Title: Qwazy Quilts

Brief Overview:

The students will identify and create repeating patterns using primary shapes and colors. They will gather data and create a bar graph representing the choices they made when creating their patterns. The students will write about their pattern and graph.

NCTM 2000 Principles for School Mathematics:

- **Equity:** *Excellence in mathematics education requires equity - high expectations and strong support for all students.*

- **Curriculum:** *A curriculum is more than a collection of activities: it must be coherent, focused on important mathematics, and well articulated across the grades.*

- **Teaching:** *Effective mathematics teaching requires understanding what students know and need to learn and then challenging and supporting them to learn it well.*

- **Learning:** *Students must learn mathematics with understanding, actively building new knowledge from experience and prior knowledge.*

- **Assessment:** *Assessment should support the learning of important mathematics and furnish useful information to both teachers and students.*

- **Technology:** *Technology is essential in teaching and learning mathematics; it influences the mathematics that is taught and enhances students' learning.*

Links to NCTM 2000 Standards:

- **Content Standards**

<u>Number and Operations</u>
- *Understand numbers, ways of representing numbers, relationships among numbers, and number systems.*
- *Understand meanings of operations and how they relate to one another.*

<u>Algebra</u>
- *Understand patterns, relations, and functions.*
- *Use mathematical models to represent and understand quantitative relationships.*
- *Analyze change in various contexts.*

<u>Geometry</u>
- *Use visualization, spatial reasoning, and geometric modeling to solve problems.*

<u>Measurement</u>
- *Understand measurable attributes of objects and the units, systems, and processes of measurement.*
- *Apply appropriate techniques, tools, and formulas to determine measurements.*

Data Analysis and Probability

- *Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them.*

- **Process Standards**

Problem Solving

- *Build new mathematical knowledge through problem solving.*
- *Solve problems that arise in mathematics and in other contexts.*
- *Apply and adapt a variety of appropriate strategies to solve problems.*
- *Monitor and reflect on the process of mathematical problem solving.*

Reasoning and Proof

- *Recognize reasoning and proof as fundamental aspects of mathematics.*
- *Make and investigate mathematical conjectures.*
- *Develop and evaluate mathematical arguments and proofs.*
- *Select and use various types of reasoning and methods of proof.*

Communication

- *Organize and consolidate their mathematical thinking through communication.*
- *Communicate their mathematical thinking coherently and clearly to peers, teachers, and others.*
- *Use the language of mathematics to express mathematical ideas precisely.*

Connections

- *Recognize and use connections among mathematical ideas.*
- *Understand how mathematical ideas interconnect and build on one another to produce a coherent whole.*
- *Recognize and apply mathematics in contexts outside of mathematics.*

Representation

- *Create and use representations to organize, record, and communicate mathematical ideas.*
- *Select, apply, and translate among mathematical representations to solve problems.*
- *Use representations to model and interpret physical, social, and mathematical phenomena.*

Grade/Level:

Grades 1-3

Duration/Length:

Two to three days

Prerequisite Knowledge:

Students should have working knowledge of the following skills:

- Recognize basic shapes
- Identify the components of a graph
- Sentence structure

- Record tallies
- Gallery Walk

Student Outcomes:

Students will be able to:

- identify a repeating pattern.
- create a repeating pattern.
- describe their repeating pattern.
- organize gathered data from their pattern.
- create a bar graph.
- compare information on their bar graph.
- complete a performance task by:
  - gathering data.
  - creating a graph.
  - communicating similarities and differences on their graph.

Materials/Resources/Printed Materials:

- Literature book on quilts
- Hundreds square paper
- Three primary shape stamps (circle, square, triangle, rectangle, etc.)
- Sentence strips/markers
- Story paper
- Chart with graph example
- Chart with repeating pattern examples
- Color stamp pads

Development/Procedures:

Day One

- Have students name places where they find patterns in the real-world, and record their ideas on a web on the chalkboard. Also have students give examples of repeating patterns in the room, school, community, and other areas in life. The following books may contain some examples: Eight Hands Round: A Patchwork Alphabet by Ann Whitford Paul, The Keeping Quilt by Patricia Pollaco, and Quilt Design Masters by Luanne Seymour Cohen.
- Share a literature selection on quilts with the students. Point out that quilts are used to represent many things, such as, family/personal history, maps, and geometric patterns. Patterns are shown in shape and color. Show and discuss several examples of quilt patterns, highlighting the repeating patterns. (Sample quilt patterns are on Teacher Resource Sheets 1-4.)
- Show a repeating pattern on chart paper. Ask students to describe the pattern. Discuss with the students what the pattern is and why it repeats.
- Show another pattern on chart paper and have students identify the pattern and tell what should come next to complete the pattern.
- Tell students that they will be making a repeating pattern using two of three stamps that will be available, and they will print them on a sheet of paper. Show the students the materials that they will use to make their pattern. Use di-cut shapes, if available, and colored construction paper.
  - Display each of the three shapes and demonstrate how it will look when it is printed.
  - Show each color that the students may choose and go over the proper procedure for making a stamp.

    - Explain that they will choose two stamps out of three and two colors from the stamp pads for their pattern.
    - Have student move to their work area and distribute paper.
    - Have students create their stamped patterns.
- Once the students have completed their repeating patterns and have cleaned up the area, distribute lined paper. Have students write sentences that describe their patterns. Provide sentence frames for lower level ability students.
- Bring students together to share their work for closure.

Day Two

- Have students take a gallery walk of the patterns that they created the previous day. Ask students to share what they saw and explain why each design was a repeating pattern. Discuss their individual patterns and have students share their sentences that they wrote the day before.
- Share with students that today they will create a different pattern using the same three choices of stamps as the previous day and use their new repeating patterns to collect data on a tally chart. (Define data with students and add it to your Math Word Wall.)
- Have students create another repeating pattern using two stamps and two colors of paint. Have students clean up their work area.
- Once students have completed their repeating patterns, inform students that they will begin to gather data.
- Show students the three stamp shapes. Have the students list all of the possible combinations of three shapes and the two colors. (There are 6.) Put these six pairs on a transparency of the Pattern Tallies, Student Resource Sheet 1 or on a similar chart on the chalkboard.
- Have students take a gallery walk with the Pattern Tallies, Student Resource Sheet 1. As students view each person's pattern, have them tally the combination on the tally table.
- Review the data the students collected to make sure everyone has the same totals of combinations.

Day Three

- Review the Pattern Tallies worksheet with students. Have students describe what information the tally chart gives. Share with students that the objective today is to take the data that they gathered and construct a bar graph.
- Show students a prepared bar graph and go over the parts of the graph. (Add those words to your Math Word Wall.) Some examples would be bar graph, title, y-axis, and x-axis.
- Have students construct a bar graph, using the data from the tally chart. Use Student Resource Sheet 2.
- Once the bar graph is completed, check parts of the graph and make sure it is labeled completely and correctly.
- Discuss facts from the graph. For example, "More students chose stars and squares than circles and stars".
- Have students write sentences stating facts about their graph. (Encourage higher able students to write more and lower ability students to use a framed sentence.)
- Have students take their repeating patterns and make a repeating pattern on two sheets of bulletin board paper to make a class quilt. Display the quilt in the hallway or in your classroom!

Performance Assessment:

Day Four

- The students will complete the performance assessment on Student Resource Sheets 3 and 4. They will collect data about their birth months, survey their peers, and collect data using a tally chart. One option you can do is have students take the data on the Special Friends in Special Seasons, Student Resource Sheet 3, and use a graphing program to make their bar graphs.
- Have them use the data that they collected to make a bar graph, Student Resource Sheet 4, Making Our Graph.
- For the last part of the assessment, students will write sentences analyzing the data on the bar graphs.
- Make a repeating pattern in the squares on Student Resource Sheet 6. Write one sentence describing the shapes and colors of the pattern, one sentence describing the pattern, and one sentence as to why it is a pattern.
- Name three things in the classroom that has patterns. Choose one of the three and explain why you know it is a pattern.

Rubric for Quilt Assessment

3 - Student chose three shapes and two colors. The pattern repeats.
2 - Student chose two shapes and two colors.
1 - Student chose one shape and two colors or one color. The pattern does not repeat.

Rubric for Writing

3 - Student wrote:
- One complete sentence describing the shapes and colors.
- One complete sentence describing the pattern.
- One complete sentence explaining why it is a pattern.
- Named three objects in classroom or home that contains patterns.
- Wrote explanation of one object and why it is a pattern.
- Uses correct capitalization, usage, punctuation, and spelling (CUPS).

2 - Student wrote:
- One complete sentence describing the shapes and colors.
- One complete sentence describing the pattern.
- Named two objects in classroom or home that contains patterns.
- Did not write full explanation of one object and why it is a pattern.
- Uses CUPS for most of written work.

1 - Student wrote:
- One complete sentence describing the shapes and colors.
- Named one object in classroom or home that contains patterns.
- No explanation of one object and why it is a pattern.
- Did not use CUPS appropriately.

Extension/Follow Up:

- Use the Student Resource Sheet 5, Pattern Quilt, to review repeating patterns. The students will need to complete repeating patterns. This would be a great review sheet for the next week or a homework assignment.
- Set up a repeating pattern center for students to go to when they have finished their work. The center might be equipped with: stamps, ink pads, pattern stickers, cut out shapes, glue, and/or crayons.

- Use various other literature on quilts for the history of quilt making and pioneer life, etc. (See bibliography)
- Have the art teacher work with you on a lesson making tessellations. Tessellations are shapes that are manipulated in repeating patterns.
- Have students create a grade or class quilt using fabric or paper about themselves, families, or science/social studies themes, such as habitats, different types of animals, cultures, or extinct or endangered animals.

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Bibliography

Literature Selections:

The Quilt, by Ann Jonas
The Quilt Story by Tony Johnston and Tomie dePaola
The Keeping Quilt by Patricia Pollaco
The Patchwork Quilt by Valerie Flournoy
Eight Hands Round: A Patchwork Alphabet by Ann Whitford Paul
The Seasons Sewn: A Year In Patchwork by Ann Whitford Paul
Stitching Stars: The Story Quilts of Harriet Powers by Mary E. Lyons
With Needle and Thread: A Book about Quilts by Raymond Bial
Quilt Design Masters by Luanne Seymour Cohen
Ernest and Celestine's Patchwork Quilt by Gabrielle Vincent
Patchwork Island by Karla Kuskin

Extension Activities

Fractions:

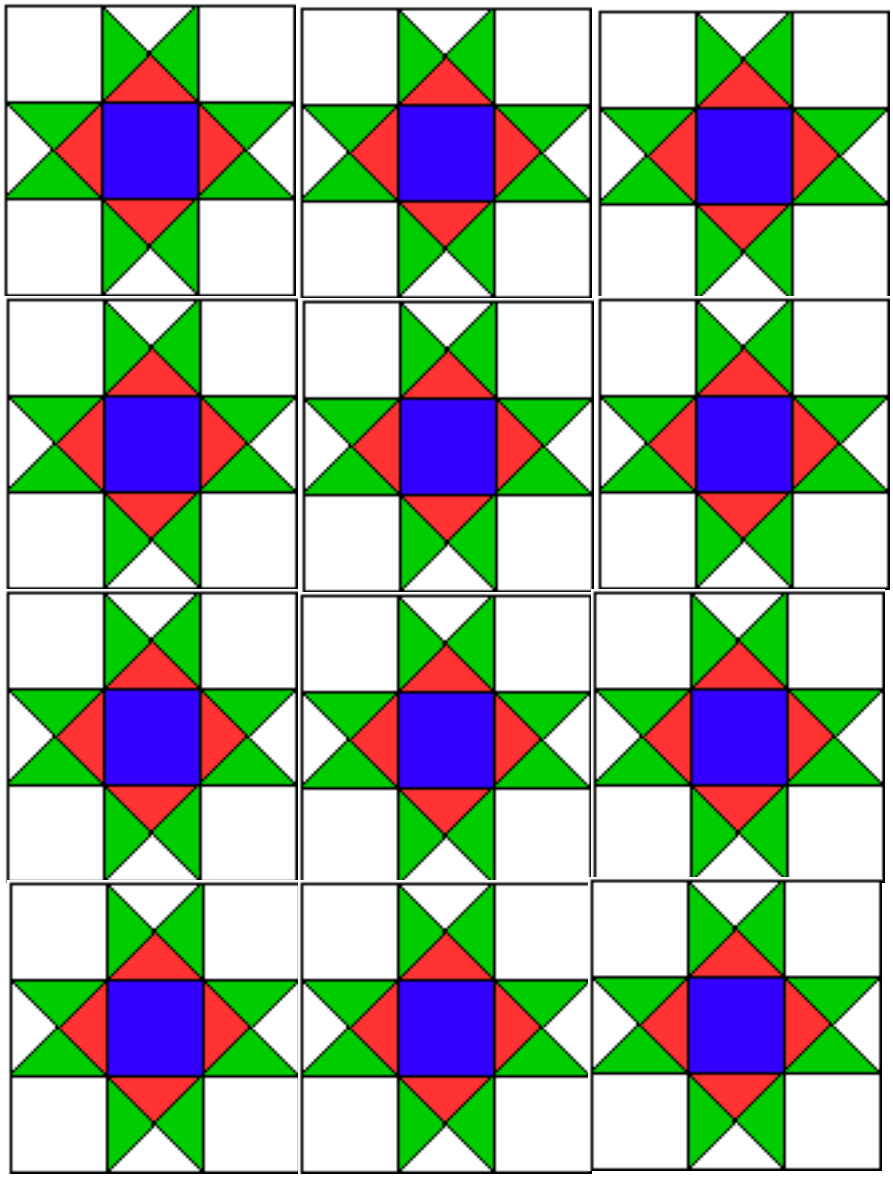
- Have students work in six groups of four.
- Have them decide on a pattern using three shapes and make a pattern on a 9 x 14 sheet of white paper. Use a total of 15 shapes.
- Make a class quilt.
- Count total amount of shapes.
- Tally different combinations, e.g., blue, red, yellow, etc.
- Discuss definition of fractions as parts of a whole.
- Model adding them together to show one whole quilt.

Computer:

- Use Tesselmania for advanced students.
- Use Kid Pix 2 to design a pattern using the stamps and/or geometric designs.

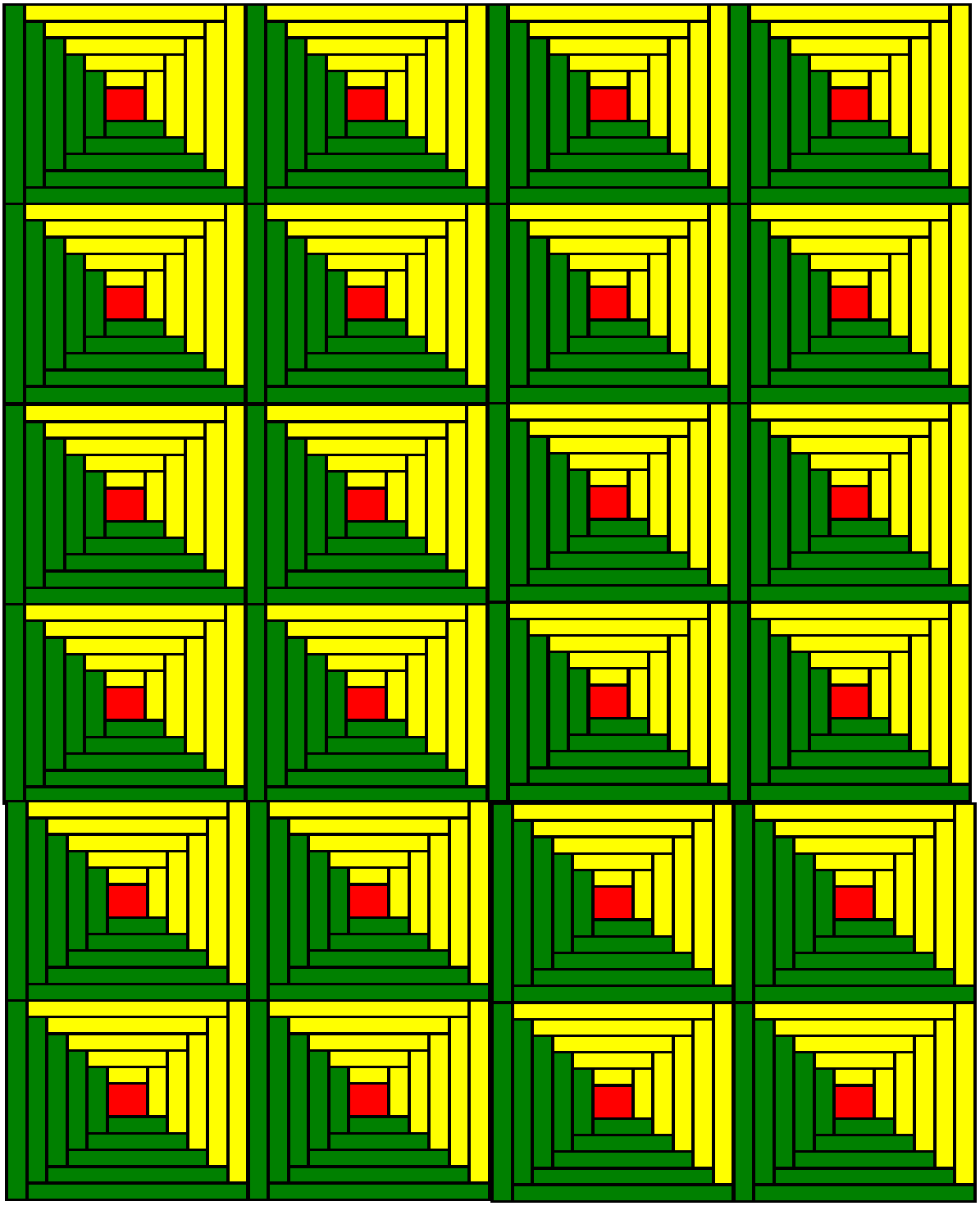
Teacher Resource Sheet 1

Lone Star



Teacher Resource Sheet 2

Log Cabin



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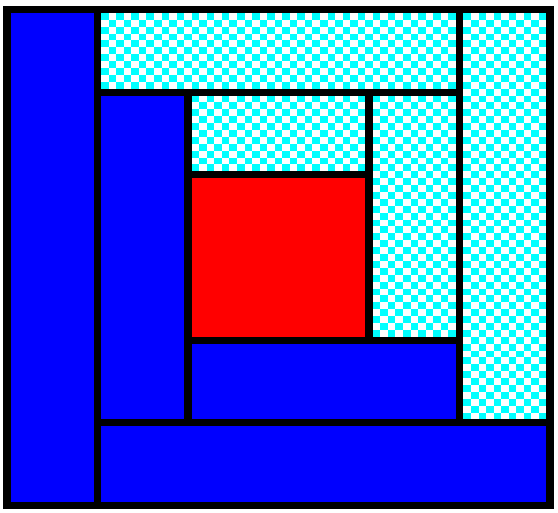
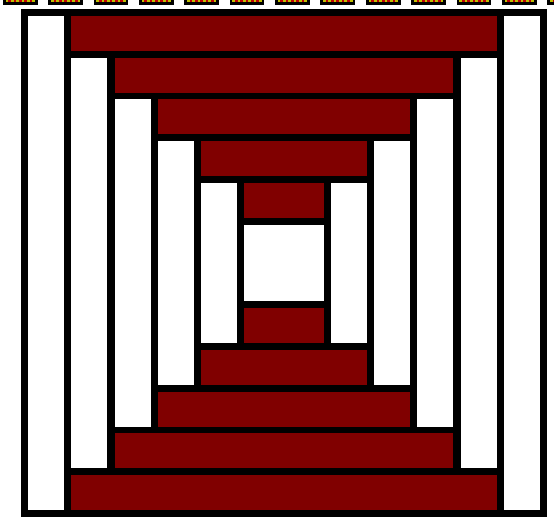
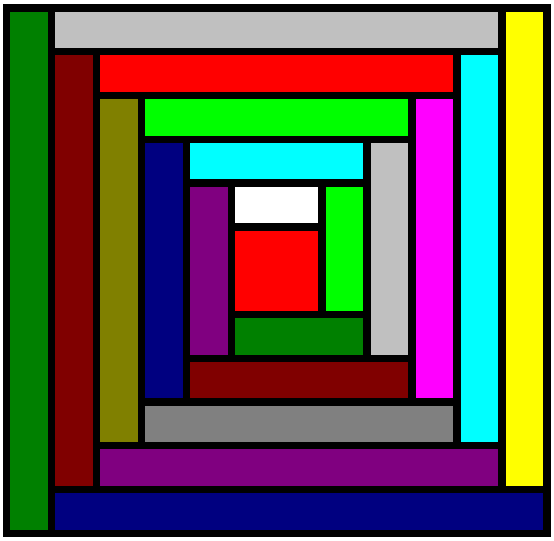
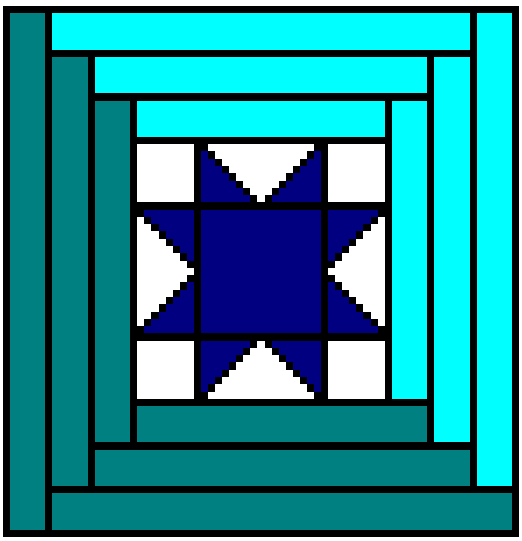
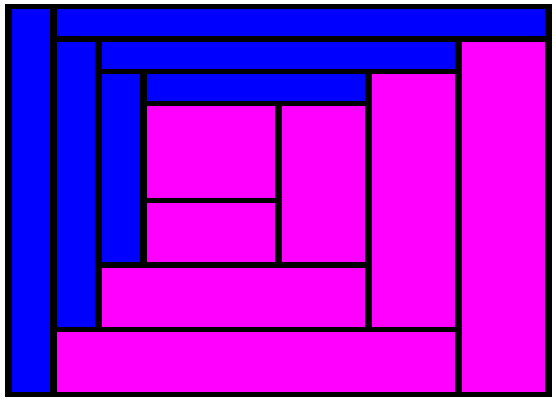


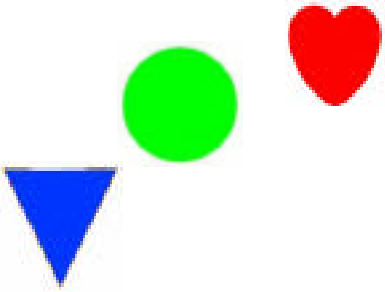




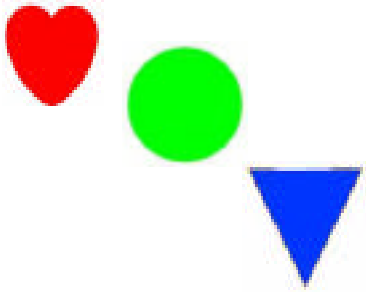




Monkey Wrench



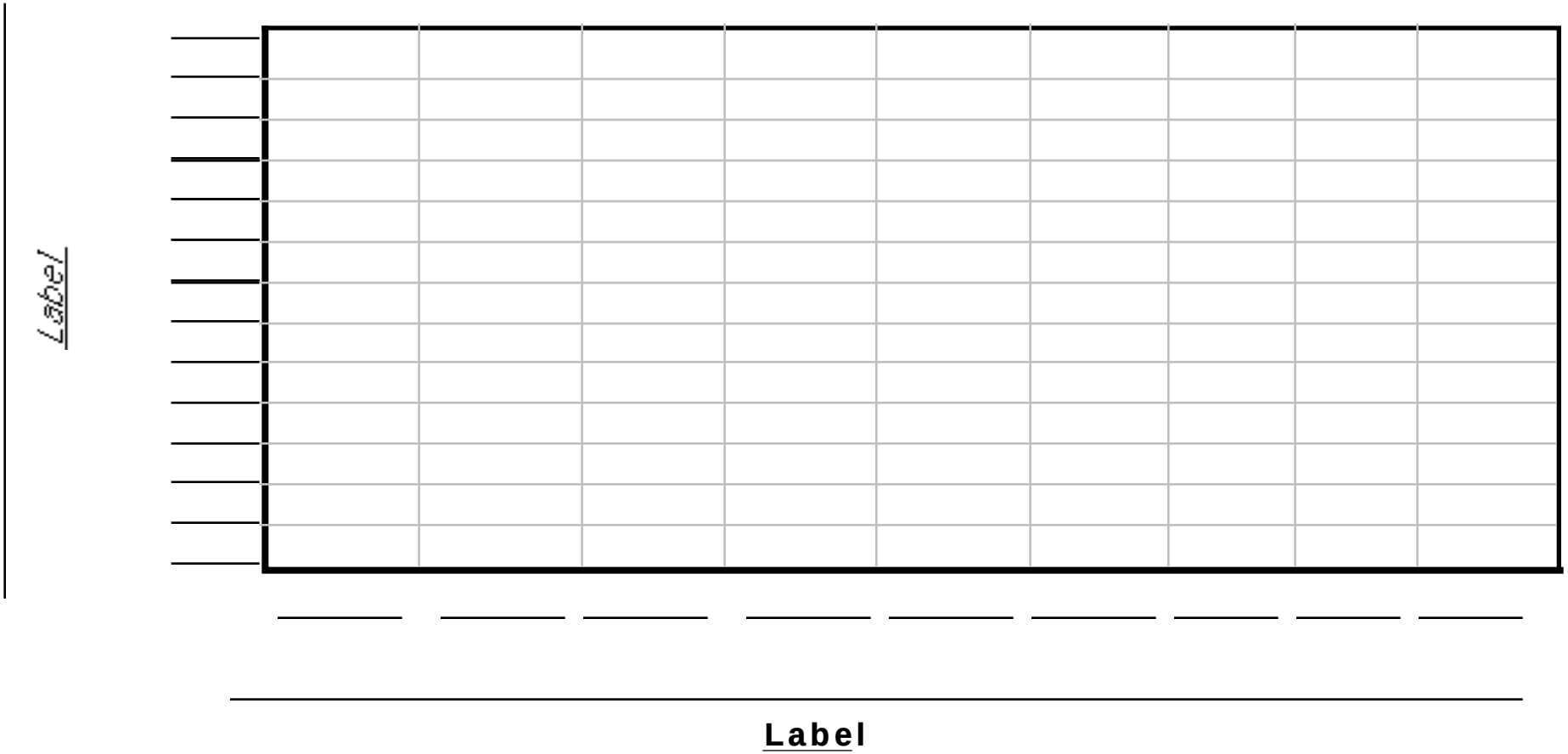
Pattern Tallies



Combinations	Tallies

Making Our GRAPH

Title



Special Friends in Special Seasons

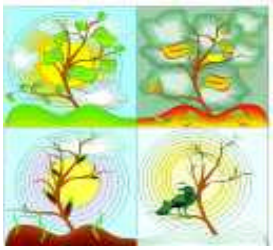
What month were you born in ? _____

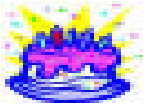
Using the chart, find the season of your birthday month.

Season	Months
FALL	September, October, November
WINTER	December, January, February
SPRING	March, April, May
SUMMER	June, July, August

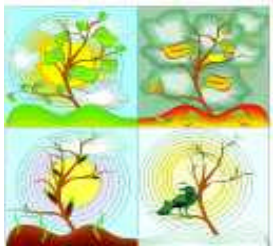
The season my birthday month is _____

Season	Tallies
FALL	
WINTER	
SPRING	
SUMMER	





Making Our GRAPH



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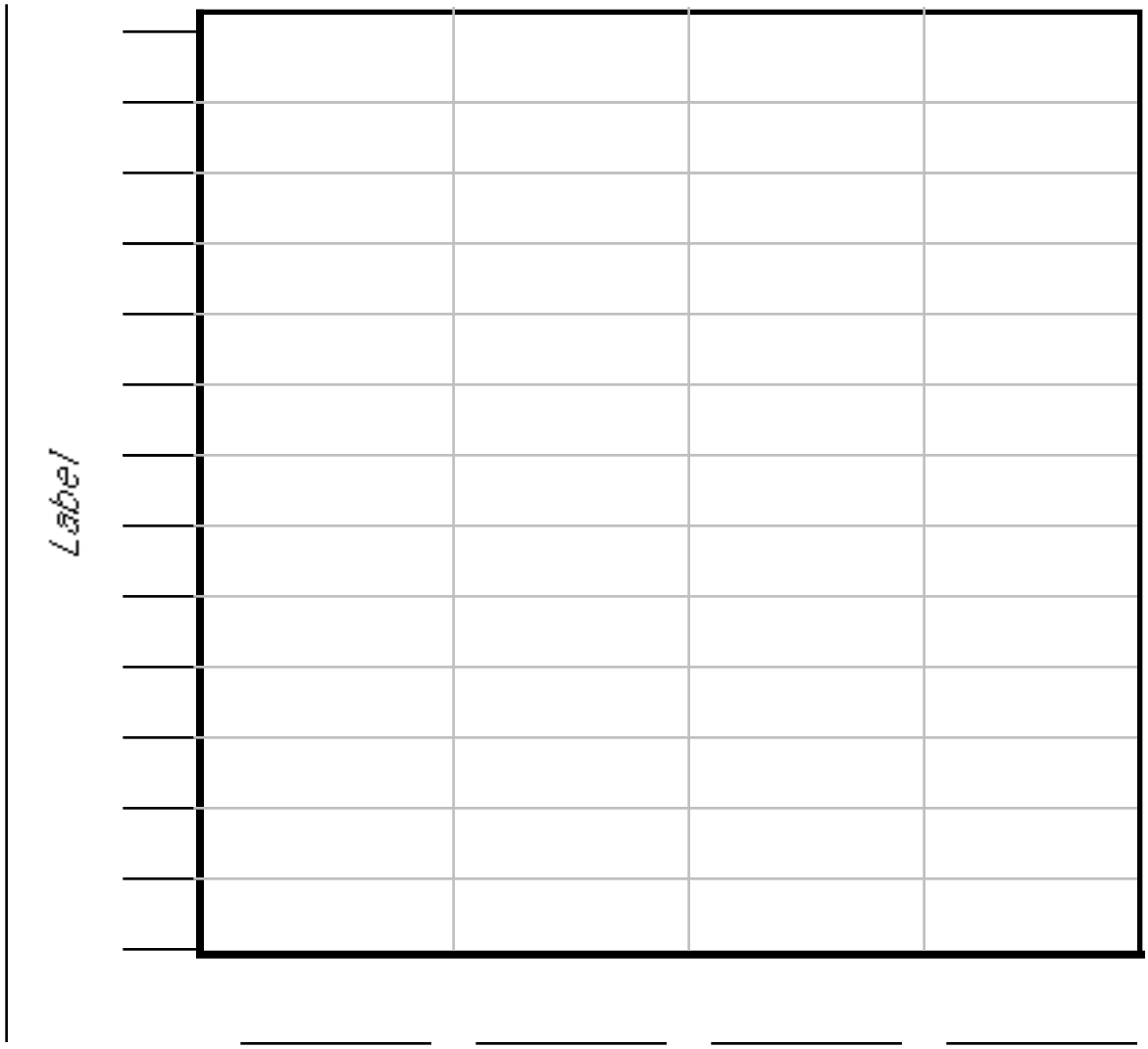
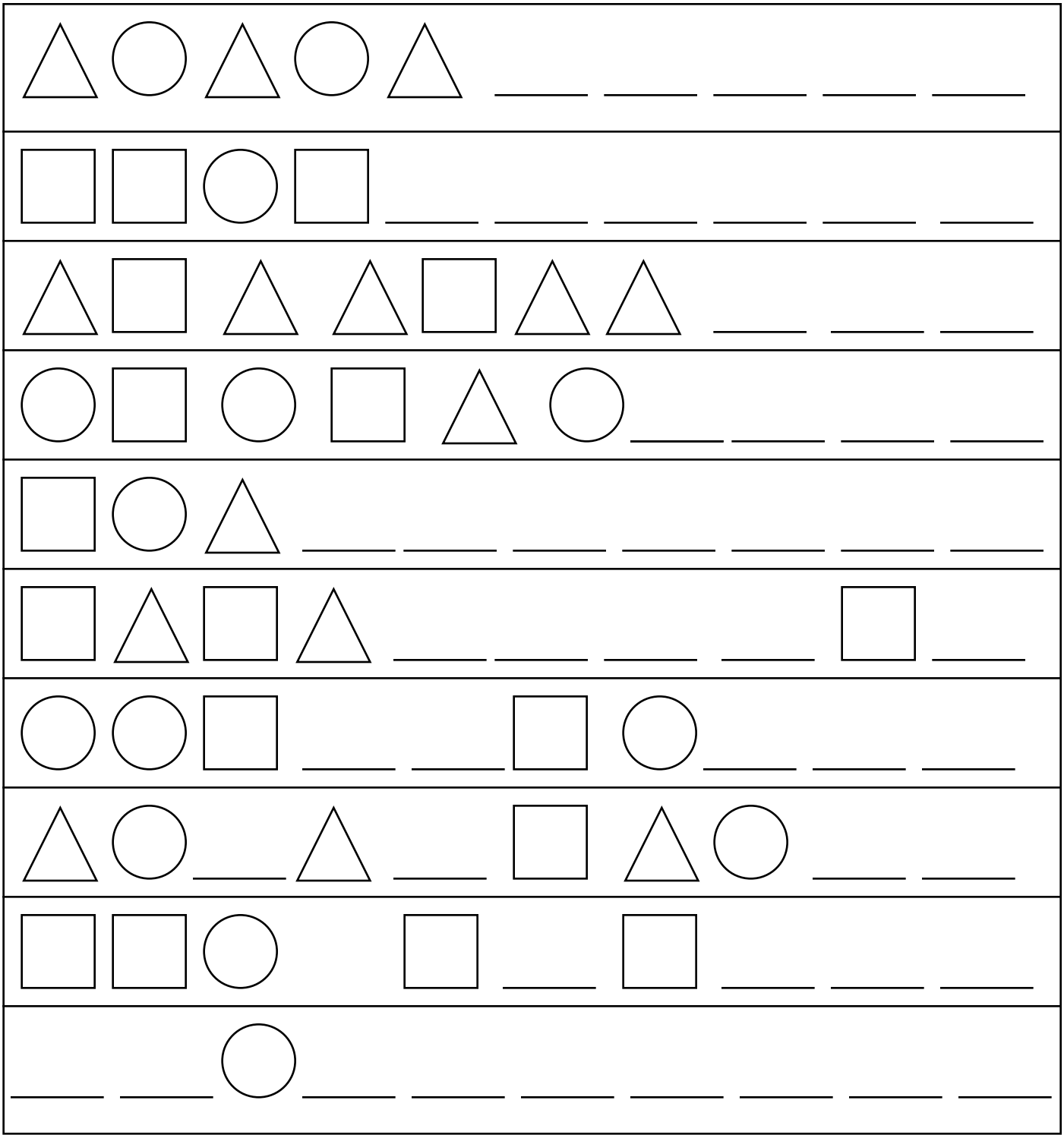


Label

Pattern Quilt

Directions: Complete the repeating pattern in the quilt below with the correct shapes.



Repeating Pattern

Directions: Make a repeating pattern in the squares below.