

Title: Stories, Stories, Books, Stories, Stories, Books, Stories, Stories, Books...

Link to Outcomes:

- **Problem Solving** Students will demonstrate their ability to solve problems with open-ended answers in a cooperative atmosphere and with the use of technology.
- **Communication** Students will demonstrate their ability to communicate mathematically. They will read, write, and discuss mathematics with language and the signs, symbols, and terms of the discipline.
- **Reasoning** Students will demonstrate their ability to reason mathematically. They will make conjectures, gather evidence, and build arguments.
- **Connections** Students will demonstrate their ability to connect mathematics topics within the discipline and with language arts, art, and music.

Brief Overview:

Through the use of literature, students will be presented with opportunities to learn what a pattern is, learn terminology, extend a pattern, and develop their own cooperative learning activity.

Grade/Level:

Third Grade

Duration/Length:

These activities should last a week. Pacing is subject to teacher's discretion. Some activities may take longer than anticipated.

Prerequisite Knowledge:

- Students should be able to recognize colors and color words.
- Students should know number order and ordinal numbers.
- Students should know the basic shapes.
- Students should be familiar with the proper format of a friendly letter.

Objectives:

- Define patterns.
- Identify and label pattern sequences.
- Learn the mathematical terminology regarding pattern formation.
- Extend existing patterns.
- Write mathematical justifications for conclusions.
- Apply learnings and strategies to problem-solving activities.

Materials/Resources/Printed Materials:

Materials for cooperative groups of 3-4 students per group

- Pattern blocks
- Unifix cubes
- Sentence strips
- Math logs or journals
- Crayons
- Rulers
- Pencils and erasers
- Large brown paper grocery bags
- Pattern shape die cuts
- Centimeter cubes
- Color index cards-5x7-ruled
- Graphic organizers
- Calculators
- Hundreds chart
- Tempera paint and brushes

Development/Procedures:

Activity One Students will create, explain, and define a pattern. Students will relate physical materials, pictures, and diagrams to mathematical ideas.

- Review with students the basic shapes using the story The Greedy Triangle by Marilyn Burns.
- Discuss with students the various shapes presented in the story.
- Discuss similarities and differences of the shapes presented, sequence changes, pattern changes. (See Teacher Resources #1 and #2)
- Introduce knowledge web entitled "Patterns."
- Use *think-pair-share* to generate background knowledge of patterns.
- Record student responses on web for review and discussion.
- Review all information gathered.
- Gather into cooperative groups and use pattern blocks to create a simple design.
- Discuss with group members reasons why or why not the blocks made patterns. Share ideas with class.
- Work in pairs to create a design that has a pattern. (Teacher models directions for understanding via overhead pattern blocks i.e., flower with pattern in the stem (Teacher Resource #3).)
- Reproduce the design made with pattern blocks into math log using die-cuts, tracing, etc.
- Identify and explain design and pattern.
- Share ideas and conclusions with class.

Evaluation:

Students will write a friendly letter to the teacher defining what is a pattern using the example they created. Evaluation is based on the criteria given in the attached rubric. (Teacher Resource #4)

Activity Two Students will identify and label core and sequence of patterns.

- Talk about circus with children. What kinds of things would they see there?
- Make a list of things students would see at the circus.
- Review what they know about patterns from yesterday.
- Go back to the circus list and find things on it that may contain a pattern.
- Ask the children to sit around you in a ring formation. Read “The 12 Circus Rings” by Seymour Chwast to them.
- Put a simple pattern on the board (ex. red, blue, red, blue....)
- Ask the children what they see. Review what a pattern is and ask them if this fits their criteria.
- Direct children to look at the pattern. Focus on “Where does it repeat?” Ask for responses. Introduce vocabulary words **term** and **core**. Explain to the children that **core** is the repeating sequence in a pattern. Explain that **term** is a single piece of the core. Using your example, ask the children to define the core and to tell how many terms make up that core.
- Extend this activity by modeling patterns using manipulatives, children, etc., then ask the children to define the core and terms of their patterns.
- Look at the pattern that you have created, focus on the core. Ask the children what are the **attributes** of the core (terms). Now, on the board, label the core as it is (boy, girl, girl). Tell the children that you are going to relabel the pattern. Point out that since the boy is in the first position, you are going to call that position “A.” Refer them to the alphabet, asking them what to label the second position (Response should be “B”). Now ask them to look at the third term, stating that the attributes are the same What could we label the third position (Response should be “B”)?? Show them that your core pattern is now called “**A, B, B.**”
- Reinforce that **A** does not refer to the item in the sequence, but rather to the **position** of the item in the sequence. **A** is the first term in the sequence. **B** also follows that rule.
- Using varied manipulatives, ask children to model the pattern **A, B, B, A, B, B, A, B, B...** It is important that they make the pattern as least three times to reinforce the idea that a pattern extends forever.
- Direct the children to the **A, B, B** pattern. Ask them how we could possibly extend this pattern. Lead discussion towards adding a third term “**C**” to the sequence.
- If the teacher chooses then, he/she may have the children extend their patterns further.

Evaluation:

- Students will justify patterns used in math log. Evaluation is based on the criteria given in attached rubric (Teacher Resource #4).
- Explain to the children that they are going to be circus clowns. They are going to design their own clown vest using patterns. Pass out brown paper bags and sentence strips to the children.
- Direct the children to choose no more than four pattern block shapes with which to work. Children may have more than one of each shape with which to work.
- Ask children to experiment with pattern blocks until they find the combination that they want to use for their core patterns.
- Children should trace their patterns onto their sentence strips and color them.
- In their math journals, children should identify the patterns that they used naming each term in the sequence (as previously modeled).

- Children should ask a partner to check their core sequence to verify that it is a pattern.
- When they have done this, allow the students to take a paper bag vest and reproduce their design all over the bag. They may do this freehand and then color.

Activity Three Students will demonstrate their ability to recognize numerical patterns/relationships and apply this knowledge to problem solving.

- Place students into cooperative learning groups.
- Pass out 100 centimeter cubes and calculators to each group.
- Explain to each group that they are going to model the patterns of the ants in the story the students and teacher are about to read.
- Review characteristics of patterns with the class.
- Read the first four pages of One Hundred Hungry Ants by Elinor J. Pinczes.
- Ask the students to model the pattern of the ants (one by one). Discuss if this is an efficient method of moving from place to place.
- Ask the children to use their calculator to count by ones the numbers of ants (use the constant arithmetic feature $0+1=,=,=,=...$). Stop at 100.
- Return to the story and read the next two pages of the story. Ask the children to model 2 rows of 50, using centimeter cubes. Count, using the calculator (constant arithmetic feature $0+2=,=,=,=...$). Stop at 100.
- Return and read the next two pages. Ask the children to model four rows of twenty-five, using the centimeter cubes. Count, on the calculator (use constant arithmetic feature, $0+4=,=,=,=...$). Stop at 100.
- Return and read the next two pages. Ask the children to model five rows of twenty, using the centimeter cubes. Count, using the calculator (use the constant arithmetic feature $0+5=,=,=,=...$).
- Return and read the next two pages. Ask the children to model ten rows of ten. Count, using the calculator (use constant arithmetic function $0+10=,=,=,=...$).
- Finish reading the story.

Evaluation:

- Students will decide which patterns and relationships were most efficient and justify their conclusions. Evaluation is based on the criteria given in the attached rubric (Teacher Resource #4).
- After finishing activity, collect materials. Discuss patterns noticed in modeling/calculator activity.
- Handout hundreds chart (Teacher should have one to model, either overhead or chart). Use hundreds chart to record patterns discovered during activity (Teacher models counting starting at 2 up to 100). Children should color each pattern found differently to see relationships.
- In their math journals, children will describe which models were most efficient in moving the ants and which ones were not. Justify the patterns/relationships found.

Extension/Follow Up:

A possible writing extension activity would be to create and publish a big book following the format of one of the books read during the unit.

As a math extension activity, the students could create a series of one-step, multi-step and process problems using the story they wrote.

In a cooperative learning activity, the students could make several sets of puzzle cards for problem solving. See Cooperative Problem Solving with Pattern Blocks for modeling.

Extended Resources:

- **Activities**

Cooperative Problems Solving with Pattern Blocks
Creative Publications

Patterns and Functions (K-9)
Hands-On, Inc.

Twenty Thinking Questions for Pattern Blocks
Creative Publications

- **Computer Programs**

Algebra Shop
Scholastic

Math Shop
Scholastic

Math Shop Jr.
Scholastic

King's Rule
Sunburst

- **Literature**

The Greedy Triangle
By Marilyn Burns

The 12 Circus Rings
By Seymour Chwast

One Hundred Hungry Ants
By Elinor J. Pinczes

- **Professional Resources**

Assessment Standards for School Mathematics
NCTM

Curriculum and Evaluation Standards for School Mathematics
NCTM

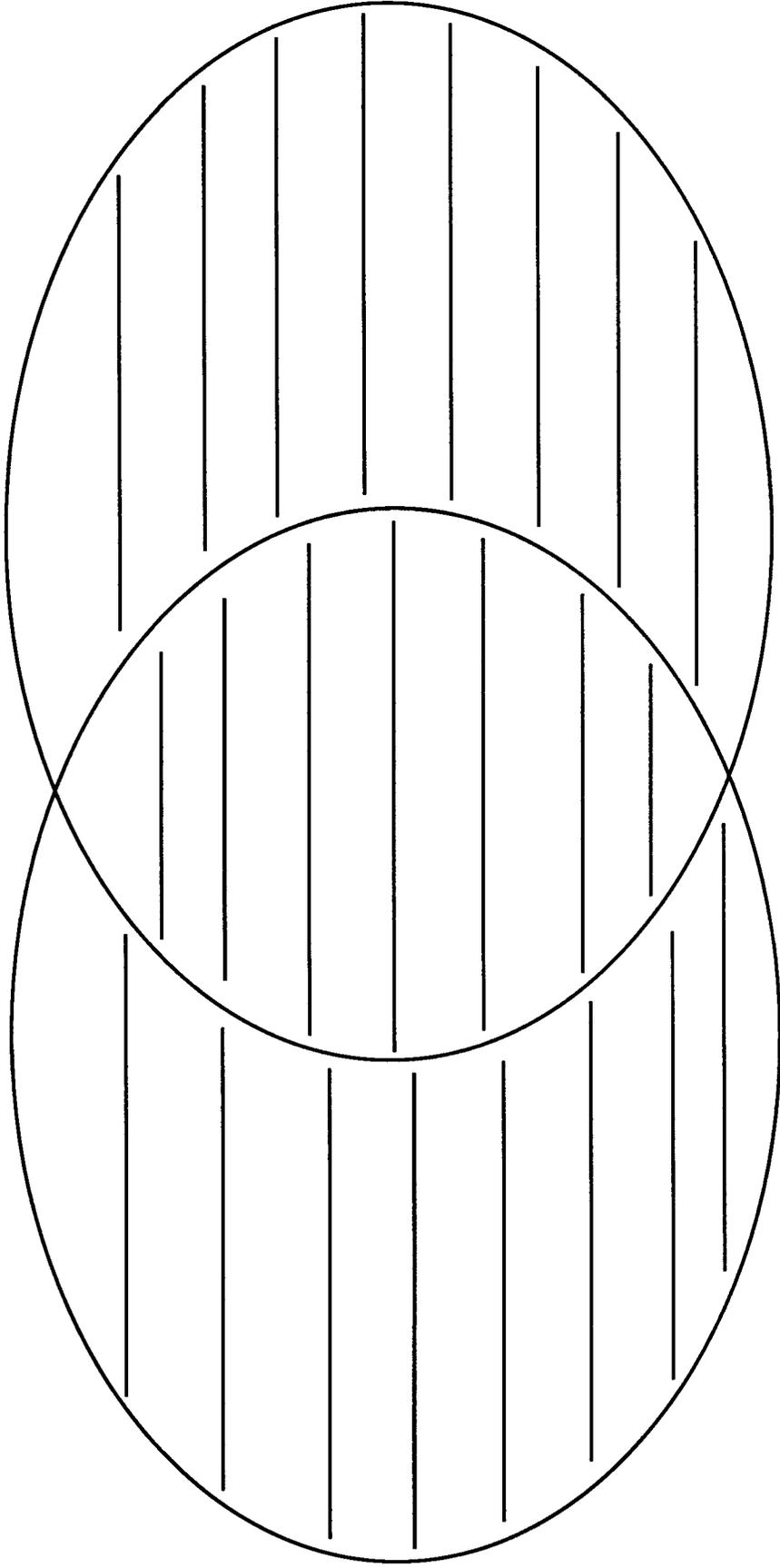
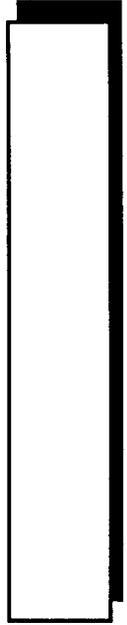
How to Use Children's Literature to Teach Mathematics
By Rosamond Welchman Tischler

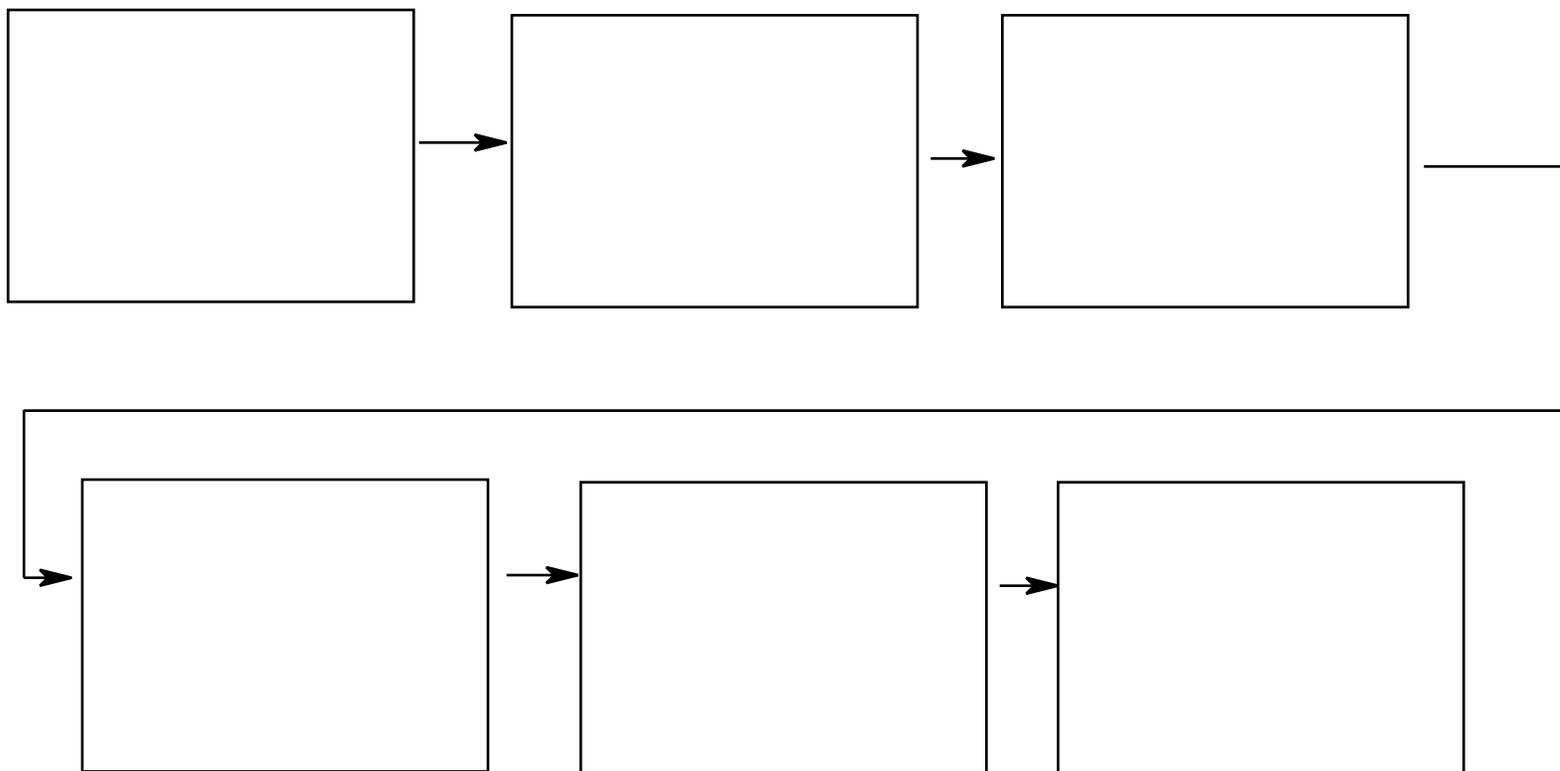
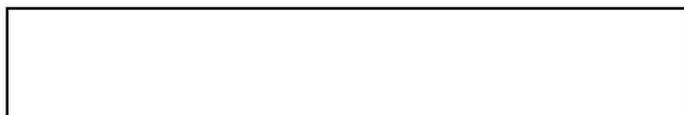
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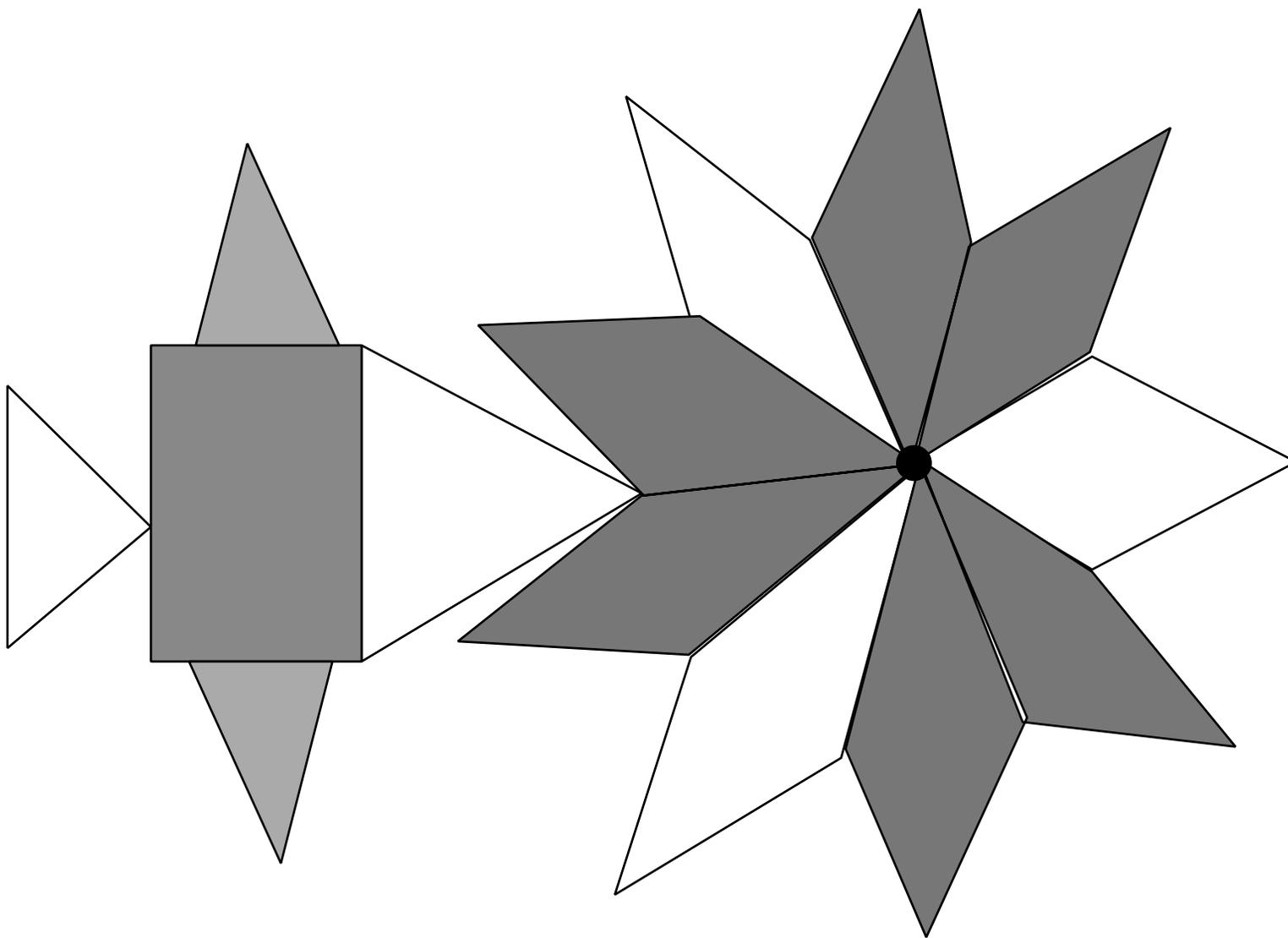
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Performance Standards

Assignment _____ Date _____

Level	Standard to be achieved for performance at specified level
<p style="text-align: center;">4</p> <p>Well Done</p>	<p>I <u>showed my thinking</u> with picture, numbers sentences, etc.</p> <p>I used a lot of <u>math language</u>.</p> <p>I used <u>complete sentences</u> to explain my thinking.</p> <p>I solved the problem <u>correctly</u> and gave <u>extra information</u>.</p>
<p style="text-align: center;">3</p> <p>Acceptable</p>	<p>I <u>showed my thinking</u> with pictures, numbers, sentences, etc.</p> <p>I used <u>math language</u>.</p> <p>I used <u>complete sentences</u> to explain my thinking.</p> <p>I used information <u>correctly</u>.</p>
<p style="text-align: center;">2</p> <p>Revision Needed</p>	<p>I showed my thinking, but I had <u>some mistakes</u>.</p> <p>I <u>did not use sentences</u> to explain my thinking.</p> <p><u>Some</u> of my information was correct.</p>
<p style="text-align: center;">1</p> <p>Begin Again</p>	<p>My thinking did <u>relate to the problem</u>.</p> <p>I <u>did not use sentences</u> to explain my thinking.</p> <p>I used the information <u>incorrectly</u>.</p>

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