

SAMPLE PAPER 6: PAPER 1

QUESTION 3 (25 MARKS)

Question 3 (a)

$$S_n = 3 \left(1 - \left(\frac{1}{3} \right)^n \right) \quad \boxed{T_n = S_n - S_{n-1}}$$

$$S_{n-1} = 3 \left(1 - \left(\frac{1}{3} \right)^{n-1} \right)$$

$$\begin{aligned} T_n &= S_n - S_{n-1} = 3 \left(1 - \left(\frac{1}{3} \right)^n \right) - 3 \left(1 - \left(\frac{1}{3} \right)^{n-1} \right) \\ &= 3 - 3 \left(\frac{1}{3} \right)^n - 3 + 3 \left(\frac{1}{3} \right)^{n-1} \\ &= -3 \left(\frac{1}{3} \right)^n + 3 \left(\frac{1}{3} \right)^{n-1} \\ &= 3 \left(\frac{1}{3} \right)^{n-1} \left[1 - \frac{1}{3} \right] \\ &= 3 \left(\frac{1}{3} \right)^{n-1} \left[\frac{2}{3} \right] = 2 \left(\frac{1}{3} \right)^{n-1} \end{aligned}$$

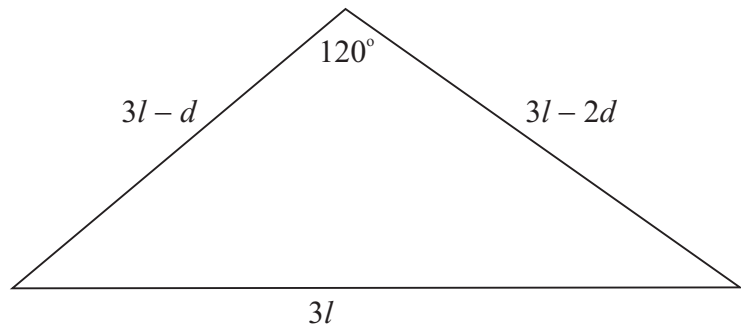
$$\boxed{\frac{T_n}{T_{n-1}} = \text{Constant}}$$

$$T_n = 2 \left(\frac{1}{3} \right)^{n-1}, \quad T_{n-1} = 2 \left(\frac{1}{3} \right)^{n-2}$$

$$\frac{T_n}{T_{n-1}} = \frac{2 \left(\frac{1}{3} \right)^{n-1}}{2 \left(\frac{1}{3} \right)^{n-2}} = \frac{1}{3}$$

Question 3 (b)

$$\boxed{a^2 = b^2 + c^2 - 2bc \cos A}$$



$$(3l)^2 = (3l - d)^2 + (3l - 2d)^2 - 2(3l - d)(3l - 2d) \cos 120^\circ$$

$$9l^2 = 9l^2 - 6ld + d^2 + 9l^2 - 12ld + 4d^2 - 2 \left(-\frac{1}{2} \right) (9l^2 - 9ld + 2d^2)$$

$$9l^2 = 9l^2 - 6ld + d^2 + 9l^2 - 12ld + 4d^2 + 9l^2 - 9ld + 2d^2$$

$$0 = 7d^2 - 27ld + 18l^2$$

$$0 = (7d - 6l)(d - 3l)$$

$$d = \frac{6l}{7}, 3l$$

$$3l, 3l - \frac{6l}{7}, 3l - \frac{12l}{7} = 3l, \frac{15l}{7}, \frac{9l}{7}$$