Advanced Higher Maths
SQA 2021 Paper 2
Question 9

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(a) Express $\frac{1}{x(5-x)}$ in partial fractions. **2**

(b) A small island is being populated by seals. The size of the seal population can be modelled by the differential equation

$$\frac{dP}{dt} = \frac{1}{100}P(5-P),\ 0 < P < 5$$

where P (in hundreds) is the number of seals on the island t years after the seals arrive.

Given that there are 250 seals after 10 years, find an expression for P in terms of t. **8**

Answers:

(a) $\frac{1}{5x} + \frac{1}{5(5-x)}$

(b) $P = \frac{5e^{0{\cdot}05t-0{\cdot}5}}{1+e^{0{\cdot}05t-0{\cdot}5}}$