Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/61**

Paper 6 (Extended) **May/June 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 will not enter into discussions about these mark schemes.

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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.

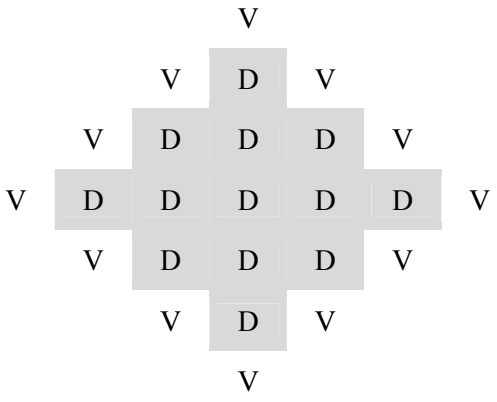
A Accuracy mark, awarded for a correct answer or intermediate step correctly obtained. For accuracy marks to be given, the associated Method mark must be earned or implied.

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
nfww	not from wrong working
oe	or equivalent
rot	rounded or truncated
SC	Special Case
soi	seen or implied

Question	Answer	Marks	Part Marks
A	**INVESTIGATION VIRUS**		
1(a)	7, 9	**1**	
1(b)	$2n-1$ oe	**1**	C opportunity
1(c)	49	**1**	C opportunity
2(a)		**1**	
2(b)	12, 16	**2**	**B1** for each C opportunity
2(c)	[p =] $4n-4$ oe	**2**	**M1** for $4n$ seen C opportunity
2(d)	25, 41	**1**	
2(e)	$[t=]\,2n^2-2n+1$ oe	**2**	**M1** for $2n^2$ soi
2(f)	Substitution leading to 61 and correct diagram or continued sequence of 25, 41, 61 with differences of 16, 20 seen	**2**	**B1** for each
2(g)	11	**2**	**M1** for 11 and – 10 or for continuation of the sequence from 61 as 85, 113, 145, 181, 221 C opportunity

Question	Answer	Marks	Part Marks
3(a)	[8,] 11, 15, 19 with supporting-diagram(s) seen and 4(2) + 3 = 11, 4(3) + 3 = 15, 4(4) + 3 = 19 soi or solving $4n + 3 = 11$, $4n + 3 = 15$, $4n + 3 = 19$ to obtain $n = 2, 3, 4$ or differences of 4 implying $4n + k$ and substituting at least one of $n = 2, 3, 4, \ldots$ to find k	**2**	**B1** for each or **B1** for any two correct values found from diagrams and verified by calculation
3(b)	$2n^2 + 5n + 1$ oe	**2**	**M1** for 19, 34, 53 seen C opportunity
Communication: Seen in three of the following questions		**1**	
1b or 2c or 2e	At least 3 differences of 2 seen; may be in table in 1(a) At least 3 differences of 4 seen ; may be in table in 2(b) For 2 rows of differences with at least 3 differences in the 2nd row; may be in table in 2(d)		
1c	$97 = \textit{their}(2n - 1)$ seen oe or algebraic change of subject of *their* $t = 2n - 1$ seen and then $n = \frac{97+1}{2}$ or continuation of sequence (need not be term by term)		
2b	At least one more correct diagram drawn		
2g	Attempt at correct method to solve *their* 3-term quadratic equation in n e.g. if correct, $(2n - 22)(n + 10) = 0$ or $(n - 11)(n + 10) = 0$ $n = \frac{-(-2) \pm \sqrt{(-2)^2 - 4 \times 2 \times -220}}{2(2)}$ or $n = \frac{-(-1) \pm \sqrt{(-1)^2 - 4 \times 1 \times -110}}{2}$ or sketch of relevant graphs		
3b	For 19, 34, 53, 76, [103] seen **and** two rows of differences		

Question	Answer	Marks	Part Marks
A	**MODELLING SCOUT'S PACE**		
1	1 km = 1000 m oe and 1 h = 60 min or 1 min = $\frac{1}{60}$ h oe	**1**	
2(a)	$\frac{5\times1000}{60}$ oe seen	**1**	
2(b)	awrt 20.8 or $20\frac{5}{6}$ isw	**1**	C opportunity
2(c)	awrt 33.3 or $33\frac{1}{3}$ isw	**1**	C opportunity
3(a)	$\left(\frac{30}{120}+\frac{30}{150}\right)\times60$ oe or $\frac{60}{5}+\frac{60}{4}$ oe or $\left(\frac{20\frac{5}{6}}{83\frac{1}{3}}+\frac{33\frac{1}{3}}{166\frac{2}{3}}\right)\times60$ oe or Walking: $\frac{120}{60}=2$ $\frac{30}{2}=15$ Jogging: $\frac{150}{60}=2.5$ $\frac{30}{2.5}=12$ 15 + 12 = 27	**1**	
3(b)	2[.00] to 2.01 nfww	**1**	**FT** $\frac{their(20.8+33.3)}{27}$ C opportunity
3(c)	7.2[0] to 7.236	**1**	**FT** *their* (b) × 3.6 C opportunity
4(a)	$\frac{30x}{120}\times\frac{1000}{60}$ oe or $\frac{20\frac{5}{6}x}{83\frac{1}{3}}\times\frac{1000}{60}$ leading to $\frac{25}{6}x$	**1**	

Question	Answer	Marks	Part Marks
4(b)	$\dfrac{\frac{25x}{6}+\frac{10y}{3}}{27}$ oe	**M1**	Allow this mark for total dist / time attempt i.e. for correct numerator over a constant; ignore units for this mark
	their $\left(\dfrac{\frac{25x}{6}+\frac{10y}{3}}{27}\right)\times\dfrac{60^2}{1000}$ oe	**M1**	Allow × 3.6
	Correct simplification to $\dfrac{5x+4y}{9}$	**A1**	Note: Answer is given so evidence must be seen; must have at least one interim step after $\left(\dfrac{\frac{25x}{6}+\frac{10y}{3}}{27}\right)\times\dfrac{60^2}{1000}$ seen
	Alternative method using ratios and the approach $\dfrac{speed_1\times time_1+speed_2\times time_2}{time_1+time_2}$ $\dfrac{\frac{15x}{3600}+\frac{12y}{3600}}{\frac{27}{3600}}$ or $\dfrac{\frac{x}{240}+\frac{y}{300}}{\frac{3}{400}}$ oe	**M1**	Or two **times** given as a ratio a : b equivalent to 5 : 4 or b : a equivalent to 4 : 5 e.g. 15 : 12 or 12 : 15 or 0.2 : 0.25
	$\dfrac{15x+12y}{27}$ or $\dfrac{\frac{5x}{1200}+\frac{4y}{1200}}{\frac{9}{1200}}$	**DM1**	$\dfrac{ax+by}{a+b}$ with correct values of a and b
	completion to given answer $\dfrac{5x+4y}{9}$	**A1**	If 0 scored, **SC1** for $\dfrac{15x+12y}{27}=\dfrac{5x+4y}{9}$ only
4(c)	$\dfrac{13x}{9}$ oe isw	**2**	**M1** for $\dfrac{5x+4\times 2x}{9}$ oe or $\dfrac{5x+8x}{9}$ C opportunity
4(d)	$\dfrac{17x}{8}$ oe or $2.125x$ isw	**2**	**M1** for $\dfrac{5x+4y}{9}=1.5x$
4(e)	4.6 oe or $4\dfrac{3}{5}$	**2**	**M1** for $\dfrac{5x+4\times 10}{9}=7$ oe C opportunity

Question	Answer	Marks	Part Marks
5	$[S =] \frac{6x+5y}{11}$	**2**	**M1** for $\frac{25}{9}y$ oe or 22 seen or 12 **and** 10 seen or $\frac{1}{5}$ **and** $\frac{1}{6}$ oe seen or $\frac{1}{300}$ **and** $\frac{1}{360}$ oe seen C opportunity
Communication: Seen in three of the following questions		**1**	
2b	for $\frac{83.3}{4}$ or $\frac{5\times1000}{4\times60}$ oe; may be in steps or e.g. 120 : 83.3 and 30: x compared or e.g. $\frac{120}{83.3}=\frac{30}{x}$		
2c	for $\frac{10\times1000}{60\times5}$ or $\frac{83.3\times2}{5}$ oe or e.g. 150 : 166.6 and 30 : x compared or e.g. $\frac{150}{166.6}=\frac{30}{x}$		
3b	for $\frac{their(20.8+33.3)}{27}$ or e.g. $\frac{their(54.1)}{27}$ seen or for comparison of ratios e.g. 54.1 to 27 x to 1		
3c	for multiplying by a correct conversion factor e.g. $\frac{(their2.01)\times60\times60}{1000}$ or $\frac{(their2.01)\times3600}{1000}$ or $(their2.01)\times3.6$ seen Note: Division by 1000 may be implied by sight of m / h and km / h etc.		
4c	for correct units seen e.g. $\frac{13x}{9}$ km/h		
4e	for correct units e.g. 4.6 km / h		
5	for showing how to get 22 e.g. $\left(\frac{30}{150}+\frac{30}{180}\right)\times60$ or for showing how to get 10 e.g. $\frac{30}{180}\times60$; may be in steps or for a correct step in simplification of $their\left(\frac{\frac{10x}{3}+\frac{25y}{9}}{22}\right)\times\frac{60^2}{1000}$ towards answer		