PoD2: 13 Hexiamond Tesselations

PoD1: 41 Knights Tours (Danny and Sylvia)

**Ones that don’t work:**

* 3xn unless n=4 ... see if you can do 3x4 ;)
* 4x4 – the corners are the problem – can you see why?
* ???

**Why don’t some work?**

3x3 definitely won’t work because you can’t get to the middle square...

3x5 is a funny one – the middle square is over-used (try it)

3x6 upwards won’t work because the paths have lots of closed loops – and if you find a closed loop you’re in trouble (try it for 3x6)

Now, you can break a closed loop by deleting an edge leaving two loose ends... so if you do this to **two** closed loops, you can use one loose ends from each as a start/end.. and then join the other two loose ends together to join the two ex-closed loops together...

...but if you’ve got more than two then you’re stuck!

**What about 4xn for n>4?**

4x5 works – it has exactly two closed loops so you can break them and join them together. Try it.

4x6... same...

Conjecture – all 4xn n>4 are possible.

**What about 5xn?**

5x5 works so by mathematical induction we reckon everything bigger than this works.

**Extra Thoughts**

I carried on doing this on the way home... and managed to do a 3x7 by 'joining' a 3x3 with a 3x4 [starting from the middle of the 3x3] and a 3x8 (joining a 3x4 with a 3x4)...

So our theory of closed loops is wrong. It's because you only need to be able to join 2 (or more) paths together.

[[However, the closed loop theory does give you a good way of constructing tours for 4xn etc]]

So... it turns out that 3x5 and 3x6 are not possible, but then 3xn should be for all n>6 using this joining technique

Now the challenge is to find out which ones can be made into single closed loops, starting and ending at the same place :)