CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the May/June 2013 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.

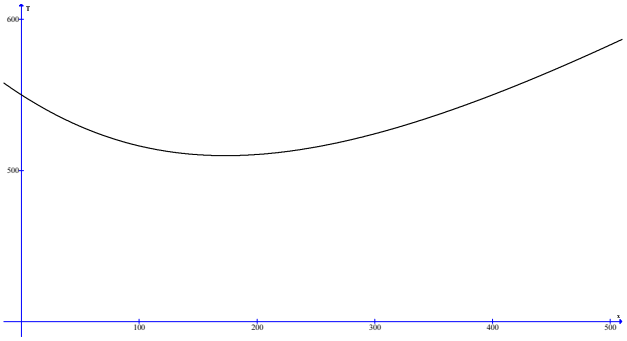
Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the May/June 2013 series for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level components and some Ordinary Level components.

A – INVESTIGATION: DIAGONALS OF RECTANGLES			
1 (a)	2	**B1**	
(b)	6	**B1 FT**	
2 (a) (i)	$x - 1$	**B1**	
(ii)	$y - 1$	**B1**	Accept **(i)** and **(ii)** swapped
(iii)	$x + y - 2$	**B1**	correct answer only
(b) (i)	$N + 1$ o.e.	**B1**	
(ii)	$x + y - 1$ o.e.	**B1**	
(c)	diagonal drawn with the 12 squares marked on the diagonal.	**B1**	
	8 +5 – 1 = 12	**B1**	8 + 5 = 13 and 13 – 1 =12. Must use **(b)(ii)** If 0 then **SC1** for 12 seen.
3 (a) (i)	12 squares clearly marked on the diagram.	**C1**	2 simultaneous intersections marked.
	9 + 6 –1 = 14 o.e.	**C1**	FT *their* **2(b)(ii)** ≠ 12
(ii)	3 × 4 = 12 seen or implied	**R1**	Accept 3 ×(3 + 2 – 1) but not 9 + 6 – 3
(b) (i)	[3 × 60 =] 180	**B2**	**B1** for 60 seen Accept using $x + y - 3$ or $x + y$ – common factor o.e. Without wrong working. Communication mark for numerical method used in either **(i)** or **(ii)** e.g. Common factor = 3 soi and 3 × (31 + 30 – 1) o.e. Common factor = 3 soi and 93 + 90 – 3
(ii)	[5 × 18 =] 90	**B2**	**B1** for 18 seen Without wrong working.

4	6 × 1, 5 × 2, 4 × 3 6 × 2 6 × 3 6 × 6	**B3**	soi by diagrams in the a space 5 + 2 – 1 etc. is insufficient **B1** for any one row **B2** for two or three rows Communication mark for showing correct numerical method or statement once. e.g. $x + y - 1 = S$, $S = 6$ OR $x + y = 7$ OR $5 + 2 - 1 = 6$ But not $5 + 2 = 7 - 1 = 6$ Deduct 1 for each incorrect extra rectangle, but ignore repeated rectangles.
		1	Communication seen in questions **3(b)** or **4**
TOTAL		**20**	

B – MODELLING: DRILLING A TUNNEL			
1	583[.09…]	**2**	**M1** for $500^2 + 300^2$ Communication mark for correct method, use of square root and no bad form seen.
2	800	**1**	
3 (a)	500 – x seen as a distance $[PC^2 =]\ 300^2 + x$ time $= \frac{\text{their distance}}{\text{speed}}$ soi	**R1** **R1** **R1**	$\frac{500-x}{2}$ on its own does not gain credit. Explanation with numerator = distance and denominator = speed
(b)	time added to change the drill's direction	**R1**	Any reason for extra time related to the context, not 'rounding', 'incorrect' or 'different' numbers.
(c)	 	**G1** **G1**	Shape continuous curve required. Minimum in the left half. and not more than 1 cm from $T = 500$ Reaches T axis between 500 and 600 Dependent on shape (but not the restrictions) Not less than ½ cm from 500 or 600.
(d) (i)	173		If not **3** then **B1** 173 **B1** 510 **SC2** for 173.2 … and 509.8 … OR 173 … and 509.8 … OR 173.2 … and 510
(ii)	510	**3**	

4 (a)	$(500 - x) + 3\sqrt{90000 + x^2}$ o.e.	**B1 B1**	**SC1** Thousands included i expressions. Ignore subsequent working.
(b) (i)	106	**B1 FT**	**FT** answers between 0 and 500 from *their* **(a)** of similar form producing a graph with a minimum. Accept 105.5 to 106.499 …
(ii)	1 350 000	**B1 FT**	**FT (b)(i)** from *their* **(a)** of similar form. Accept 1350 thousand. Accept range from 1 348 000 to 1 349 000
5 (a)	x stays the same o.e.	**B1**	$x = 173$ on its own is insufficient. Communication: method description or substitution of a $d > 500$ soi
(b)	Substitute $x = 173[.2\ldots]$ in $T = \frac{d-x}{2} + \sqrt{90000 + x^2}$ o.e.	**M1**	
	$= \frac{d}{2} - 86.5 + 346.4[...]$		
	$= \frac{d}{2} + 260$	**A1**	Accept 346.3[…] 259.8 to 259.9 instead of –86.5 + 346.4[…]
	OR One substitution of a minimum to check that $T = \frac{d}{2} + 260$	**[B1]**	e.g. substituting 500 and/or *their* answer to **3(d)(iii)**
	Two more substitutions of minima.	**[B1]**	
		1	Communication seen in **1** or **5(a)**.
TOTAL		**20**	