**Fractals Project: GRASP**

**GOAL:** Bring art and mathematics together for a new exhibit at the National Art Museum

**ROLE:** Local artist, expert mathematician

**AUDIENCE:** The general public, as well as the art critics from the Washington Post

**SCENARIO:** A new art exhibit is opening at the National Art Museum highlighting mathematics and geometry in art. They are soliciting submissions of fractal pictures and posters from local artists and mathematicians that highlight fractals. A **fractal** is a rough or fragmented geometric shape that can be split into parts, each of which is (at least approximately) a reduced size copy of the whole. Each iteration of the design is smaller and smaller, making a simple picture look much more complex

**PERFORMANCE:** You have decided to submit a project to the committee. You think your best chance of creating a piece that will be good enough to be displayed in the exhibit is if you do one of the following:

Option A: You are an excellent artist, both by hand and on the computer. You decide to create a Sierpinski triangle. A Sierpinski triangle is a fractal made starting with an equilateral triangle that has three midsegments drawn, connecting it’s midpoints. Then, on the outer three triangles, the midsegments of these triangles are drawn. This pattern repeats, with midsegments drawn on the outer three triangles, with each iteration being called a stage. You will make a 5 to 7 stage Sierpinski triangle, and then color this triangle according to a pattern of your choosing. You will then write a one paragraph description of your Triangle, including your methodology for how you made your triangle, and how you chose your color pattern. Then, you need to make two charts 1) The number of triangles you have in each iterations, and write a general formula for this pattern, 2) The length of each side in the triangle, and write a general formula for this pattern. This picture and description should be submitted both in person and electronically.

Option B: You are an excellent photographer, as well as have an excellent eye for images and for creating poster. You decide to create a poster that highlights fractals in the real world. You select four different images of fractals, and present them on a poster in a collage fashion (on the computer). Your poster must include a caption for each photograph, and it must include a one paragraph description of where you find fractals in the real world, and what a fractal is in your words. You can feel free to be creative and write this description as a poem, song, rap, or comic. You will then save this poster as a PDF so that it can be emailed to the judging committee.

**Standards:**

G-SRT.5. Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.

G-MG.1. Use geometric shapes, their measures, and their properties to describe objects (e.g., modeling a tree trunk or a human torso as a cylinder).

Option A Rubric:

|  |  |  |
| --- | --- | --- |
| Subject | Grade | Comments |
| Work Hard: This project must be turned in on time to receive full credit. | /4 |  |
| The following grades will be averaged and entered under the standards G-SRT.5, G-MG.1 |  |  |
|  |  |  |
| Triangle Constructed Correctly | /4 |  |
| Neatness | /4 |  |
| Designed and Colored | /4 |  |
| Description | /4 |  |
| Patterns Calculations | /4 |  |
| Total Grade | /4 |  |

Option B Rubric:

|  |  |  |
| --- | --- | --- |
| Subject | Grade | Comments |
| Work Hard: This project must be turned in on time to receive full credit. | /4 |  |
| The following grades will be averaged and entered under the standards G-SRT.5, G-MG.1 |  |  |
|  |  |  |
| Overall Presentation Quality | /4 |  |
| Picture One and Caption | /4 |  |
| Picture Two and Caption | /4 |  |
| Picture Three and Caption | /4 |  |
| Picture Four and Caption | /4 |  |
| Description Paragraph Content (descriptions, definition) | /4 |  |
| Description Paragraph Quality | /4 |  |
| Total Grade | /4 |  |