

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

MARK SCHEME for the May/June 2012 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
soi	seen or implied

Qu.	Answers	Mark	Part Mark
1 (a)	950	2	M1 for $2000 \div (19 + 21)$
(b)	7 cao	2	M1 for $\frac{265}{37}$ seen oe e.g. adding up 37s
(c)	66	3	M1 for 54 seen M1 indep for 80 seen Or M2 for $\frac{33}{100} \times 200$ or M1 for $\frac{67}{100} \times 200$
(d)	41	4	M1 for $(500 \times 1.04) \times (1.04)$ oe A1 for 540.8 M1 dep for 'their 540.8' – 500 B1 ft for 'their 40.8' rounded to 41 Alt Method M1 for $[500 + (500 \times 0.04)] \times 0.04$ M1 dep 'their 20' + 'their 20.8' A1 for 40.8 B1 ft for 'their 40.8' rounded to 41
2 (a) (i)	Image at $(-5,2), (-2,2), (-2,4), (-3,4), (-3,3), (-5,3)$	2	B1 correct reflection in $x = k, k \neq 0$ SC1 for totally correct reflection in x axis
(ii)	Image at $(2,4), (2,6), (-1,6), (-1,5), (1,5), (1,4)$	2	SC1 for 180° rotation not about $(2,4)$
(iii)	Image at $(1,1), (3,1), (3, -1), (7, -1), (7, -3), (1, -3)$	2	SC1 for correct size and orientation
(b) (i)	Reflection, $y = 0$ or x axis	1ft, 1ft	Ft their (a)(i)
(ii)	Translation, $\begin{pmatrix} 4 \\ 8 \end{pmatrix}$	1ft, 1ft	Strict ft Allow 4 right and 8 up

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3	(a) (i) $\frac{1}{6}$ oe	1	Accept 0.167 or 16.7% <u>o</u> or better
	(ii) $\frac{2}{6}$ oe	1	Accept $\frac{1}{3}$ or 0.333 or 33.3% <u>o</u> or better
	(iii) 1	1	Accept "one" or 100% <u>o</u>
	(b) (2,2,2), 4,4,4,4,5,5,7,7,9 seen on spinner	3	B1 for 4,4,4,4 seen B1 for 5,5 AND 7,7 seen B1 for ONE 9 seen.
	(c) Felix's probability is $\frac{3}{12}$ which is less than Jon's probability (of $\frac{2}{6}$) which is $\frac{4}{12}$ oe	1	Accept equivalent reasoning
	(d) (i) (90°, 120°, 30°), 72°, 48°	3	M1 for $\frac{360}{60} \times f$ for one 'Number' correct A1 for 1 correct answer If zero scored SC1 for their two answers totalling 120°
	(ii) 30° angle correct 72°, 48°	1 1ft	
	(iii) 4	1	
	(iv) 4.85	3	M1 $2 \times 15 + 4 \times 20 + 5 \times 5 + 7 \times 12 + 9 \times 8$ (allow 1 error) M1 dep for their $\frac{\Sigma fx}{60}$
4	(a) If x is more than 11 then $11 - x$ would be negative oe	1	
	(b) $14 + 4x$ cao accept $2(2x + 7)$	2	M1 for $2x + 3 + 11 - x + 3x$
	(c) (i) 4.5 cao	3	B1ft for "their (b)" = 32 M1ft for collecting their like terms correctly to give simplified expression of form $ax = b$ OR M1ft $x = \frac{b}{a}$
	(ii) 6.5	2ft	M1ft for clear attempt at substituting their (c)(i) into 2 or more sides of triangle

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5	(a)	Correct diagram: 4 rows & 6 columns	1		
	(b)	35	1		
	(c)	(i)	$n + 2$ cao	1	
		(ii)	$n(n + 2)$ oe	1 ft	Ft 'their (c)(i)' $\times n$ if (c)(i) linear
	(iii)	440	1 ft	Ft substitution of 20 into 'their (c)(ii)'	
6	(a)	2 cao	2	M1 for $(\frac{\text{change in } y}{\text{change in } x})$ with their values	
	(b)	$-0.5x + 6$	2	B1 for $(y =) -0.5x + k$ or $jx + 6$ ($j \neq 0$)	
	(c)	1:4	2	M1 for 3:12 SC1 for final answer of 4:1 or -1:4 or 1:-4	
	(d)	$25^\circ - 29^\circ$	1		
	(e)	(Corresponding) angles equal oe (Corresponding) lengths in same ratio oe	2		
	(f)	45	3	B1 for '6' and '15' or '6.5-6.9' and '13.2-13.6' seen M1 for $0.5 \times 6 \times 15$ or $0.5 \times "6.7" \times "13.4"$	
	(g)	(i)	D correctly marked on grid	1	
		(ii)	(9, -6)	1ft	Ft their point D
7	(a)	(i)	10	1	
		(ii)	Toni passes Poppy oe	1	E.g. They are both half way between café and home.
		(iii)	18	2	M1 for 3km in 10 mins oe seen or $\frac{3}{10}$ or $\frac{1.5}{5}$ or $\frac{3}{6}$
	(b)	(i)	Straight line (10.30, 3) to (10.50, 3) Straight line (10.50, 3) to (11.10, 5)	1 1	SC1 for (10.30,3) to (10.50,5) on its own
		(ii)	Straight line (10.50, 3) to (10.55, 1.5) Straight line (10.55, 1.5) to (11.15, 0)	1 1	
	(iii)	7.2 cao	3	B1 Correct time seen from their diagram M1ft $(\frac{3}{\text{'their 25'}}) \times 60$ oe	

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8	(a) (i) 170 (ii) 130 (b) 5 (c) Said by 1.5 secs (d) (i) 67.4° (ii) 113° or 112.6° (e) 6×10^{-3}	1 2 1ft 3ft 2 1ft 4	 M1 $50^2 + 120^2$ Ft is $\frac{\text{'their (a)(i)'}}{34}$ M1ft $\frac{\text{'their (a)(ii)'}}{4} (= 32.5)$ M1ft $34 - \frac{\text{'their (a)(ii)'}}{4} (34 - 32.5)$ M1 'tan' = $\frac{120}{50}$ or 'sin' = $\frac{120}{\text{their } 130}$ or 'cos' = $\frac{50}{\text{their } 130}$ 1ft 180 – 'their (d)(i)' M1 '50' × '120' figs seen in area calculation A1 for 6000 seen (implied by 0.006 later) M1 for dividing by 1000 ² , 0.05 & 0.12 seen or $\times 10^{-6}$ oe somewhere B1 ft from 'their 0.006' provided SF power is –ve Or SC1 for 0.6×10^{-2} oe
9	(a) (i) 226 to 226.224 cm ³ (ii) 8 cao www (b) 5.09 (5.092 to 5.10) (c) 148 cm ² (d) (i) <i>mv</i> oe (ii) <i>msv</i> oe (iii) 1000 <i>msv</i> oe	3 4 2 3 1 1ft 1ft	M1 $\pi \times 3^2 \times 8$ B1 for units : cm ³ B1 1500 used M1ft $\frac{3}{4} \times \text{their (a)(i)}$ M1ft $\frac{\text{their } 1500}{\frac{3}{4} \times \text{their (a)(i)}}$ M1 $\frac{16}{\pi}$ M2 for $2 \times 4 \times 5 + 2 \times 4 \times 6 + 2 \times 5 \times 6$ SC1 for $2 \times 4 \times 5$ oe or $4 \times 5 + 4 \times 6 + 5 \times 6$ implied by 40, 48, 60 or 74, or list of 20, 20, 24, 24, 30, 30 Ft (d)(i) × <i>s</i> Ft (d)(ii) × 1000