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Other Names					
Candidate Signature					



General Certificate of Education Advanced Subsidiary Examination June 2011

# **Use of Mathematics**

**UOM4/1** 

**Applying Mathematics Paper 1** 

Thursday 26 May 2011 9.00 am to 10.00 am

### For this paper you must have:

- a clean copy of the Data Sheet (enclosed)
- a graphics calculator
- a ruler.

#### Time allowed

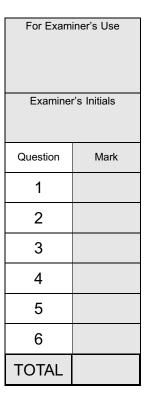
1 hour

#### Instructions

- Use black ink or black ball-point pen. Pencil should only be used for drawing.
- Fill in the boxes at the top of this page.
- Answer all questions.
- Write the question part reference (eg (a), (b)(i) etc) in the left-hand margin.
- You must answer the questions in the spaces provided. Do not write outside the box around each page.
- Show all necessary working; otherwise marks for method may be lost.
- Do all rough work in this book. Cross through any work that you do not want to be marked.
- The **final** answer to questions requiring the use of tables or calculators should normally be given to three significant figures.
- You may **not** refer to the copy of the Data Sheet that was available prior to this examination. A clean copy is enclosed for your use.

#### Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 30.





## Answer all questions in the spaces provided.

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		Use Diet + exercise = weight loss (or gain)! on the Data Sheet.		
1		Sara is a female of weight 65 kg and has a 'light active' Activity Factor. So 20 years of age, with height 170 cm.	he is	
(a	) (i)	Calculate, using the simple method, Sara's daily calorie needs.	(2 marks)	
	(ii)	Calculate, using the complex method, Sara's daily calorie needs.	(2 marks)	
	(iii)	Explain why the simple method and the complex method might give very danswers for a person's daily calorie needs.	lifferent (1 mark)	
(b	) (i)	Assuming that the other factors remain constant, find, using the complex m formula that shows how Sara's daily calorie needs, $C$ , vary with her age, $T$ Give your answer in the form $C = a + bT$ .		
	(ii)	Interpret your answer to part (b)(i) in terms of how Sara's daily calorie need with age.	ds vary (2 marks)	
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2	Write down a formula that gives the weight gain (kg) for a calorie intake <i>c</i> calories above a person's daily calorie needs.	of (2 marks)
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For Ryan, who has a 'light active' Activity Factor and a daily calorie intake of 2000 calories, write down a recurrence relation for his weight based on the simple method of calculating his daily calorie needs, and show that this simplifies to

$$w_n = 0.256 + 0.996w_{n-1} (3 marks)$$

(b) Use this recurrence relation to find the weight of Ryan after five days if his weight at the start of this period was 75 kg. (3 marks)

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4	Using the recurrence relation in the article, it is found that on the fourteenth day
	Ben's weight is 81 kg. Find when the exponential model

$$w = \frac{2500 - 580e^{-0.0031t}}{24}$$

predicts this by finding t to one decimal place.

(4 marks)

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The article shows that, to lose weight, Ben has to carry out exercise for which

	$E \times h \geqslant 7.25$ .	Using data from the	article, suggest tw	o different ways in v	which he
	might do this.				(2 marks)
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5

- 6 (a) Use the model  $w = \frac{2500 580e^{-0.0031t}}{24}$  to find Ben's weight after 1 year, that is when t = 365.
  - (b) Sketch a graph of the model  $w = \frac{2500 580e^{-0.0031t}}{24}$  for  $t \ge 0$ , clearly showing all distinctive features. (3 marks)
  - (c) Interpret your graph in terms of Ben's weight. (1 mark)

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#### **END OF QUESTIONS**

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