**Fractal Card Activities**

**Activity 1: Box Patterns for Fractals**

**Materials:** Stage 1 – 4fractal cards

**Objective:** Examine and extend patterns relating to the pop-out boxes on the fractal cards.

**Directions:** Extend the patterns for stage number 5 through *x*. Write expressions in *x* for columns 2 and 3.

**TABLE 1: Box Patterns**

|  |  |  |
| --- | --- | --- |
| Column 1 **Stage or Card Number, *x*** | Column 2 **Number of Boxes Added, *y1*** | Column 3Total Number of Boxes, ***y2*** |
| 1 | 1 | 1 |
| 2 |  |  |
| 3 |  |  |
| 4 |  |  |
| 5 |  |  |
| 6 |  |  |
| 7 |  |  |
| 8 |  |  |
| 9 |  |  |
| *x* |  |  |

**Question 1: Did you use your calculator to find the regression equation? Was the expression in the equation different from above? Why?**

**Question 2:** Write an equation using the expression from Column 2, *y*1 = (write your expression from Column 2, row *x*). On graph paper, label the *x* and *y*1 axes. Then graph each ordered pair (*x*, *y*1). Describe the shape of the graph.

**Question 3:** Write an equation using the expression from Column 3, *y*2 = (write your expression from Column 3, row *x*). On graph paper, label the *x* and *y*2 axes. Then graph each ordered pair (*x*, *y*2). Describe the shape of the graph.

**Activity 2: Fractal Patterns**

**Materials:** Stage 1 – 4fractal cards

**Objective:** Find your own two patterns. Then, examine and extend patterns relating to your fractal card patterns.

**Directions:** Fill in **Table 2**. Use the stage number as *x*. Your patterns will be *y*1 and *y*2.

**Describe your pattern for *y*1:**

**Describe your pattern for *y*2:**

**TABLE 2: My Patterns**

|  |  |  |
| --- | --- | --- |
| Column 1 **Stage or Card Number, *x*** | Column 2 ***y1*** | Column 3 ***y2*** |
| 1 | 1 | 1 |
| 2 |  |  |
| 3 |  |  |
| 4 |  |  |
| 5 |  |  |
| 6 |  |  |
| 7 |  |  |
| 8 |  |  |
| 9 |  |  |
| *x* |  |  |

**Write your equations below. Be prepared to share your patterns with the group.**

*y*1 =

*y*2 =

**Activity 3: Ratios for Fractal Cards**

**Directions**: Use the descriptions **A** – **G** to fill in **Table 3**. Use inches for all measurements. If your cards are not “perfect” use the measurements that would be ideal using the cutting pattern.

**A**. Stage Number (Card Number, always *x*)

**B**. Distance to measure **in** to make the newest cut (Write as a fraction, proper or improper, in simplest form to better see the pattern.)

**C**. Length of the newest cut (Write as a fraction, proper or improper, in simplest form to better see the pattern..)

**D**. Length of one face of the newest rectangular prism

**E**. The ratio of C to B (C ÷ B) (Write as a decimal.)

**F:** Area of **one** paper face of the newest, smallest box created at the given stage (Write as a decimal.)

**G**. Area of **all** box faces at the given stage (the paper covered faces only). Watch out!\*

**\* Hint for G:** Some box faces are part of two different boxes. Do not double count any areas. The last row of cells should be a constant value or a formula for the column in terms of *x*.

**TABLE 3: Ratios for Fractal Cards**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **A** | B | **C** | **D** | **E** | **F** | **G** |
| 1 | 2 | 2.5 = 5/2 | 4 | 1.25 | 10 | 20 |
| 2 |  |  |  |  |  | 25 |
| 3 |  |  |  |  |  |  |
| 4 |  |  |  |  |  |  |
| *x* |  |  |  |  |  |  |