

12 (a) A geometric sequence has first term 1 and common ratio $\frac{1}{2}$

12 (a) (i) Find the sum to infinity of the sequence.

[2 marks]

12 (a) (ii) Hence, or otherwise, evaluate

$$\sum_{n=1}^{\infty} (\sin 30^\circ)^n$$

[2 marks]

12 (b) Find the smallest positive exact value of θ , in **radians**, which satisfies the equation

$$\sum_{n=0}^{\infty} (\cos \theta)^n = 2 - \sqrt{2}$$

[4 marks]