

Write $w = \frac{p}{q}$ in simplest form, with $p > q$. Choose m large such that $mq > a$. Then

$$\frac{mp}{mq} = \frac{mq+1}{mq} \times \frac{mq+2}{mq+1} \times \cdots \times \frac{mp}{mp-1},$$

which we can rewrite as

$$\left(1 + \frac{1}{mq}\right) \left(1 + \frac{1}{mq+1}\right) \cdots \left(1 + \frac{1}{mp-1}\right),$$

as required.