If the sequence $\{a_n\}_{n=1}^{\infty}$ tends to limit L as $n \to \infty$, then for any fixed number $M > 0$, the sequence $\{Ma_n\}_{n=1}^{\infty}$ tends to the limit ML.

$$(\forall \epsilon > 0)(\exists n \in N)(\forall m \geq n)[|a_m - L| < \epsilon] \tag{1}$$

$$(\forall \epsilon > 0)(\exists n \in N)(\forall m \geq n)[|Ma_m - ML| < \epsilon] \tag{2}$$

Proof: By contradiction.
Suppose:

$$\begin{aligned}(\forall m \geq n)[|Ma_m - ML| \geq \epsilon]\\ M|a_m - L| \geq \epsilon \qquad && \text{(By algebra)}\end{aligned}$$

By (1) we could find such $a_m - L$ that equal to $\frac{\epsilon}{2M}$.

$$\begin{aligned}M * \frac{\epsilon}{2M} \geq \epsilon\\ \frac{\epsilon}{2} \geq \epsilon\end{aligned}$$

But this is contradiction. Hence we could find n for (2).
QED.