Converges.

$$\begin{aligned}\sum_{n=1}^{\infty}\frac{1+8^n}{9^n} &= \sum_{n=1}^{\infty}\left(\frac{1}{9^n}+\frac{8^n}{9^n}\right)=\sum_{n=1}^{\infty}\left[\left(\frac{1}{9}\right)^n+\left(\frac{8}{9}\right)^n\right]\\ &\quad\text{[sum of two convergent geometric series]}\\ &= \frac{1/9}{1-1/9}+\frac{8/9}{1-8/9}=\frac{1}{8}+\frac{8}{1}=\frac{65}{8}\end{aligned}$$