UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the October/November 2010 question paper for the guidance of teachers

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 must be read in conjunction with the question papers and the report on the examination.

- CIE will not enter into discussions or correspondence in connection with these mark schemes.

CIE is publishing the mark schemes for the October/November 2010 question papers for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level syllabuses and some Ordinary Level syllabuses.

A INVESTIGATION THE FIBONACCI SEQUENCE

1

Term position	...	12	13	14	15
Fibonacci number	...	144	233	**377**	**610**

2
C1

1
1ft
C1 for showing working

ft for 610 – 233 + 'their 377'

2 **(a)**

Term position	3	**6**	9	**12**
Fibonacci number	2	8	**34**	**144**

1 for both in row 1

2

1 for both in row 2

(b) **(i)**

Term position	4	8	12	**16**
Fibonacci number	3	**21**	**144**	**987**

1

2ft for all 3 in row 2
–1 eeoo

ft from Q1 for 987 – 'their 377' + 'their 610'

3 is the 4th term...
Every 4th term...

5

(ii)

Term position	**5**	**10**	**15**	20
Fibonacci number	5	55	**610**	6765

2 for all 3 in row 1
–1eeoo
1ft

ft from Q1 for 'their 610'

5 is the 5th term...
Every 5th term in the... is a multiple of 5

1
1 for both entries

5

(c) Every 6th term in the...

1

3	**(a)** 5 by 8 rectangle drawn, divided into: one 5 by 5 square one 3 by 3 square one 2 by 2 square and two 1 by 1 squares	2	If not all correct 1 for any 2 squares shown excluding the two 1 by 1 squares	
	(b) 8 by 13 rectangle drawn, divided into: one 8 by 8 square one 5 by 5 square one 3 by 3 square one 2 by 2 square and two 1 by 1 squares	2	If not all correct 1 for any 2 squares shown	
	(c) **(i)** Size of rectangle: 1 by 1 | 1 by 2 | 2 by 3 | 3 by 5 | 5 by 8 | 8 by 13 Least number of squares: 1 | **2** | **3** | 4 | **5** | **6**	1	1 for all 4 entries	
	(ii) 8	1		
	(iii) 89 144	2	1 each	
	(d) $n - 1$	1	oe	e.g. $\frac{n(n-1)}{n}$
	The least number of squares is: the same as the term number that comes between the position numbers of the width and the length OR the mean of the position numbers of the width and the length OR width (smallest) position plus 1 or length (largest) position minus 1 OR e.g. for n^{th} and $(n + 2)^{th}$ terms, answer of $n + 1$ oe	2 C1ft	1 identifying 'term' or 'position' number of width/length 1 method of calculation/showing connection C1ft sketches/working shown to identify/illustrate answer	1 for explaining least number of squares is sequential from 2 OR Identifying width/length as e.g. n and $n + 2$ 'width' + 1 scores 1 unless width is identified as shorter side, and same for 'length'– 1 For C1 must show some understanding
			[Total: 26 + C2 = 28 scaled to 24]	

B MODELLING THE SOLAR SYSTEM				
1	**8.4** **2.8** **8.9** **3.6** **9.2** **4.0**	3	2 for 5 or 4 correct 1 for 3 or 2 correct 0 for 1 or 0 correct	Note: In Q 1, 3, 4, 5 a penalty of -1 once for not rounding to 2 sf
2	**(a)** 7 points plotted **(b)** Mean (8.6, 3.2) plotted Line of best fit ruled through **mean**	P2ft P1 L1	P1 ft for 4, 5 or 6 correct plots ft for 3 points in Q1 Between (7.6, 1.9) and (8, 1.9) and between (9.6, 5) and (10, 5)	Condone inaccuracies of up to 1 mm in plotting Condone inaccuracies of up to 1 mm in plotting and drawing
3	2.8×10^9 (km) / 3.2×10^9 (km)	3 C	1 for 4.5 seen (maybe on axis) 1ft for 9.45 / 9.5 oe ft from line of best fit 1ft for answer C opportunity for minimum of 4.5 on graph or 4.5 and 9.45/9.5 oe in working	Note: In Q 1, 3, 4, 5 a penalty of -1 once for not rounding to 2 sf (anti-log value read from 4.5 and line of best fit)
4	(m =) 1.5 [1.3 – 1.7] (c =) –9.6 / –9.7	1 1ft C	Maybe necessary to ft from m C opportunity if working shown for m and c	Note: In Q 1, 3, 4, 5 a penalty of -1 once for not rounding to 2 sf (c = 3.2 – their m × 8.6)
5	7.6×10^4 (days) / 6.0×10^4 (days)	1ft C	Maybe necessary to ft from m and c C opportunity if working shown	Note: In Q 1, 3, 4, 5 a penalty of -1 once for not rounding to 2 sf (anti-log (their m × log(4.5×10^9) + their c))

6	**(a)** $\log T = \log S^m + \log k$ $\log T = \log kS^m$ $T = kS^m$ **(AG)**	M1 E1		÷ by log = E0
	(b) $(k =)\ 2.0 \times 10^{-10}$ / 2.5×10^{-10}	1ft	ft from their c	(anti-log their c)
	(c) T = their $k \times (1.5 \times 10^8)^{\text{their } m}$ $T \approx 367$ / 459 OR 365 = their $k \times S^{\text{their } m}$ $S \approx 1.5 \times 10^8$	1ft 1ft	Substitution of their values ft from **6(b)** and 4 and value of S or T from table Q1	
	Comment that is appropriate to result of their test	1		
		C	C opportunity if working shown	
		C1	1 for <u>two</u> C opportunities shown	
				[Total: 20 scaled to 16]