2.27 Theorem. Let p be a prime and let a and b be integers. If $p|ab$, then $p|a$ or $p|b$.

Proof. Let p be a prime and let a and b be integers be given such that $p|ab$. Suppose $p|ab$ and $p \not| b$. Since p is prime, $(p, b) = 1$. By Theorem 1.41, since $p|ab$ and $(p, b) = 1$, $p|a$. The same argument can be said of letting $p|ab$ and $p \not| a$. Thus, if $p|ab$, then $p|a$ or $p|b$. □