



# Substitution method

$$\begin{aligned} E[T(n)] &\leq \frac{2}{n} \sum_{k=2}^{n-1} ak \lg k + \Theta(n) \\ &\leq \frac{2a}{n} \left( \frac{1}{2} n^2 \lg n - \frac{1}{8} n^2 \right) + \Theta(n) \\ &= an \lg n - \left( \frac{an}{4} - \Theta(n) \right) \end{aligned}$$

Express as *desired* – *residual*.