



Logs

Maths Past Exam Questions

Marking Schemes

Higher Level

2013

Paper One- Project Maths - Section A – Q3

Question 3

(25 marks)

Scientists can estimate the age of certain ancient items by measuring the proportion of carbon-14, relative to the total carbon content. The formula used is $Q = e^{-\frac{0.693t}{5730}}$, where Q is the proportion of carbon-14 remaining and t is the age, in years, of the item.

- (a) An item is 2000 years old. Use the formula to find the proportion of carbon-14 in the item.

$$Q = e^{-\frac{0.693t}{5730}} = e^{-\frac{0.693 \times 2000}{5730}} = 0.7851$$

- (b) The proportion of carbon-14 in an item found at Lough Boora, County Offaly, was 0.3402. Estimate, correct to two significant figures, the age of the item.

$$\begin{aligned} Q &= e^{-\frac{0.693t}{5730}} = 0.3402 \\ \Rightarrow -\frac{0.693t}{5730} &= \ln 0.3402 \\ \Rightarrow t &= -\frac{5730 \times \ln 0.3402}{0.693} \approx 8915 \approx 8900 \text{ years} \end{aligned}$$