

# B.U.G.

## Biodiversity in Urban Gardens



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## **Lesson 1: The Curious Garden**

This lesson is designed to introduce students to the concept and importance of biodiversity in urban areas, the overarching theme of the B.U.G. curriculum unit. Using the children's book *The Curious Garden*, by Peter Brown, this lesson allows students to consider how urban gardens create habitats for living things in a city, and can transform the urban environment.

**Materials for the lesson:** *The Curious Garden*, by Peter Brown

**Tips for teaching the lesson:**

If you are not using a school or community garden for this activity, scout out an area in advance where students are likely to succeed in finding examples from the worksheet.

<b>Name:</b> Urban Gardens, Urban Habitats	<b>Topic:</b> Introducing biodiversity in urban gardens
<b>Subject:</b> Science	<b>Grade Level:</b> K-5
<b>Objective(s):</b> SWBAT state three advantages of having a garden nearby (examples: growing food, increasing the number of plants and animals, having a cleaner home, having a prettier place to live, etc.).	
<b>State Standard(s):</b>	
LS2 (K-4) <b>SAE –6</b> Describe ways plants and animals depend on each other (e.g., shelter, nesting, food). LS3 (K-4) <b>SAE –7</b> Using information (data or scenario), explain how changes in the environment can cause organisms to respond (e.g., survive there and reproduce, move away, die).	
<b>Secondary Standard(s):</b>	
<b>R–3–4</b> Demonstrate initial understanding of elements of literary texts by... Identifying or describing character(s), setting, problem/solution, major events, or <u>plot</u> , as appropriate to text.	

Time	Action	Assessment	Materials
5 minutes	Introduction: Write the word garden on the board, and show SS the cover of book.	What is a garden? Has anyone been to a garden before? What happens in a garden? (Things grow) What grows in a kindergarten?	<i>The Curious Garden,</i> by Peter Brown.
15-20 minutes	Read book to class, show Ss the pictures.	Assess Ss understanding of problem (city is grey) and solution (Liam plants a garden)	
p.1		What does the city look like? What are these black things? Is smoke good for you? Does the city look clean? Where are the people?	
p.3		Who is the boy? What did he find? What will happen to him?	
p.5		What did Liam find? How will he help the plants?	
p.7		How do the plants look now? What do plants need to be healthy? (water)	
p.9		What is happening to the garden now? If there is empty space, what happens to the garden? What would happen if there were no empty spaces? (garden would not grow)	
p.11		What is in the garden now? (Birds, Liam, butterflies, grass, moss, flowers) Did Liam plant the birds and butterflies? Why are the birds and butterflies in the garden?	
p.13		Look at how far the garden has grown.	
p.15		Where is the garden now? Are the plants still there, or not?	
p.17		Why is Liam reading (to learn about gardens)	

	p.19	What does the garden need? (sun, water, help from Liam, music)	
	p.25 (flip back to beginning, and compare)	How is the city different now? Where did all the people come from? Are the people there because of the garden? What about the end of the story, how does it look now?	
10 minutes	Discuss with students	How did the city change, after Liam worked in the garden? (emphasize the benefits of an urban garden)	
		What lives in the garden? What did we see? What was hiding? (in addition to organisms from book, it's likely there were other insects, ants, bees, worms, and small mammals like squirrels and mice)	
		Why weren't those things there in the beginning? (All organisms need a place to live. With a garden, there's a place for gardeners, birds, butterflies, and all sorts of plants)	

## Lesson 2 (Indoor): Plants

This lesson is designed to introduce students to the basic parts of plants: roots, stems, leaves, flowers, fruits, and seeds. If you have access to seedlings, this lesson can be complemented by allowing students to see and touch a variety of plants. Remember, B.U.G. lessons overlap, and you do not need to complete every lesson to teach your students about biodiversity.

**Materials for the lesson:** Pea Plant Flip Chart

### Tips for teaching the lesson:

Begin with the Pea Plant Flip Chart to show students plant parts and how they develop, but follow up by having students look at seedlings or house plants (and a variety of garden seeds) to see the variety of root systems, leaf shapes, and seed shapes. Biodiversity is just as important within the plant kingdom as it is within a garden habitat!

<b>Name:</b> Plant Parts	<b>Topic:</b> Plants
<b>Subject:</b> Life Sciences	<b>Grade Level:</b> K-5
<b>Objective:</b> SWBAT identify the parts of plants, and how parts develop as a plant grows from a seed.	
<b>State Standard(s):</b>	
<i>LS1 (K-4) INQ + POC-1</i> Sort/classify different living things using similar and different characteristics. Describe why organisms belong to each group or cite evidence about how they are alike or not alike.	
<i>LS1 (K-4) POC-3</i> Predict, sequence or compare the life stages of organisms – plants and animals.	
<i>LS1 (K-4) FAF-4</i> Identify and explain how the physical structures of an organism (plants or animals) allow it to survive in its habitat/environment (e.g., roots for water).	
<b>National Standard(s):</b> As a result of activities in grades K-4; all students should develop:	
<ul style="list-style-type: none"><li>• understanding of organisms and environments</li><li>• abilities necessary to do scientific inquiry</li></ul>	

Time	Action	Assessment	Materials
10 mins	Remind students about <i>Curious Garden</i> , and how Liam's city began to change.	Did we see any plants in the Curious Garden book? Who planted the plants? How did the plants spread to new places?	Curious Garden book
5 mins	Tell students that they are going to look at how plants grow, and learn the names of the parts of a plant and what each plant part does for the plant.		Pea Plant Flip Chart
20 mins	Flip pages of chart, reviewing each part of the pea plant and how the plant grows, develops, and makes new pea seeds.	Ss will be invited to the flip chart to name plant parts as they "grow" in the Pea Plant Flip Chart, and give an idea about their function.	
15 mins	Pass around seedlings or houseplants for students to observe and name plant parts.	What parts of the plants could students find? Are leaves on different plants the same? Do any plants have different parts than the pea plant in the flip chart?	
	Alternate closing activity: return to <i>Curious Garden</i> and ask students to identify plant parts that they see in the book.		

## **Lesson 2 (Outdoor): Plants**

This lesson is designed to allow your students to examine the plants in your area. This area could be your schoolyard, along a nearby street, or in a nearby park or wild area. As with any trip outside the classroom, student safety comes first. Use your judgment as to what will work best for your students. Remember, B.U.G. lessons overlap, and you do not need to complete every lesson to teach your students about biodiversity.

**Materials for the lesson:** Plant Parts Outdoor Worksheet

**Tips for teaching the lesson:**

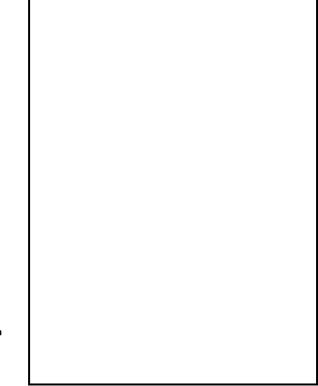
If you are not using a school or community garden for this activity, scout out an area in advance where students are likely to succeed in finding examples from the worksheet.

## Plant Parts

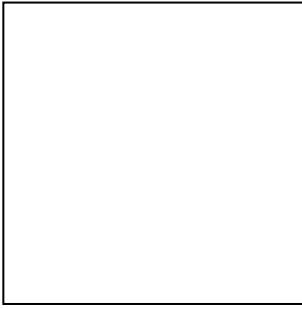
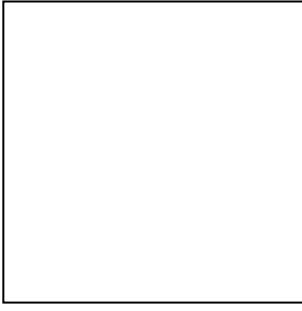
Look at all of the different plants around your garden, yard, or park. What can you find?

### **ROOTS**

Do you see any roots? Draw a root that you see:



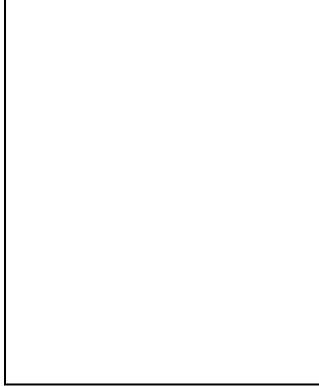
Draw a picture of 2 different leaves that you see:



### **STEMS**

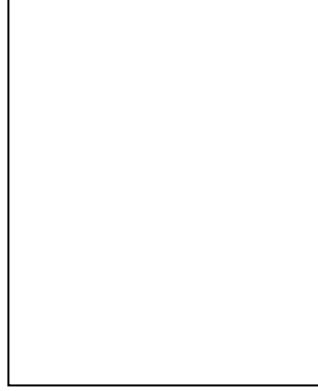
Can you find plants with stems? Can you find a plant with a different stem, or no stem?

Draw a picture of a plant with a stem that you see:  
**LEAVES**



*FLOWERS, FRUIT, & SEEDS*

Do you see any flowers, fruits, or seeds? Draw one that you see:



<b>Name:</b> Plant Parts	<b>Topic:</b> Plants		
<b>Subject:</b> Life Sciences	<b>Grade Level:</b> K-5		
<b>Objective:</b> SWBAT identify the parts of plants based on outside observations of plants.			
<b>State Standard(s):</b> <i>LS1 (K-4) INQ + POC-1</i> Sort/classify different living things using similar and different characteristics. Describe why organisms belong to each group or cite evidence about how they are alike or not alike. <i>LS1 (K-4) POC-3</i> Predict, sequence or compare the life stages of organisms – plants and animals. <i>LS1 (K-4) FAF –4</i> Identify and explain how the physical structures of an organism (plants or animals) allow it to survive in its habitat/environment (e.g., roots for water).			
<b>National Standard(s):</b> Characteristics of Organisms, their lifecycles, and their relation to their environments. Life Science Standard C.			
<b>Time</b>	<b>Action</b>	<b>Assessment</b>	<b>Materials</b>
5 mins	Remind students about <i>Curious Garden</i> , and how Liam's city began to change.	Did we see any plants in the Curious Garden book? Who planted the plants? How did the plants spread to new places?	Curious Garden book
5 mins	Tell students that they are going to look at plants in their garden (or in a nearby park/natural area). Like real scientists, they are going to record what they see.	Ss will complete plant parts observation worksheet.	colored pencils, worksheets
15 mins	Students observe plants		
15mins	Students record observations	What parts of the plants could students find? How many different types of leaves did students find? Did any plants have no stems? Did any students see plant roots?	
5 mins	Have discussion with class	Emphasize biodiversity among plants (all different sizes, shapes), and how	

	this variety creates a diversity of habitats for living things in a garden.
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#### **Additional Activity: A Plant Parts Garden!**

One of the Southside Community Land Trust's favorite curriculum topics is the different plant parts and their roles in making the plant healthy. To begin a season's exploration of a garden through the different parts of the plant how each part contributes to the overall life of the plant, you can plant a "Plant Parts Garden." At our Youth Garden Clubs, this garden usually takes the shape of a two-dimensional plant with root crops planted in the root region, celery in the stem, lettuces and leafy greens in the leaves, etc. Using small rocks or another creative material to outline the shapes before you do your seeding or transplanting will help students visualize the plant you are creating. Think of it as drawing a giant plant on the ground and filling in the different plant parts with the appropriate crops!

## **Lesson 3 (Indoor): Insects**

(Adapted from Texas A&M University, Department of Entomology)

**Purpose:** At the end of this activity the student will have a new understanding of how insects/organisms are impacted by factors that are essential to an organism's survival in a particular habitat. The students will understand how lacking just one element of a habitat (food, water, shelter, and space) can affect an organism's chance for survival. This activity will take 20-30 minutes to complete.

**Standards:**

a. identify and describe roles of organisms in living systems and parts in nonliving objects.

1. predict and draw conclusions when part of a system is removed

**Materials:**

- Strips of colored paper- representing the different elements of a habitat

**Motivate!** : The teacher will begin the class by asking students what would happen to them if they did not have enough water to drink? What would happen if they did not have a space in which to live? Would these factors make life easy or hard? What would you have to do to survive in these conditions? The students will then learn that a habitat consists of factors such as food, water, space, and shelter.

**Activity:**

- The students will then be invited to partake in a habitat game in which they are to imagine themselves as an insect.
- In order to survive, the insect must collect food, find water, find a place to stay for shelter, and an insect must find a place to live where there is space.
- The class will simulate the collection process by having strips of various colors of paper, (with each color representing an element of habitat) distributed around the room.
  - The color strips will be coded as follows
    - Red = shelter

- Green = food
- Blue = water
- Brown = space
- In order to survive the activity, each student must collect 1 red paper, 3 green slips of paper, 2 blue strips of paper, and 1 brown strip of paper within 30 seconds of the instructor telling the students to go on their survival trek.
- At different intervals, the teacher can simulate different conditions such as season, weather, and climate changes.
- As students collect the colored strips, the teacher will remind them that those insects who do not collect the needed amount of food, shelter, water, and space: can become sick and/or die.
- This activity can take as long as the teacher feels necessary and as long as the children are interested and learning.

**Safety Tips:**

- If this game is played indoors, it should be done in an area where students can maneuver around furniture safely.
- Students should also be reminded that if they are in a classroom, that only walking is permitted.
- The teacher needs to be weary in asking questions such as "What would happen if you did not have food? What would happen if you did not have a home?" In some cases students in the classroom may have experienced these events.

**Concept Discovery:** After the class has played several rounds of the game, the class will come together for discussion. What have the students learned? Did any of the children not meet the needs for survival? If the students were real insects and they did not meet their needs, what would happen? How is habitat important? What is happening to insects that are living in a forest that is being torn down? Do they die from loss of habitat, or do they survive and adapt to their changing environment?

**Going Further:** The students can analyze their own habitat based on what they have learned in the activity. Students can go home after the activity and think about what their own habitat is? How are the student's needs within their own habitat met? What happens if a need is not met? Students can then return to class prepared to share what they have learned about their own survival.

**Closure:** This activity will close with having the children think about different types of insects. Do different insects have different needs? Are some insect's needs harder to meet than other insect's needs? Through this activity the students have learned the importance of habitat, and how if one element of habitat were missing, an organism would need to struggle in order to survive.

**Connections:**

- In mathematics the students can make graphs that show the number of insects that survive and the number of insects that die.
- In literature, students may write a story about a particular habitat and how its inhabitants are affected by varying circumstances.
- In history, students can look at different historical events that have altered habitats permanently.

## **Lesson 3 (Outdoor): Insects**

This lesson is designed to allow your students to see the different types of insects and other invertebrates that live in your area. This area could be your schoolyard, along a nearby street, or in a nearby park. As with any trip outside the classroom, student safety comes first. Use your judgment as to what will work best for your students.

**Materials for the lesson:** Insect Collection How-To Videos (Rhode Island Natural History Survey); Insect Key (K-5) or Insect Key (Advanced)

### **Tips for teaching the lesson:**

**SAFETY NOTE: While being stung by insects is never pleasant, it can be life threatening to students with allergies. Find out if this is true of your students, and have an action plan in case of emergency. Younger students may not know or understand that they have an allergic reaction, it is your job to keep your students safe. Also, it is important that students look where they are going with aerial nets, and that they have plenty of space in which to work.**

We HIGHLY recommend that you try these techniques yourself in advance. You want an area that has some variety, so that students get different answers. This allows each group to be proud of their own work. Some students may have difficulty collecting things, and with very young students (K-2) the motor skills to collect insects may not be developed enough to allow all techniques to succeed.

You may have to help students to collect insects, and some students may be squeamish. Teachers are always brave enough to collect insects! If pressed for materials, it is not necessary to teach the techniques one at a time. Students can rotate from station to station, but it really helps to have someone at each station to explain the new technique.

There are a LOT of different species of insect, and many other invertebrates like spiders and worms, which are not insects at all. It is not important that students have 100% accuracy distinguishing between types of beetles. It is enough to see that there are far more insects than one might think, and that the numbers are greater still where there is a diversity of plant life (like in Liam's Curious Garden).

<b>Name:</b> Insect Collection and Identification	<b>Topic:</b> Insects		
<b>Subject:</b> Life Sciences	<b>Grade Level:</b> K-5		
<b>Objective</b> SWBAT collect insects with 2 of the methods demonstrated by the teacher, and classify what they find.			
<b>State Standard(s):</b> <i>LS1 (K-4) /NQ + POC-1</i> Sort/classify different living things using similar and different characteristics. Describe why organisms belong to each group or cite evidence about how they are alike or not alike.			
<b>National Standard(s):</b> Characteristics of Organisms, their lifecycles, and their relation to their environs. Life Science Standard C.			
Time	Action	Assessment	Materials
5 mins	Remind students about <i>Curious Garden</i> , and the insects that live there.	Did we see anything in the book that wasn't a plant? Did we see butterflies? Did we see birds? What do the birds eat? Could there be insects we don't see in the picture?	Curious Garden book
2 mins	Overview, five ways to look for insects	Students can name the five methods: sweep net, aerial net, hand pick, beating, sifting	petri dishes, hand lenses, white cloth for beating method, sweep net, aerial net, screen sifter
2 mins	Demonstrate sweep net		
5 mins	Students use sweep net	are students safe?	
2 mins	Demonstrate aerial net	are students collecting insects?	
5 mins	Students use aerial net		
2 mins	Demonstrate hand pick		
5 mins	Students use hand pick		
2 mins	Demonstrate beating		
5 mins	Students use beating		

2 mins	Demonstrate sifting		
5 mins	Students use sifting		
2 mins	Gather the students (whistle)	What did you find? Did you collect an insect? What does it look like? Where did you find it? What kind of insect is it?	Whistle or other signal to gather students
6 mins	Go back inside, collect materials, collect insects and discuss.	What did we find? Are they all the same, or all different? Does anyone know the names of these insects? Is this a beetle? is this a spider? is this an ant?  See lesson continuation for ID.	petri dishes, overhead projector (Petri dishes are clear, just set them on the overhead projector)  Insect Key (K-5) or Insect Key (Advanced)

***Insect Collection and Identification continued:***

5 mins	Remind students of what they found	Did anyone see an insect like this one?	petri dishes, overhead projector (Petri dishes are clear, just set them on the overhead projector)
5 mins	Teach students how to use the key.	We can use this key to find out the name of our insect.	Insect Key (K-5) or Insect Key (Advanced)
5 mins	Teacher gives example of identifying insect	What should I do first? What should I do second? What do we have?	
10 mins	Teacher lets students identify an insect as a class.	What should I do first? What should I do second? What do we have?	
10 mins	Each group given an insect to identify	What do you have? How many legs does it have? Does it have a mouth?	

		Where is the mouth?	
5 mins	Clean up	Were all the insects the same? How many kinds of insects were there? Do you think we have every kind of insect? Why are there so many kinds of insects? Is the garden a good place for insects to live? Is the garden helpful to people?	
5 mins	Discuss		

## **Lesson 4 (Indoor): Birds**

This lesson is designed to allow your students to learn about the variety and diversity of birds.

### **Tips for teaching the lesson:**

The most difficult connection is between the activities and the birds. We need more than a fun activity, we need students to see the connections between the model birds (themselves) and the real birds. Try the technology in advance. Minimizing the transition time between activities will prevent classroom management from being a problem.

You can either make all of the bird 'food' actual food, like spaghetti and gummy worms, or you can avoid that entirely and use toothpicks and pipe cleaners. Make sure to account for food allergies if you take the first approach.

You'll need food of the following types:

- |                   |   |
|-------------------|---|
| Plants in water:  | Use the pan of water, add lettuce bits                          |
| Animals in water: | Use very light things, like sunflower seeds, in a pan of water. |
| Worms:            | Use gummy worms, and add them to sand or dirt                   |
| Seeds:            | Use some kind of hard candy, like jellybeans, in sand or dirt   |

Every student will need a plastic cup as a 'stomach', and a way to collect food (one of the methods). If you have time, you can have every student try every method, or have students report to the class on how well their food-collecting method worked.

<b>Name:</b> Bird Beak Lab	<b>Topic:</b> Birds		
<b>Subject:</b> Life Sciences	<b>Grade Level:</b> K-5		
<b>Objective</b> SWBAT demonstrate how different birds eat, and classify birds based on their eating methods.			
<b>State Standard(s): LS1 (K-4)-INQ + POC-1</b>			
Sort/Classify different living things using similar and different characteristics. Describe why organisms belong to each group or cite evidence about how they are alike or not alike.			
<b>National Standard(s):</b> Characteristics of Organisms, their lifecycles, and their relation to their environments. Life Science Standard C.			
Time	Action	Assessment	Materials
5 mins	Remind students about <i>Curious Garden</i> , and the birds that live there.	Did we see any birds in the Curious Garden book? Would birds go to the garden? Where do birds live?	Curious Garden book, stopwatch.
3 mins	Introduce bird beak lab. Students will be birds, and have to find food to survive.		cups, spoons, chopsticks, tweezers/clothespins, round toothpicks, $\frac{1}{4}$ washers, small rocks, pan of water, lettuce.
5 min/ station	Students try to gather food at each station (have more stations than groups, just in case) Collect data as a class,	Is that easy, or hard? How is it working? Which methods worked well for the lettuce? What about for the seeds? Which worked well for the spoons?	clipboards and worksheets, or collect data on whiteboard
5 mins		Where do you think this bird lives? What do you think it eats?	images of birds, with names
5 mins	closing discussion	What kinds of birds might live in the Curious Garden? Are there things to eat in the garden? Why does that matter to the birds?	

## **Lesson 4 (Outdoor): Birds**

This lesson is designed to allow your students to learn about the variety and diversity of birds.

**Materials for the lesson (optional):** Rhode Island Natural History Survey Bird Identification Guide

### **Tips for teaching the lesson:**

Check out these ideas from the Cornell Lab of Ornithology about types of bird feeders, where to place them, and what to put inside: <http://www.allaboutbirds.org/NetCommunity/Page.aspx?pid=1178>. Birds do not necessarily work on the school schedule, so you may have to prepare this lesson, and then wait to teach it when birds are available. A bird feeder will assist by attracting birds to a viewable location.

Identifying birds is a skill that is easy to learn. Information about field markings, and the kinds of birds that live in your neighborhood, can be found on the Audubon Society of RI website: [www.asri.org](http://www.asri.org) or here: <http://www.allaboutbirds.org/NetCommunity/Page.aspx?pid=1058>. More in-depth bird activities are also available in the Audubon's teacher's kit.

You can find pictures of the birds you might find online. This is most helpful for students who are having trouble focusing on a moving bird, or on days where birds cannot be seen. Resources are available on the Cornell Lab of Ornithology website: [www.birds.cornell.edu](http://www.birds.cornell.edu).

For older students, more writing should be done. Have them describe the bird, and talk about the different parts of the bird's body.

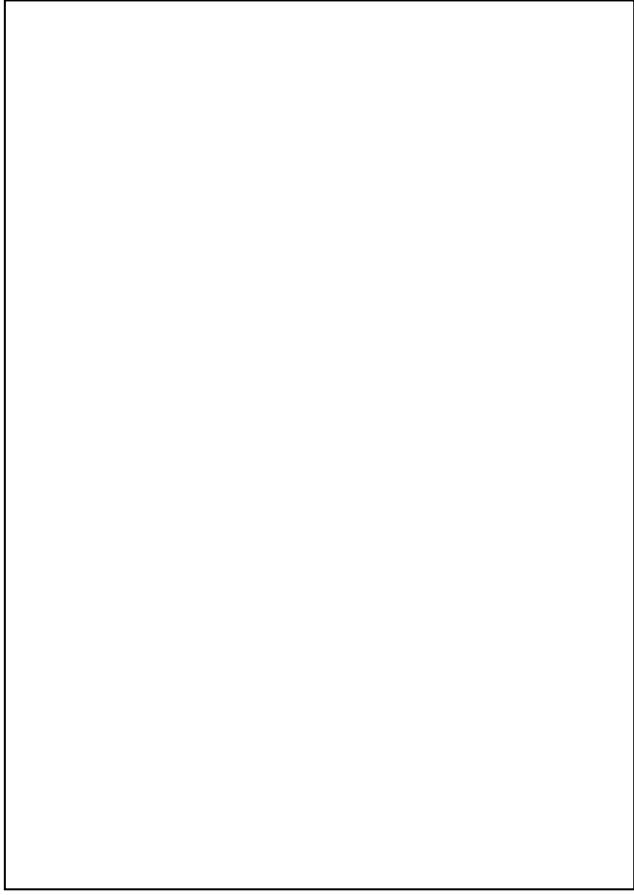
## **Looking for Birds**

**Find a spot where you can sit still and be quiet for 10 minutes. Look all around you. Do you see any birds? If you do....**

**What color is your bird?** \_\_\_\_\_

**What is your bird doing?** \_\_\_\_\_

**Draw a picture of your bird here:**



<b>Name:</b> Bird Observation	<b>Topic:</b> Birds in Urban Gardens					
<b>Subject:</b> Life Sciences	<b>Grade Level:</b> K-5					
<b>Objective</b> SWBAT observe a bird, and describe what they see.						
<b>State Standard(s):</b>						
<p><b>LS1 (K-4) SAE -2</b> Identify the basic needs of plants and animals in order to stay alive (water, air, food, space)</p> <p><b>LS2 (K-4) SAE -6</b> Describe ways plants and animals depend on each other (shelter, nesting, food)</p>						
<b>National Standard(s):</b>						
Characteristics of Organisms, their lifecycles, and their relation to their environs. Life Science Standard C.						
Time	Action	Assessment	Materials			
5 mins	Remind students about <i>Curious Garden</i> , and the birds that live there.	Did we see any birds in the Curious Garden book? Would birds go to the garden? Where do birds live?	Curious Garden book			
5 mins	Tell students that they are going to look for birds that live near their classroom. Like real scientists, they are going to record what they see.	Ss will complete bird observation.	colored pencils, worksheets			
15 mins	students observe birds					
15mins	students record observations	What did the birds look like? What color was your bird? What size was your bird? What were the birds doing? Do you think birds would come to the Curious Garden?	RINHS Bird Identification Guide			
5 mins	Have discussion with class	-emphasize connection between habitat and biodiversity-				

## **Lesson 5 (Indoor/Outdoor): Small Mammals**

This lesson is designed to allow your students to look for small animals in your area. Many small animals are, well, small, and tend to avoid children when they are excited and noisy! Since animals are also most active at dawn and dusk, when school is normally closed, this lesson focuses on gathering evidence that small animals live in/near urban gardens. While there are multiple methods, footprint 'traps' work well for this by providing an exciting way for citizens to use observational evidence and make scientific deductions.

The area you use could be your schoolyard, or in a nearby park or wild area. Keep in mind that the traps will need to be left overnight, so public areas may not be appropriate for this activity. Use your judgment as to what will work best for your students.

**To set up the flour trap, you will need the following:**

- Plywood board (2' x 2' or larger)
- flour
- canned dog or cat food
- screws/nails
- screwdriver/hammer

The day before you intend to give the lesson, poke holes in the can of cat or dog food, but leave it unopened. Attach the can securely to the center of the board with nails or screws. Sprinkle a thin layer of flour on the plywood, and leave the trap overnight to see which visitors you may have gotten to your school garden or grounds. As small animals (quadrupeds) investigate the food, they will leave tracks in the flour. The tracks will allow us to see what lives in the area. Have the students identify the footprints using the footprint guide.

**Tips for teaching the lesson:**

Set up the trap the day before. It is useful to mark off the area to be observed before bring your students. This helps prevent a student from stepping in the flour and ruining the flour prints!

<b>Name:</b> Flour Traps and Animal Tracks	<b>Topic:</b> Small Animals (quadrupeds)		
<b>Subject:</b> Life Sciences	<b>Grade Level:</b> K-5		
<b>Objective SWBAT</b> classify living things based on their tracks and other evidence.			
<b>State Standard(s): LS1 (K-4) INQ + POC-1</b>			
Sort/classify different living things using similar and different characteristics. Describe why organisms belong to each group or cite evidence about how they are alike or not alike.			
<b>National Standard(s):</b> As a result of activities in grades K-4; all students should develop:			
<ul style="list-style-type: none"> <li>understanding of organisms and environments</li> <li>abilities necessary to do scientific inquiry</li> </ul>			
Time	Action	Assessment	Materials
5 min.	Intro- relate back to Curious Garden.	What lived in Liam's garden? Were there animals there? Did we see animals? Were the animals hiding? How could we see them? (rhetorical)	Flour trap from yesterday
5 min.	T shows Ss how to ID from footprints	Does anyone know what a footprint is? What do footprints look like?	Animal Tracks
10 min.	Ss practice ID from footprints	What makes the rabbit track different from the others? What makes the rat different than the others? What do salamander tracks look like? What do dog tracks look like?	
10 min.	Ss predict what happened, then leave classroom, look at flour trap	Record the student responses before and after, so you can compare.	
5 min.	Look for other signs, hair, droppings, etc.		
	T shows Ss trap results, verify results.	What did we see? What did we predict? Are those the same, or different? Does anyone want to change the prediction? Would scientists ever do that?	(Scientists change their ideas all the time, so that the ideas fit the results.)
10 min.	Head back to class, compare results to predictions.		

## **Lesson 6 (Indoor/Outdoor): Soil**

This lesson is designed to allow your students to examine the soil in your area. This area could be your schoolyard, along a nearby street, or in a nearby park or wild area. As with any trip outside the classroom, student safety comes first. Use your judgment as to what will work best for your students.

### **Materials for the lesson:**

You will need some equipment for this lab, which can be easily found in most science labs or kitchens:

- Clipboards and pens
- Trowel or small shovel
- Plastic bucket for soil samples
- Timer or stopwatch
- Clear plastic cups
- A gallon of water
- A graduated cylinder or measuring cup
- Funnels
- Empty two-liter bottles
- Ring stand
- Desk lamp or light bulb

### **Conducting the tests:**

- **Observation test:** Students will compare their soil sample to samples of pure clay, and pure sand. Which sample is most like their soil? What is their soil made of?
- **Water test:** Students will put their soil into a funnel. Then, they will pour water through their soil sample. How long does it take the water to come out the bottom?
- **Sinking/floating test:** Students will put some of their soil into a graduated cylinder, and then fill the cylinder with water. Does their soil sink, or float? Does it do both?
- **Squeeze test:** Students will grab a handful of their soil, and squeeze it together. Does it stick together like clay, or does it fall apart immediately, like sand?

- Living thing test:** Students will need a ring stand and a two-liter bottle, cut in half. Put the top of the bottle in the ring stand, like a large funnel, and put the rest of the bottom underneath. Add soil to the upside-down top of the two-liter bottle. Then, put the light directly over the soil. As the soil gets warmer and drier, living things will move away from the heat. They will fall into the other part of the bottle over time. This test takes about 20-30 minutes.

**Students are likely to find many living things inside soil. At this age, general descriptions of organisms are appropriate (worm, ant, spider, mite, beetle). Lesson 3 may also be helpful in identifying some insects. Emphasize that soil is important, because it is the home for these creatures, and healthy soil is the home of lots of different organisms.**

#### Tips for teaching the lesson:

Start collecting two liter bottles. If weather is poor, these tests can all be done within a classroom. Just gather the soil in advance.

Name: Examining Soil Properties and Soil as Habitat	Topic: Soil		
Subject: Life Sciences	Grade Level: K-5		
Objective SWBAT describe the characteristics of a soil sample			
<b>State Standard(s): LS3 (K-4) SAE -7</b> Using information (data or scenario), explain how changes in the environment can cause organisms to respond(e.g. survive there and reproduce, move away, die).			
<b>National Standard(s):</b> As a result of activities in grades K-4; all students should develop:			
<ul style="list-style-type: none"> <li>understanding of organisms and environments</li> <li>abilities necessary to do scientific inquiry</li> </ul>			
Time	Action	Assessment	Materials
2 min.	Intro Demo: set up living thing test (may want to set up 2-3 to make sure)	What is in the top bottle? What is in the bottom bottle. Does anything live there? Do we see anything? What happens if we put the light very close?  Do we see anything right away? Will we see anything later?	timer or stopwatch
5 min	Collect/Distribute soil samples	students will turn in data	soil samples; containers, shovels,
5 min			

stations: 5 min. each (20 min. total)	<ul style="list-style-type: none"> <li>• Observation test</li> <li>• Water test</li> <li>• Sinking/floating test</li> <li>• Squeeze test</li> </ul>	What is your soil like? Do you have the same soil as anyone else? Is it okay to have a different answer?	lab materials (see above) soap and water sponge/paper towels mop and bucket
5 min.	Return to living thing test; observe results	What is in the top bottle? The bottom bottle? Does anything live there? Can you see anything? What is different? Why is there a difference?	
3 min.	Discuss, turn in results		
5 min.	Clean up, return soil, wash up		

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