct Must be continuous and straight</p>

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9	(a) Bisector of angle $BAC$ with correct arcs	2	Either <b>B1</b> correct without arcs or <b>B1</b> for 2 pairs of accurate arcs seen
	(b) (i) Bisector of $BC$ with 2 pairs of correct arcs	2	Either <b>B1</b> correct without arcs or <b>B1</b> for 2 pairs of accurate arcs seen
	(ii) 10.8 to 11.2 (cm) cao	1	
	(iii) 32.4 to 33.6	1ft	Their (b)(ii) $\times$ 3
	(iv) $155^\circ$ to $165^\circ$ cao	1	
	(c) (i) Circle centre $L$ , radius 3cm	2	<b>B1</b> circle centre $L$ , incorrect radius or <b>SC1</b> for part circle with correct radius
	(ii) 41km to 44km cao	1	
10	(a) (i) 30	1	
	(ii) 43	1	
	(iii) 20	1	
	(iv) $\frac{1}{8}$ or 0.125	1	
	(v) 32	1	
	(a) (i) 65	1	
	(ii) $7n - 5$ or equivalent	2	<b>B1</b> for $7n$ seen
	(c) 1325	2	<b>B1</b> for $\frac{50^2 + 3 \times 50}{2}$ or better seen
	(d) 4096	1	