

LC 2013 (SET D): PAPER 1

QUESTION 3 (25 MARKS)

Question 3 (a)

$$Q = e^{-\frac{0.693t}{5730}} \leftarrow \text{Replace } t \text{ by 2000 and input into your calculator.}$$

$$t = 2000: Q = e^{-\frac{0.693(2000)}{5730}} = 0.7851 = 78.51\%$$

Question 3 (b)

$$Q = 0.3402 = e^{-\frac{0.693t}{5730}} \leftarrow \text{Take the natural log of both sides.}$$

$$\ln(0.3402) = \ln\left(e^{-\frac{0.693t}{5730}}\right)$$

$$\ln(0.3402) = -\frac{0.693t}{5730}$$

$$\therefore t = -\frac{5730 \ln(0.3402)}{0.693} = 8915.17 \approx 8900 \text{ years}$$

MARKING SCHEME NOTES

Question 3 (a) [Scale 15B (0, 7, 15)]

7: • Value correctly substituted into e

Question 3 (b) [Scale 10C* (0, 3, 7, 10)]

- 3: • Correct statement
 • Uses logs (correctly or incorrectly)
 • Makes an effort to isolate t
- 7: • Gets correct linear equation for t

NOTE: Incomplete rounding or incorrect rounding or no rounding gets 9 marks.