Q1. Solve the following:

(a) $\log_{1/3}27 = x$ (b) $\log_{16}32 = x$

Q2. Solve the equation $\log_5(x - 2) = 1 - \log_5(x - 6)$

Q3. Simplify $\log_9 3 - \log_9 6 + \log_9 18$

Q4. The size of the human population, N, can be modelled using the equation $N = N_0 e^{rt}$ where N_0 is the population in 2006, t is the time in years since 2006, and r is the annual rate of increase in the population.

(*a*) In 2006 the population of the United Kingdom was approximately 61 million, with an annual rate of increase of 1·6%. Assuming this growth rate remains constant, what would be the population in 2020?

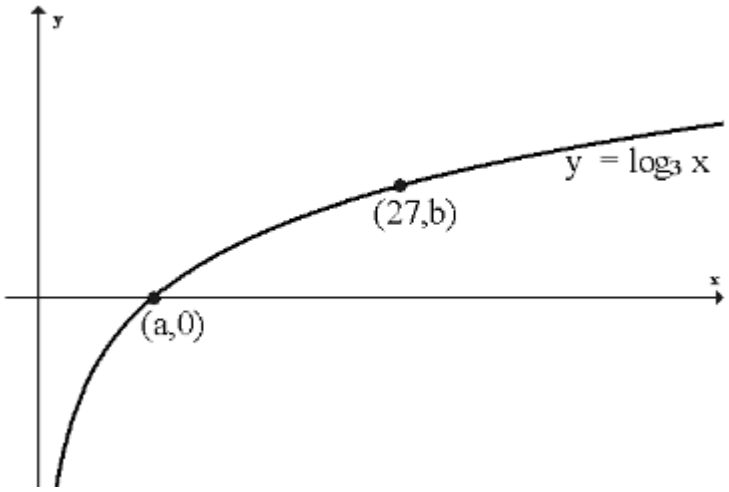
(*b*) In 2006 the population of Scotland was approximately 5·1 million, with an annual rate of increase of 0·43%.

Assuming this growth rate remains constant, how long would it take for Scotland's population to double in size?

Q5.

The diagram shows part of the graph of $y = \log_3 x$.

(a) Find the values of a and b.
(b) Sketch the graph of $y = \log_3(x + 1) - 3$.



Q6.

The graph opposite illustrates the law $y = kx^n$.

Find the values of k and n.