Question	Scheme	Marks	AOs
9(a)	$\log_{10} N = 2.2 \pm ....$ or $m = \dfrac{1.7-2.2}{40}$	M1	1.1b
	$\log_{10} N = 2.2 - 0.0125t$	A1	1.1b
		(2)	
(b)	$a = 10^{2.2}$	B1	1.1b
	$b = 10^{"-0.0125"}$	M1	3.1b
	$N = 158 \times 0.972^t$	A1	3.3
		(3)	
(c)(i)	The number of fish in thousands when monitoring began	B1	3.4
(ii)	The rate of decrease of fish in the lake from one year to the next	B1	3.4
		(2)	
(d)	119 000	B1	2.2a
		(1)	
(e)	$20 = 158 \times 0.972^T \Rightarrow T = \log_{0.972}\left(\dfrac{20}{158}\right)$ or $\log_{10} 20 = 2.2 - 0.0125T \Rightarrow T = \dfrac{2.2 - \log_{10} 20}{0.0125}$	M1	3.4
	$T =$ awrt 72 (or accept awrt 73)	A1	1.1b
		(2)	
(f)	Suggests the rate of decrease may not remain constant	B1	3.5b
		(1)	
			(11 marks)

Notes

(a)

M1: Attempts to find the gradient of the line or proceeds to a linear equation of the form $\log_{10} N = 2.2 \pm ....$

A1: $\log_{10} N = 2.2 - 0.0125t$

(b)

B1: Correct expression for a, may be implied by correct value

M1: Attempts to find b

A1: $N = 158 \times 0.972^t$

(c)

(i)

B1: The initial number of fish in thousands when the population was first recorded

(ii)

B1: See scheme, e.g. allow 'The number of fish is decreasing by 2.8% a year'.

(d)

B1: 119 000 cao

(e)

M1: Sets up a correct equation and proceeds to find a value for T. This mark cannot be implied by the correct answer. Condone use of 20 000 here.

A1: awrt 72 or awrt 73

(f)

B1: Gives a valid reason suggesting that the rate of decrease may change.
e.g. The temperature could change which would change the rate of decrease.
e.g. The amount of food for the fish may increase which would reduce the rate of decrease.
e.g. The reason for the decrease may change such as not as many are being caught.