The induction method

Mathematical induction can be informally illustrated by reference to the sequential effect of falling dominoes. An implicit proof by mathematical induction for arithmetic sequences was introduced in the *al-Fakhri* written by al-Karaji around 1000 AD, who used it to prove the binomial theorem and properties of Pascal's triangle.

None of these ancient mathematicians, however, explicitly stated the inductive hypothesis. Another similar case was that of Francesco Maurolico in his *Arithmeticorum libri duo* (1575), who used the technique to prove that the sum of the first n odd integers is n^2. The first explicit formulation of the principle of induction was given by Pascal in his *Traité du triangle arithmétique* (1665).

1. Explain the link between the induction reasoning and "the effect of falling dominoes". What is "the inductive hypothesis" ?

2. 1, 3, 5 ... etc... are odd numbers.
   In the text, we can read "... the sum of the first n odd numbers is ^{2} "
   a. Which mathematicians proved this property ?
   b. Give an example to illustrate "the sum of the first n odd numbers is n^2 ".
   c. Choose the right answer: the nth positive odd number is:
      $$n ? \qquad 2n + 1 ? \qquad 2n - 1 ?$$
   d. Prove by induction this property: " the sum of the first n odd numbers is n^2 " .