

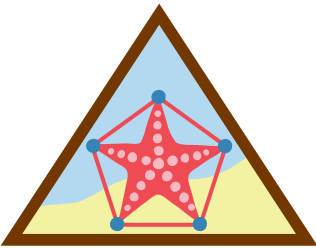
### Brownie Shapes in Nature

Nature is full of shapes, like a leopard's spots, a butterfly's wings, a bee's honeycomb or a turtle's shell. In this badge, Brownies look carefully at nature and track what they see. They create art about it and share what they find.

#### Steps

1. Track natural objects
2. Graph natural objects
3. Make a spiderweb with symmetry
4. Explore tessellations
5. Collect data about birds

**Purpose:** When Brownies earn this badge, they'll know about counting, graphing, symmetry, and tessellations. They'll also know about spiders, birds, and other natural objects.



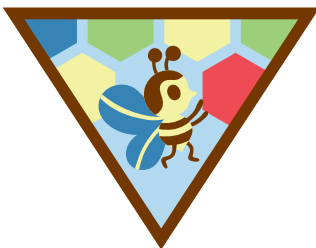
### Brownie Numbers in Nature

Brownies use their senses and other tools to gather information and learn about the natural world.

#### Steps

1. Explore temperature
2. Measure the length of leaves
3. Graph your leaf data
4. Find space to grow
5. Plot and plant a garden

**Purpose:** When Brownies earn this badge, they'll know how to measure temperature and length. They'll also know about square feet, diagrams, and grids. They'll have explored leaves and gardening.



### Brownie Design with Nature

Brownies use math to do things in the natural world. They find the age of natural objects, build a honeycomb, design a bird feeder, and make bird food to go bird-watching.

#### Steps

1. Calculate the age of a natural object
2. Explore the shape of beehives
3. Measure and build a bird feeder
4. Use ratios to make bird food
5. Graph data about birds

**Purpose:** When Brownies earn this badge, they'll know about natural objects. They'll know how to measure, use scale and ratio, and make a graph.



## Brownie Shapes in Nature 1

**Activity 1—Arrival and Opening Ceremony:** Brownies draw and share pictures of their favorite things to do and look at outside, and then brainstorm some benefits of being in nature.

**Activity 2—Step 1: Track natural objects** (choose one)

**Choice 1: Track natural objects**

Brownies brainstorm a list of things they would find in nature. Then, they choose four natural objects from the list, go on a scavenger hunt, and track the number of each object they find using tally marks. Brownies use **How to Make a Foldable** to organize and track their data on their scavenger hunt.

**Choice 2: Search for Many Kinds of a Natural Object**

Brownies brainstorm a list of things they would find in nature. Then, they choose one natural object, decide on four different ways to describe it, and track their findings on their scavenger hunt using tally marks. Brownies use **How to Make a Foldable** to organize and track their data on their scavenger hunt.

**Choice 3: Find Nature Beyond your Neighborhood**

Brownies brainstorm a list of things they would find in nature. Then, they choose four natural objects from the list, decide on a scavenger hunt location, and track the number of each object they find using tally marks. Their scavenger hunt can take place online, in a video, or in a book. Brownies use **How to Make a Foldable** to organize and track their data on their scavenger hunt.

**Activity 3—Step 2: Graph natural objects** (choose one)

**Choice 1: Make a Bar Graph**

Brownies learn how to share their observations and data they collected from Step 1. First, the troop makes a bar graph together representing their favorite animals. Then, Brownies count up their data from their Step 1 foldable, create a bar graph and share their findings with the troop.

**Choice 2: Make a Pie Chart**

Brownies learn how to share their observations and data they collected from Step 1. First, the troop makes a pie chart together representing their favorite animals. Then, Brownies count up their data from their Step 1 foldable, create a pie chart and share their findings with the troop.

**Choice 3: Make a Word Cloud**

Brownies learn how to share their observations and data they collected from Step 1. First, the troop makes a word cloud together representing their favorite animals. Then, Brownies count up their data from their Step 1 foldable, create a word cloud and share their findings with the troop.

**Activity 4—Step 3: Make a spiderweb with symmetry** (choose one)

**Choice 1: Make a Spiderweb with Yarn and Sticks**

Brownies learn about spiderwebs with patterns and symmetry formed by radials and spirals. They use skewers and yarn to make spiderwebs with different numbers of radials and sections. Brownies use **The Shape of Spiderwebs** to compare the patterns they formed.

**Choice 2: Make a Giant Spiderweb**

Brownies learn about spiderwebs with patterns and symmetry formed by radials and spirals. As a troop, they use yarn to build a giant spiderweb. Then, Brownies use **The Shape of Spiderwebs** to identify the shapes and patterns in different webs.



### **Choice 3: Make a Spiderweb with Glue**

Brownies learn about spiderwebs with patterns and symmetry formed by radials and spirals. They use glue to make spiderwebs with different numbers of radials and sections. Brownies use **The Shape of Spiderwebs** to compare the patterns they formed.

**Activity 5—Closing Ceremony:** Brownies review their favorite part of the meeting and what they learned.

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## **Brownie Shapes in Nature 2**

**Activity 1—Arrival and Opening Ceremony:** Brownies look at Photos of Tessellations and discuss patterns in nature.

**Activity 2—Step 4: Explore tessellations** (choose one)

### **Choice 1: Draw a Leaf Tessellation**

Brownies learn about tessellations. They use fallen leaves to create a tessellation by tracing it over and over so that its edges fit together. After coloring them in, they share their tessellation with the group.

### **Choice 2: Search for Tessellations**

Brownies learn about tessellations. They search for tessellations created by nature and those created by humans. Brownies can search for tessellations in photos and videos or in read like, like in their home or meeting space.

### **Choice 3: Make a Tessellation Quilt**

Brownies learn about tessellations. They use shapes that tessellate like a square, triangle, or hexagon as their pattern to make a quilt. Brownies cut out and fit the shapes together in a tessellation to assemble their quilt.

**Activity 3—Step 5: Collect data about birds** (choose one)

### **Choice 1: Create a Data Table**

Brownies learn about different kinds of birds and how to identify them. They create a data table to track their observations while bird watching. Brownies can observe birds outdoors or in a nature video or livestream. In the end, they share and compare their data.

### **Choice 2: Act Out Your Observations**

Brownies learn about different kinds of birds and how to identify them. They create a data table to track their observations while bird watching. Brownies can observe birds outdoors or in a nature video or livestream. In the end, they present their data in the form of a skit, puppet show, or song.

### **Choice 3: Count Birds for Citizen Science**

Brownies learn about different kinds of birds and how to identify them in an outdoor area for a citizen science project. They create a data table to track their observations while bird watching. In the end, they share their data and verify it before sending it to the project's scientists.

**Activity 4—Closing Ceremony:** Brownies earn their Shapes in Nature badge.

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## **Brownie Numbers in Nature 1**

**Activity 1—Arrival and Opening Ceremony:** Brownies examine natural items using their senses and learn



about some instruments that scientists use to measure.

### **Activity 2—Step 1: Explore temperature** (choose one)

#### **Choice 1: Measure Temperature with Crickets**

Brownies learn about temperature, the thermometer and two different units of measure: Celsius and Fahrenheit. They count cricket chirps for 15 seconds and use a formula to determine the temperature, and then compare that value to the reading on the thermometer.

#### **Choice 2: Measure Temperature with Water**

Brownies learn about temperature, the thermometer and two different units of measure: Celsius and Fahrenheit. They explore water's states of matter and measure water at various temperatures using a thermometer.

#### **Choice 3: Create a Calendar with Nature's Clues**

Brownies learn about temperature, the thermometer and two different units of measure: Celsius and Fahrenheit. They explore nature for clues that the weather is changing, and then they will make a natural calendar of the seasons and share with the troop.

### **Activity 3—Step 2: Measure the length of leaves** (choose one)

#### **Choice 1: Measure with a Ruler**

Brownies learn about measuring in centimeters and inches. They choose three different leaves to measure with a ruler and write down their measurements on **My Leaf Measurements** as reduced fractions for both inches and centimeters.

#### **Choice 2: Measure with your Body**

Brownies learn about measuring in centimeters and inches with a ruler. They choose three different leaves to measure using their finger or toe and estimate any fractions. Brownies chart their leaf data on **My Leaf Measurements**.

#### **Choice 3: Measure with an Object**

Brownies learn about measuring length and width with a ruler. They choose three different leaves to measure using an object such as a rock, shell or stick and estimate any fractions. Brownies chart their leaf data on **My Leaf Measurements**.

### **Activity 4—Step 3: Graph your leaf data** (choose one)

#### **Choice 1: Draw a Line Plot**

Brownies share their leaf measurement data from Step 2. They draw a line plot on graph paper and compare their graphs.

#### **Choice 2: Make a Line Plot with Natural Objects**

Brownies share their leaf measurement data from Step 2. They create a line plot using natural objects such as sticks, rocks, and shells and compare their graphs.

#### **Choice 3: Make a Human Line Plot**

Brownies share their leaf measurement data from Step 2. They create a line plot using themselves as data points.

### **Activity 5—Closing Ceremony:** Brownies review their favorite part of the meeting and what they learned.



## Brownie Numbers in Nature 2

**Activity 1—Arrival and Opening Ceremony:** Brownies explore how their meeting snack relates to the meeting's activities.

**Activity 2—Step 4: Find space to grow** (choose one)

**Choice 1: Plot an Edible Garden**

Brownies explore how much space different plants need to grow by measuring area. They create a diagram of a garden for fruits and vegetables using **My Square-foot Diagram**. Then, they make a life-sized grid using masking tape on the floor and index cards for their plants.

**Choice 2: Plot a Forest**

Brownies explore how much space trees need to grow by measuring area. They create a diagram of a garden for fruits and vegetables using **My Square-foot Diagram**. Then, they make a life-sized grid using masking tape on the floor and index cards for their plants.

**Choice 3: Plot a Flower Garden**

Brownies explore how much space different flowers need to grow by measuring area. They create a diagram of a garden for fruits and vegetables using **My Square-foot Diagram**. Then, they make a life-sized grid using masking tape on the floor and index cards for their plants.

**Activity 3—Step 5: Plot and plant a garden** (choose one)

**Choice 1: Plant an Herb Garden**

Brownies plot and plan an herb garden. They measure and calculate quadrants for their growing area on a foil pan, mark the quadrants and reflect the measurements on **Plot My Garden**. Then, they calculate the correct number of plants for each quadrant, draw them on their diagram, then plant seeds in their pan.

**Choice 2: Plant an Outdoor Garden**

Brownies plot and plan an outdoor garden. They measure and calculate quadrants for their growing area, mark the quadrants with string and reflect the measurements on **Plot My Garden**. Then, they calculate the correct number of plants for each quadrant, draw them on their diagram, then plant seeds in their outdoor garden.

**Choice 3: Plant a Container Garden**

Brownies plot and plan a container garden. They measure and calculate quadrants for their growing area, mark the quadrants and reflect the measurements on **Plot My Garden**. Then, they calculate the correct number of plants for each quadrant, draw them on their diagram, then plant seeds in their container.

**Activity 4—Closing Ceremony:** Brownies earn their Numbers in Nature badge.

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## Brownie Design with Nature 1

**Activity 1—Arrival and Opening Ceremony:** Brownies work through a puzzle together and then discuss tessellations.

**Activity 2—Step 1: Calculate the age of natural objects** (choose one)

**Choice 1: Calculate the Age of a Tree**

Brownies calculate the age of a tree using math and observations. They observe and tally the light and dark



annual rings of a cross-section of a tree. Then, they determine the age of the tree and calculate the year it was planted.

### **Choice 2: Calculate a Pet's Age in Pet Years**

Brownies calculate the age of pets using math. They calculate how old their pet cats and dogs are based on their size and estimated aging rates.

### **Choice 3: Calculate the Age of a Snake**

Brownies calculate and compare the ages of different snakes using measurement and observation. They research snakes and measure strings to decide which snake they match with. Then, they compare their results with the correct answer.

## **Activity 3—Step 2: Explore the shape of beehives** (choose one)

### **Choice 1: Create a Beehive to Fit You**

Brownies learn about honeycombs made from tessellating hexagons. They sketch a honeycomb tessellation, increase their scale by making a honeycomb they can all stand in using 75 one-foot strips of paper, masking tape, or sticks.

### **Choice 2: Build a Bee Hotel**

Brownies learn about honeycombs made from tessellating hexagons. They sketch a honeycomb tessellation, then learn about bees that do not use hives. Brownies create a bee-hotel using bamboo, rolled paper, etc.

### **Choice 3: Calculate How Much Honey a Beehive Might Hold**

Brownies learn about honeycombs made from tessellating hexagons. They sketch a honeycomb tessellation, then learn about honey boxes. Brownies create a diagram of a honey box and its inner frames using masking tape. Then, they calculate how much honey all the frames can hold.

## **Activity 4—Closing Ceremony:** Brownies review their favorite part of the meeting and what they learned.

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## **Brownie Design with Nature 2**

**Activity 1—Arrival and Opening Ceremony:** Brownies make a poster and share what they've learned about the importance of bees.

## **Activity 2—Step 3: Measure and build a bird feeder** (choose one)

### **Choice 1: Build a Seed Feeder**

Brownies learn about volume and how to measure it accurately. They review the materials available for building a seed feeder, draw ideas and choose a design to build. They use rulers to measure the volume of their seed feeder and other features including holes for birds to reach the seeds and a string for hanging it.

### **Choice 2: Build a Nectar Feeder**

Brownies learn about volume and how to measure it accurately. They review the materials available for building a nectar feeder and draw and cut out red foam flowers to attach to the feeder to attract hummingbirds. They measure the volume of their feeder, use rulers to mark volume increments to track consumption, and then measure string to hang their jar.

### **Choice 3: Build a Feeder for Unusual Food**

Brownies learn about volume and how to measure it accurately. They review the materials and types of seeds available for building their feeder, draw ideas, and choose one design to build. They use rulers to measure the





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volume of their seed feeder and other features including holes for birds to reach the seeds and a string for hanging it.

### **Activity 3—Step 4: Use ratios to make bird food** (choose one)

#### **Choice 1: Create your own Bird Seed Recipe**

Brownies learn about ratios to make food for the feeder they created. They research local birds and what they eat. They use ratios to create a bird seed recipe (enough for their feeder using its volume measured in Step 2), then follow it and measure the correct amounts.

#### **Choice 2: Follow a Nectar Recipe**

Brownies learn about solutions and ratios to make nectar for the feeder they created. They use a formula for a nectar recipe to figure out how much sugar they should add to water.

#### **Choice 3: Multiply the Recipe**

Brownies learn about ratios to make food or nectar for the feeder they created. They research local birds and what they eat (if using seed feeders). Brownies use ratios to create a bird seed or nectar recipe. They add up the volumes of their feeders, and then multiply their recipe to make enough bird seed or nectar for all the feeders at once.

### **Activity 4—Step 5: Graph data about birds** (choose one)

#### **Choice 1: Graph Data from your Bird Feeder**

Brownies learn about ornithologists and how they study and collect data about birds. They learn how to graph data about the amount of food or nectar birds consume from their feeder. Brownies prepare a graph and track their feeders for one week and share their findings at the next meeting.

#### **Choice 2: Go Bird-Watching and Graph Birds you See**

Brownies learn about ornithologists and how they study and collect data about birds. They go bird watching, identify and tally the number of birds they see (either outside or in a video). Then, Brownies graph and compare their data.

#### **Choice 3: Find the Best Place for your Feeder**

Brownies learn about ornithologists and how they study and collect data about birds. They find the best place for their feeder by placing it outside and tracking seed or nectar consumption every few days. They graph and share this data at the next meeting.

### **Activity 5—Closing Ceremony:** Brownies earn their Design with Nature badge.