**8** The first term of a progression is $\sin^2\theta$, where $0 < \theta < \frac{1}{2}\pi$. The second term of the progression is $\sin^2\theta\cos^2\theta$.

**(a)** Given that the progression is geometric, find the sum to infinity. [3]

It is now given instead that the progression is arithmetic.

**(b)** **(i)** Find the common difference of the progression in terms of $\sin\theta$. [3]

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**(ii)** Find the sum of the first 16 terms when $\theta = \frac{1}{3}\pi$. [3]

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