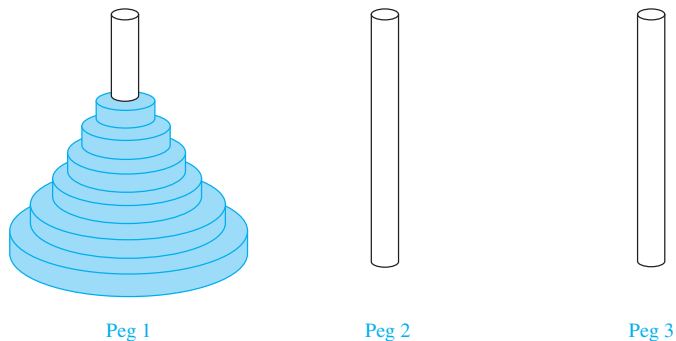


- (1) **Fibonacci's Rabbits** A single newly born pair of rabbits (one male, one female) is placed on an island. A pair of rabbits does not breed until they are 2 months old. After they are 2 months old, each pair of rabbits produces another pair (one male, one female) each month. Find a recurrence relation for the number of pairs of rabbits on the island after  $n$  months, assuming that no rabbits ever die.

- (2) **The Tower of Hanoi** A popular puzzle of the late nineteenth century invented by the French mathematician Édouard Lucas, called the Tower of Hanoi, consists of three pegs mounted on a board together with disks of different sizes. Initially these disks are placed on the first peg in order of size, with the largest on the bottom (as shown in the figure). The rules of the puzzle allow disks to be moved one at a time from one peg to another as long as a disk is never placed on top of a smaller disk. The goal of the puzzle is to have all the disks on the second peg in order of size, with the largest on the bottom.

Let  $H_n$  denote the number of moves needed to solve the Tower of Hanoi problem with  $n$  disks. Set up a recurrence relation for the sequence  $\{H_n\}$ .



**The Initial Position in the Tower of Hanoi.**