Therefore $ab = c^{x+y}$.

We can rewrite these equations to give us two equations involving powers.

Let $\log_c a = x$ and $\log_c b = y$.

Therefore $\log_c ab = \log_c a + \log_c b$, as required.

$c^x = a$ and $c^y = b$

We will prove that $\log_c a + \log_c b = \log_c ab$ for any $a, b > 0$ and $c > 0$, but $c \neq 1$.

We would like to express $\log_c ab$ in terms of $\log_c a$ and $\log_c b$. If we try to express ab in terms of c, we might be able to say more about $\log_c ab$.