FRACTALS AND CHAOS THEORY

Last year, I was priveleged to attend a two day seminar given by Boston University professor, Bob Devaney, one of the leading authorities in the study of Fractal Geometry and Chaos Theory (here systems appear to be random but are, in fact, deterministic). Go to his website at:

http://math.bu.edu/DYSYS/applets/

Applets associated with this site include (the rules are all on the site; I will work with the students to introduce them to as many of these interactive fractal games as possible; I hope you will work with your child to figure out the rest):

The chaos game . Yes, this is a game. Try to beat the computer by hitting specific targets via the moves of an iterated function system. This game allows students to understand the construction of the Sierpinski triangle via the chaos game.

Fractalina. This applet allows you to set up the vertices, compression ratios, and rotations associated to an iterated function system and then compute and view the resulting fractal. On some browsers, apparently the numbers that you enter in this program show up as white-on-white, so the numbers do not appear on the screen. If this is the case, you can just highlight the appropriate window to see the numbers. Someday I'll figure out how to fix this....

Fractanimate. This applet allows you to string together a collection of fractal images generated by Fractalina into a movie. We encourage you to become quite familiar with **Fractalina** before trying to use this applet.

you need to be on Devaney's web site to play this game, but the amazing property of chaos theory is that if you start at any vertex at the triangle, and randomly choose one of the colors representing a vertex of the triangle and I place a point at the half way point between the original point and the chosen vertex and repeat the process infinitely, you will create a Sierpinski's Triangle.

when you are on the site, click on one of the colors and the new point will be half way between the original point and the chosen vertex

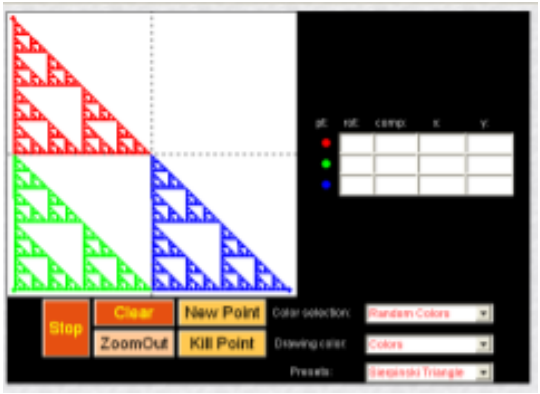
your job is to get the point into the green triangle in at least 4 moves.

each time your go up in a level of difficulty, you will be required to use more than 4 moves to win.

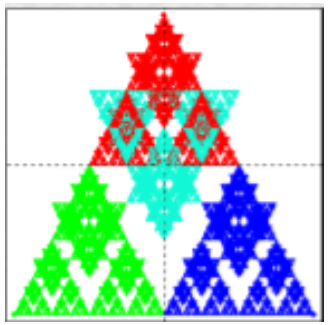
with Fractalina, you actually create your own fractals by chosing the points, the compression, the rotation, and the placement. You cannot make a mistake. just explore the possibilities until you create something worthy of the Institute of Contemporary Art.

standard Sierpinski's Triangle

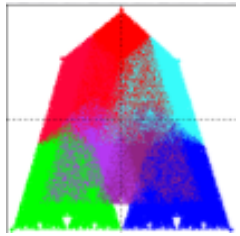
move one or more points



add a point in the middle and rotate it 180 degrees leaving the others alone

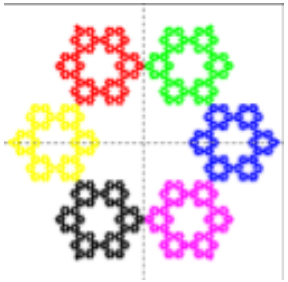


add one point in the center of each quadrant

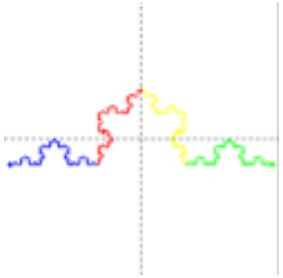


Sierpinski's Pentagon

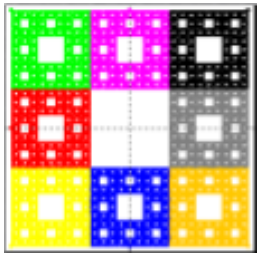
Sierpinski's Hexagon



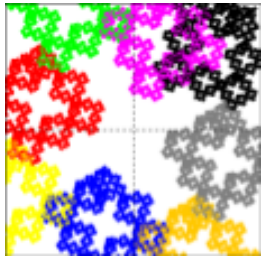
Koch Curve



Sierpinski's Carpet



Sierpinski's Carpet with a 45 degree rotation



Fractanimate is a combination of Fractalina and an animation program that allows you to program the starting frame, set an ending frame and create rotations, compressions, adding and moving points, etc. This is the most interesting and, of course, challenging.