CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the October/November 2012 series

0607 CAMBRIDGE INTERNATIONAL MATHEMATICS

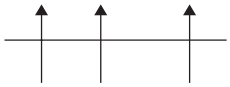
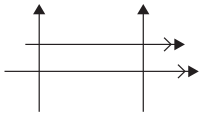
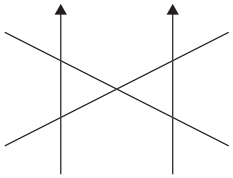
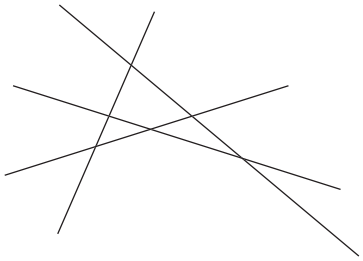
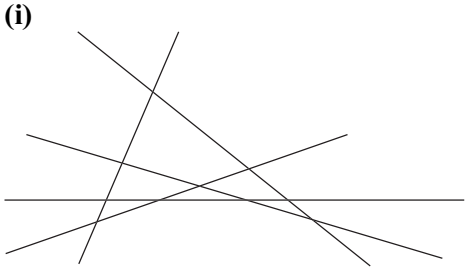
0607/06 Paper 6 (Extended), maximum raw mark 40

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.

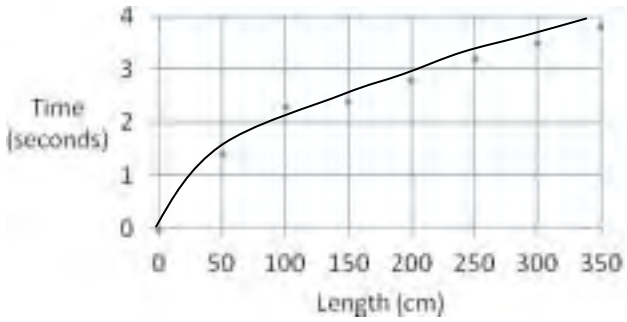
Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

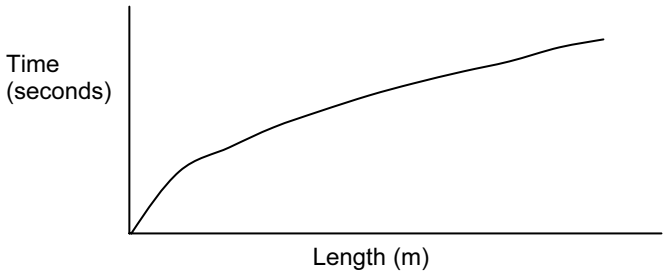
Cambridge will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the October/November 2012 series for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level components and some Ordinary Level components.

A INVESTIGATION STRAIGHT LINES					
1		parallel	**1**		
2	**(a)**	 o.e.	**1**	4 lines and 3 points **C**	If arrows on parallels condone non-parallel lines once, otherwise 'parallel' lines must not meet inside the answer space. If arrows on non-parallels condone once. Allow diagrams where crossing points coincide Communication opportunity for parallel arrows drawn correctly on any one diagram
	(b)	 o.e.	**1**	4 lines and 4 points **C**	
	(c)		**1**	4 lines and 5 points **C**	
	(d)		**1**	4 lines and 6 points	
3	**(a)**	cross all lines o.e.	**1**	'other lines' 'through all lines' 'cuts at 4 (distinct) points' 'not parallel to any if the others'	Ignore extra statements Statements about triangles are insufficient Distinct points, if not indicated here must be shown on diagram in **(b)(i)**
	(b)	**(i)**  o.e.	**1**	5 lines and 10 points	Allow freehand lines but must not imply another intersection
		(ii) 10	**1FT**	**FT** for 5 lines only	

4	**(a)**	<table><tr><td>Number of lines</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td></tr><tr><td>Maximum number of crossing points</td><td>0</td><td>**1**</td><td>3</td><td>6</td><td>**10**</td><td>15</td><td>**21**</td><td>28</td><td>**36**</td></tr></table>	**3**	**B1** for 1 **B1** for 21 **B1** for 36	
	(b)	odd + even = odd odd + odd = even even + even = even even + odd = odd	**R1**		With or without numbers Statement any order
5	**(a)**	$\frac{1}{2}n^2 - \frac{1}{2}n$ or $\frac{1}{2}n(n-1)$ o.e.	**3**	**M1** method that would lead to a correct answer **B1** $\frac{1}{2}n^2$ **SC2** $\frac{1}{2}n^2 + \frac{1}{2}n$ o.e. without working	e.g. difference method as far as kn^2 or 2 substitutions seen 'number of lines' ≡ n
	(b)	Must <u>see</u> 10 substituted once and ' **= 45** '	**1**		e.g. $\frac{1}{2} \times 10 \times 9 = 45$ $\frac{1}{2} \times 100 - \frac{1}{2} \times 10 = 45$
	(c)	16	**1**	**C** opportunity for showing working	Attempt at factorising Attempt at use of formula Graph/sketch drawn Extend table – 10 to 16 inclusive Trial & Improvement – two cases seen including 16
	(d)	Evidence of method e.g. sketch, attempt at factorising, attempt at use of formula, solution of quadratic (33 and 34 or 1056 and 1122), substitution of 34 and 35 (561 and 595), followed by No	 **M1** **A1**	**M1FT** for use of quadratic with middle term found in **5(a)** **SC1** Correct <u>equation</u> followed by n = 34.8... and No **SC1** 34 and 561, 35 and 595 and No **SC2** 595 and No with explanation	
			1	**C1**	Communication seen in one of **2(a** or **b** or **c)** or **5(c)**
		Total	**20**		

B MODELLING A SWING					
1	**(a)**	7 or 8 correctly plotted points from table	**3**	**P2** for 6 or 5 correct points **P1** for 4 or 3 correct points	
	(b)	2.3 (seconds)	**1**		Coordinates not accepted
	(c)	**(i)**  This shape curve through approx. (100, 2)	**1**	**C** opportunity for smooth curve	Curve should ignore incorrectly plotted points Correct polygon = 1 (no C1)
		(ii) 1.9 – 2.1 (seconds)	**1FT**	**FT** *their* curve if answer outside range	
2	**(a)**	$T = aL^b$	**1**		
	(b)	**(i)** $1.4 = a \times 50^b$ and $2.8 = a \times 200^b$ then a eliminated OR $1.4 = a \times 50^{½}$ and $2.8 = a \times 200^{½}$ show both giving $a = 0.197\ldots(0.2)$ OR substitute $b = ½$ in one equation to find a and then substitute $a = 0.197\ldots(0.2)$ into other equation to get $b = ½$ OR Find $a = 0.2$ in **(b)(ii)** OR incorrect use of correct model in **(b)(ii)** giving $a = 0.04$ or better then substitute twice with $L = 50$ and $L = 200$	**2**	**M1** substitution **M1** elimination **M1** substitution **M1** showing both a equal **M1** finding a by substitution **M1** substitution of a **M2** substitution	
		(ii) 0.2	**2FT**	**M1** complete method – substitution of any correct point **B1** for correct to 1 dp	**M1FT** *their* model using $b = ½$ and values given **B1FT** $a = 0$

		(iii) $T = 0.197...(0.2)L^{0.5}$ $T = 0.197..(0.2) \times 250^{0.5}$ $T = 3.1...$ or $= 3.2$	**1FT** **1**	**M1** or **M1 FT** for *their* model written with *their a* and $b = ½$ **M1** for substitution giving 3.1... (3.2)	**M1 FT** for use of $T = aL^b$ with *their*
	(c)	**(i)** $(L =)$ 400	**1FT**	**FT** *their a* in *their* model **dependent on first M1** in **2(b)(iii)**	**FT** for incorrect use of $T = aL^b$ with *their a*
		(ii) $T = 0.2 \times 100^{½}$ $(T) = 2$	**1**	Need to see substitution of 0.2/0.198/0.197 leading to $T = 2/1.98/1.97$	
3	**(a)**		**1**	From (0, 0) to approx. (10, 6.4) with this shape **C** opportunity for smooth curve matching function	Within 2 mm from (0, 0) Watch for joining plotted points that wavers
	(b)	**(i)** $\sqrt{(L \div 100)}$ OR $\sqrt{(L \times 100)}$	**1**		
		(ii) $\left(T = 0.2L^{0.5} = \frac{\pi}{5}\sqrt{\frac{L}{9.8}}\right)$ $\frac{\pi}{5 \times \sqrt{9.8}} = 0.2$ $\sqrt{L} = L^{\frac{1}{2}}$ o.e. soi OR 3 substitutions in each model giving close values	**2**	**M1** comparison of coefficients **M1** comparison of notation	Or **M1** sketching graphs correctly with correct scales **Dependent M1** for comparison of graphs
			1	**C1**	Communication seen in one of **1(c)(i)** or **3(a)**
		Total	**20**		
		Final total	**40**		