

King Kong Skyscrapers

Introduction

This problem can be done on pen and paper by drawing or by just writing the numbers down. You could also use something like sugar cubes to help!

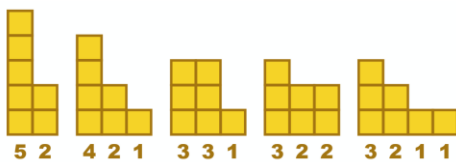
It would be good to do the first example together as a group showing all the steps

For 6 floors students can choose their starting point – maybe 42 or 33 or 411 etc. It doesn't need to be two columns to start with.

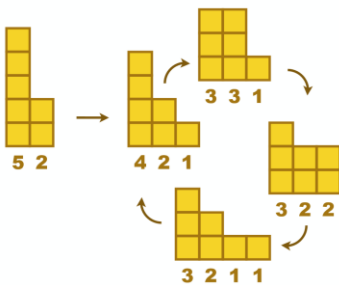
Students can share their findings for 6. Have all options been considered?

Solution

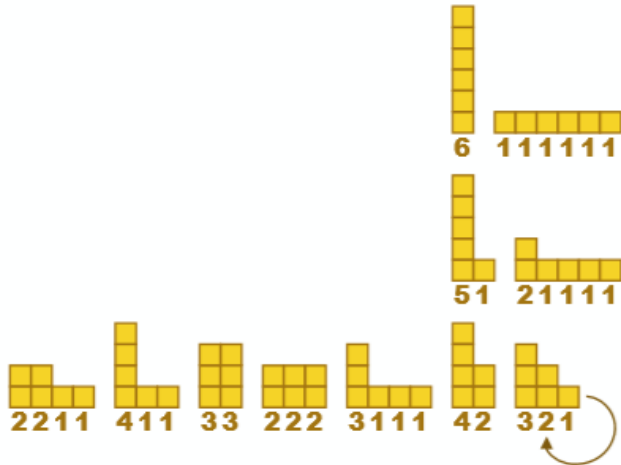
Starting with 52:



Then you get 421 again so you are stuck in a loop! Like this:



No matter where you start for 6 you end up with 321



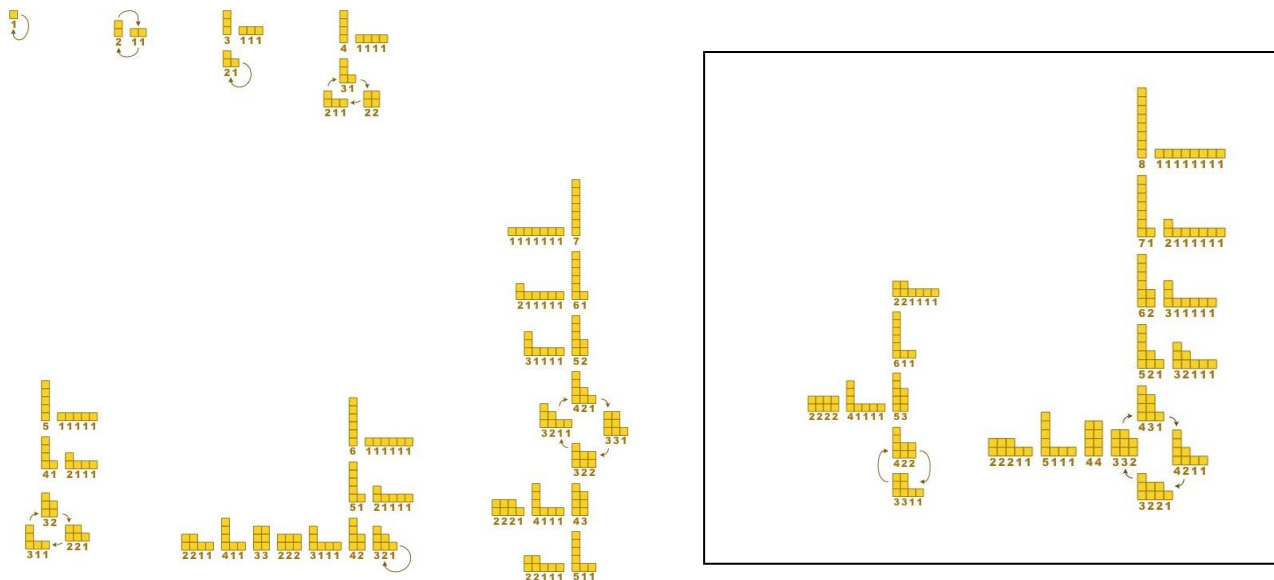
It is the same idea for all the numbers 1,3,6,10,15,21 ... etc. The triangular numbers!

Extension

Konstantin Oskolkov of the Steklov Mathematical Institute in Moscow was told about this puzzle by a stranger c.1980. It has become known as Bulgarian Solitaire. It is written by MathPickle in terms of King Kong here:

<http://mathpickle.com/project/bulgarian-solitaire-patterns/>

Solutions for 1- 8 (8 has two loops depending where you start!)



What happens to cycles for numbers one less than these triangular numbers?

If King Kong explores the skyline starting with one block... and just keeps on increasing the number of blocks... How many 2-cycles does he find?

King Kong tries to reverse the algorithm. Of course this doesn't work because one skyline can result from several precursors. What is the greatest number of precursors that King Kong will discover?