

# Re: juggling's combinatorics problem with siteswap

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btw, if you are not a juggler, but find it fascinating, there's a software called JugglingLab that can simulate by a visual display any juggling siteswap pattern. From a math perspective, it's more fascinating than watching people juggling. The software can be downloaded at <http://jugglinglab.sourceforge.net/>

some more thoughts on orbits...

a pattern can have several orbits, but two orbits may be the same. For example, one hand juggling two balls. Now, both hand does that. That's a pattern with 2 orbits, but same. They are mirror images. Mirror image orbits are not necessarily shows only in patterns where each hand minds its own business.

suppose one hand juggles 2 balls in a cycle. (i.e. shower). That's one orbit.

suppose one hand juggles 3 balls in a cycle. (i.e. shower). That's one orbit. Now suppose one throws a ball really high, then do two small throws of the other two balls, then the 1st ball came down and throw it high again, then two small throws with the other 2 balls... this pattern would be 2 orbits. Now a similar pattern with high and low throws with 3 balls one hand can be made so that it has just one orbit, such a ball of any color will go thru the same pattern.

in pattern 64645 (5 balls), there are 3 orbits, 2 distinct ones.

Essentially, each hand independently juggles 2 balls, and another ball goes from hand to hand by itself.

One may ask the question, given a specific orbit, what patterns are possible using that orbit with n balls.

another concept is that some orbits are entirely juggled by a single hand, as in many of the above examples. In network theory jargon, we can call it a loop, as it connects only to itself.

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sorry for the rather incoherent ramble... will have to think about these more coherently and perhaps put together a nice account in the future.

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[http://xahlee.org/PageTwo\\_dir/more.html](http://xahlee.org/PageTwo_dir/more.html)