

Teacher Resource Guide

for K–2 classrooms

Math in Nature: an engaging and delightful introduction to cross-curricular concepts for the primary grades.

This series invites children to journey into the natural world—a world they love to discover and could explore endlessly—to find not only math, but science, language arts, and visual arts, too! Written by Lizann Flatt, a former *chickaDEE Magazine* editor and author of several children's books, and using illustrated cut-paper collage art by Ashley Barron, the Math in Nature series is a veritable cross-curricular goldmine.

This educator's companion to *Shaping Up Summer*, the fourth and final book in the series, contains unintimidating and fun ways to introduce key concepts to the students in your K–2 classrooms. They will laugh, use their imaginations, and learn through these activities, which are all inspired by the book.



GROUPING AND COMPARING ACTIVITIES

Shape Up!



What you need:

- Black-line master for Shape Up!
- A ruler
- Crayons or pencil crayons

What to do:

1. Have students draw one shape in each of the spaces in the first column of the black-line master. In the second column, label each shape with its appropriate name. You may choose to write the names of the shapes on the board so that students can use deduction to figure out the harder names: square, hexagon, oval, triangle, rectangle, and circle.
2. Have students count and record the number of sides in each shape, for those that have straight sides.
3. In the fourth column, have students describe the shapes in other ways. You may suggest that they use the ruler to measure the length of each of the sides of the square, hexagon, triangle, and rectangle. Or they could count the number of corners and identify whether they are an L shape or a V shape.
4. As a class, discuss which shapes have parallel sides (rectangle, square, hexagon) and which do not (triangle). It may be difficult for students to see the parallel sides of the hexagon at first, but there are three pairs of parallel sides.

Curriculum: Mathematics

Learning Outcomes: Comparing, Measuring, Recording Observations

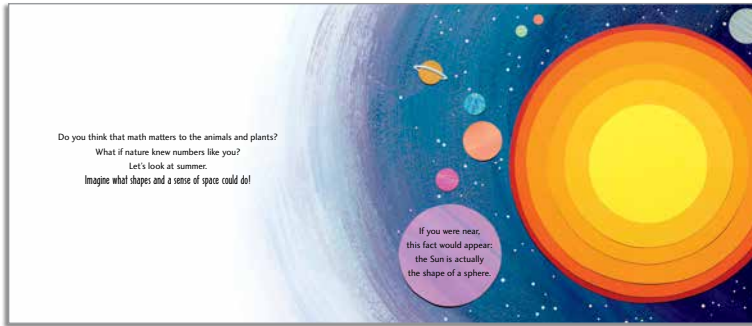
Grouping: Individual, Whole Class

Shape Up!

Black-line master.

SHAPE	NAME	NUMBER OF SIDES	OTHER OBSERVATIONS

Shapes and Space



What you need:

- A variety of 2-dimensional and 3-dimensional objects, including coins, balls, ice-cream cones, blocks, stamps, game pieces, paper money, etc.

What to do:

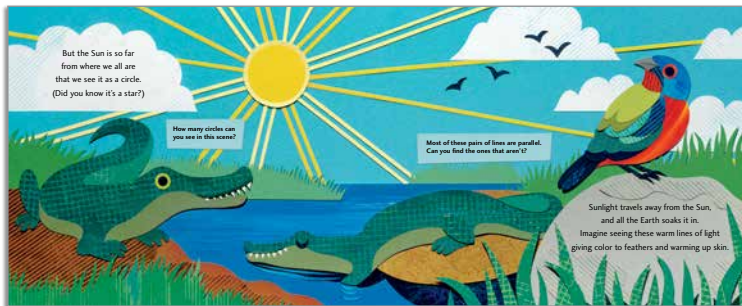
1. In small groups, have students compare the objects and group them into similar categories. There is no right or wrong answer at this point. Students can use whatever sorting strategy they choose.
2. Have students discuss what is similar and what is different about the objects. Have each group report one of their findings to the class.
3. Show the class a circle and a sphere. Have them describe what is similar and what is different. Explain that a circle is flat (2-dimensional) and a sphere is round (3-dimensional). Brainstorm a list of circular objects and spherical objects. Identify whether other objects they used are 2-dimensional or 3-dimensional.
4. Show the class the picture on page 3. Explain how, on the paper, the sun appears as a circle, but in reality, the sun is a sphere.
5. On page 2, the author writes about "a sense of space." Ask students to define space. They may focus on outer space, but space can also be defined as the area between two or more objects or an empty area.
6. Have students find the word "space" in a print or online dictionary. Have them read out the different definitions.

Curriculum: Mathematics, Language Arts

Learning Outcomes: Comparing, Grouping, Presenting, Defining

Grouping: Small Groups, Whole Class, Individual

Circles and Lines



What you need:

- Black-line master of pages 4–5
- A ruler

What to do:

1. As a class, count the circles shown in this image. Ask students if these objects are circles or spheres in reality. (Eyeballs and the Sun are both spheres.)
2. Give each student a ruler and a copy of the black-line master. Have them examine the rays of the sun shown in this image. Are all of the pairs of rays the same?
3. Have students use their rulers to measure the distance between the rays in each pair (i) where they meet the sun, (ii) halfway down the rays, and (iii) at the end of the rays.
4. Explain that parallel lines run side by side and are always the same distance apart. Two of the pairs in this image have rays that are not parallel. Have students identify which ones they are.

Extension: On page 4, the author says, "Did you know [the sun is] a star?" Ask the students to give their definition of a star. Then provide the correct definition: a star is a ball of burning gas that gives off light.

Curriculum: Mathematics, Science

Learning Outcomes: Comparing, Measuring, Defining

Grouping: Individual, Whole Class

Circles and Lines

Black-line master.





What you need:

- Black-line master
- Tangram pieces

What to do:

1. In small groups, have students count the number of squares they can find in each picture in the web (the steamship, sailboat, and fish). Students may or may not include the rhombus shapes in their count.
2. Draw a rhombus, a square, and a rectangle on the board. How are they the same? How are they different?
3. Explain that a rhombus is a shape (a quadrilateral) with four sides that are all the same length. Explain that a square also has four sides that are all the same length, but each corner is a right angle, like an L. Explain that a rectangle also has right-angled corners, but all four sides are not the same length.
4. Ask students: Is a rhombus a square? (No.) Is a square a rhombus? (Yes.) Is a rectangle a square? (No.) Is a rectangle a rhombus? (Yes.) This may be confusing at first, but if you keep referring back to the definition (the “rule”) for each shape, it will help reinforce the concept.
5. Have students work in small groups to complete tangram puzzles. Tangram puzzles are made by piecing different shapes, including squares, rhomboids, rectangles, and triangles, together into a larger “picture.” You can find many images by searching the internet.

Curriculum: Mathematics

Learning Outcomes: Comparing, Measuring, Defining

Grouping: Small Groups, Whole Class

All Squared Away

Black-line master.

Rhombus: a shape with four sides all the same length.

Square: a shape with four sides all the same length. All four corners are right angles.

Rectangle: a shape with four sides, not all the same length. All four corners are right angles.



Shape Dance



What you need:

- Chalk
- Music and loud speakers (optional)

What to do:

1. In a hard-top area of the playground, draw large shapes in random locations with chalk. Label them square, rectangle, rhombus, circle, triangle, and hexagon. Draw more than one of each shape.
2. Have students run, hop, or skip through the play area. When you shout out a particular shape, they should go to the nearest drawing that matches that shape. Instead of simply naming the shape, you could also shout out the “rule.” (For example, “Go to the shape that has four equal sides and right-angled corners.” In this case, students could go to a square or a rectangle.) As an alternative, you could play music and have students dance until the music stops and you shout out the name of a shape.

Curriculum: Mathematics, Physical Education

Learning Outcomes: Comparing, Measuring

Grouping: Whole Class

“Same”-etry



What you need:

- Black-line master of pages 22–23
- A sheet of construction paper
- Pencil
- Scissors

What to do:

1. Have students fold the paper in half. It does not matter if they fold it lengthwise or widthwise.
2. Demonstrate drawing half a heart shape and have them do the same.
3. Cut along the line and open the heart shape.
4. Explain that the line running down the middle of the heart is the line of symmetry. The two halves of the heart on either side of the line are exactly the same.
5. In pairs, have students look at the animals in the picture on pages 22–23. Imagine drawing a line of symmetry down the center of the animal, from nose to tail. Are the animals symmetrical? (Note: You may need to explain the difference between the symmetry of a real newt and the newts illustrated here. As they are drawn, the newt on the left is not symmetrical. In life, of course, newts are symmetrical.)
6. What other objects on the page are symmetrical? The flowers as drawn are symmetrical. For the lily pads, however, it depends where the line of symmetry is drawn. Demonstrate this on the board. If you draw the line of symmetry through the leaf starting at the bottom of the V, then they are symmetrical. If you draw the line elsewhere, however, they will not be.
7. Have students look for symmetry in other living things. Two- and four-legged animals all have symmetry. Their sides are symmetrical: they have a top and a bottom and a front and a back.

Curriculum: Mathematics, Art, Science

Learning Outcomes: Making Connections, Comparing, Observing

Grouping: Individual, Pairs, Whole Class

“Same”-etry

Black-line master.



COMPARING AND CONSTRUCTING ACTIVITIES

Build a Shape



What you need:

- 6 toothpicks per student
- Modeling clay

What to do:

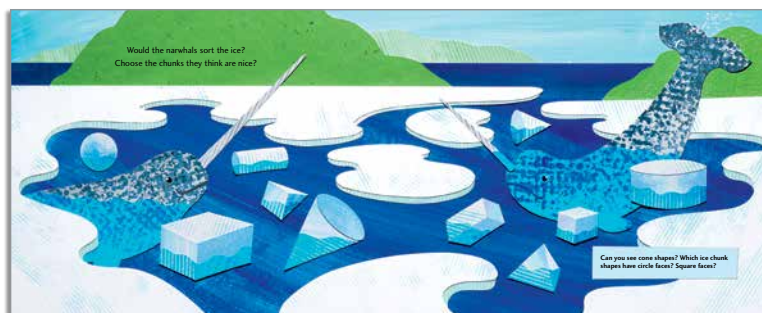
Have students use the toothpicks and modeling clay to construct a square, rhombus, hexagon, rectangle, and triangle. As you ask them to build the different shapes, continue to reinforce the similarities and differences between the shapes. [For example, a square and a rectangle both have four sides with L-shaped corners: in a square, all four sides are the same (one toothpick) length; in a rectangle, two sides are longer (two toothpicks).]

Curriculum: Mathematics

Learning Outcomes: Comparing, Measuring

Grouping: Individual

The Third Dimension



What you need:

- Building “blocks” (cylinders, cubes, rectangular prisms, etc.)
- Modeling clay

What to do:

1. Introduce the students to the name of each shape shown on pages 12–15.
2. Have students use the modeling clay to build each of the shapes shown.
3. Compare their 3-dimensional shapes to the similar 2-dimensional shapes (e.g., sphere and circle; cube and square). Here, you can introduce the concept of faces (see pages 14–15) as students see the circle face in the bottom of a cone and the square faces on a cube.
4. For homework, have students look for places in their home or neighborhood where they see these shapes. For example, telephone poles are cylinders, sugar can come in cubes, soccer balls are spheres, etc.

Curriculum: Mathematics

Learning Outcomes: Comparing, Measuring, Modeling, Extending Understanding

Grouping: Individual, Whole Class

COMPARING AND OBSERVING ACTIVITIES

Skunk Shapes



What to do:

1. In pairs, have students discuss the shapes that each skunk has made in the ground. What does each skunk have in common? (Each has five shapes.) How are they different? (Each grouping of shapes is different.)
2. Next, have the students look at each group of shapes. Have them imagine the “rule” that each skunk is using to create its shapes. (Skunk #1: three straight sides; triangles. Skunk #2: four straight sides; rhombi, rectangles, and squares. Skunk #3: shapes must have at least one rounded edge.)
3. Have students choose a word that describes each of the third skunk’s shapes. Encourage creative, descriptive words and have students share their ideas with the class.

Extension: Have students investigate in the library or online how skunks warn potential enemies. Students may know that skunks spray a smelly musk, but their black-and-white pattern also gives a “keep away” warning, and skunks will also raise their tails like a signal before they resort to spraying.

Curriculum: Mathematics, Language Arts, Biology

Learning Outcomes: Comparing, Observing

Grouping: Pairs, Whole Class

Shape Bingo



What you need:

- Black-line master for Shape Bingo
- Cardstock
- Pencils

What to do:

1. Cut out the bingo cards from the black-line master and glue them to cardstock.
2. Give each student a bingo card and take a walk through the school, schoolyard, and/or neighborhood to look for the shapes shown on pages 6 and 7. (Street signs can be a particularly good source.)
3. When students find a matching shape on their walk, they cross it off on their bingo card. The first one to create a line yells, “BINGO!” Ask the student to recall which object matched which shape to ensure correct answers.

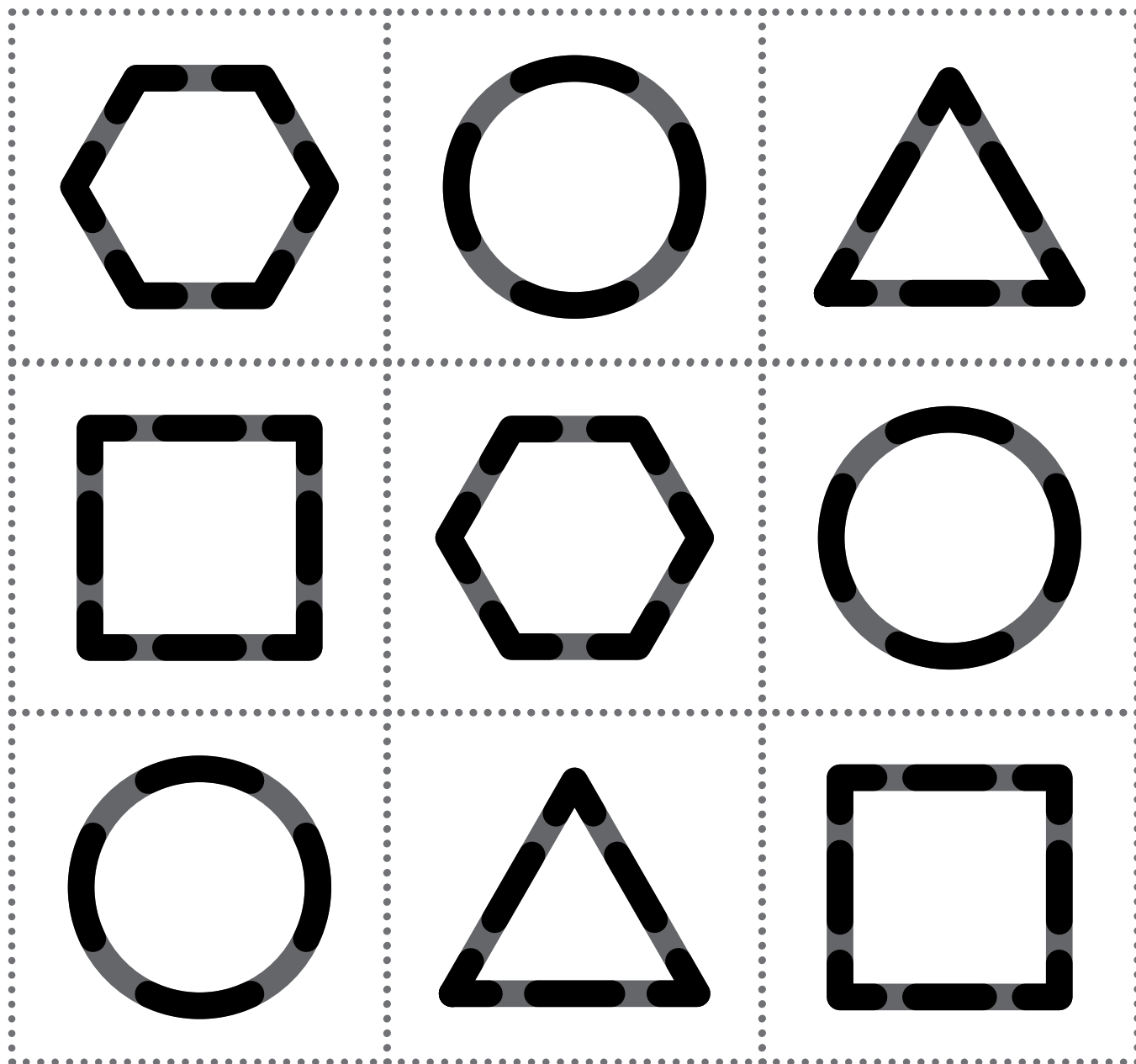
Curriculum: Mathematics, Physical Education

Learning Outcomes: Making Connections, Comparing, Observing

Grouping: Individual

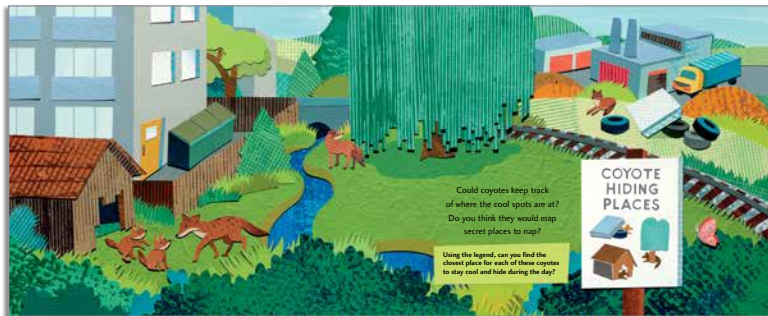
Shape Bingo

Black-line master.



SPATIAL REASONING AND DESCRIBING ACTIVITIES

Find Your Way



What you need:

- A variety of maps
- Large sheets of paper
- Drawing materials

What to do:

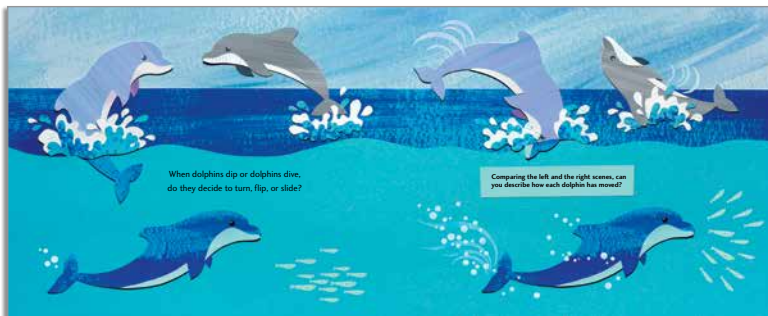
1. As a class, look at the legend on pages 26–27. Explain how a legend uses small symbols or icons to identify particular locations or sites of interest.
2. Show students the legends used on actual maps. Have them match a symbol in the legend to a location on the map.
3. Have students use the large sheets of paper to draw maps of small sections of the school, using a legend to mark the location of recurring or particular sites, such as washrooms, water fountains, the office, exits, etc.

Curriculum: Mathematics, Social Studies

Learning Outcomes: Spatial Reasoning, Understanding Direction, Observing, Making Connections, Mapping

Grouping: Whole Class, Individual

Flipping Out



What you need:

- Gym mat

What to do:

1. On mats in the gymnasium, recreate the movements made by the dolphins on these pages.
2. Have students show you how they would turn, flip, and slide.
3. Have students use other words to describe these motions. They might include: roll over, dive, glide, etc.

Curriculum: Mathematics, Physical Education, Language Arts

Learning Outcomes: Spatial Reasoning, Understanding Position, Observing, Making Connections

Grouping: Whole Class

Position Play



What you need:

- Variety of gym equipment

What to do:

1. Place a variety of equipment in the gymnasium (e.g., mats, objects that students can climb on, balls, etc.)
2. In the gym, shout out different scenarios where students must position themselves in relation to another person or object. For example, “Hold a ball above you,” “Go under the mat,” “Run to the right,” etc.

Curriculum: Mathematics, Physical Education

Learning Outcomes: Spatial Reasoning, Understanding Position, Observing, Making Connections

Grouping: Whole Class

Left or Right, Up or Down?

What you need:

- Playing cards
(one set of ace to king for each group)

What to do:

1. Introduce or review the difference between left and right. There are many techniques, but one is to have students hold their hands in front of them, palms facing away. The left-hand thumb and pointer finger make an L-shape.
2. Have students spread their playing cards on the table. Guide them through an exercise to make a grid of nine cards. For example, put the ace in the center of the table; put the jack to the right of the ace; put the two above the jack, etc.
3. Have students ask each other questions, such as, “Which card is to the right of the ace?” “Which card is below the king?” “Which card is at the top left?” etc.

Curriculum: Mathematics

Learning Outcomes: Spatial Reasoning, Understanding Position, Observing, Making Connections

Grouping: Small Groups, Whole Class



What you need:

- A small box or container
- Two blocks or other small objects
- Paper
- Drawing materials

What to do:

1. Have students use the blocks and box to model the relationships shown on pages 18–21 (e.g., inside, outside; in front of, behind; between, beside; over, under; above, below).
2. In pairs, have one student hide a block somewhere in the classroom and direct his or her partner to the block using the directional words introduced on these pages.
3. Have students use the drawing materials to draw and label two different situations using the words introduced on these pages. Review the pictures in the book for inspiration. For example, they could draw an ice-cream cone and label it: The ice cream is inside the cone. Or they could draw a child on a surfboard and label it: The surfboard is under the boy.

Curriculum: Mathematics, Visual Arts

Learning Outcomes: Spatial Reasoning, Understanding Position, Making Connections, Comparing, Observing

Grouping: Individual, Pairs

Baby Names Nature Activity



What to do:

As the Nature Notes on page 30 explain, baby beavers are called kits. Put the following two lists on the board in random order and have students match the animal names to what their babies are called:

- alligator — hatchling
- robin — chick
- mole — pup
- spider — spiderling
- skunk — kit
- whale — calf
- bee — larva
- grasshopper — nymph
- frog — tadpole
- coyote — whelp (or pup)

Curriculum: Language Arts

Learning Outcomes: Matching, Extending Understanding

Grouping: Whole Class

The illustrations in this book are deceptive. At first glance, they may seem simple, yet upon closer inspection, the layers, textures, and colors used make stunning collages. To create each of the illustrations in *Shaping Up Summer*, artist Ashley Barron scoured drawers and drawers of paper scraps, searching and unearthing until she found the perfect colors to bring the animals and landscapes to life.

Collage Creations

What you need:

- Blank paper
- Powdered paint and water
- Paintbrushes
- Tools to add textures and patterns (combs, doilies, straws)
- Scissors
- Pinking shears or other scissors that create interesting edges
- Glue

What to do:

1. As a class, review several pages in *Shaping Up Summer*, but focus on the art instead of the text. Note the different patterns, colors, and shapes that the artist used.
2. Have students use the paintbrushes, tools, and their fingers to create pages with color and texture. Allow the pages to dry completely. (As an option, you could also use papers that already have different patterns and textures.)
3. Have students cut simple shapes from their paper to make their own collages. The shapes can then be assembled and glued to a fresh sheet of paper.

Curriculum: Visual Arts

Learning Outcomes: Art Composition, Cutting, Painting

Grouping: Individual, Whole Class

Note: Depending on the age of your students, you may want to create shape templates that the students can trace before cutting. You may also want the entire class to participate in recreating one of the illustrations from the book. The planets on pages 2–3 or the flowers on pages 20–21 are good ones to try, as they are less detailed.

Storytelling



What to do:

Ask students to create a short story using their own words and observations based on pages 16–17 of *Shaping Up Summer*. What are the beavers doing or thinking about? How are they interacting?

Curriculum: Language Arts

Learning Outcomes: Observing, Describing, Writing

Grouping: Individual

PATTERNING AND SEQUENCING ACTIVITIES

Animal Alliteration



What to do:

1. Read the sentence on page 6 out loud. Ask students if they notice a pattern in the way you are speaking. If they don't notice, emphasize the *m*- and *d*-words. Do they hear the pattern and the use of the same sounds? This is alliteration.
2. Ask students to create their own short sentences that use alliteration. You may have to give them prompts, such as, "Suppose a squirrel..." or "Would a wolf..."

Curriculum: Language Arts

Learning Outcomes: Listening, Describing Patterns

Grouping: Whole Class

Do You Hear What I Hear?

What to do:

In partners, have students choose any page from *Shaping Up Summer*. Ask them to create dialogue for the animals on the page. What are the animals saying? Depending on your students' writing skills, they can write their dialogue on paper in speech balloons or share their ideas orally.

Curriculum: Language Arts

Learning Outcomes: Creativity, Dialogue

Grouping: Partners

Word Patterns

What to do:

1. Read *Shaping Up Summer* aloud and ask students to listen for repeating or rhyming sounds.
2. As you read, have students clap out the syllables. Help students identify where the number of syllables in two lines of text is the same, even though the number of words in each line is different.

Curriculum: Language Arts

Learning Outcomes: Identifying Patterns, Listening

Grouping: Whole Class