



BACKGROUND FOR TEACHERS: BRANCHING

The most common type of branching pattern is based on a series of three-way forked joints, like a tree branch. These branching patterns start from a single point and grow outward in many directions. While branching does not always follow the simple geometry of other categories, it is an important and recognizable pattern.

Branching patterns are very economical in that they reach a large surface area using the shortest path. For this reason, branching patterns are formed by organisms, systems, and structures that distribute or collect large volumes of material. Many natural systems, especially those involving liquids, have branching patterns. Examples of branching patterns include river systems (water transport), lightning (electrical dissipation), and plants (nutrient, gas, and water transport). Our own blood travels in a branching pattern of

arteries and veins! Branching patterns can also be found in diverse man-made things including roadways, decorative designs, and mobiles.

CONVERSATION STARTERS

Use these questions to guide your class in a conversation about branching objects and images. In your discussion listen for ideas that could lead to interesting classroom investigations.

What do you notice about branching patterns?

How are they the same and how are they different? **Create** a list of words describing what you notice.

Where around the classroom do you see branching? **Make** a list of branching patterns you could find around your school or museum.

What do the things with branching patterns share in common?

BRANCHING PATTERNS ACTIVITIES

PLANT PATTERN SURVEY—Take a mini field trip to search for the branching patterns of many plants and plant products.

Skills: learning cooperatively, comparing and contrasting, using gross motor skills, observing objects, learning through inquiry, and critical thinking

Once you know what to look for, branching patterns are easy to spot. Two variations of this activity are described below. The first involves a trip to a local playground, schoolyard, or tree-lined street—anywhere you can find plants. The second option, good for winter and rainy days, can be done as a take-home activity that challenges students to survey either a refrigerator or grocery store. You may want to use the Plant Pattern Survey Sheet on page 26 as a template. Once the survey has been completed, create a chart with the class results.

Observation and description are two skills that every good scientist needs to learn. Encourage the group to look carefully and ask questions about all parts of the plants they find. Since plants are alive, remind children to be respectful of nature and leave plants growing where they find them. At the end of the survey you may want to show, as an example, the branching root system of one plant.

MATERIALS

- paper
- pencil
- tree and plant guides (optional)

INSTRUCTIONS

1. Start by going over some examples of branching patterns. Explain that you will be searching for examples of branching patterns on your field trip. You may want to have the children work with partners or as small teams. Provide each student or team with a copy of the Plant Pattern Survey Sheet on page 26. Ask the students to record their results clearly on the sheet.

2. Spend about 10 to 15 minutes outside searching for examples of branching patterns. Encourage children to look carefully at the whole plant. Most plants have at least some branching.

3. Bring the whole class together and share the results of the children’s observations. Ask: Where did you notice branching patterns? Were all the branching patterns the same? Did anyone find any hidden or surprising branching patterns?

WRAP UP

Ask students to share what they noticed about the patterns they found, where the patterns were located, and what they learned. Have children look at the **brush coral** in the kit. Discuss ways in which the coral and the other branching objects and images are both similar to and different from the patterns they found.

ROOTS, SHOOTS, AND RIVERS

BUNCHES OF BRANCHES:

AT-HOME ACTIVITY

1. Start by going over some examples of branching patterns. Explain that each student will be searching for examples of branching patterns either at home or at a grocery store. Provide each student or team with a copy of the Plant Pattern Survey Sheet on page 26. Ask the students to record their results clearly on the sheet.

2. Encourage the children to look carefully for examples of whole plants and parts of plants that have branching patterns.

3. Ask the class to share the results of their at-home surveys. Ask: Where did you notice the branching patterns? Were all the branching patterns the same? Did anyone find any hidden or surprising branching patterns?



Schematic plant showing branching

ADDITIONAL ACTIVITIES

Look for opportunities to connect your branching activities with math, physical science, and life science topics being studied in your classroom.

LEAF RUBBING

Skills: creating and extending patterns, comparing and contrasting, using fine motor skills, observing objects, and spatial awareness

Make leaf rubbings to reveal natural branching patterns. Begin by having students use magnifiers to look at some fallen leaves that you have collected. Then invite children to use thin paper and the side of a crayon to create the rubbings. Have children cut out their leaf rubbings and hang them up on a bulletin board. (Tree-shaped silhouettes mounted on a bulletin board work well for this activity.) Or, make leaf mobiles by tying several of the rubbings to pipe cleaners with string (see Mobile Movements).

INK-BLOWN BRANCHING

Skills: artistic expression, creating and extending patterns, comparing and contrasting, using fine motor skills, and observing objects

Create naturalistic branching patterns by blowing ink on paper. Place a drop of ink at the bottom of a piece of plain paper and have children use a straw to blow the ink around in a branching pattern. Ask the children which types

of trees or plants they are reminded of. Add colorful flowers, leaves, or fruit to the trees by gluing tufts of colored tissue to the branches.

MOBILE MOVEMENTS

Skills: artistic expression, comparing and contrasting, using fine motor skills, and observing objects

Make a mobile using leaf shapes. First, have students look at examples of mobiles by an artist such as Alexander Calder. Then distribute pipe cleaners and string to the class and invite them to create a simple mobile armature. Complete the mobiles by attaching either leaf rubbings, leaf shapes, or images of branching patterns cut from recycled magazines.

