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Cambridge International General Certificate of Secondary Education

MARK SCHEME for the May/June 2015 series

0607 CAMBRIDGE INTERNATIONAL MATHEMATICS

0607/61 Paper 6 (Extended), maximum raw mark 40

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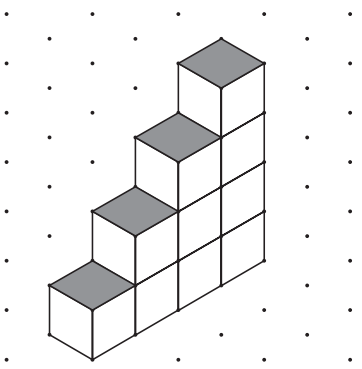
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Abbreviations
cao correct answer only
dep dependent
FT follow through after error
isw ignore subsequent working
oe or equivalent
SC Special Case
nfww not from wrong working
soi seen or implied

A INVESTIGATION STAIRCASES

1 (a) 3 — **1**

(b)  — **1**

(c)

Height	1	2	3	4	5	6
Cubes	1	3	6	**10**	**15**	**21**

1

(d) $\frac{1}{2}n^2 + \frac{1}{2}n$ oe — **1** — **C** opportunity

(e) 55 — **1FT** — **FT** *their* **(d)** provided an expression in n with numerical coefficients **C** opportunity

2 (a) 16 — **1**

(b)

Height	1	2	3	4	5	6
Cubes	1	**4**	9	16	**25**	**36**

1

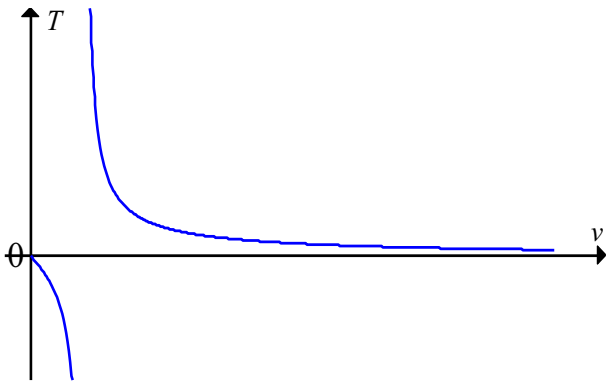
(c) n^2 — **1** — oe

(d) 100 — **1**

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3	**(a)**	<table><tr><td>Height</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td></tr><tr><td>Cubes</td><td>2</td><td>**6**</td><td>12</td><td>**20**</td><td>**30**</td><td>**42**</td></tr></table>	**1FT**	**FT** of all values double *their* **1(c)**
	(b)	$n^2 + n$ oe	**1**	**C** opportunity
	(c)	110	**1FT**	**FT** *their* **(b)** provided an expression in n of correct order with numerical coefficients **C** opportunity
	(d)	15	**1**	**C** opportunity
4	**(a)**	<table><tr><td>Height</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td></tr><tr><td>Cubes</td><td>1</td><td>6</td><td>18</td><td>**40**</td><td>**75**</td><td>**126**</td></tr></table>	**2**	**B1FT** for any two
	(b)	$\frac{1}{2}n^3 + \frac{1}{2}n^2$ oe	**1**	**C** opportunity
5		<table><tr><th>Type of staircase</th><th>Max height using 1800 cubes</th><th>Number of cubes left over</th></tr><tr><td>*UP*</td><td>**59**</td><td>**30**</td></tr><tr><td>*UP/DOWN*</td><td>42</td><td>36</td></tr><tr><td>*DOUBLE*</td><td>**41**</td><td>**78**</td></tr><tr><td>*MULTIPLE*</td><td>**15**</td><td>**0**</td></tr></table>	**3FT**	**FT** *their* UP $(\frac{1}{2}n^2 + \frac{1}{2}n)$, *their* DOUBLE $(n^2 + n)$, *their* MULTIPLE $(\frac{1}{2}n^3 + \frac{1}{2}n^2)$ if expression in n with numerical coefficients of correct order with at least two terms **B1** for each pair (row) if **B0** then allow **B1** for correct column of maximum heights **C** opportunity
Communication seen in three of **1(d)**, **1(e)**, **3(b)**, **3(c)**, **3(d)**, **4(b)**, **5**			**1**	

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B	**MODELLING BOAT TRIPS**			
1	**(a)**	40	**1**	**C** opportunity
	(b)	6	**1**	**C** opportunity
2	**(a)**	46.1[53...] or 46.2 seen or $\frac{10}{13}\times 60 = 46$ oe	**1**	may convert to metres per min etc; condone e.g. … = 46 seconds; allow × 60 to be implied by units stated
	(b)	4.33[3…] or $4\frac{1}{3}$ isw	**1**	**C** opportunity
	(c)	13.0[3…] or $13\frac{1}{30}$	**1**	**C** opportunity
3	**(a) (i)**	$[T =]\frac{20}{v+2}+\frac{20}{v-2}$ oe isw	**1**	
	(ii)	$[T =]\frac{20(v-2)+20(v+2)}{(v+2)(v-2)}$ oe isw or $T(v-2)(v+2) = 20(v-2)+20(v+2)$ oe isw	**2**	**B1** for either correct numerator or denominator/left hand side or right hand side; must be from correct two partial fractions
	(iii)		**2**	**B1** correct shape with 2 branches **B1** asymptote at $v = 2$ only soi
	(iv)	[k =] 2 with valid reason in context	**1**	not for e.g. T would be negative
	(b)	2.25 oe	**1**	
	(c)	13.6[2...] to 13.63 isw	**1**	isw halving after correct answer seen

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4	**(a) (i)**	$[T =]\frac{40v}{v^2 - 9}$	**1**	or $[T =]\frac{40v}{v^2 - 3^2}$ isw
	(ii)	13.9[7…] to 14.0	**1FT**	**FT** from *their* 9; **FT** correct to at least 3 sf
	(b)	5	**1**	**C** opportunity
5	**(a)**	Valid explanation	**1**	e.g. total distance travelled is now 80 [km] or it now travels 40 [km] each way oe
	(b)	Stretch, [scale factor =] 2, *v*-axis invariant	**2**	**B1** for stretch with either factor 2 or *v*-axis invariant
Communication seen in two of **1(a)**, **1(b)**, **2(b)**, **2(c)**, **3(c)**, **4(b)**			**1**	

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