

SAMPLE PAPER 2: PAPER 1

QUESTION 3 (25 MARKS)

Question 3 (a)

100, 90, 81,.....

$$a = 100, r = 0.9$$

Which term is equal to 50, half of its original mass?

$$50 = 100(0.9)^{n-1}$$

$$0.5 = 0.9^{n-1}$$

$$\log_{10}(0.5) = (n-1)\log_{10}(0.9)$$

$$\therefore n = \frac{\log_{10}(0.5)}{\log_{10}(0.9)} + 1 = 7.58 \text{ days}$$

Seven days must elapse before it is less than half its original mass.

Question 3 (b)

$$S_n = \frac{108(1 - (\frac{1}{3})^n)}{\frac{2}{3}} = 162(1 - (\frac{1}{3})^n)$$

$$S_\infty = \frac{108}{\frac{2}{3}} = 162$$

$$S_n - S_\infty = 0.05$$

$$162(1 - (\frac{1}{3})^n) - 162 = 0.05$$

$$162(\frac{1}{3})^n = 0.05$$

$$3^n = 3240$$

$$n \log_{10} 3 = \log_{10} 3240$$

$$\therefore n = \frac{\log_{10} 3240}{\log_{10} 3} = 7.36$$

Eight terms must be added together so that the sum differs from the sum to infinity by less than 0.05.
