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.

Mark schemes must be read in conjunction with the question papers and the report on the examination.

- Cambridge will not enter into discussions or correspondence in connection with these mark schemes.

Cambridge is publishing the mark schemes for the October/November 2011 question papers for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level syllabuses and some Ordinary Level syllabuses.

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 × 24 + 3 × their **(b)(i)** seen or implied
2	**(a)** 52.2(%) or 52.17…	1	
	(b) 11000 – (32 ÷ 100 × 11000) or (68 ÷ 100 × 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 × 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 + their –2, 2 + 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) $3x^3 - 2x^2y$ final answer	**2**	**B1** for $3x^3 \pm jx^2y$ or $kx^3 - 2x^2y$
	(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 $\frac{4\times(-3)^2}{3}$ or better in working.
	(ii) $(x) = \sqrt{\frac{3y}{4}}$ 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 $\tan 22 = \frac{h}{140}$ or better or **M1** for $\tan(90–22) = \frac{140}{h}$ or better
	(b) 529 (km/h) or 528.6 or 528.57…	**2**	**M1** for $\frac{(1850)}{3.5}$ or better.
	(c) (i) 3700(m)	**1**	
	(ii) 14.3 or 14.2(8…)	**2ft**	**M1** for $\sin(BAC) = \frac{\text{their (c)(i)}}{15000}$

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 $\frac{1}{2} \times 30 \times 16 + \frac{1}{2} \times 30 \times 16 + 16 \times 24 +$ 30×24 + 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)** × 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) $\frac{1}{8}$ 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 $\frac{50^2 + 3\times 50}{2}$ or better seen
	(d) 4096	**1**	