

11 The daily world production of oil can be modelled using

$$V = 10 + 100\left(\frac{t}{30}\right)^3 - 50\left(\frac{t}{30}\right)^4$$

where V is volume of oil in millions of barrels, and t is time in years since 1 January 1980.

11 (a) (i) The model is used to predict the time, T , when oil production will fall to zero.

Show that T satisfies the equation

$$T = \sqrt[3]{60T^2 + \frac{162\,000}{T}}$$

[3 marks]

11 (a) (ii) Use the iterative formula $T_{n+1} = \sqrt[3]{60T_n^2 + \frac{162\,000}{T_n}}$, with $T_0 = 38$, to find the values of T_1 , T_2 , and T_3 , giving your answers to three decimal places.

[2 marks]

11 (a) (iii) Explain the relevance of using $T_0 = 38$

[1 mark]

11 (b) From 1 January 1980 the daily use of oil by one technologically developing country can be modelled as

$$V = 4.5 \times 1.063^t$$

Use the models to show that the country's use of oil and the world production of oil will be equal during the year 2029.

[4 marks]