7 Scientists observed a colony of seabirds over a period of 10 years starting in 2010.

They concluded that the number of birds in the colony, its population P, could be modelled by a formula of the form

$$P = a(10^{bt})$$

where t is the time in years after 2010, and a and b are constants.

7 (a) Explain what the value of a represents.

[1 mark]

7 (b) Show that $\log_{10} P = bt + \log_{10} a$

[2 marks]

7 (c) The table below contains some data collected by the scientists.

Year	2013	2015
t	3	
P	10 200	12 800
$\log_{10} P$	4.0086	

7 (c) (i) Complete the table, giving the $\log_{10} P$ value to 5 significant figures.

[1 mark]

7 (c) (ii) Use the data to calculate the value of a and the value of b.

[4 marks]

7 (c) (iii) Use the model to estimate the population of the colony in 2024.

[2 marks]

7 (d) (i) State an assumption that must be made in using the model to estimate the population of the colony in 2024.

[1 mark]

7 (d) (ii) Hence comment, with a reason, on the reliability of your estimate made in part **(c)(iii)**.

[1 mark]