**General Certificate of Education
June 2011**

AS Level Use of Mathematics   **UOM4/1**

Applying Mathematics

Mark Scheme

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation events which all examiners participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for standardisation each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, examiners encounter unusual answers which have not been raised they are required to refer these to the Principal Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of candidates' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

Key to mark scheme and abbreviations used in marking

M	mark is for method		
m or dM	mark is dependent on one or more M marks and is for method		
A	mark is dependent on M or m marks and is for accuracy		
B	mark is independent of M or m marks and is for method and accuracy		
E	mark is for explanation		
√ or ft or F	follow through from previous		
	incorrect result	MC	mis-copy
CAO	correct answer only	MR	mis-read
CSO	correct solution only	RA	required accuracy
AWFW	anything which falls within	FW	further work
AWRT	anything which rounds to	ISW	ignore subsequent work
ACF	any correct form	FIW	from incorrect work
AG	answer given	BOD	given benefit of doubt
SC	special case	WR	work replaced by candidate
OE	OE	FB	formulae book
A2,1	2 or 1 (or 0) accuracy marks	NOS	not on scheme
–x EE	deduct x marks for each error	G	graph
NMS	no method shown	c	candidate
PI	possibly implied	sf	significant figure(s)
SCA	substantially correct approach	dp	decimal place(s)

Application of Mark Scheme

No method shown:

Correct answer without working	mark as in scheme
Incorrect answer without working	zero marks unless specified otherwise

More than one method / choice of solution:

2 or more complete attempts, neither/none crossed out	mark both/all fully and award the mean mark rounded down
1 complete and 1 partial attempt, neither crossed out	award credit for the complete solution only

Crossed out work   do not mark unless it has not been replaced

Alternative solution using a correct or partially correct method   award method and accuracy marks as appropriate

General Certificate of Education
A/S Level – Applying Mathematics UOM 4/1
Answers and Marking Scheme – June 2011

Question 1

(a)(i)	$C = 0.9 \times 65 \times 24 \times 1.2 = 1684.8$	**M1**	
	calories	**A1**	
(a)(ii)	$C = (655.1 + 9.65 \times 65 + 1.84 \times 170 - 4.68 \times 20) \times 1.5$	**M1**	
	$= 2252$ calories	**A1**	SC1 1801.86 (using 1.2 for AF)
(a)(iii)	The complex method takes into account factors such as age and height	**B1**	
(b)(i)	$C = (655.1 + 9.65 \times 65 + 1.84 \times 170 - 4.68 \times T) \times 1.5$	**M1**	For method shown or for method to find a or b
	$C = 2393 - 7.02T$	**A1, A1**	SC2 $C = 1914.2 - 5.62T$ (using 1.2 as AF)
(b)(ii)	Sara's daily needs are reduced (linearly) with age	**(B1)** **B1**	
	TOTAL	**10**	

Question 2

	Weight gain $= \dfrac{c}{7800}$	**M1** **A1**	$\div$ by 7800 Or alternative formulation
	TOTAL	**2**	

Question 3

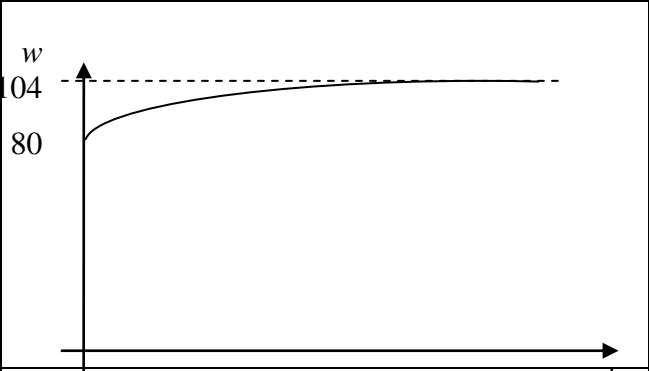| (a)	$w_n = w_{n-1} + \dfrac{2000 - 24w_{n-1} \times 1.2}{7800}$	**M1 A1**	
	$w_n = w_{n-1} + 0.2564 - 0.00369w_{n-1}$		
	$w_n = 0.256 + 0.996w_{n-1}$	**A1**	
(b)	<table><tr><td>n</td><td>wn</td></tr><tr><td>0</td><td>75.00</td></tr><tr><td>1</td><td>74.96</td></tr><tr><td>2</td><td>74.91</td></tr><tr><td>3</td><td>74.87</td></tr><tr><td>4</td><td>74.83</td></tr><tr><td>5</td><td>74.78</td></tr></table>	**M1A1**	evidence of any one term correct
	74.78 kilograms = 74.8 kilograms	**A1**	
	TOTAL	**6**	

Question 4

	$81 = \dfrac{2500 - 580e^{-0.0031t}}{24}$	**M1**	
	$81 \times 24 - 2500 = -580e^{-0.0031t}$		
	$0.9586 = e^{-0.0031t}$	**M1**	Isolating term in e (can include coefficient)
	$-0.042259 = -0.0031t$	**M1**	evidence of use of logs
	$t = 13.6$	**A1**	
	TOTAL	**4**	

Question 5

	Any values of E (from article) and h where the product is greater than 7.25	**B1 + B1**	B1 for each pair of E and h
	TOTAL	**2**	

Question 6

(a)	$w = \dfrac{2500 - 580e^{-0.0031 \times 365}}{24} = 96.4\text{kg}$	**M1 A1**	Accept 96 kg
(b)	$\begin{array}{c} w \\ 104 \\ 80 \end{array}$	**B1** **B1** **B1**	General shape of curved line Intercept at 80 Asymptote at 104
(c)	Ben's weight will slowly increase	**B1**	Or increases more rapidly in early years or will never rise above 104 (kg)
	TOTAL	**6**	
	TOTAL MARK FOR PAPER	**30**	