Scheme	Marks	AOs
$0.2 \mathrm{m}^2$	B1	3.4
	(1)	
$A = 0.2e^{0.3t}$ Rate of change = gradient = $\frac{dA}{dt} = 0.06e^{0.3t}$	M1	3.1b
At $t = 5 \Rightarrow$ Rate of Growth is $0.06e^{1.5} = 0.269 \text{ m}^2/\text{day}$	A1	1.1b
	(2)	
$100 = 0.2e^{0.3t} \Rightarrow e^{0.3t} = 500$	M1 A1	3.1a 1.1b
$\Rightarrow t = \frac{\ln(500)}{0.3} = 20.7 \text{ days} \qquad 20 \text{ days } 17 \text{ hours}$	M1 A1	1.1b 3.2a
	(4)	
The model given suggests that the pond is fully covered after 20 days 17 hours. Observed data is inconsistent with this as the pond is only 90% covered by the end of one month (28/29/30/31 days). Hence the model is not accurate	B1	3.5a
	(1)	
(8 marks)		
Notes:		
B1: 0.2 m^2 oe		
(b) M1: Links rate of change to gradient and differentiates $0.2e^{0.3t} \rightarrow ke^{0.3t}$ A1: Correct answer $0.269 \text{ m}^2/\text{day}$ (c) M1: Substitutes $A = 100$ and proceeds to $e^{0.3t} = k$ A1: $e^{0.3t} = 500$ M1: Correct method when proceeding from $e^{0.3t} = k \Rightarrow t =$		
A1: 20 days 17 hours (d)		
B1: Valid conclusion following through on their answer to (c).		
	$A = 0.2e^{0.3t}$ Rate of change = gradient = $\frac{dA}{dt} = 0.06e^{0.3t}$ At $t = 5 \Rightarrow$ Rate of Growth is $0.06e^{1.5} = 0.269 \text{ m}^2/\text{day}$ $100 = 0.2e^{0.3t} \Rightarrow e^{0.3t} = 500$ $\Rightarrow t = \frac{\ln(500)}{0.3} = 20.7 \text{ days} \qquad 20 \text{ days } 17 \text{ hours}$ The model given suggests that the pond is fully covered after 20 days 17 hours. Observed data is inconsistent with this as the pond is only 90% covered by the end of one month $(28/29/30/31 \text{ days})$. Hence the model is not accurate oe ate of change to gradient and differentiates $0.2e^{0.3t} \rightarrow ke^{0.3t}$ answer $0.269 \text{ m}^2/\text{day}$ utes $A = 100$ and proceeds to $e^{0.3t} = k$ 500 t method when proceeding from $e^{0.3t} = k \Rightarrow t =$ 17 hours	0.2 m ² B1 (1) $A = 0.2e^{0.3t}$ Rate of change = gradient = $\frac{dA}{dt} = 0.06e^{0.3t}$ M1 At $t = 5 \Rightarrow$ Rate of Growth is $0.06e^{1.5} = 0.269$ m ² /day A1 (2) $100 = 0.2e^{0.3t} \Rightarrow e^{0.3t} = 500$ M1 A1 $\Rightarrow t = \frac{\ln(500)}{0.3} = 20.7 \text{ days} 20 \text{ days } 17 \text{ hours}$ M1 A1 (4) The model given suggests that the pond is fully covered after 20 days 17 hours. Observed data is inconsistent with this as the pond is only 90% covered by the end of one month $(28/29/30/31 \text{ days})$. Hence the model is not accurate (1) (8 n) Oe attention and proceeds to $e^{0.3t} = k$ 500 to method when proceeding from $e^{0.3t} = k \Rightarrow t =$ 17 hours