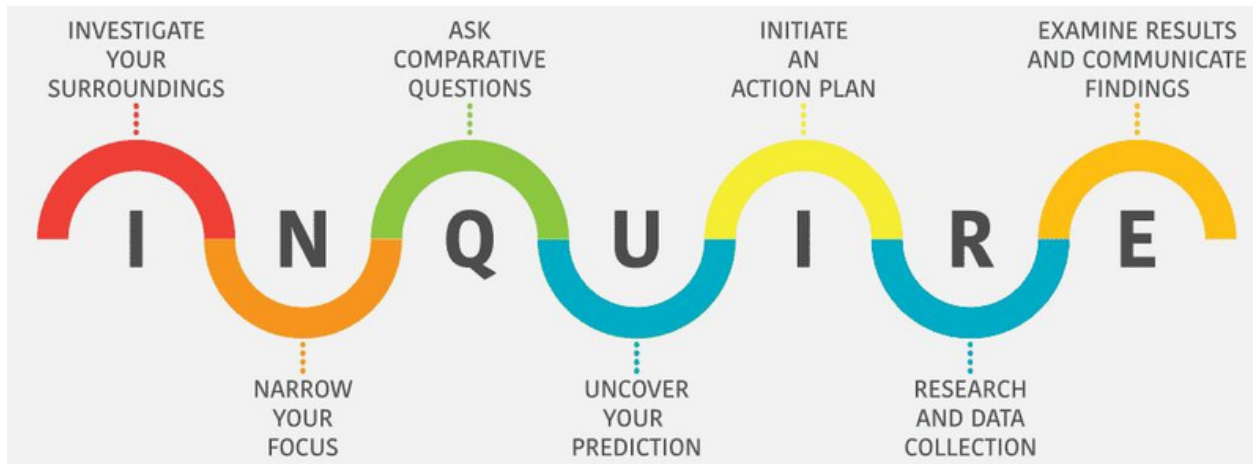


Exploring Living Things in Ecosystems

An inquiry-based lesson plan designed to promote critical thinking by integrating content with traditional and inquiry-based learning.



All Hands-On Learning is NOT Inquiry-Based Learning

Inquiry based learning is process-oriented and does not focus on a single correct answer, but rather emphasizes the process of gathering information and forming a conclusion. Traditional hands-on learning tends to be product-oriented and has students follow a pre-planned procedure to come to a single, specified answer.

Key Terms

Process Skills (PS)

Skills that students will engage in while thinking critically. These include observing, questioning, predicting, planning, investigating, interpreting, and communicating. These skills are found in each step of the inquiry process.

Investigating Surroundings

Observing the overall surroundings. What do I see? What is understood about the topic? What still needs to be understood?

Narrowing Focus

Observing student needs and interests, as well as academic content. Find the balance between natural curiosity and standards-based concepts. What area can be concentrated on to best promote growth and learning?

Questioning

Forming questions about what is not fully understood. Comparative questions can be investigated. They need to be able to lead into an action plan. What can be found out?

Uncover Prediction

Logically thinking to form a prediction about what could happen. What do I expect to happen based on my experiences and knowledge?

Initiate Plan

Figure out the action plan. Design an experiment which will answer the comparative question. What can I do to answer this question? How can I find this out?

Research and Collect Data

Investigating the elements of the experiment. Researching and collecting data that applies to the action plan.

Examine Results

Interpreting the data collected. What does this data mean? What else do I want to find out?

Communicating

Communicating the information that was found to someone else. The way the data is presented. What will the audience want to know? What will the audience be able to understand about this?

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Overview

This is an inquiry-based learning lesson in which students learn about how ecosystems support living organisms. Students will be engaged in hands-on activities to answer a comparative question regarding: will different living organisms be more likely to be located on a mountain or in a valley? They will analyze their findings and present to the class. The project will link IBL with traditional teaching by giving teachers options to best suit the needs of the class. More questions will emerge to continue scientific investigations and further the learning process.

Practical Application

This experiment allows students to understand what living organisms need to survive as well as how different environments support different organisms. Each student will have practice with the scientific process, including documenting and interpreting data.

Lesson Plan

Grade Level: K, 1

Class:

Teacher:

Time Required/Duration: 4 days, 30-45 minutes each

Objectives

1. Incorporate the process of inquiry-based learning into a traditional direct instruction classroom setting.
2. Students will be able to identify living things in a model ecosystem.
3. Students will be able to label parts of an animal and create a visual of the habitat the animal lives in.
4. Students will be able to identify where an animal would be most likely to live.
5. Students will be able to collect data about where different organisms are located on a model ecosystem.
6. Students will be able to uncover additional questions and think critically about the data found.

Standards

Scientific Inquiry, Practice and Applications

- Apply knowledge of science content to real-world challenges.
- Plan and conduct simple scientific investigations using appropriate safety techniques based on explorations, observations and questions.
- Employ simple equipment and tools to gather data and extend the senses.
- Use data and mathematical thinking to construct reasonable explanations.
- Communicate with others about investigations and data.
- The world is discovered through exploration.
- Exploration leads to observation. Observation leads to questions.
- Natural events happen today as they happened in the past.
- Events happen in regular patterns and cycles in the natural world.

Educational Standards

K.LS.1 Living things have specific characteristics and traits.

K.LS.2: Living things have physical traits and behaviors, which influence their survival.

1.LS.2: Living things survive only in environments that meet their needs.

1.LS.1: Living things have basic needs, which are met by obtaining materials from the physical environment.

Materials

Needed:

1. Chart Paper/ Easel
2. Coloring supplies
3. Screen to Project Student Findings

Vocabulary

(See Appendix 2 for Vocabulary Defined)

Living	River
Comparative Question	Tally Marks
Prediction	Ecosystem Model
Shelter	Environment
Habitat	Deer
Mountain	Eagle
Valley	Squirrel
	Rabbit

Instructional Procedure

Day 1¹

1. Ask students to give examples of living things. Write these ideas on easel paper or whiteboard, under the heading “Living things”.
2. Ask students if they agree with this list. Why or why not?
3. Think, pair, share about what all living things have in common, and what living things need to survive. Write these ideas down.
4. Give students the scientific definition of living things (“Background Science”, page 10). Explain how their ideas were very close to what scientists have determined.
5. Introduce the ecosystem model and have students brainstorm different living things that could be found in that type of environment. **(Investigate Surroundings)**
6. Students will then independently create a list of living organisms that might be located within that environment (in their Investigation Book). Lists should be a combination of pictures and labels based on the writing capabilities of your students. **(Narrow Focus)**
 - a. These lists should be collected and used in the Day 2 lesson. (Make note of students who understand the concept of living and those that need further work with this term. Make sure to clarify any of their drawings if unsure what they meant.)
7. Students will write on their KWL chart (in their Investigation Book) what they know and wonder about living things.

Day 2

1. Discuss some of the living things students listed that could be found in this particular ecosystem. Have students explain why those living things would be located in this type of environment. If students do not initially state any non-examples, create some of your own to spark discussion as to why those living things would not be found in this environment (i.e. whales or camels).
2. Discuss that even in this one ecosystem there are different landforms. Ask students if they think some animals might live in some areas instead of others, leading them to wonder if some animals may live in the valley but not the mountain and vice versa. Have them think, pair, share their ideas about this. After allowing discussion, inform students that the class could look into this further.
3. Introduce the comparative question: Would a certain animal (deer, squirrel, eagle, rabbit) be more likely to be located on a mountain or in a valley? **(Ask Comparative Questions)**
4. Have students go to their seats and make a prediction about where they think each animal would be more likely to be located (“My Predictions” in their Investigation Book). **(Uncover Prediction)**
5. After making their predictions, have students talk briefly with small groups as to where they think each animal may be located.
6. As a class, view the model ecosystem and the different animal models that are located on the ecosystem model. Determine how to collect data as to where each animal is located. If students are struggling, help lead them towards utilizing tally marks. **(Initiate Action Plan)**
7. Direct students to write in their KWL chart for the day about what they have learned so far.

¹ This will be an introductory lesson on living things for kindergarteners and a review for first grade

Day 3

1. Re-engage students with the comparative question: Would a certain animal (deer, squirrel, eagle, rabbit) be more likely to be located on a mountain or in a valley?
2. Explain to students each of the 4 stations that will allow them to research the comparative question, learn more about a specific animal in this ecosystem, and show what they have learned thus far.

- Station 1. Ecosystem: Students will collect data in the form of tally marks as to how many of the specific animal are located on the mountain and how many are located in the valley. **(Research and Collect Data)** After students have collected their data, have them compare whether their data shows that there were more of their animal on the mountain or in the valley. **(Examine Results)**
- Station 2. Informational Books: Students will buddy read the book attached about their specific animal or they can read informational books provided by the teacher about living organisms. **(Research and Collect Data)** Draw and
- Station 3. Label: Students will be given an image of their animal. They should label as many parts of their animal as they can. After this is completed, they will draw and color the environment in which their animal lives. Our Environment: Students will draw a picture of their environment and the animals they typically see there.
- Station 4. They will label the animals in their picture and write about why those animals are present in their environment.

3. Split students into 4 mixed ability groups based on reading level. Assign each group to the animal they will investigate: deer, eagle, squirrel, or rabbit.
4. Have students rotate stations every 8 minutes with their group. As the teacher, make sure to circulate the room and provide assistance as needed (likely spending the most time at the ecosystem station to answer questions about the collection of data).
5. Direct students to write in their KWL chart for the day what they have learned.
6. After all materials have been collected, have students come back together and share with a partner (that was not in their group) one item that they learned today and one item they are excited to share with their peers tomorrow.

Day 4

1. Re-engage students in the comparative question: Would a certain animal (deer, squirrel, eagle, rabbit) be more likely to be located on a mountain or in a valley?
2. Have students think, pair, share how they were able to investigate this question and collect data.
3. Explain that today students will be able to share their data with their peers. They will do this by organizing all of their data onto a worksheet which they will present.
4. Students will work with their mixed ability groups from yesterday to analyze the data that was collected. **(Examine Results)**
5. Students will synergize to organize their ideas and findings clearly onto a worksheet which they will be presenting. Each student will write on their own copy of the worksheet.
6. Students will rehearse what they will say to their peers.
7. Groups will take turns communicating their findings with the whole class. The teacher can help make this process go smoothly by asking guiding questions and by projecting the groups' papers. **(Communicate Findings)**
8. Direct students to write in their KWL chart for the day what they have learned about living things. Guide students through the student feedback form (Appendix 6), collecting them once completed.
- 9.

Instructional Overview

Day 1

1. Introduce living things to the class.
2. The class will create a chart of living things, and a chart of what living things need to survive.
3. Introduce ecosystem model. **(Investigate surroundings)**
4. Students will create a list of living organisms that might live in that environment. **(Narrow Focus)**
5. Students write in their KWL chart.

Day 2

1. Discuss as a class what living things might live in the ecosystem model.
2. Introduce the comparative question: Would a certain animal (deer, squirrel, eagle, rabbit) be more likely to be located on a mountain or in a valley? **(Ask Comparative Questions)**
3. Students will make a prediction about each animal. **(Uncover Prediction)**
4. Students will discuss in small groups where they think each animal may be located.
5. Students and the teacher will determine how to collect data as to where each animal is located, leading towards utilizing tally marks. **(Initiate Action Plan)**
6. Students write in their KWL chart.

Day 3

1. Students will be engaged in four different stations where they collect data from the model ecosystem, read about living organisms, label parts of their animal, and draw the environment that their animal would live in. **(Research and Collect Data)**
2. Students write in their KWL chart.

Day 4

1. Students will analyze the data that was collected by answering questions on a worksheet. **(Examine Results)**
2. Students will communicate findings with the whole class. **(Communicate Findings)**
3. Students write in their KWL chart.
4. The teacher will administer the student feedback form.

Post-Assessment

1. Have each student answer the questions on the worksheet (Page 45).
-Discussion about the material during this time could be encouraged, but the answers should be in their own words and what they individually think.
2. Each group will prepare an explanation to the class about their findings. It should cover the data they collected for their animal and any other relevant information.

Background Science- Teacher Information

Scientifically speaking, an object is living if it has the ability to carry on life processes such as movement, respiration, growth, responsiveness to environmental stimuli and reproduction. When working on creating a definition with your class of what a living thing is, key characteristics to discuss would include: eating, breathing, and growing.

Making sure that students understand that plants are alive is important, but it can be confusing when discussing “breathing”. Plants use the air around them by taking it in through their leaves and using it, with the light, to feed itself and grow. When they do this, they release the things in the air (oxygen) they do not need, which people and animals use.

The ecosystem displays mountains, valleys, plains, and hills. Within these environments water, trees, and grass can be found. Each of these are important factors in the habitats of the living organisms this lesson revolves around. Students can assume that other items naturally found around each of these would be present here as well, such as nuts from trees, insects in the grass, and pebbles in the water. Note that some items in the ecosystem may not be to scale.

In this ecosystem, many animals can be found, some of which include: deer, squirrels, eagles, and rabbits. Deer are mammals that eat plants, such as grass, bark, and berries. They live in wooded areas, grasslands, and mountains. They usually live alone, other than when still protecting their young. Squirrels are mammals that eat seeds, nuts, fruit, and some insects. They live in trees, and live in both urban and rural areas. Eagles are birds that eat small animals, such as fish, rabbits, or any other animal that is available for them to eat. They make nests in high trees or in the mountain sides, and stay away from cities for the most part. Rabbits are mammals that eat plants, such as grass, clover, and flowers. In the winter they will eat twigs and tree bark. They sleep in tunnels underground, called warrens.

Journaling

Students will document their thoughts and questions each day for the duration of this lesson. Students will be writing in a KWL chart in their investigation books, which they will add on to each day. If needing to keep track of what was written each day, students can use different colors to write with on different days throughout the lesson, or the teacher can print multiple sheets of the KWL chart for the students to use a different page each day. Writing should be done at the end of each class period, that way they can document what they have learned each day and add any new questions that come to their minds. If the students already regularly engage in a journaling activity, the teacher can choose to use that method instead of the KWL chart. The goal of journaling is for students to reflect on their knowledge and how it has grown, as well as to think about and record the questions they have about this topic.

About Inquiry-Based Learning As It Applies To This Lesson Plan

This is a project that works best when students work in small groups (4-5). Inquiry is collaborative in nature. The process takes advantage of students' strengths to contribute to the project. Some are great communicators, some are problem-solvers, and some have well-developed technical skills. In the workplace, we also work in groups. We work as part of a team. The inquiry process develops skills necessary to solve complex problems in the world.

The students will benefit from the background science of living organisms. Make sure the book about living things is available to each group. Some in the group may have little interest in the material provided whereas others will want to read it in depth, but the end result will be that everyone in the group will know more about living organisms. Students can discuss where different organisms are located on the ecosystem model using the data collected through tally marks.

Investigate your surroundings and narrow your focus: Encourage each group to think about what living things need to survive. Have them get familiar with the ecosystem and discuss different resources in the environment that would help living things survive. Have them discuss why some animals might live in the mountainous areas or in the valley. Why would a certain animal live in the mountains? Why might they live in the valley? This is a good time for students to write down questions, which they can do in their KWL Chart.

Ask comparative questions: At the heart of inquiry is the comparative question. Comparative questions are ones that can be investigated. Some questions are very good questions, but they are very difficult to investigate. For example: Why are butterflies attracted to my flower garden? Good question, but difficult to investigate. However, we can take that question and change it to: Are butterflies attracted more to red flowers or white flowers? Do you see where we are going with this? You can now design an experiment to count how many butterflies visited each of the colors and compare the results. More questions will come of this process. Do the findings hold up for different kinds of butterflies? Another experiment can be designed. In the case of where different living organisms might live, the comparative question, at least somewhat, is being provided by you. This makes the lesson plan a guided inquiry. An open inquiry is one in which the students pick the topic, create the questions, create the action plan, etc. The comparative question for this lesson plan is: Would _____ be more likely to be located on the mountains or in the valley? Later, we will revisit the questions the students asked above and have them separate those questions that can be investigated and those that cannot. Often, questions that would be difficult to investigate can be made investigable by turning them into comparative questions.

Uncover your prediction: We are not talking about group-think here. What do you individually think? Each group will be collecting data for a different animal. Will the data that they find about one animal be the same as another animal? Each student will have a prediction and they should record that prediction. A prediction is not the same thing as a hypothesis. A hypothesis might be: All swans are white. A prediction would be: I think the next swan I see will be white. A prediction is based upon the individual's experiences, observations, opinions, knowledge, and instincts.

Initiate an action plan: The experiment has been provided. The action plan was designed to help students answer the comparative question. Students will take the data and logically find an answer to the comparative question. Ask the students to record their data on the data sheet provided. To make future lesson plans or repeats of this one more inquiry-based, simply ask them to make a data sheet and record their findings. Perhaps have half the groups use the data sheet provided and then let the other half come up with their own. Part of inquiry requires you to give up some control to allow your students to figure it out.

Examine results and communicate findings: Each group will present their findings to the class. Typically, each group would prepare a graph, data table, chart, pictures or whatever they want to communicate their findings to the class. A poster or section of white board is helpful. The group goes to the front and each member usually participates. As a group, they share the data they collected in the form of tally marks . They share their individual predictions. They share their analysis of the tally marks, giving their reasoning as to why they came to that logical conclusion. How do they answer the comparative question? What did they learn from the experience? Classmates then have an opportunity to ask questions to the presenting group.

Student/Teacher Roles for Each Step:

Investigate your surroundings:	The students are doing this
Narrow your focus:	The students and the teacher are doing this
Ask comparative question:	The teacher is doing this
Uncover your prediction:	Each student is doing this
Initiate an action plan:	The students and the teacher are doing this
Research and data collection:	The students are doing this*
Examine results and communicate findings:	The students are doing this

*You may use the data sheet provided or the student may create their own

Group Procedures

Station 1: Ecosystem

1. Turn to the “My Data” page in your Investigation Book.
2. Circle the animal your group is investigating.
3. Find the mountains on the ecosystem model.
4. Find each model of the animal your group is investigating on the mountains.
5. Count how many you see. In the box labeled “mountains” make a tally for each of your animal that you count.
6. Find the valley on the ecosystem model.
7. Find each model of the animal your group is investigating in the valley.
8. Count how many you see. In the box labeled “valley” make a tally for each of your animal that you count.
9. Talk with your group about how many tallies you have.
10. Determine if there were more located on the mountain or in the valley.

Station 2 : Reading

1. You will buddy read the book “Living Things”.
2. After you have finished reading, you can make your own list of living things.

Station 3: Draw and Label

1. Look at the picture of your animal.
2. Think about what you notice about it. Talk to your group.
3. Label as many parts on the animal as you know. Think about what these parts are for (ex. the mouth is for the animal to eat).
4. Think about where you have seen this animal before. Draw the environment that the animal would be found in.
5. Color the picture.

Station 4: Our Environment

1. Brainstorm with your group different animals that live in our environment.
2. Draw a picture of our environment with the animals you typically see around your community.
3. Label the animals in your picture.
4. Write a sentence or two about your picture.

Extension

This activity could be used as an extension or as homework. The goal of this activity is to allow students to think about where and when they see animals in their daily lives.

As an extension for this lesson, students can take home one of the data collection sheets provided on pages 16 and 17. Either of these will guide students through observing different animals in their environment. One of which focuses on the animals they have already investigated in class. The other focuses on different animals they may see in their own environment which may or may not include the animals already investigated.

Students will then bring back the information they collected and compare what they saw with their peers. There are many options as to what to do with this data, some of which include investigating:

- Is a specific animal more likely to be found in town or out of town?
- Is a specific animal more likely to be active during the night or day?

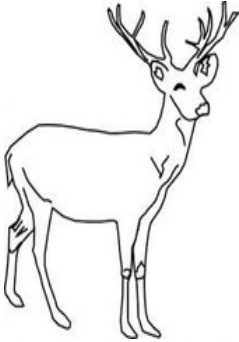
Animals Where I Live

Look for animals around your house or on a drive around town. Write down what animal you saw. What time of day did you see it? Where did you see the animal? What was the animal doing?

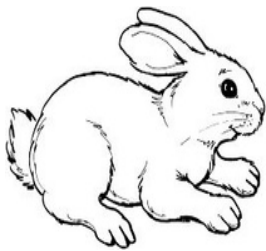
Animal	Time of Day	Where It Was Seen	What It Was Doing

Animals Where I Live

Make a tally for each time you see one of these animals on your way home or at your house. Which animal is most common where you live?



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Institute

Inquiry-Based Learning
Educational Consultants



**Living- things that eat,
breathe, and grow**



**Comparative Questions-
questions we can
investigate**



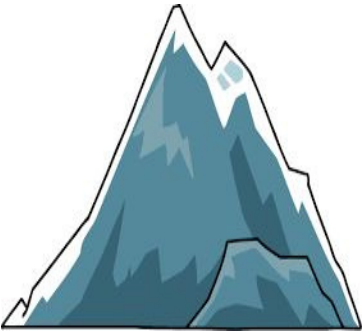
**Prediction- what you
think before you
investigate**



Shelter- a place that protects living animals



Habitat- the natural environment of a living thing



Mountain- very tall and normally rocky. Where some living things live.



Valley- low land by hills and mountains. Where some living things live.



River- a natural stream of water that may flow into a lake or ocean



Tally Marks- a way of keeping count by drawing marks



Ecosystem Model- a small representation of a large ecosystem



Environment- the place where people, animals, and plants live



Deer- a mammal that eats plants such as grass, bark, twigs, and berries



Squirrel- a mammal that eats seeds, nuts, fruits and some small insects



Eagle- a bird that eats small animals like rabbits, raccoons, and fish



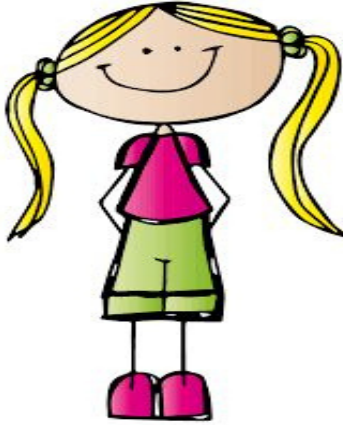
Rabbit- a mammal that eats weeds, grass, clover, and some flowers

Student Background Information

Pages 23-31 are pages to a book for the students to buddy read at Station 2.

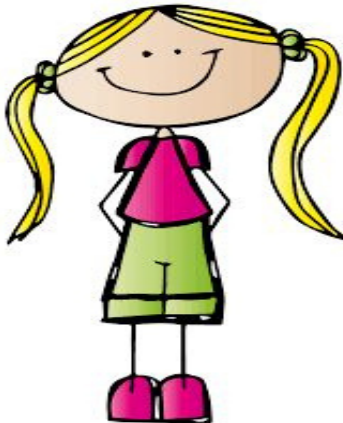
These are to be printed and put together for students to read and gather knowledge from.

Living Things

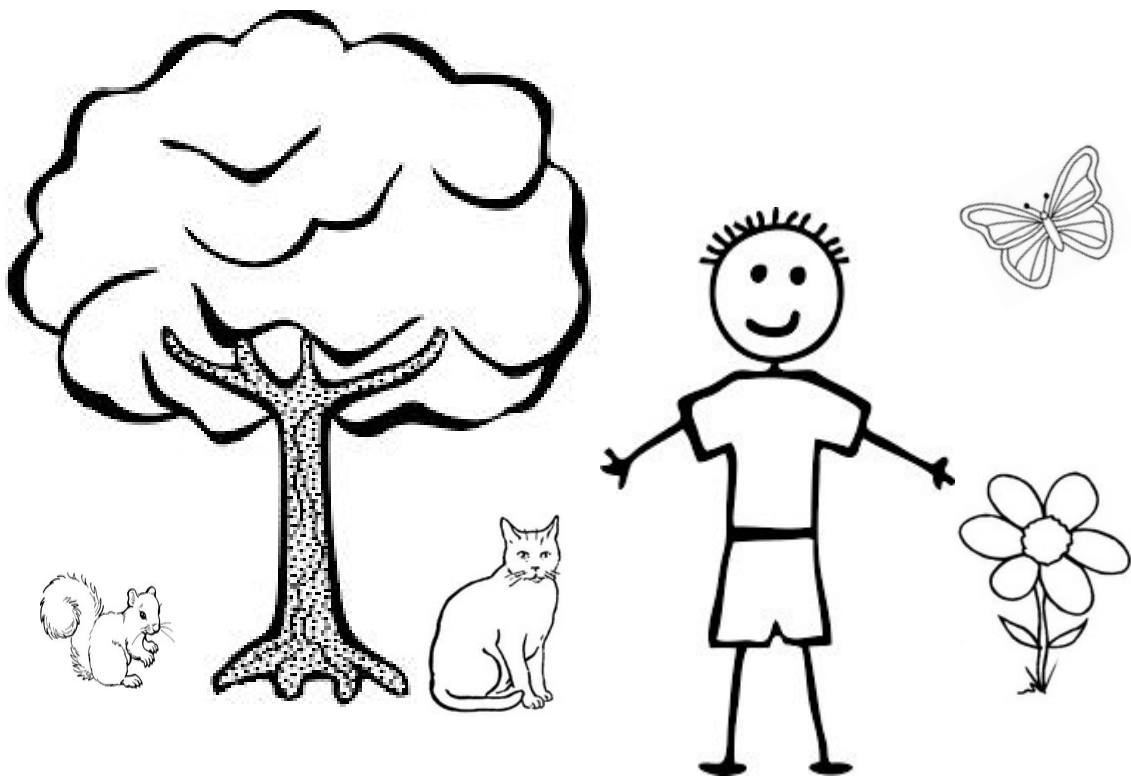


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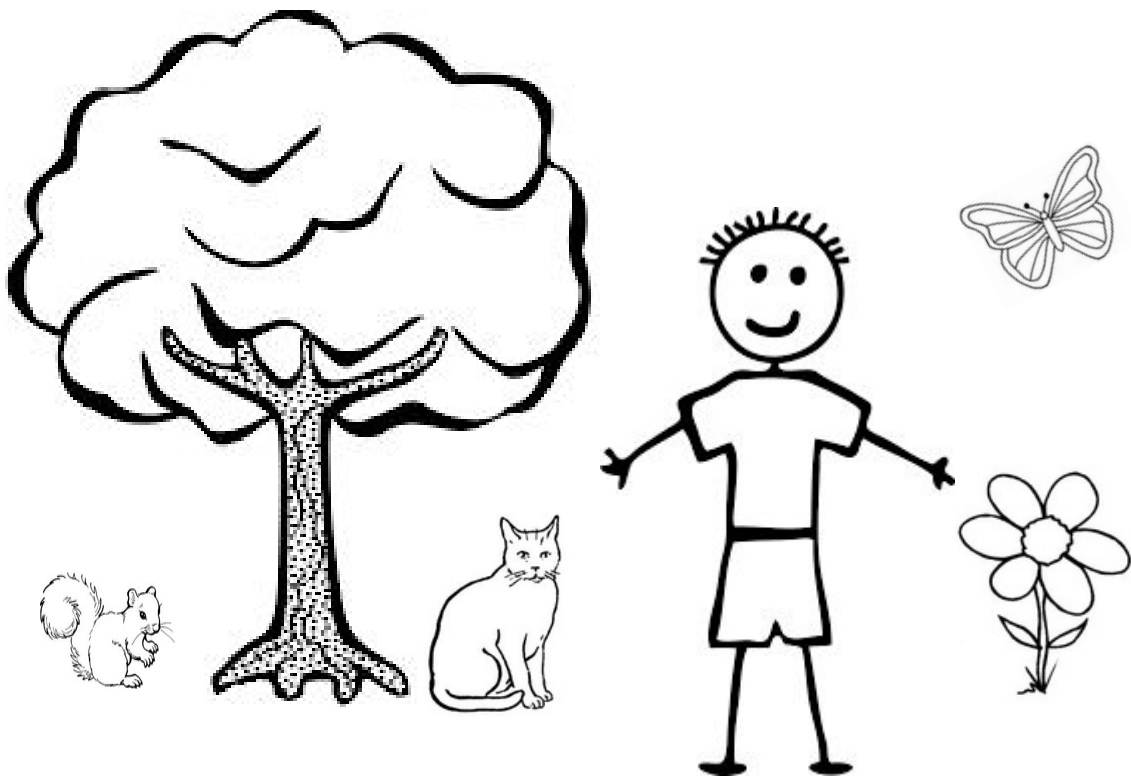
Living Things



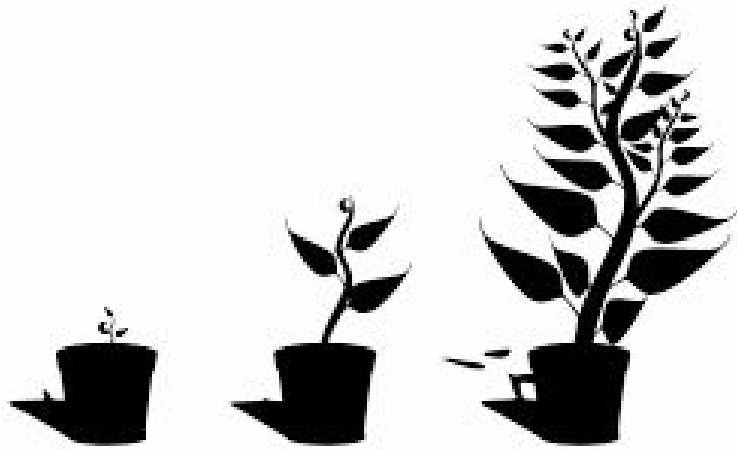
Name: _____



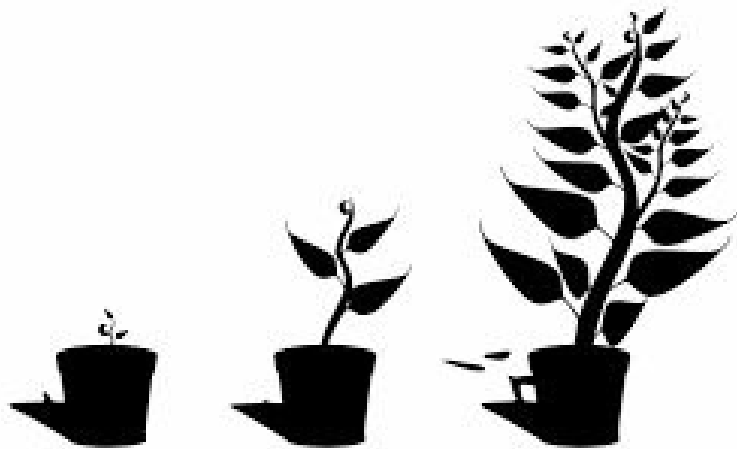
There are many living things.



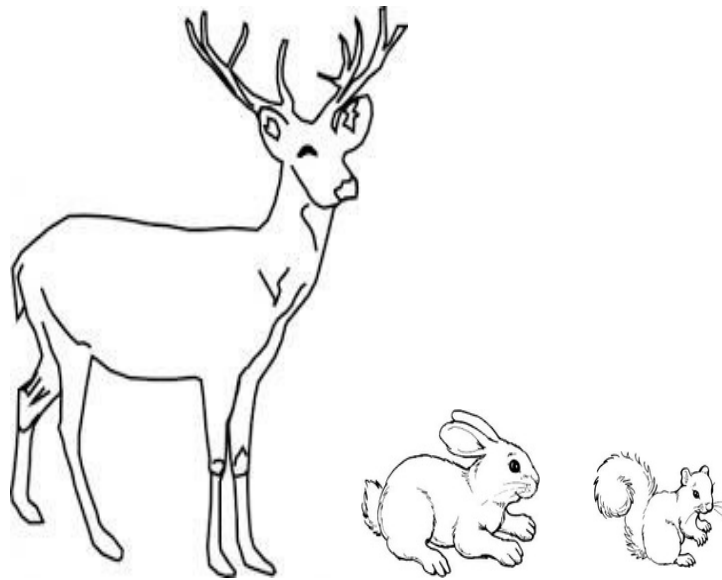
There are many living things.



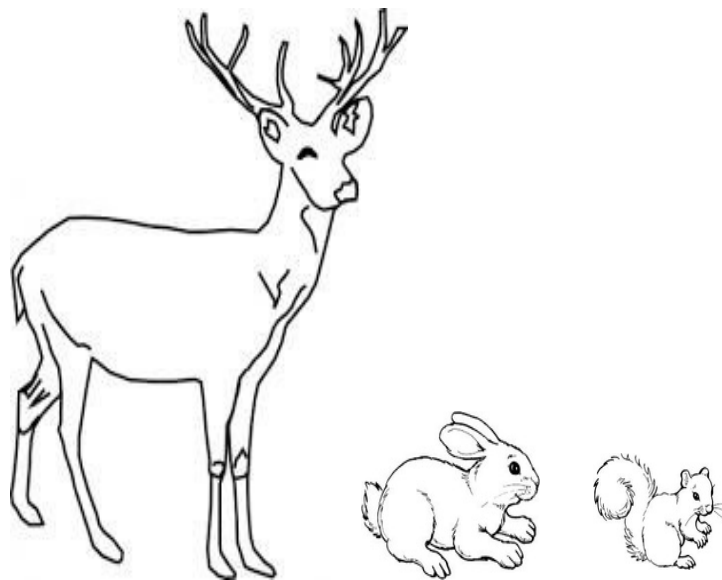
Living things eat, breathe, and grow.



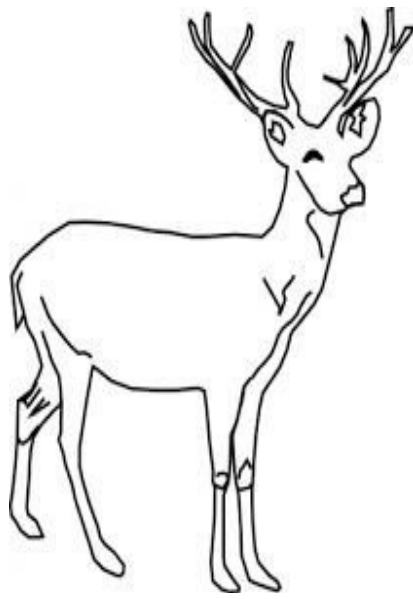
Living things eat, breathe, and grow.



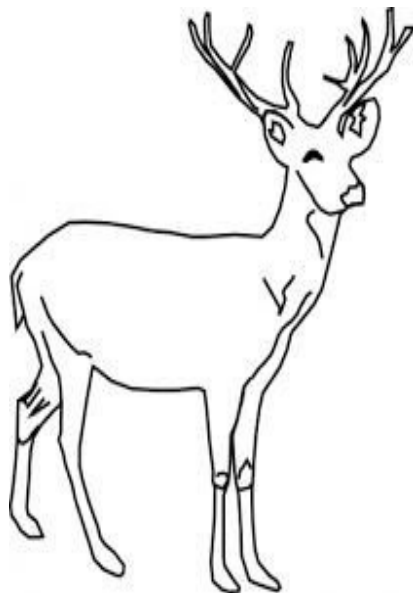
Animals are living things because they eat, breathe, and grow.



Animals are living things because they eat, breathe, and grow.



Deer are living things. They eat plants.



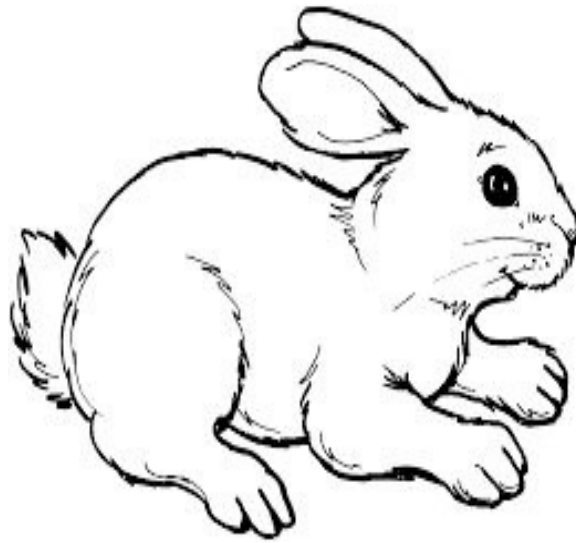
Deer are living things. They eat plants.



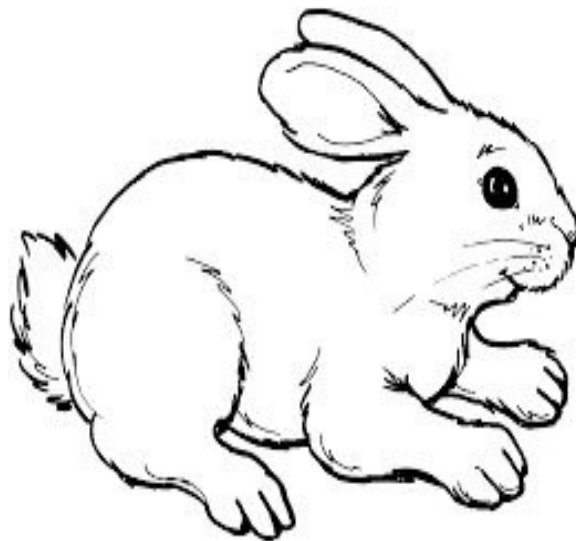
Squirrels are living things. They eat plants and some insects.



Squirrels are living things. They eat plants and some insects.



Rabbits are living things. They eat plants.



Rabbits are living things. They eat plants.



Eagles are living things. They eat small animals like rabbits.



Eagles are living things. They eat small animals like rabbits.

My list of living things:

My list of living things:

About the Investigation Books

Pages 33-44 include sheets for student investigation books. The teacher can choose which pages to include. The “My Animal” labeling page will be different for each group depending on the animal assigned to them, and their investigation books should reflect that.

My Investigation Book

Investigator: _____



Name: _____

Things that could be living in the ecosystem:

KWL Chart

Living things

K

Things I
Know

•

•

•

W •

Things I
Wonder

•

•

L

Things I
Learned

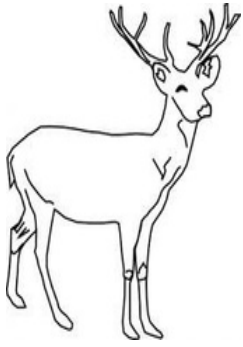
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My Predictions

I think that more....



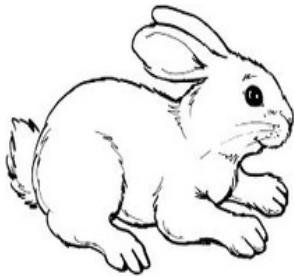
will be in the



mountains



valley



will be in the



mountains



valley



will be in the



mountains



valley



will be in the

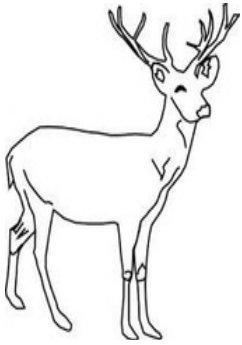


mountains

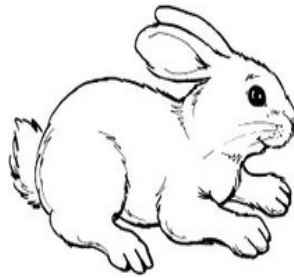


valley

My Data



deer



rabbit



eagle



squirrel



mountains



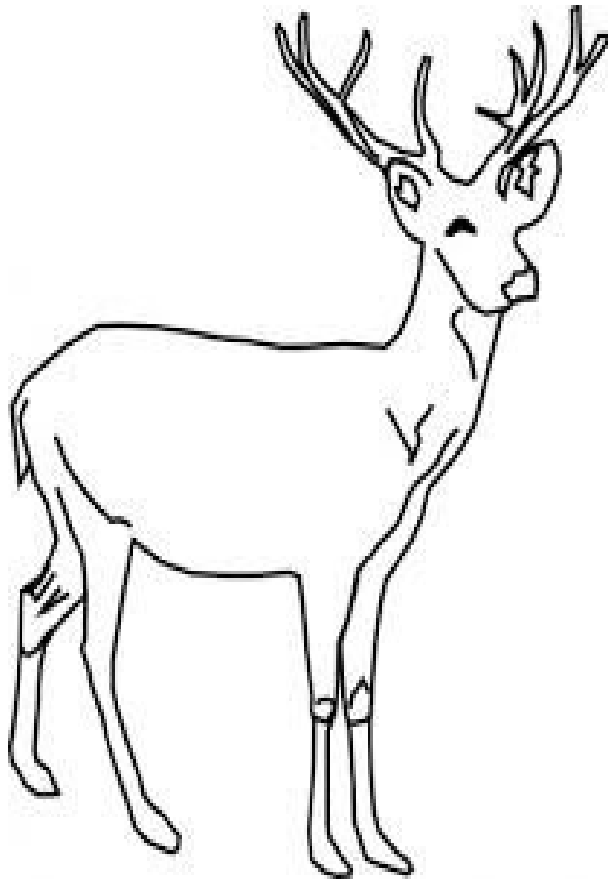
valley

There were more _____

in the _____.

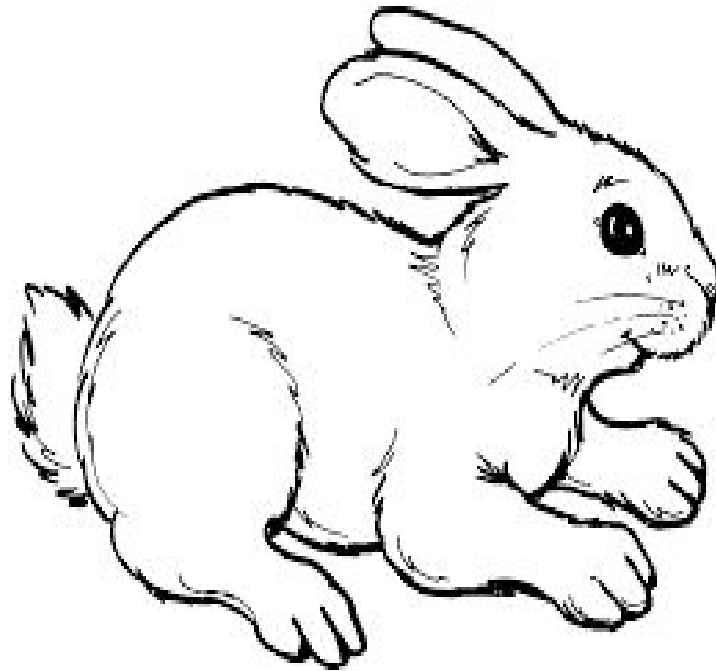
My Animal

Label the parts of the deer. **Draw** the environment the deer lives in. **Write** about the animal.



My Animal

Label the parts of the rabbit. **Draw** the environment the rabbit lives in. **Write** about the animal.



My Animal

Label the parts of the eagle. **Draw** the environment the eagle lives in. **Write** about the animal.



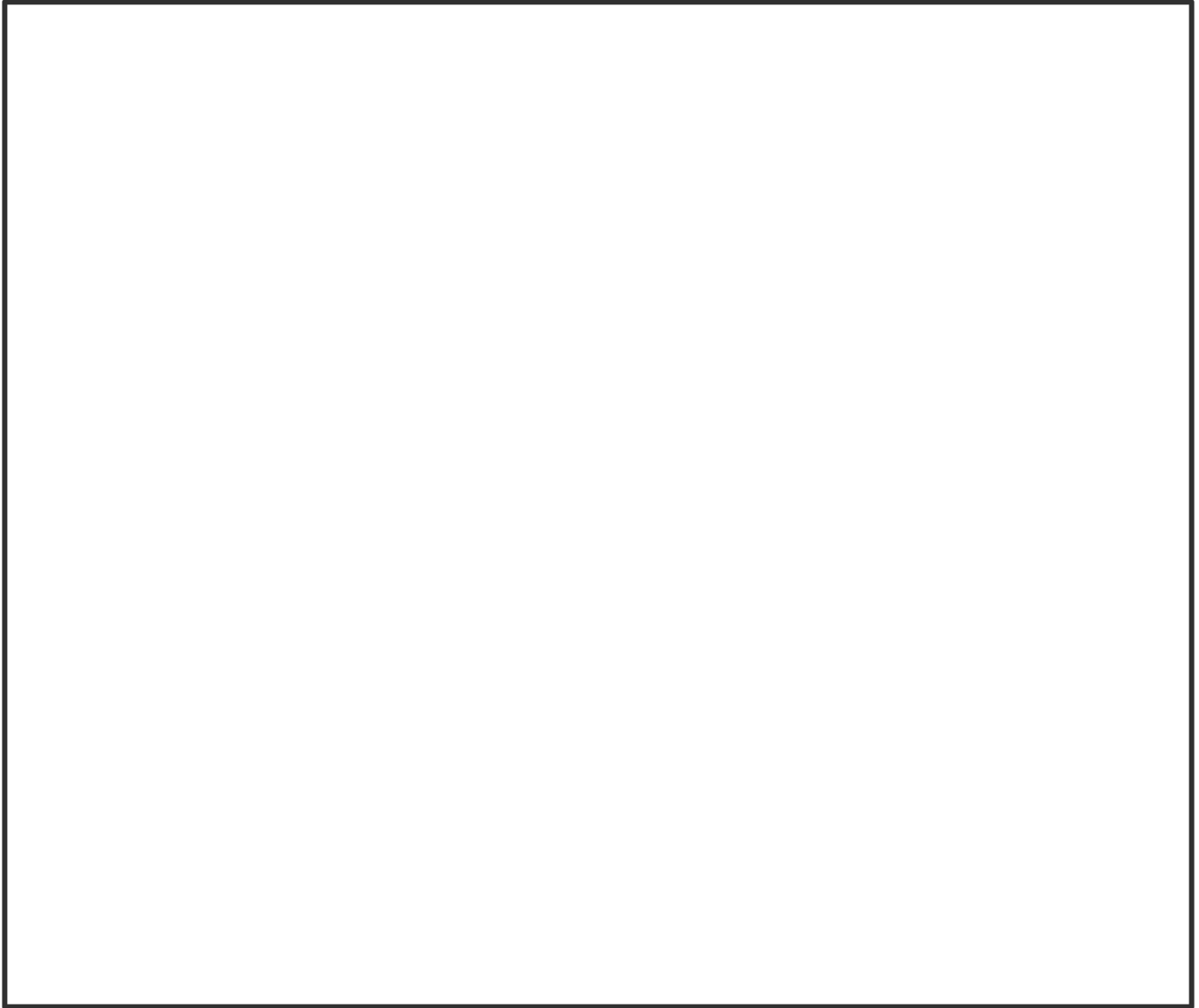
My Animal

Label the parts of the squirrel. **Draw** the environment the squirrel lives in. **Write** about the animal.

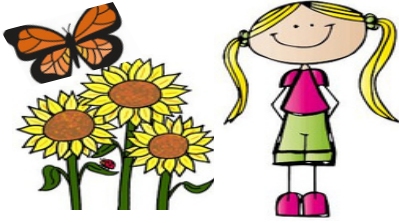


Animals in Our Ecosystem

Draw a picture of where we live and all of the animals you might see here. Label the animals in the environment. Write a sentence about our environment.



Vocabulary



Living- things that eat, breathe, and grow



Shelter- a place that protects living animals



Habitat- the natural environment of a living thing



Mountain- very tall and normally rocky. Where some living things live.



Valley- low land by hills and mountains. Where some living things live.



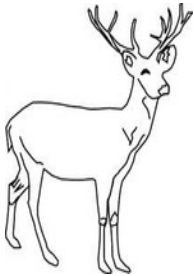
River- a natural stream of water that may flow into a lake or ocean



Tally Marks- a way of keeping count by drawing marks



Environment- the place where people, animals, and plants live



Deer- a mammal that eats plants such as grass, bark, twigs, and berries



Squirrel- a mammal that eats seeds, nuts, fruits and some small insects



Eagle- a bird that eats small animals like rabbits, raccoons, and raccoons



Rabbit- a mammal that eats weeds, grass, clover, and some flowers

My Animal: _____

Investigator: _____

I thought more _____ would be in the _____.

This is the data I found of how many were located on the mountain and in the valley.

 mountains	 valley
Total:	Total:

There were more _____ in the _____ .

This is because _____

_____ .

1.What did you learn from this?

2.What do you still want to know?

3.Was it fun?

1. What evidence suggests students grasped the major themes of the experiment?

2. Do you anticipate other guided or open inquiry projects arising from this project? What questions did the students ask that suggest understanding and interest in the subject?

3. To what extent did this project fit into your curriculum and teaching agenda?

4. Would you consider doing this again?

5. What would improve this experience?