9.

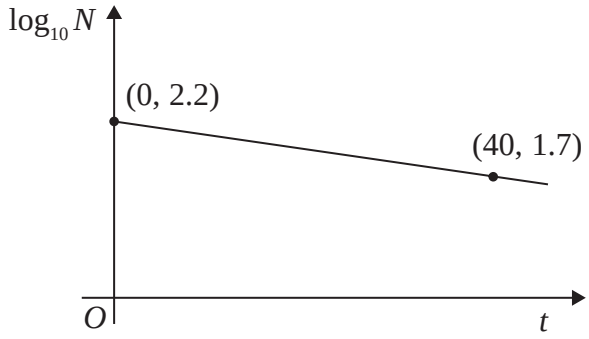

Figure 2

The number of fish in a lake is being monitored.

The line shown in Figure 2 models the linear relationship between $\log_{10} N$ and t, where

- N is the number of fish in thousands
- t is the number of years after monitoring began

The line passes through the points (0, 2.2) and (40, 1.7)

Using this information,

(a) find an equation for this line,

(2)

(b) find a complete equation for the model in the form

$$N = ab^t$$

where a and b are constants.
Give the value of a and the value of b, each to 3 significant figures.

(3)

With reference to the model interpret,

(c) (i) the value of a

(ii) the value of b

(2)

(d) Find, according to the model, the number of fish when $t = 10$, giving your answer to the nearest 1000

(1)

The model predicts that T years after monitoring began, the number of fish will fall below 20 000 for the first time.

(e) Find the value of T, giving your answer to the nearest integer.

(*Solutions relying entirely on calculator technology are not acceptable.*)

(2)

(f) Give a reason why the model may not be realistic.

(1)