

12 In an experiment 500 fruit flies were released into a controlled environment. After 10 days there were 650 fruit flies present.

Munirah believes that N , the number of fruit flies present at time t days after the fruit flies are released, will increase at the rate of 4.4% per day. She proposes that the situation is modelled by the formula $N = Ak^t$.

- (i) Write down the values of A and k . [2]
- (ii) Determine whether the model is consistent with the value of N at $t = 10$. [2]
- (iii) What does the model suggest about the number of fruit flies in the long run? [1]

Subsequently it is found that for large values of t the number of fruit flies in the controlled environment oscillates about 750. It is also found that as t increases the oscillations decrease in magnitude.

Munirah proposes a second model in the light of this new information.

$$N = 750 - 250 \times e^{-0.092t}$$

- (iv) Identify three ways in which this second model is consistent with the known data. [3]
- (v) (A) Identify one feature which is not accounted for by the second model. [1]
(B) Give an example of a mathematical function which needs to be incorporated in the model to account for this feature. [1]