1. Let \( \sum_{n=1}^{\infty} a_n \) be a given \textbf{convergent} series and let \( c \neq 0 \) be a constant. Prove that 
\[
\sum_{n=1}^{\infty} ca_n \text{ converges and } \sum_{n=1}^{\infty} ca_n = c \sum_{n=1}^{\infty} a_n.
\]

2. Let \( \sum_{k=1}^{\infty} a_k \) be an infinite series whose sequence of partial sums is \( \{S_n\} \), where \( S_n = \frac{4n}{3n+5} \).

(a) Does the series \( \sum_{k=1}^{\infty} a_k \) converge? If so, what is its sum? Explain your reasoning.

(b) Find an explicit expression for the \( k^{th} \) term, \( a_k \), of the series.