Strong Induction

Prove: It takes n-1 breaks to reduce an n-square chocolate bar to n individual squares

Set-up and Base case:

Let P(n) be the predicate: it takes n-1 breaks to reduce an n-square chocolate bar to n individual pieces. We will prove P(n) is true for all $n>0$ using strong induction.

Base case: When you have a 1-square chocolate bar, it requires 0 breaks because it is already in 1 individual piece. Thus P(1) is true

Inductive Step

Inductive step: We assume for induction the P(k) is true for $1 \le k < n$. We will prove P(n) is true. Since n>1, we can break our chocolate into two pieces, one with a squares, and one with b squares, where $a + b = n$, and $1 \le a < n$ and $1 \le b < n$. Using our inductive assumption, it requires $a - 1$ breaks to separate the first piece, and $b - 1$ breaks to separate the second piece. Adding up all the breaks , we have $(a - 1) + (b - 1) + 1 = n - 1$ breaks.