

## **Title: Nature's Showcase (Patterns)**

### **Link to Outcomes:**

- **Problem Solving** Students will demonstrate their ability to work independently and collaboratively to solve real-life problems involving patterns.
- **Communication** Students will analyze, clarify, and justify their ideas orally and in writing about the logical relationships found in patterns. Students will employ the use of mathematical vocabulary to communicate effectively.
- **Reasoning** Students will demonstrate their ability to reason mathematically by making conjectures, gathering evidence, and organizing data to identify and create patterns.
- **Mathematical Connections** Students will connect the topic of patterns with the science topics of plants and ecology.
- **Patterns and Relationships** Students will describe examples of patterns found in nature.
- **Statistics** Students will collect, organize, and display data in order to support conclusions. Students will also determine how to create patterns in which one or more variables were controlled.

### **Brief Overview:**

This is an interdisciplinary activity which integrates math and science. Students will be asked to examine and create patterns. Additionally, they will be asked to build patterns from oral and written descriptions.

### **Grade/ Level**

Grade 3/4

### **Duration/Length:**

The activities in *Nature's Showcase* should take 3 or 4 days.

### **Prerequisite Knowledge:**

- Sequential order
- Logic activities
- Deductive and inductive reasoning
- Computations (addition, subtraction, multiplication)

## **Objectives:**

- Students will read a prompt and respond to the prompt after discussing why they think working on a garden relates to math.
- Students will be able to copy different types of patterns and identify their attributes.
- Students will be able to continue different types of patterns
- Students will be able to describe different types of patterns.
- Students will build patterns when given descriptions.
- Students will be able to create patterns.
- Students will be able to identify patterns and make predictions.
- Students will be able to organize information and find regularity in the data.
- Students will be able to identify patterns as they occur in nature.

## **Materials/Resources/Printed Materials:**

- Sentence strips
- Artificial flowers or pictures of assorted flowers
- Link cubes or other manipulatives
- Grids
- Miss Rumphius by Cooney
- Patterns and Functions (Kindergarten through Grade Nine) Hands On, Inc. pp. 87-89
- Worksheets

## **Development/Procedures:**

### **Activity One**

- Students will read and respond to the prompt (Student Resource #1) after discussing why they think working on a garden project will relate to math. Students will be able to identify patterns as they occur in nature (Student Resource #2).
- Have students read the prompt. Have students discuss the positive and negative ideas for planting a garden as a math activity.
- Distribute books and pictures of flower beds which have been planted in various patterns. Ask students to identify the order in which the flowers are planted. Have students search for repeated ordering of flowers. Have them cite details of the flower beds that would indicate a pattern. Use the information gathered about repeating order to develop a class definition of a pattern.

### **Activity Two**

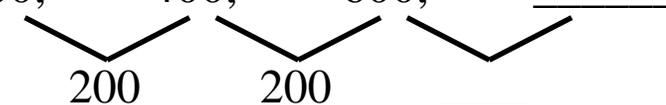
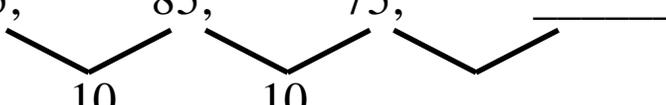
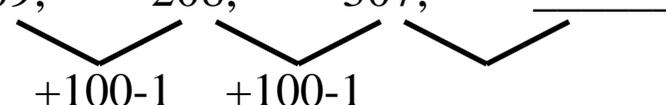
- Students will be able to copy different types of patterns and identify their attributes.
- Line up a group of students in front of the room to make a color pattern with pictures of flowers or artificial flowers. The rest of the class will match the color pattern by using link cubes. Repeat this several times. Discuss the relationships. Have the students form a pattern in which the colors of the original pattern is different from the colors of the link cubes.

- Discuss with the students how the red, yellow, red, yellow... color pattern and the blue, green, blue, green... pattern are similar because they both follow a pattern of one color followed by another color. Introduce letter labels such as A,B,A,B,... for the patterns.
- Brainstorm with students about patterns that are made without using objects. Model some patterns without using objects and ask students to copy these patterns. Have students practice copying semi-abstract to abstract patterns such as shapes, numerical, etc.

### Activity Three

- Students will be able to continue different types of patterns.
- Read to the students the story, *Miss Rumphius*. Have the students pretend that Miss Rumphius designed some flower patterns to illustrate a garden which she would plant in the future. Have the students identify the patterns and then complete them.
- Ask students to work in pairs completing rows of flower patterns that Guilford's and Bedford's students plan to use in their gardens. Write in your journal or log the types of patterns each school used. Note similarities and differences between the patterns.
- Numerical Patterns
- Ask students to practice continuing semi-abstract to abstract patterns such as shapes, numerical, etc. It is suggested that teachers spend more than one day on numerical patterns. Teachers should model how to find the difference between the numbers in the patterns before having students complete that task.

For Example:

1. 200, 400, 600, \_\_\_\_\_  

2. 95, 85, 75, \_\_\_\_\_  

3. 109, 208, 307, \_\_\_\_\_  


#### **Activity Four**

- Students will be able to describe different types of patterns.
- Present your students with a letter (Student Resource #3) Mrs. Langley wrote to the Guilford students in which she requested their assistance in describing patterns which were made by her class in a previous activity. Ask students to use letters (A, B, C, A, B, C, A, B, C, ...) to describe the patterns (Student Resource #4). Identify any other attributes of the patterns.
- Ask students to orally review three other students' descriptions. They must justify their findings by using the Praise-Question-Polish technique (Student Resource #5).
- Ask students to send postcards (Student Resource #6) to Mrs. Langley with the patterns and their descriptions of the patterns.

#### **Activity Five**

- Students will build patterns when given descriptions.
- Explain to students that Mrs Ward's class has received index cards from Bedford on which students have placed descriptions of patterns. Students will work in cooperative groups to complete the patterns. Remind students to use the Think Aloud technique (Student Resource #7) to complete the task.
- Ask Mrs. Langley's students to write Mrs. Ward's class pen pal letters (friendly letters) telling about the patterns created from the descriptions. Make sure Mrs. Langley's students include notes from their Think Aloud activity.

#### **Activity Six**

- Students will be able to create patterns.
- Review with students the story, *Miss Rumphius*. Discuss with students how they would plan a row of flowers on an empty row of earth. Give each student a sentence strip and pictures or stickers of flowers and directions to create their own pattern.
- Ask each student to draw a flower bed using the pattern that he created.
- Give students extra sentence strips and directions to create non-flower patterns.

#### **Activity Seven**

- Students will be able to identify patterns and make predictions.
- Have student review problem-solving strategies and the attributes of patterns.
- Distribute problem-solving worksheets (Student Resources #8, #9, and #10), calculators, and manipulatives. Ask students to work in pairs to solve the pattern problems.

- Explain to students that they must complete a Think Dialogue cartoon (Student Resources #11 and #12) that will illustrate how they solved one of the problems on the worksheet. Each student will share his cartoon.

### **Activity Eight**

- Students will organize information and find regularity in the data.
- Give each student a problem-solving worksheet, calculator, and manipulatives. Ask students to work in pairs to solve the worksheet.
- Have students write a rule, a chart, or a formula that they can use to solve this type of problem or a similar problem.

### **Evaluation:**

In cooperative groups, each group will write a description for a pattern. Groups will exchange descriptions. They will duplicate the patterns by following the given directions. They will analyze the pattern and identify its components. Using the information gathered from its observations, each group will construct a similar but different pattern.

### **Extension/Follow Up:**

Give students a 6x6 grid and ask them to write the letters which spell out the flower, *Lupine* by consecutively placing one letter in each box of the grid. Next, ask students to color the first letter (L) each time that it appears in the grid. Students will then identify and discuss the pattern formed.

As a cooperative learning activity, give each group a flashcard with the name of a different flower. Ask groups to design a grid which will create a diagonal pattern for their flowers.

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### ACTIVITY ONE - PROMPT

Direction: Read the selection below carefully. Write your response in a letter format. Remember that your audience is the principal.

Bedford Elementary School's fourth grade students in Mrs. Langley's class were pen pals with Mrs. Ward's third grade students at Guilford Elementary School. Bedford's students decided to plant a garden this year and wrote their pen pals explaining their ideas to build a garden called Nature's Showcase. Mrs. Ward's class thought a garden was a good idea. The students in both schools decided to write their principals, Mrs. Payne and Mrs. Clark, for permission to do the joint projects.

The students had problems writing their class letters. They could not think of a reason for asking to plant a garden in Math class. Could you help them complete their letters? Write letters to Mrs. Payne and Mrs. Clark giving at least two reasons why math students should build a garden. Include math skills you would use to complete the project. Don't forget to ask for permission.

## Activity One - Miss Rumphius's Patterns

Directions: Look at Miss Rumphius's patterns and complete them.



## **Activity Four - Mrs. Langley's Letter**

January 5, 1995

Dear Third Graders,

I am glad to hear that both of our classes are planning a flower garden. My students have designed rows of flowers to show patterns. Please assist me by reviewing the patterns. Write a description of each pattern. In your description include the type of pattern and the attributes of that pattern. Place your information on the prepared postcards.

Thank you,

Mrs. Langley

## Activity Four — Descriptions

Directions: Describe the patterns.



**ACTIVITY FOUR-WORKSHEET TWO**

# **PRAISE**

I like the way you.....

# **QUESTION**

Why did you.....

# **POLISH**

Another idea you might want to try with your pattern.....

Dear Mrs. Langley,

This is the pattern I reviewed \_\_\_\_\_.  
This is a description of my pattern.

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Comments: \_\_\_\_\_

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Sincerely,

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## **Activity Five-Think Aloud Worksheet**

Directions: Read each pattern description carefully. As you work on the pattern, express your thoughts orally. Have one person to be the recorder and write down your ideas on the sequence chart below.

**First,**

**Second,**

**Next,**

**Then,**

**We then realized that**

**ACTIVITY SEVEN - WORKSHEET**

Directions: Read the problems carefully with your partner. Pick a problem-solving strategy to solve the problem. Show your work. Make sure you answer the question at the end of the problem. Good Luck!

**Problem One:**

Bedford School decided on two different flowers for their garden. One of the flowers, the Lupine White, is sold in a market packet of six flowers. The Lupine Red is sold in a packet with four flowers. If the class bought the same number of packets for each kind of flower, how many packets of each kind will they need to have a total of 60 flowers?

**WORKSPACE****WHAT I DID****WHAT I WAS THINKING****SOLUTION**

Challenge Problem Two:

Lupine White costs \$1.39 a market packet and Lupine Red costs \$.89 a market packet. What will be the total cost of sixty flowers?

WORKSPACE

WHAT I DID

WHAT I WAS THINKING

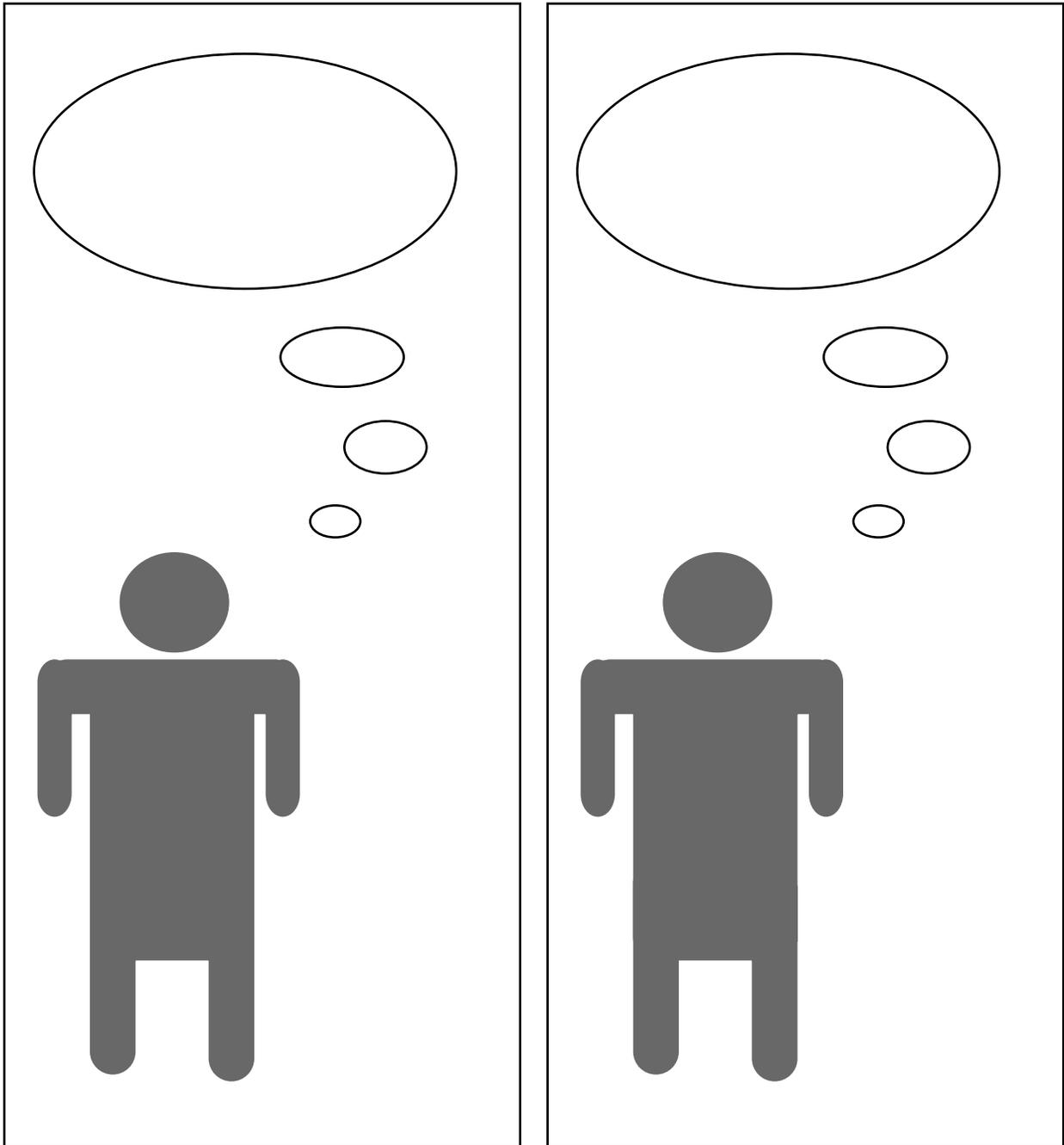
SOLUTION

Challenge Problem #3

You did such a good job planning your school's garden that the city council has asked you to plan a flower garden for a park near your school. The city council will donate 120 flowers in varieties of Lupine Red in market packets of four, Lupine White in six flower packets, and Lupine Blue in groupings of twelve. By using all of the flowers, how many different combinations can you make? (You may use a calculator if you wish.)

When you have completed your plans for the city park garden, write a letter to the city council to explain and justify your flower combinations.

## Activity Seven-Dialogue Cartoons



### Activity Seven-Dialogue Cartoon (continued)

