UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the October/November 2011 question paper

for the guidance of teachers

0581 MATHEMATICS

0581/32 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
1	**(a) (i)** 15 35		1	Accept 3.35 **pm** Condone 1535 pm
	(ii) (0)4 20 **pm** cao		1	
	(b) (i) 16(.00)		1	
	(ii) 96(.00)		2	**M1** for $2 \times 24 + 3 \times$ their **(b)(i)** seen or implied
2	**(a)** 52.2(%) or 52.17…		1	
	(b) $11000 - (32 \div 100 \times 11000)$ or $(68 \div 100 \times 11000)$		M1	
	(=) 7480		E1	Must see this for the second mark.
	(c) 8293 or 8290 or 8293.2 or 8293.21 as final answer		3	Either **M1** for 7480×1.035^2 oe or **M1** for $7480 \times 1.035 = 7741.8$ and their 7741.8×1.035 (**M1** implied by 8012.76...) Then **M1** dep for completion of method for the third year If zero **SC1** for answer 813.(2…)
	(d) (i) 4 400		1	
	(ii) 4 950		1	
	(iii) 1 650		1ft	11 000 – their **(d)(i)** – their **(d)(ii)**
	(e) 8 : 9 : 3 cao		2	**B1** for 40 : 45 : 15 oe seen or correct non-integer ratio

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

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

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