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**Proof:** 

$$x \cdot v = b^m \cdot b^n = b^{m+n}$$

Taking the logarithm of both sides, we get:

$$\log_b(x \cdot y) = \log_b(b^{m+n}) = m + n = \log_b(x) + \log_b(y)$$

This leaves us with our result:

$$\log_{b}(x \cdot y) = \log_{b}(x) + \log_{b}(y)$$