

$$\begin{aligned} \text{area} &= 2At^2(1 + 2 + 3 + \dots n) \\ &= 2At^2 \frac{(n^2 + n)}{2} \\ &= A(nt)^2 \left(1 + \frac{1}{n}\right) \rightarrow \lim_{n \rightarrow \infty} = A(nt)^2 \\ \text{area} &= AT^2 \end{aligned}$$