We use properties of logarithms all the time, but to really understand why they work we need to mathematically prove them. Use the definition of logarithm and properties of exponents to prove the two properties of logarithms given below.

$$
\log (x y)=\log (x)+\log (y)
$$

$$
\log \left(x^{n}\right)=n \cdot \log (x)
$$

