

SAMPLE PAPER 2: PAPER 1

QUESTION 1 (25 MARKS)

Question 1 (a)

$$\log_9(x+2) - \log_3 x = 0 \quad \boxed{\log_b x = \frac{\log_a x}{\log_a b}}$$

$$\log_9(x+2) - \frac{\log_9 x}{\log_9 3} = 0$$

$$\log_9(x+2) - \frac{\log_9 x}{\frac{1}{2}} = 0$$

$$\log_9(x+2) - 2\log_9 x = 0 \quad \boxed{\log_a \left(\frac{x}{y} \right) = \log_a x - \log_a y}$$

$$\log_9 \frac{x+2}{x^2} = 0$$

$$\frac{x+2}{x^2} = 9^0 = 1 \quad \boxed{a^x = y \Leftrightarrow \log_a y = x}$$

$$x+2 = x^2$$

$$x^2 - x - 2 = 0$$

$$(x-2)(x+1) = 0$$

$$x = 2 \quad [x = -1 \text{ is not allowed as } x > 0.]$$

Question 1 (b) (i)

$$\binom{5}{3} = \frac{5 \times 4 \times 3}{3 \times 2 \times 1} = 10$$

$$\binom{5}{2} = \frac{5 \times 4}{2 \times 1} = 10$$

Question 1 (b) (ii)

$$\begin{aligned} (p+q)^5 &= \binom{5}{0} p^5 q^0 + \binom{5}{1} p^4 q^1 + \binom{5}{2} p^3 q^2 + \binom{5}{3} p^2 q^3 + \binom{5}{4} p^1 q^4 + \binom{5}{5} p^0 q^5 \\ &= p^5 + 5p^4 q + 10p^3 q^2 + 10p^2 q^3 + 5p^1 q^4 + q^5 \end{aligned}$$

Question 1 (b) (iii)

$$T_3 = 10p^3 q^2 = 10(0.6)^3 (0.4)^2 = 0.3456$$
