

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

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

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

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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	<b>M1</b> for $(\frac{\text{change in } y}{\text{change in } x})$ with their values	
	(b)	$-0.5x + 6$	2	<b>B1</b> for $(y =) -0.5x + k$ or $jx + 6$ ( $j \neq 0$ )	
	(c)	1:4	2	<b>M1</b> for 3:12 <b>SC1</b> 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	<b>B1</b> for '6' and '15' or '6.5-6.9' and '13.2-13.6' seen <b>M1</b> 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	<b>M1</b> 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	<b>SC1</b> 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	<b>B1</b> Correct time seen from their diagram <b>M1ft</b> $(\frac{3}{\text{'their 25'}}) \times 60$ oe	

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