Question	Scheme	Marks	AOs
11 (a)	$35\,(\text{km}^2)$	B1	3.4
		(1)	
(b)	Sets their $\quad 60 = 80 - 45\mathrm{e}^{14c} \Rightarrow 45\mathrm{e}^{14c} = 20$	M1 A1	1.1b 1.1b
	$\Rightarrow c = \dfrac{1}{14}\ln\left(\dfrac{20}{45}\right) = \cdots -0.0579$	dM1	3.1b
	$A = 80 - 45\mathrm{e}^{-0.0579t}$	A1	3.3
		(4)	

(c)	Gives a suitable answer
	   • The maximum area covered by trees is only 80km^2
	   • The "80" would need to be "100"
	   • Substitutes 100 into the equation of the model and shows that the formula fails with a reason eg. you cannot take a log of a negative number
		B1	3.5b

		(1)	

(6 marks)

Notes

(a)

B1: Uses the equation of the model to find that $35\,(\text{km}^2)$ of the reserve was covered on 1$^{\text{st}}$ January 2005. Do not accept eg. 35 m^2

(b)

M1: Sets their $60 = 80 - 45\mathrm{e}^{14c} \Rightarrow A\mathrm{e}^{14c} = B$

A1: $45\mathrm{e}^{14c} = 20$ or equivalent.

dM1: A full and careful method using precise algebra, correct log laws and a knowledge that e^{x} and $\ln x$ are inverse functions and proceeds to a value for *c*.

A1: Gives a complete equation for the model $A = 80 - 45\mathrm{e}^{-0.0579t}$

(c)

B1: Gives a suitable interpretation (See scheme)