8. (i) Find the value of

$$\sum_{k=3}^{\infty} 6\left(\frac{1}{2}\right)^k$$

(3)

(ii) Show that

$$\sum_{n=0}^{125} \log_4\left(\frac{k+3}{k+2}\right) = 3$$

(3)

(Total for Question 8 is 6 marks)