Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/63**

Paper 6 (Extended) **October/November 2017**

MARK SCHEME

Maximum Mark: 40

Published

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

Cambridge International will not enter into discussions about these mark schemes.

Cambridge International is publishing the mark schemes for the October/November 2017 series for most Cambridge IGCSE®, Cambridge International A and AS Level components and some Cambridge O Level components.

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.

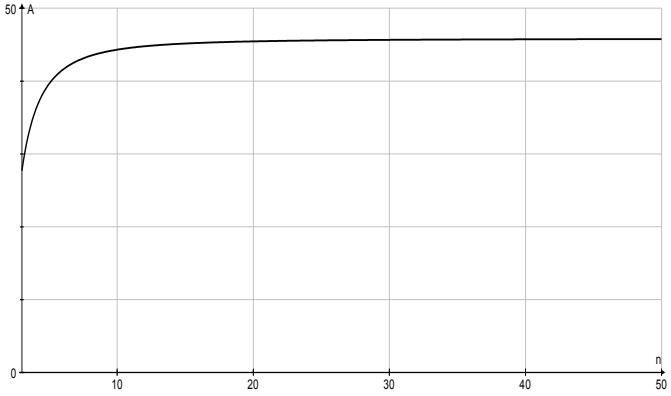
Abbreviations

awrt	answers which round to
cao	correct answer only
dep	dependent
FT	follow through after error
isw	ignore subsequent working
nfww	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>	**2**	**B1** for at least five unshaded numerical pairs correct and **B1** for all four algebraic expressions correct
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>	**1**	At least four of the unshaded pairs correct
2(d)	$\frac{mn}{2}+\frac{1}{2}$ oe [black] $\frac{mn}{2}-\frac{1}{2}$ oe [white]	**2**	**B1** for each

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>3(a)</td><td>8
8
8</td><td>1</td><td></td></tr>
<tr><td>3(b)(i)</td><td>
<table>
<tr><td></td><td colspan="7">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><td></td><td>3 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>
<tr><td>Grey</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>6 by 1</td><td>6 by 2</td><td>6 by 3</td><td>6 by 4</td><td>6 by 5</td><td></td><td>6 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>
<tr><td>Grey</td><td>2</td><td>4</td><td>6</td><td>8</td><td>10</td><td></td><td>2n</td></tr>
</table>
</td><td>2</td><td>B1 for all numerical unshaded triples correct
and
B1 for all algebraic triples correct</td></tr>
<tr><td>3(b)(ii)</td><td>$\frac{mn}{3}$ oe</td><td>1</td><td></td></tr>
<tr><td>3(b)(iii)</td><td>No
and
n must be a multiple of 3 oe</td><td>1</td><td></td></tr>
<tr><td>4(a)</td><td>$\frac{16\times14}{6} = 37.3[....]$ or is not integer</td><td>1</td><td></td></tr>
<tr><td>4(b)</td><td>1 × 18 18 × 1
2 × 9 9 × 2
3 × 6 6 × 3</td><td>1</td><td>C opportunity</td></tr>
<tr><td>5</td><td>m or n or mn is a multiple of p oe</td><td>1</td><td></td></tr>
<tr><td colspan="2">Communication: seen in one of the following questions</td><td>1</td><td></td></tr>
<tr><td>1(c)</td><td colspan="3">Showing (at least 2 different) pairs of factors of 24</td></tr>
<tr><td>4(b)</td><td colspan="3">$\frac{mn}{6} = 3$ or $mn = 18$</td></tr>
</table>

Question	Answer	Marks	Guidance
B	**MODELLING AREAS OF POLYGONS**		
1(a)	<table><tr><th>Width m</th><th>Length m</th><th>Area m^2</th></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>	**1**	
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 × *their* 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 $n \geqslant 3$ oe	**1**	
4(b)	$\frac{144}{8\tan\left(\frac{180}{8}\right)} = 43.45[\ldots]$ 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 2.4tan54 or $\frac{2.4\sin 54}{\sin 36}$		
3(a)(iii)	0.5 × 4.8 × *their* 3.3 oe		
3(b)	$\frac{2}{\tan 30}$ or $\frac{2\sin 60}{\sin 30}$ or 2tan60		
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		