UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the October/November 2010 question paper for the guidance of teachers

0581 MATHEMATICS

0581/31 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
art anything rounding to
soi seen or implied

Qu.	Answers	Mark	Part Marks
1	**(a)** **(i)** 84 cao **(ii)** 31 or 37 cao **(iii)** 121 cao **(iv)** 125 cao	1 1 1 1	
	(b) $55\% < \frac{5}{9} < \sqrt{0.31}$ oe for each term	2	**M1** for all numbers written as decimals or for all numbers written as percentages
2	**(a)** 90° (Angle between) tangent and radius/ diameter	1 1 dep	
	(b) **(i)** 54° cao	1	
	(ii) $\frac{1}{2} \times (180 - 54)$ or $180 - 90 - {}^{1}/_{2}(180 - 126)$ or 54/2 followed by (180 – 90 – 27 oe)	2	**M1** for using isosceles triangle POR or **M1** for using isosceles triangle ROS then triangle PRS
	(c) **(i)** 90° cao **(ii)** 27° cao	1 1	
3	**(a)** **(i)** 63	2	**M1** for their "378" ÷ 6 or **SC1** for 333 seen
	(ii) 38 cao	1	
	(b) **(i)** 1.5 cao **(ii)** 4	1 2	**B1** for attempt to order the numbers
	(c) 80°	2	**M1** for 84 ÷ their total × 360
	(d) **(i)** 1 <u>hour</u> **(ii)** 4 and a half more suns drawn	1 1	Condone size, shape of suns
	(e) **(i)** 4 correct plots **(ii)** Positive	2 1	**B1** for 3 or 2 correct

4	**(a)** 42	1	
	(b) **(i)** 60°	1	
	(ii) 6.06(217…)	2	**M1** ft for $\frac{x}{7} = \cos 30$ or $\frac{x}{7} = \sin 60$ or $\frac{x}{3.5} = \tan 60$ or $\frac{3.5}{x} = \tan 30$ or better
	(c) **(i)** 21.2 to 21.4 ft	2ft	**M1** for $\frac{1}{2} \times 7 \times$ their **(b)(ii)** oe
	(ii) 91.4 to 91.7 ft	2ft	**M1** ft 7 × 7 + 2 (their **(c)(i)**) or **B1** for 49
5	**(a)** 36 (%)	3	**M2** for $\frac{5.1 - 3.75}{3.75} \times 100$ **M1** for $\frac{5.1}{3.75}$ or 136% or 1.36 or 5.1 – 3.75 implied by 1.35
	(b) 400	2	**M1** for 2.04 ÷ 5.1 implied by figs 4
	(c) **(i)** 1.53	2	**M1** for (1 – 0.7) × 5.1 oe or 5.10 – (5.10 × 0.70)
	(ii) 40.29 cao	2	**M1** for 7 × 5.1 + 3 × their **(c)(i)** or 35.7 + (3 × their **(c)(i)** evaluated)
6	**(a)** –1, –4, 1.3, 1	2	**B1** for –1 and 1 and **B1** for –4 and 1.3
	(b) 10 points plotted ½ small square accuracy	P3ft	**P2** for 8 or 9 points, **P1** for 5 or 6 or 7 points
	smooth correct curves not across y-axis	C1	
	(c) –1.6 correct or ft	1ft	ft from their graph
	(d) **(i)** $y = 5$ drawn	1	
	(ii) ($x =$) 0.8 correct or ft	1ft	ft from their graph
	(e) **(i)** Ruled line drawn from (–0.5, –8) to (2, 2)	2	**B1** for ruled line drawn from either point not horizontal or vertical
	(ii) 4 cao	1	
	(iii) $y = 4x - 6$ or $y =$ their **(e)(ii)** $x +$ their intercept or $y = 4x +$ their intercept	2ft	**B1** ft $y = 4x + k$ or $y =$ their **(e)(ii)** $x + k$ or $y = jx - 6$ or $y = jx +$ their intercept
7	**(a)** 0.5 or 1/2	2	**M1** for collecting terms correctly
	(b) $6x - 34y$ or $2(3x - 17y)$	2	**B1** for $21x - 28y$ or **B1** for $-15x - 6y$ or **B1** for $6x$ or **B1** for $-34y$
	(c) $3g^2(2 - g)$ cao	2	**B1** for correct partial factorising

8	**(a)** **(i)** Rotated 180° about origin	2	**B1** for correct shape and orientation in wro position
	(ii) Reflected in $y = 3$	2	**B1** for reflection in $x = 3$ or $y = k$
	(iii) Translated by $\begin{pmatrix} -5 \\ 3 \end{pmatrix}$	2	**B1** for translation by $\begin{pmatrix} -5 \\ k \end{pmatrix}$ or $\begin{pmatrix} k \\ 3 \end{pmatrix}$ or $\begin{pmatrix} 3 \\ -5 \end{pmatrix}$
	(b) **(i)** Reflection	1	
	$x = -1$	1	
	(ii) Enlargement only	1	**B1** for each
	(sf) 3	1	Independent
	(centre) (1, 3)	1	Independent
9	**(a)** 248 art	3	**M2** for $\sqrt{325^2 - 210^2}$ or better **M1** for $325^2 = x^2 + 210^2$ or better
	(b) **(i)** 40.3° art	2	**M1** sin = 210 ÷ 325 or cos = $\frac{\text{their (a)}}{325}$ or tan = $\frac{210}{\text{their (a)}}$
	(ii) 319.7(5)° or 320°	2ft	**M1** for 360 – their **(b)(i)**
	(c) **(i)** 28	2	**B1** for (time =) 7.5 or 7.30 or **M1** for 210 ÷ their 7.5
	(ii) 8h 47min	3	**M1** for 325 ÷ 37 **A1** for 8.78(37…) **B1** independent converting decimal time to minutes
	(iii) 22 47 or 10 47 pm	1ft	ft 1400 + their **(c)(ii)**
10	**(a)** 5 by 5 shape	1	
	(b) First row 25 2500 n^2	1, 1, 1	Independent
	Second row 1 1 1	1	All three
	Third row 24 2499 $n^2 - 1$	1, 1, 1	Independent
	(c) 100	1	
11	**(a)** 8	1	
	(b) **(i)** 355	2	**M1** for 8 × 40 + 35 seen or better
	(ii) 33	3	**M2** for $\frac{(288 - 24)}{8}$ or **B1** for 264 seen
	(c) $t = \frac{p - k}{8}$	2	**B1** mark for a correct step