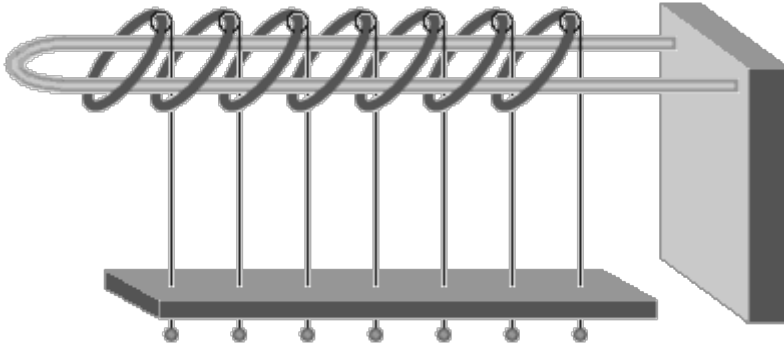


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## Chinese Rings

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On the left, we see the famous Chinese rings puzzle, also called baguendaudier. There are also some magic tricks called chinese rings too, also called linking rings. The object is to remove all of the rings from the horizontal loop of stiff wire, and/or put them back on. It is related to [The Tower of Hanoi](#), as it also uses a simple binary gray code as its solution.

As it is shown here, the first two rings can be moved off the left end of the stiff wire. One or both of those can then be slipped through the stiff wire loop (from top to bottom). Then the fourth ring can be slipped over the end. If just one of the first two was removed, then the third ring could have been slipped over the end. Anyway, over and over again, rings must be put back onto the stiff wire loop, in order to remove other rings. The solution takes many moves. The seven rings here take 85 moves, although this can be shortened by making more than one move simultaneously (removing 2 rings from the end, simultaneously). In general, the number of moves is  $(2^{(n+1)} - 2)/3$  if  $n$  (the number of rings) is even, and  $(2^{(n+1)} - 1)/3$  if  $n$  is odd ( $2^x$  means 2 to the  $x$  power, by the way). Most of the solution is easy, as you normally have only two moves, going forward or going back to the previous state. Starting the solution is the difficult part, as you must decide whether to remove one ring or two. If  $n$  is even, remove 2; if  $n$  is odd, remove 1.

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### Addendum:

I received email saying that it takes 64 moves (not 85) to remove the rings in the above 7-ring puzzle, not counting multiple moves. Several sources say 85. Who's right? At first, I thought that maybe the above formulas pertain to a more difficult position of the three rings. There are more difficult situations, by the way, as the puzzle as shown is almost half-solved. Then I examined the email. With three rings left, this person said that it takes four moves to remove the rings. I get five moves. The last one is a multiple move that removes two rings. These two rings just drop right off, but technically it is a multiple move. It is certainly possible to call this double move a move, and that has been done elsewhere on the Internet, but I won't do that here. And this same multiple move comes up repeatedly in the solutions with more rings, either moving two rings onto the loop, or two rings off of the loop. It would seem that 85 moves for seven rings is the right answer, without double moves. Just add two to your count, every time you add or remove two rings simultaneously.

See [On-Line Encyclopedia of Integer Sequences!](#) and [On-Line Encyclopedia of Integer Sequences!](#).

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