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Cambridge International General Certificate of Secondary Education

CAMBRIDGE INTERNATIONAL MATHEMATICS

0607/63

Paper 6 (Extended)

October/November 2017

MARK SCHEME

Maximum Mark: 40

Published

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Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

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MARK SCHEME NOTES

The following notes are intended to aid interpretation of mark schemes in general, but individual mark schemes may include marks awarded for specific reasons outside the scope of these notes.

Types of mark

- M Method marks, awarded for a valid method applied to the problem.
- A Accuracy mark, awarded for a correct answer or intermediate step correctly obtained. For accuracy marks to be given, the associated Method mark must be earned or implied.
- B Mark for a correct result or statement independent of Method marks.

When a part of a question has two or more ‘method’ steps, the M marks are in principle independent unless the scheme specifically says otherwise; and similarly where there are several B marks allocated. The notation ‘**dep**’ is used to indicate that a particular M or B mark is dependent on an earlier mark in the scheme.

Abbreviations

awrt	answers which round to
cao	correct answer only
dep	dependent
FT	follow through after error
isw	ignore subsequent working
nfwf	not from wrong working
oe	or equivalent
rot	rounded or truncated
SC	Special Case
soi	seen or implied

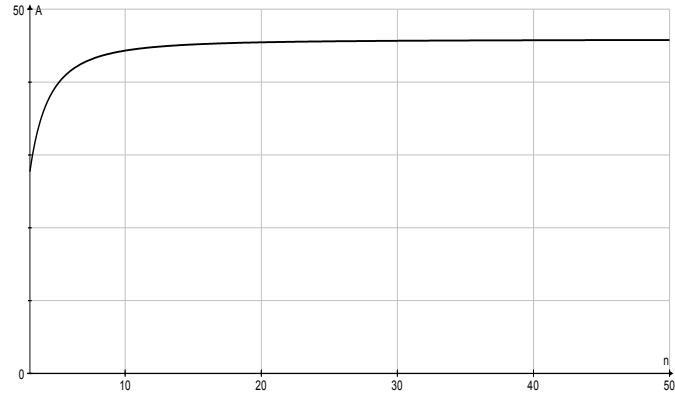
Question	Answer	Marks	Guidance																																																																
A	INVESTIGATION	CHEQUERED FLAGS																																																																	
1(a)	10 10	1																																																																	
1(b)(i)	<table><tr><td></td><td colspan="7">Size of flag</td></tr><tr><td></td><td>2 by 1</td><td>2 by 2</td><td>2 by 3</td><td>2 by 4</td><td>2 by 5</td><td></td><td>2 by n</td></tr><tr><td>Black</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td></td><td>n</td></tr><tr><td>White</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td></td><td>n</td></tr></table> <table><tr><td></td><td colspan="7">Size of flag</td></tr><tr><td></td><td>4 by 1</td><td>4 by 2</td><td>4 by 3</td><td>4 by 4</td><td>4 by 5</td><td></td><td>4 by n</td></tr><tr><td>Black</td><td>2</td><td>4</td><td>6</td><td>8</td><td>10</td><td></td><td>$2n$</td></tr><tr><td>White</td><td>2</td><td>4</td><td>6</td><td>8</td><td>10</td><td></td><td>$2n$</td></tr></table>		Size of flag								2 by 1	2 by 2	2 by 3	2 by 4	2 by 5		2 by n	Black	1	2	3	4	5		n	White	1	2	3	4	5		n		Size of flag								4 by 1	4 by 2	4 by 3	4 by 4	4 by 5		4 by n	Black	2	4	6	8	10		$2n$	White	2	4	6	8	10		$2n$	2	B1 for at least five unshaded numerical pairs correct and B1 for all four algebraic expressions correct
	Size of flag																																																																		
	2 by 1	2 by 2	2 by 3	2 by 4	2 by 5		2 by n																																																												
Black	1	2	3	4	5		n																																																												
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Black	2	4	6	8	10		$2n$																																																												
White	2	4	6	8	10		$2n$																																																												
1(b)(ii)	$3n$ oe $3n$ oe	1																																																																	
1(c)	8	1	C opportunity																																																																
1(d)	$\frac{mn}{2}$ oe	1																																																																	
2(a)	8 7	1																																																																	
2(b)	[No] one of m or n must be even	1																																																																	
2(c)	<table><tr><td></td><td colspan="5">Size of flag</td></tr><tr><td></td><td>3 by 1</td><td>3 by 2</td><td>3 by 3</td><td>3 by 4</td><td>3 by 5</td></tr><tr><td>Black</td><td>2</td><td>3</td><td>5</td><td>6</td><td>8</td></tr><tr><td>White</td><td>1</td><td>3</td><td>4</td><td>6</td><td>7</td></tr></table> <table><tr><td></td><td colspan="5">Size of flag</td></tr><tr><td></td><td>5 by 1</td><td>5 by 2</td><td>5 by 3</td><td>5 by 4</td><td>5 by 5</td></tr><tr><td>Black</td><td>3</td><td>5</td><td>8</td><td>10</td><td>13</td></tr><tr><td>White</td><td>2</td><td>5</td><td>7</td><td>10</td><td>12</td></tr></table>		Size of flag						3 by 1	3 by 2	3 by 3	3 by 4	3 by 5	Black	2	3	5	6	8	White	1	3	4	6	7		Size of flag						5 by 1	5 by 2	5 by 3	5 by 4	5 by 5	Black	3	5	8	10	13	White	2	5	7	10	12	1	At least four of the unshaded pairs correct																
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Black	2	3	5	6	8																																																														
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	5 by 1	5 by 2	5 by 3	5 by 4	5 by 5																																																														
Black	3	5	8	10	13																																																														
White	2	5	7	10	12																																																														
2(d)	$\frac{mn}{2} + \frac{1}{2}$ oe [black] $\frac{mn}{2} - \frac{1}{2}$ oe [white]	2	B1 for each																																																																

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Question	Answer	Marks	Guidance																																																																																
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	Size of flag																																																																																		
	3 by 1	3 by 2	3 by 3	3 by 4	3 by 5		3 by n																																																																												
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3(b)(ii)	$\frac{mn}{3}$ oe	1																																																																																	
3(b)(iii)	No and n must be a multiple of 3 oe	1																																																																																	
4(a)	$\frac{16 \times 14}{6} = 37.3[....]$ or is not integer	1																																																																																	
4(b)	$\begin{array}{cc} 1 \times 18 & 18 \times 1 \\ 2 \times 9 & 9 \times 2 \\ 3 \times 6 & 6 \times 3 \end{array}$	1	C opportunity																																																																																
5	m or n or mn is a multiple of p oe	1																																																																																	
Communication: seen in one of the following questions		1																																																																																	
1(c)	Showing (at least 2 different) pairs of factors of 24																																																																																		
4(b)	$\frac{mn}{6} = 3$ or $mn = 18$																																																																																		

Question	Answer	Marks	Guidance																					
B	MODELLING AREAS OF POLYGONS																							
1(a)	<table><tr><td>Width m</td><td>Length m</td><td>Area m²</td></tr><tr><td>1</td><td>11</td><td>11</td></tr><tr><td>2</td><td>10</td><td>20</td></tr><tr><td>3</td><td>9</td><td>27</td></tr><tr><td>4</td><td>8</td><td>32</td></tr><tr><td>5</td><td>7</td><td>35</td></tr><tr><td>6</td><td>6</td><td>36</td></tr></table>	Width m	Length m	Area m ²	1	11	11	2	10	20	3	9	27	4	8	32	5	7	35	6	6	36	1	
Width m	Length m	Area m ²																						
1	11	11																						
2	10	20																						
3	9	27																						
4	8	32																						
5	7	35																						
6	6	36																						
1(b)	Square	1																						
2	6.93 or better 27.71	2	B1 Accept 6.9 to 6.93 or $4\sqrt{3}$ or $\sqrt{48}$ B1 Accept 27.68 to 27.72																					
3(a)(i)	360 ÷ 5 oe leading to 72	1																						
3(a)(ii)	3.3[0...]	1	C opportunities																					
3(a)(iii)	7.93 or 7.92 to 7.93	1	FT $2.4 \times$ <i>their</i> 3.3 correctly evaluated to 3 s.f. C opportunity																					
3(a)(iv)	39.6 seen or 39.6 to 39.65	1																						
3(b)	41.6 or 41.4 to 41.6	1	C opportunities																					
4(a)(i)	$0.5 \times \frac{24}{n} \times \frac{\frac{12}{n}}{\tan \frac{360}{2n}} \times n$ isw	1																						
4(a)(ii)	Integer or $n \geq 3$ oe	1																						
4(b)	$\frac{144}{8 \tan \left(\frac{180}{8} \right)} = 43.45[\dots]$ or 43.45 to 43.50	1																						

Question	Answer	Marks	Guidance
B	MODELLING AREAS OF POLYGONS		
4(c)	Correct shape 	1	
4(d)	9	1	C opportunity
4(e)	45.8	1	Accept 45 to 46
4(f)(i)	circle	1	
4(f)(ii)	$\frac{144}{\pi}$	2	M1 for $[r =] \frac{12}{\pi}$ or SC1 for 45.8[...]
4(g)	$\frac{P^2}{4n \tan \frac{180}{n}}$	1	C opportunity
Communication: seen in two of the following questions		1	
3(a)(ii)	$\frac{a}{2} = 36$ or $\frac{2.4}{\tan 36}$ or $2.4 \tan 54$ or $\frac{2.4 \sin 54}{\sin 36}$		
3(a)(iii)	$0.5 \times 4.8 \times \text{their } 3.3$ oe		
3(b)	$\frac{2}{\tan 30}$ or $\frac{2 \sin 60}{\sin 30}$ or $2 \tan 60$		
4(d)	43.9[...] for 9 or 44.3[...] for 10		
4(g)	$\frac{360}{2n}$ or $\frac{180}{n}$ and $0.5 \frac{P}{n}$ or $\frac{P}{2n}$ seen		