Higher Maths
SQA 2019 Paper 2
Question 4

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Maths.scot

In a forest, the population of a species of mouse is falling by 2·7% each year.

To increase the population scientists plan to release 30 mice into the forest at the end of March each year.

(a) u_n is the estimated population of mice at the start of April, n years after the population was first estimated.

It is known that u_n and u_{n+1} satisfy the recurrence relation $u_{n+1} = au_n + b$.

State the values of a and b. **1**

The scientists continue to release this species of mouse each year.

(b) (i) Explain why the estimated population of mice will stabilise in the long term. **1**

(ii) Calculate the long term population to the nearest hundred. **2**

Answers:

(a) $a = 0.973, b = 30$

(b) (i) A limit exists as the recurrence relation is linear and $-1 < 0.973 < 1$.

(ii) 1100