

Q	Marking Instructions	AO	Marks	Typical Solution
10(a)	Uses model to form an equation to find k with $t=5.7$, $m = \frac{1}{2} m_0$	AO3.4	M1	$200 = 400e^{-k \times 5.7}$
	Obtains correct value of k	AO1.1b	A1	
	Uses model to find m with $t=4$, $m_0 = 400$ and <i>their</i> k (Condone $m_0=200$)	AO3.4	M1	$k=0.1216047\dots$ $m = 400 e^{-0.1216\dots \times 4}$
	Obtains correct value of m CAO (245.9296...) AWRT 250	AO1.1b	A1	$m = 250$
(b)	Uses model to set up inequality or equation using <i>their</i> k and 280	AO3.1b	M1	$400e^{-0.1216t} \leq 280$
	Solves their inequality or equation to find t (Follow through their k only) (2.933067)	AO1.1b	A1F	$e^{-0.1216t} \leq 0.7$ $-0.1216t \leq \ln(0.7)$ $t \geq 2.933$
	Interprets <i>their</i> solution (Only follow through if time is earlier than 1:42 pm)	AO3.2a	A1F	10:56 am
(c)	States any sensible reason such as: Different people eliminate caffeine at different rates The model is based on an average person The length of time taken to drink two cups of coffee may have been significant The amount of caffeine in a “strong cup of coffee” may vary	AO3.5b	B1	Different people eliminate caffeine at different rates
	Total		8	