

Induction

Mathematically, induction is a method of proof for a countable number of cases.

**Principle of Induction**

Let  $P(n)$  be a family of statements indexed by the natural numbers. Suppose that

- $P(0)$  is true.
- For any  $n$ , if  $P(n)$  is true then  $P(n + 1)$  is also true.

then  $P(n)$  is true for all  $n \in \mathbb{N}$ .

This can then be applied to form a definition for the natural numbers.

Test

Mathematical induction proves that we can climb as high as we like on a ladder, by proving that we can climb onto the bottom rung (the basis) and that from each rung we can climb up to the next one (the step).