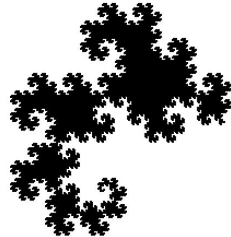


Computer programming the Dragon Curve with Lux Blox

That's right – no computer required.



Description:

The dragon curve is a fractal that can be created by folding paper over and over again and then unfolding and arranging it through a series of Left and Right orthogonal turns. The problem with creating many iterations through folding is that the folds become too rounded as they increase and no one has an infinitely long strip of paper. (They can be created through drawing (see links below).

With Lux, the limitation of paper length and fold width are no longer. Using color to code right and left turns you can create as many iterations you would like (of course with the limitation being the number of pieces.)

How to do this with Lux:

Let's start with some rules here:

Blue = Right turn (r)

Orange = Left turn (l)

The first piece will be white

You will need 2^n number of pieces where n is the number of iterations

Iteration 1:

Number of pieces:

2 or 2^1

Steps:

r



Iteration 2:

Number of pieces:
4 or 2^2

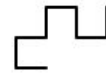
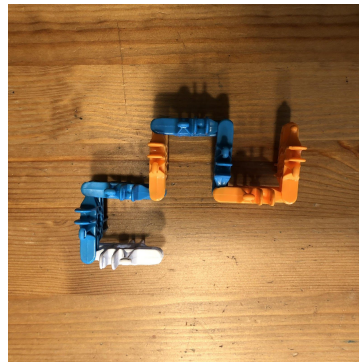
Steps:
rrl



Iteration 3:

Number of pieces:
8 or 2^3

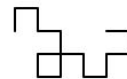
Steps:
rrlrrll



Iteration 4:

Number of pieces:
16 or 2^4

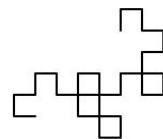
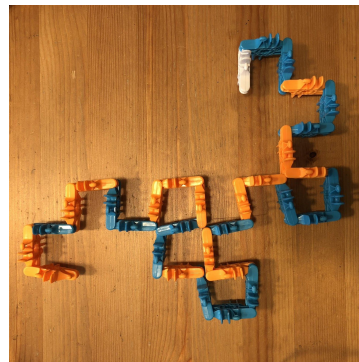
Steps:
rrlrrllrrrllrll



Iteration 5:

Number of pieces:
32 or 2^5

Steps:
rrlrrllrrrllrllrrrllrllrllrllrll

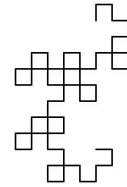
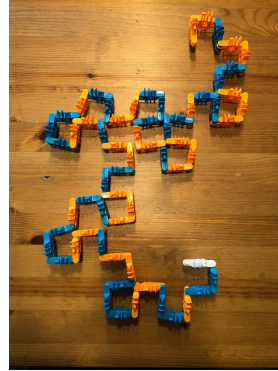


Iteration 6:

Number of pieces:
64 or 2^6

Steps:

```
rrlrrllrrrllrllrrrllrllllrllrll  
rrrlrrllrrrllrllllrllrrllllrllrll
```

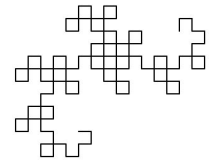
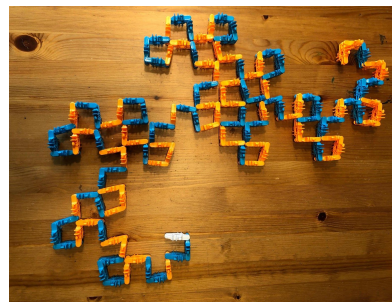


Iteration 7:

Number of pieces:
128 or 2^7

Steps:

```
rrlrrllrrrllrllrrrllrllllrllrllr  
llrrrllrllrrrllrllllrllrllllrllr  
llrllrrrllrllrrrllrllrrrllrll  
llrllrllllrllrllrrrllrllllrllr  
rllllrllrll
```

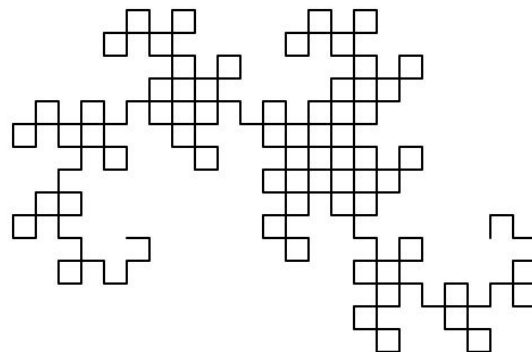


Iteration 8:

Number of pieces:
256 or 2^8

Steps:

```
rrlrrllrrrllrllrrrllrllllrllrllr  
rrllrllrrrllrllrrrllrllllrllrllr  
rrlrrllrllrllrllrrrllrllllrllrllr  
rrllrllrrrllrllrrrllrllllrllrllr  
rrlrrllrrrllrllllrllrllllrllrllr  
rrllrllrrrllrllrrrllrllllrllrllr  
rrlrrllrllrllrllrrrllrllllrllrllr  
rrllrllrllrllrllrrrllrllllrllrllr  
rrlrrllrrrllrllrrrllrllllrllrllr  
rrllrllrllrllrllrrrllrllllrllrllr  
rrlrrllrrrllrllrrrllrllllrllrllr  
rrllrllrllrllrllrrrllrllllrllrllr  
rrlrrllrllrllrll
```



Helpful hints for classrooms:

For many students, break up the string of steps and have each student (or pair of students) put together a strand. Making sure you keep the student's strands in order, they can be placed back together. A table is helpful for this.

Example:

For 7 iterations:

Name	Strand	number
Opal	rrlrrllrrrllrll	1
Jim	rrrlrrlllrrllrl	2
Molly	lrrrlrrllrrrllr	3
Henry	lllrrlrrlllrrll	4
Mike	rllrrrlrrllrrrl	5
Ellen	lrllrrrlrrlllrr	6
Marie	lrlllrrlrrllrr	7
Lucy	rllrlllrrlrrlllrrllrll	8

Iterations (what patterns do you see emerging here?):

Iteration	Pieces	Steps	Picture
1	$2^1 = 2$	r	See above
2	$2^2 = 4$	rrl	See above
3	$2^3 = 8$	rrlrrll	See above
4	$2^4 = 16$	rrlrrllrrrllrll	See above
5	$2^5 = 32$	rrlrrllrrrllrllrrrllrrllrrllrll	See above
6	$2^6 = 64$	rrlrrllrrrllrllrrrllrrllrrllrllr rrlrrllrrrllrllrrrllrrllrrllrll	See above
7	$2^7 = 128$	rrlrrllrrrllrllrrrllrrllrrllrllr rrlrrllrrrllrllrrrllrrllrrllrllr rrlrrllrrrllrllrrrllrrllrrllrlll rrlrrllrrrllrllrrrllrrllrrllrll	See above
8	$2^8 = 256$	rrlrrllrrrllrllrrrllrrllrrllrllr rrlrrllrrrllrllrrrllrrllrrllrllr rrlrrllrrrllrllrrrllrrllrrllrlll rrlrrllrrrllrllrrrllrrllrrllrllr rrlrrllrrrllrllrrrllrrllrrllrllr rrlrrllrrrllrllrrrllrrllrrllrlll rrlrrllrrrllrllrrrllrrllrrllrlll rrlrrllrrrllrllrrrllrrllrrllrlll rrlrrllrrrllrllrrrllrrllrrllrll	See above
9	$2^9 = 512$	rrlrrllrrrllrllrrrllrrllrrllrllr rrlrrllrrrllrllrrrllrrllrrllrllr rrlrrllrrrllrllrrrllrrllrrllrlll rrlrrllrrrllrllrrrllrrllrrllrllr rrlrrllrrrllrllrrrllrrllrrllrllr rrlrrllrrrllrllrrrllrrllrrllrlll rrlrrllrrrllrllrrrllrrllrrllrlll rrlrrllrrrllrllrrrllrrllrrllrllr rrlrrllrrrllrllrrrllrrllrrllrllr rrlrrllrrrllrllrrrllrrllrrllrllr rrlrrllrrrllrllrrrllrrllrrllrlll rrlrrllrrrllrllrrrllrrllrrllrlll rrlrrllrrrllrllrrrllrrllrrllrllr rrlrrllrrrllrllrrrllrrllrrllrlll rrlrrllrrrllrllrrrllrrllrrllrlll rrlrrllrrrllrllrrrllrrllrrllrlll rrlrrllrrrllrllrrrllrrllrrllrll	