Student Notebook
Finding Urban Nature

Use the scientific process to discover nature’s interconnections in the schoolyard habitat
Finding Urban Nature (FUN) is a hands-on, natural science discovery program that has reached more than 25,000 students in 26 Seattle Public Schools since 1989. Spanning eight lessons throughout the school year, small groups of 3rd and 4th graders, with the assistance of volunteer guides, examine their schoolyard habitats and discover the plants and animals that live there. Parents, Seattle Audubon members, senior citizens, university students, and other community members are among the hundreds of volunteer guides who share their love of nature and the environment with the children. The aim of FUN is to open the eyes of the participants to the fact that nature is all around us, even in an urban setting. FUN provides a means of bringing the excitement of environmental discovery into the classroom, while introducing students to the processes of scientific inquiry, observations, recording data, and making and testing hypotheses.

The FUN program is one of the longest-running and highly-valued education programs at Seattle Audubon.

This notebook was developed by Anita Lagerberg and Martha Nester. It has evolved with help from:

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FINDING URBAN NATURE

FIELD NOTES FOR LEAF HUNT

DATE ______________ LOCATION __________________________________ TIME__________

WEATHER:   □ Rainy       □ Cloudy or Partly Cloudy   □ Sunny

PREDICTED NUMBER OF PLANT SPECIES IN STUDY AREA ___________ (estimate at the beginning)

ACTUAL NUMBER OF PLANT SPECIES IN STUDY AREA _______________ (count at the end)

VOCABULARY

Habitat: A place where an animal or plant lives and can find food, shelter, oxygen, water, and space to survive.

Species – a group of individuals that share a unique set of characteristics

Characteristics: Traits that describe living and non-living things (e.g., color, shape, texture).

Leaf Form: The overall shape of the leaf (oval, heart, or triangle, etc.).

Leaf Margin: The outer edge of the leaf (smooth, toothed, etc.).

Leaf Form: the overall shape of the leaf

□ Oval    □ Heart    □ Round    □ Triangle    □ Narrow

□ Lobed    □ Scaly    □ Needles    □ Compound    □ Other?

Leaf Margin: the outer edge of the leaf

□ Smooth    □ Toothed    □ Other?

Leaf Texture: how the leaf feels in your hands

□ Smooth    □ Rough    □ Scaly    □ Thick    □ Thin    □ Fuzzy    □ Other?
# Leaf Form Bar Graph

<table>
<thead>
<tr>
<th># of Leaves Collected</th>
<th>Oval</th>
<th>Heart</th>
<th>Round</th>
<th>Triangle</th>
<th>Narrow</th>
<th>Lobed</th>
<th>Scaly</th>
<th>Needles</th>
<th>Compound</th>
<th>Other</th>
</tr>
</thead>
<tbody>
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</tbody>
</table>

Leaf Form Type
### Leaf Margin Bar Graph

<table>
<thead>
<tr>
<th># of Leaves Collected</th>
<th>Smooth</th>
<th>Toothed</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>35</td>
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</table>

**Leaf Margin Type**

*Leaf Hunt, Continued*
Use the bar graphs you created to answer the following questions:

1. The most common leaf form collected is: _________________________________
   a. Our group collected ____________ leaves with this leaf form.

2. The least common leaf form collected is: _________________________________
   a. Our group collected ____________ leaves with this leaf form.

3. The most common leaf margin collected is: _______________________________
   a. Our group collected ____________ leaves with this leaf margin.

4. The least common leaf margin collected is: _______________________________
   a. Our group collected ____________ leaves with this leaf margin.

5. How do animals depend on plants in a habitat?
   ________________________________________________________________
   ________________________________________________________________
   ________________________________________________________________

6. Why is it important to have different types of plants in your schoolyard habitat?
   ________________________________________________________________
   ________________________________________________________________
   ________________________________________________________________

**Challenge Question:** What would happen if all of the grass in this habitat was replaced with many different species of plants?
   ________________________________________________________________
   ________________________________________________________________
   ________________________________________________________________

Leaf Rubbing Page
FINDING URBAN NATURE

FIELD NOTES FOR WEB IT

DATE ______________ LOCATION ____________________________ TIME ______________

WEATHER □ Rainy □ Cloudy or Partly Cloudy □ Sunny

Vocabulary

- **arachnid** – a group of animals that include spiders, mites, and ticks
- **adaptation** – an inherited trait, like a special behavior or physical characteristic, that helps a species survive in its habitat
- **wave** - a disturbance that travels through space and matter transferring energy from one place to another
- **predator** – an animal that hunts other animals for food
- **prey** – an animal that is hunted for food

QUESTIONS FOR THE DAY

1. What did you observe the spider do when a leaf or pine needle was placed in its web? (skip this question if you did not find a spider in a web)

____________________________________________________________________________________________________

____________________________________________________________________________________________________

____________________________________________________________________________________________________

2. Why are spiders important to the habitat around your school?

____________________________________________________________________________________________________

____________________________________________________________________________________________________

____________________________________________________________________________________________________
3. How do spiders find prey or foreign objects in their web?

a. **Challenge Question:** Are spiders born with this ability? What is the word that describes an ability or characteristic that an animal is born with?

4. Which web type is most common in your study site?

a. **Challenge Question:** Why do webs come in different shapes and sizes?

5. Are spiders using human-made places to build their webs? If yes, what are they using?
FINDING URBAN NATURE
FIELD NOTES FOR ROOTS & SHOOTS

DATE __________________ LOCATION _____________________________ TIME __________________

WEATHER □ Rainy □ Cloudy or Partly Cloudy □ Sunny

VOCABULARY

- *competition* – the fight for resources in order to survive
- *shoot* – the above-ground part of a plant (stems, branches, leaves, flowers, and fruit)
- *fibrous root* – the below-ground part of a plant with a large mass of string like roots
- *taproot* – the below-ground part of a plant with a long main root (which may have smaller roots growing from it)
- *invasive species* - A species that is non-native, able to succeed in many habitats, grows quickly, and spreads to the point of disrupting an ecosystem.

QUESTIONS FOR THE DAY

1. What resources does a plant need to survive?

   ____________________________________________________________

   a. What happens if a plant does not get all of these resources?
   ____________________________________________________________
2. Why are roots and shoots important to a plant?
Roots:_________________________________________________________________________________________________
__________________________________________________________________________________________________
__________________________________________________________________________________________________

Shoots:_____________________________________________________________________________________________
__________________________________________________________________________________________________

3. What makes invasive species such great competitors?
____________________________________________________________________________________________________
__________________________________________________________________________________________________
__________________________________________________________________________________________________

4. How do animals, including humans, use plant roots and shoots?
____________________________________________________________________________________________________
__________________________________________________________________________________________________
__________________________________________________________________________________________________

5. What was one interesting thing you observed today?
____________________________________________________________________________________________________

Use the space below to draw some interesting things that you observed today.
FIELD NOTES FOR Neighborhood birds

VOCABULARY

*Diversity:* The differences between living things in a habitat.

*Circumference:* the measurement around something that is round, like your head or an orange. In this lesson, you will measure the distance around the middle of the bird.

*Species* – a group of individuals that share a unique set of characteristics

♀: The symbol for female

♂: The symbol for male

Use your Bird Skin Observations to answer these questions:

1. Which bird has the longer body length? ________________________________

2. Which bird has the larger body circumference? ________________________________

3. Looking at this bird's beak, what type of food do you think it eats? Why do you think this?
   ______________________________________________________________________
   ______________________________________________________________________
   ______________________________________________________________________

4. Looking at the bird’s feet, where do you think this bird might spend much of its time?
   - ☐ In the water
   - ☐ Perching on branches
   - ☐ Seizing prey
   - ☐ Climbing up and down tree trunks

5. Describe the characteristics of one of your birds that help it survive in its habitat.
   ______________________________________________________________________
   ______________________________________________________________________
   ______________________________________________________________________
   ______________________________________________________________________

6. **Challenge Question:** What can you do to help birds survive in your neighborhood?
   ______________________________________________________________________
   ______________________________________________________________________
   ______________________________________________________________________
   ______________________________________________________________________
# BIRD SKIN OBSERVATION DATA SHEET

**DATE** 

**TEAM** 

**MEMBERS**

<table>
<thead>
<tr>
<th>NAME OF BIRD</th>
<th>1.</th>
<th>2.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MALE OR FEMALE</td>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>BIRD BODY LENGTH</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Measure the bird from tip of beak to tip of tail, down its back.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>BIRD CIRCUMFERENCE</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Measure the bird around the widest part of its body.</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>SHAPE OF BEAK</th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Draw a picture of the shape of its beak.</td>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>SHAPE OF FEET</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Draw a picture of the shape of its feet.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>COLOR AND MARKINGS OF BIRD</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Beak</td>
<td>Food</td>
<td></td>
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<tr>
<td>------</td>
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<td></td>
</tr>
<tr>
<td><img src="image" alt="Overlapping beak to tear and open cones. (Example: Crossbill)" /></td>
<td><img src="image" alt="Cone" /></td>
<td></td>
</tr>
<tr>
<td><img src="image" alt="Longish and sharpish beak to dig/grab insects. (Example: Woodpeckers)" /></td>
<td><img src="image" alt="Insect" /></td>
<td></td>
</tr>
<tr>
<td><img src="image" alt="Short, thick, and pointed beak for cracking and eating seeds. (Example: Sparrows, Finches)" /></td>
<td><img src="image" alt="Seed" /></td>
<td></td>
</tr>
<tr>
<td><img src="image" alt="Long and pointed beak like a spear to catch and eat fish. (Example: Great Blue Heron, Kingfisher)" /></td>
<td><img src="image" alt="Fish" /></td>
<td></td>
</tr>
<tr>
<td><img src="image" alt="Flat and scoop-like to sift pond weeds out of water. (Example: Ducks)" /></td>
<td><img src="image" alt="Pond weeds" /></td>
<td></td>
</tr>
<tr>
<td><img src="image" alt="Large and sharply hooked for tearing and eating meat. (Example: hawks, falcons, vultures)" /></td>
<td><img src="image" alt="Smaller birds, rodents, rabbits" /></td>
<td></td>
</tr>
<tr>
<td><img src="image" alt="Long and wide – good for scavenging. (Example: Gulls, Crows)" /></td>
<td><img src="image" alt="Food scraps and road kill" /></td>
<td></td>
</tr>
<tr>
<td><img src="image" alt="Long and narrow to reach into flowers for nectar. (Example: hummingbirds)" /></td>
<td><img src="image" alt="Flowers" /></td>
<td></td>
</tr>
<tr>
<td>Primary Activity</td>
<td>Foot Shape</td>
<td>Adaptation and Lifestyle</td>
</tr>
<tr>
<td>-----------------------</td>
<td>------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>Swimming</td>
<td><img src="image1.png" alt="Image" /></td>
<td>Webbed feet help birds, like ducks, paddle through water efficiently. Gulls have similar feet to prevent them from sinking into mud and wet sand as they walk about.</td>
</tr>
<tr>
<td>Swimming and Walking</td>
<td><img src="image2.png" alt="Image" /></td>
<td>These feet belong to semi-aquatic birds that spend some time swimming and some time walking around on land. The lobes help the birds swim efficiently, and walk well on land. Coots and grebes have lobed feet.</td>
</tr>
<tr>
<td>Perching on branches</td>
<td><img src="image3.png" alt="Image" /></td>
<td>Perching birds like wrens, warblers, and thrushes have flexible toes. Three point forward and one points backward. When a perching bird sits on a branch, a tendon on the back of the ankle automatically locks the toes around the branch; this prevents the bird from falling out of the tree while sleeping.</td>
</tr>
<tr>
<td>Seizing Prey</td>
<td><img src="image4.png" alt="Image" /></td>
<td>Birds of prey, like falcons, hawks, and vultures, have claw-like feet called talons from grabbing prey.</td>
</tr>
<tr>
<td>Climbing</td>
<td><img src="image5.png" alt="Image" /></td>
<td>Woodpeckers have two toes point forwards and two pointing backwards. This lets them climb up, down, and sideways on tree trunks. Notice the sharp nails for holding onto wood.</td>
</tr>
</tbody>
</table>
# FINDING URBAN NATURE

## FIELD NOTES FOR Bird Nests

**DATE** ______________________  
**LOCATION** _____________________________  
**TIME** _____________________________

### WEATHER
- [ ] Rainy
- [ ] Cloudy or Partly Cloudy
- [ ] Sunny

---

**GOAL:** Build a model of an ideal nest for your schoolyard habitat.

## 1. PLAN

**Criteria:** Details that will make your project successful  
My bird nest will have these criteria:

- [ ] ______________________________________
- [ ] ______________________________________
- [ ] ______________________________________
- [ ] ______________________________________

**Constraints:** Limits that you will need to work around  
List the limits you think you will have in this habitat:

- ______________________________________
- ______________________________________
- ______________________________________
- ______________________________________

---

## 2. BUILD

Prepare the nest frame, collect nesting materials, weave and fill the nest.

Circle the materials you used for your nest:

- twigs
- green grass
- dried grass
- pine needles
- green leaves
- dried leaves
- hair/feathers
- mud
- bark
- moss/lichen
- Other: ________________________________

I lined the inside of my nest with: ________________________________

---

## 3. TEST

My nest passed the following tests:

- [ ] Egg test (Will your nest hold a rock, or does the rock fall through a hole?)
- [ ] Windstorm test (Does it stay together when lightly shaken or bumped?)
- [ ] Camouflage test (Does it blend in with the habitat while still accessible for birds?)

---

## 4. RETRY

What do you need to change about your nest to make it better fit the criteria in your plan?
FINDING URBAN NATURE
Bird Nests - Continued

VOCABULARY

engineer – (noun) Someone who designs and builds structures to help solve problems.
   – (verb) To plan and build a solution to a problem.
criteria – The characteristics and requirements an engineer would like to include in a design for a successful final product.
constraints – Limits to a possible engineering solution or problem, like available resources and materials.
camouflage – Characteristics that allow an animal or object to blend into its environment

QUESTIONS FOR THE DAY

1. Why do birds build nests?

2. How are birds adapted to build nests? How do they know what to do?

   Challenge Question: What happens if a nest that a bird built fails (for example, it falls apart in bad weather)?

3. How did you choose the place to put your nest?

4. Is your schoolyard habitat a good place for birds to build nests? Why or Why not?

   Challenge Question: What happens if the materials that a bird usually uses to build a nest go away (for example, if a forest gets logged, if there is a fire or flood, etc.)
**DATE ______________________ LOCATION ________________________________ TIME__________________**

**WEATHER**  
- ☐ Rainy
- ☐ Cloudy or Partly Cloudy
- ☐ Sunny

Use the tally chart below to mark the types of litter critters you found in the natural litter:

<table>
<thead>
<tr>
<th>Litter Critter</th>
<th>Tally</th>
<th>Decomposer?</th>
<th>Predator?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ant</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beetle</td>
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<td></td>
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<tr>
<td>Centipede</td>
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<tr>
<td>Millipede</td>
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<td></td>
<td></td>
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<tr>
<td>Earwig</td>
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<td></td>
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<tr>
<td>Earthworm</td>
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<tr>
<td>Mite</td>
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<tr>
<td>Pill Bug/Roly Poly</td>
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<td>Slug</td>
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<tr>
<td>Sow Bug/Potato Bug</td>
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<td>Snail</td>
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<tr>
<td>Spider</td>
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<tr>
<td>Worms (small, not earthworm)</td>
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<td>Other:________________________</td>
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<tr>
<td>Other:________________________</td>
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</table>
Graph the data from the chart above in the bar graph below:

<table>
<thead>
<tr>
<th>Number of Litter Critters Found</th>
<th>Ant</th>
<th>Beetle</th>
<th>Centipede</th>
<th>Millipede</th>
<th>Earwig</th>
<th>Earthworm</th>
<th>Mite</th>
<th>Pill Bug</th>
<th>Slug</th>
<th>Sow Bug</th>
<th>Snail</th>
<th>Spider</th>
<th>Worms (Other)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
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</table>

**VOCABULARY**

- **decomposer** – an animal that eats dead and decaying material and returns the nutrients back to the environment
- **natural litter** – materials left by plants and animals, such as dead leaves, sticks and branches, scat, fur and feathers, etc.
- **predator** – an animal that hunts other animals for food
- **prey** – an animal that is hunted for food
- **entomologist** – a scientist who studies insects
QUESTIONS FOR THE DAY

1. How many of the critters that you found are decomposers? How many are predators?

__________________________________________________________________________________________________________

__________________________________________________________________________________________________________

What are the critters doing in the litter?

__________________________________________________________________________________________________________

2. Describe the habitat where you found your litter critters.

__________________________________________________________________________________________________________

__________________________________________________________________________________________________________

__________________________________________________________________________________________________________

3. What is the difference between natural litter and litter left behind by humans?

__________________________________________________________________________________________________________

__________________________________________________________________________________________________________

__________________________________________________________________________________________________________

Challenge Question: What would happen if humans removed all of the natural litter from the schoolyard habitat?

__________________________________________________________________________________________________________

__________________________________________________________________________________________________________

Would birds be affected? How about other animals?

__________________________________________________________________________________________________________

__________________________________________________________________________________________________________
DATE ______________________ LOCATION ______________________________ TIME____________________

WEATHER  □ Rainy  □ Cloudy or Partly Cloudy  □ Sunny

Habitat: Check the words that best describe your quadrat or sample square.
   ____ Bare ground          ____ Garden bed          Other__________
   ____ Grassy/Weedy         ____ Shrub area
   ____ Next to sidewalk/building   ____ Tree area

Environmental Factors: things that affect a habitat: Check all that describe the area inside your sample square.
1. Ground cover in your quadrat or sample square
   ____ Lots of grass/weeds     ____ Just a little grass/weeds     ____ No grass, just soil
   ____ Wood chips            ____ Leaf litter
   Other____________________

2. Weather Conditions
   ____ Sunny: sample area is → __ in the sun    OR   ___not in the sun
   ____ Cloudy
   ____ Rainy
   ____ Air Cold    OR    ____Air Warm

3. Soil Conditions
   ____ Packed, hard to push in stakes       ____ Loose, easy to push in stakes
   Soil is:  ____ dry       ____ damp

   ____ Soil has an earthy smell         ____ Soil does not have an earthy smell
   ____ Soil dark in color        ____ Soil light in color
   ____ Water soaked in slowly    ____ Water soaked in quickly

I predict we will or will not find a lot of earthworms here because
# Worm Worlds - Continued

## Worm Count

<table>
<thead>
<tr>
<th>Worms</th>
<th>Tally Marks</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of <strong>juvenile</strong> worms found in your group’s quadrat</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of <strong>adult</strong> worms found in your group’s quadrat</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Total number of worms found at your group’s quadrat

Did you see any other animals (besides worms) in or around your quadrat?  

- **YES**  
- **NO**

If yes, what animals did you see?

<table>
<thead>
<tr>
<th>NOTES:</th>
</tr>
</thead>
<tbody>
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</tbody>
</table>
FINDING URBAN NATURE
Worm Worlds Data Sheet, Week 2

DATE ________________________ LOCATION ______________________________ TIME______________________

WEATHER

☐ Rainy
☐ Cloudy or Partly Cloudy
☐ Sunny

Habitat: Check the words that best describe your quadrat or sample square.

_____ Bare ground
_____ Garden bed
Other__________

_____ Grassy/Weedy
_____ Shrub area

_____ Next to sidewalk/building
_____ Tree area

Environmental Factors: things that affect a habitat: Check all that describe the area inside your sample square.

1. **Ground cover** in your quadrat or sample square
   
   ___ Lots of grass/weeds
   ___ Just a little grass/weeds
   ___ No grass, just soil
   ___ Wood chips
   ___ Leaf litter
   Other_________________

2. **Weather Conditions**

   ___ Sunny: sample area is → ___ in the sun   OR   ___not in the sun
   ___ Cloudy
   ___ Rainy
   ___ Air Cold   OR   ___Air Warm

3. **Soil Conditions**

   ___ Packed, hard to push in stakes
   ___ Loose, easy to push in stakes

   Soil is: ___ dry
   ___ damp

   ___ Soil has an earthy smell
   ___ Soil does not have an earthy smell
   ___ Soil dark in color
   ___ Soil light in color
   ___ Water soaked in slowly
   ___ Water soaked in quickly

I predict we will or will not find a lot of earthworms here because
Worm Worlds – Continued

Worm Count

<table>
<thead>
<tr>
<th>Worms</th>
<th>Tally Marks</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of <strong>juvenile</strong> worms found in your group’s quadrat</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of <strong>adult</strong> worms found in your group’s quadrat</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total number of worms found at your group’s quadrat</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Did you see any other animals (besides worms) in or around your quadrat?  

YES  NO

If yes, what animals did you see?

<table>
<thead>
<tr>
<th>Notes</th>
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<tbody>
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</tbody>
</table>

NOTES:
FINDING URBAN NATURE
Conclusions for Worm Worlds

VOCABULARY

- **environmental factor** – conditions that have an effect on a habitat, e.g. the amount of moisture in the soil, full-sun vs. shade, presence of vegetation, etc.
- **clitellum** – the band around an earthworm containing its reproductive organs
- **juvenile** – immature; not able to reproduce
- **adult** – mature; able to reproduce
- **oligochaetologist** - scientist who studies terrestrial and aquatic annelids (worms)

Enter your data here to help you finish your conclusion.

<table>
<thead>
<tr>
<th>Worm Counts</th>
<th>Week 1:</th>
<th>Week 2:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of earthworms</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of adults</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of juveniles</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Environmental Factors</th>
<th>Week 1:</th>
<th>Week 2:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ground cover</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weather</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soil Conditions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. The site with the most worms was _______________________. Here we found _____ worms.

2. The site with the least worms was _______________________. It only had _____ worms.

3. I predicted we would find (circle one) **A LOT OF WORMS** or **NOT AS MANY WORMS** during Week 2, compared to Week 1. These data **SUPPORT** or **DO NOT SUPPORT** our prediction.

4. We believe more earthworms were found in Week _______ because the soil was **HARD** or **SOFT**, absorbed the slurry **QUICKLY** or **SLOWLY** and the air temperature was **COOLER** or **WARMER** than Week _______.

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If we were to do this investigation again, we would change

Write more below if these sentence starters do not work with your data.