Principle Of Mathematical Induction

The Principal of Mathematical induction : Suppose there is a given statement $P(n)$ involving the natural no. n such that

(i) The statement is true for $n=1$, i.e., $P(1)$ is true and

(ii) If the statement is true for $n=k$ (where k is some positive integer), then the statement is true for $n=k+1$, i.e., truth of $P(k)$ implies the truth of $P(k+1)$.

Then $P(n)$ is true for all natural numbers n.

Basic Step : The first step in a proof that uses mathematical induction is to prove that $P(1)$ is true. This step is called the basic step.

Inductive Step : The step where we suppose that $P(k)$ is true for some positive integer k and we need to prove that $P(k+1)$ is true is called Inductive step.

Inductive hypothesis : The assumption that the given statement is true for $n=k$ in inductive step is called Inductive hypothesis.

Note : $\boxed{1+2+3+\ldots+n = \frac{n(n+1)}{2}}$ is the correct one.

$$\boxed{1^2+2^2+3^2+\ldots+n^2 = \frac{n(n+1)(2n+1)}{6}}$$

$$\boxed{(ab)^n = a^n b^n}$$

$$\boxed{1^3+2^3+3^3+\ldots+n^3 = \left[\frac{n(n+1)}{2}\right]^2}$$