May Dose of Discovery: Week 4
Backyard Science: Symmetry in Nature

Learning Points:

- Children will be able to have fun and experiment with finding symmetry in nature.
- Children will be able to differentiate and find examples of the different types of symmetry (reflection, rotational, and translational) as well as being able to recognize when something is not symmetrical (asymmetry).
- Children will also be able to apply this knowledge by creating fun, symmetrical artwork.
- These activities can be done all in one afternoon or broken up in the week or weekend, as desired.

Background Information:

**Symmetry** creates balance and can be found everywhere in nature, which is probably why we find it to be so beautiful. There are three main types of symmetry: reflection (bilateral), rotational (radial), and translational symmetry.

**Reflection (Bilateral) Symmetry:** Reflection symmetry is also known as bilateral symmetry. It is the “mirror” effect, or when one object is reflected across a plane to create another instance of itself. The most common type of reflection we think of, and the most common we see is across the central axis being vertical but reflection symmetry can take on any direction: vertical, diagonal, and anything in between.

**Rotational Symmetry:** Rotational symmetry (or radial symmetry) is when an object is rotated in a certain direction around a point. Rotational symmetry in nature is found in everything from the petals of a flower to the topside view of a jellyfish.

**Translational Symmetry:** Translational symmetry is when an object is relocated to another position while maintaining its general or exact orientation. In the example below, we’ve moved one object several times at even intervals. These intervals do not have to be equal in order to maintain translational symmetry; they just need to be proportional.

Materials:

- **Finding Symmetry in Nature**
  - Bag or backpack; camera, found objects in nature; glue; **journal pages**; mirror; construction paper; poster tack (optional)
- **A Leaf’s Purpose**
  - **Journal pages**; 3 different types of leaves; ruler; string; graph paper; pencil; colored paper; tempura paint, large paint brushes

Information Adapted from Symmetry in Design: Concepts, Tips and Examples by WebFX: [https://www.webfx.com/blog/web-design/symmetry-design/](https://www.webfx.com/blog/web-design/symmetry-design/)
Activities:

Finding Symmetry in Nature

Step 1: Take a look around your backyard or take a fun nature walk with your family around the neighborhood and see if you can spot all kinds of interesting shapes and patterns in nature. Bring a small bag or backpack with you to collect the smaller objects you find as well as a camera to take picture of anything too big to collect.

Specifically see if you can find any examples of what you think are naturally symmetrical objects.

Also see if you can find other objects that you are pretty sure are NOT symmetrical to test as well.

Step 2: If you are able, print out the photos you took onto paper to study them more closely.

Step 3: Make some educational guesses on if you think each object is symmetrical or not and why you think that. Record this by either gluing the object or picture in your printed journal pages or sketch the object if it can’t be glued onto the page or if you can’t print the picture. Journal any observations you have about the object and what you think about the object’s symmetry in the space below the object.

Step 4: See if you found examples of all 3 kinds of symmetry: Reflection, Rotational, and Translational.

Which types of symmetry were most common in nature?

Which type was your favorite kind of symmetry?

Did you find a lot of examples of Asymmetry: objects that do not have symmetry – the 2 halves are different?
Do objects in nature match up exactly when divided along their lines of symmetry: the dividing line that you can “fold” the object along and have the two halves match up? Do you still think this symmetrical?

**Step 5:** Take all of your printed photos or any objects that are flat enough and use a small mirror (like this in the photo) and tested out each image to see if it is a good example of reflection symmetry. Use this method to experiment and find the different lines of symmetry for each object.

**Step 6:** After testing the pictures with the mirror, sort your journal pages into the 4 different categories (if you found examples of them all): asymmetry, rotational symmetry, reflection symmetry, and translational symmetry.

**Step 7:** Now that you know more about the different types of symmetry, go on another nature walk or go back into your backyard and see if you can add to the examples that you already found and/or you can make your own symmetrical artwork using the sun!

**Step 8:** Get a sheet of construction paper (the darker colors work best). Collect up some nature objects that you can create your own symmetry with and arrange them on the paper. Put your paper in a sunny, but not windy, place for a few hours and see what happens with the paper!

**Hint** If it is a windy day, you can use some poster tack to keep the lighter objects in place.

A Leaf’s Purpose

Step 1: Start this activity by journaling about the following questions:

What are leaves?

What do leaves do for the plants they are a part of?

Step 2: See if you can find the perimeter of 3 different types of leaves in inches and centimeters by wrapping a piece of yarn or string and measuring it. Simply wrap the yarn around the edge of a leaf and then use a measuring tape to find the length of the yarn.

Perimeter is the distance around the outside of a shape

Step 3: Now see if you can find the area of the same 3 leaves in square inches and square centimeters. Print out this centimeter grid paper and trace each leaf. Count the full squares inside the leaf and then estimate the half and quarter filled squares to add more area. For example, if there were two halves, you can would count them as one of if there was a square about 3/4 full and another 1/4 full, you can combined them as one as well.

Area is the space occupied by a flat shape or the surface of an object.

Step 4: Add to your Nature Art Collection by creating leaf bursts in your nature journal sheets. Place a leaf on colored paper. Using tempera paint and a large paintbrush, use a dry brush technique to make short strokes from the leaf outward.

**Hint** A dry brush technique means you dab much of the paint off the brush so that very little paint is pulled across the paper.

Step 5: After you do this all the way around the leaf, pull the leaf up to find a pretty reverse stencil keepsake of your leaf shape!

Activity Adapted from Nature Study – Leaves by Our Journey Westward: [http://ourjourneywestward.com/nature-study-leaves/](http://ourjourneywestward.com/nature-study-leaves/)