

Descriptive Field Investigation

Getting to Know a Tree or Shrub

First Grade



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Descriptive Field Investigation

Getting to Know a Tree or Shrub

Overview

Younger students are always captivated by trees so using trees to foster science observation skills is a perfect fit. Students start in the first lesson by practicing observation skills in the classroom with natural objects. Next, they use those skills to observe schoolyard trees looking for shapes and identifying structures. Students use a pre and post drawing of trees to document how much they learned through observation. Through books and an activity students also learn the function of tree parts (LS1.A). Lastly students explore how shapes of trees and their leaves help them function to solve problems such as severe weather and getting the sunlight needed to survive. (K-2-ETS1-1). The phenomena that students are exploring is that there are so many kinds of trees in Washington State.

Project Learning Tree Lessons

These lessons are adaptations of Project Learning Tree activities: *The Closer you Look #6*, *Adopt a Tree #21*, *Get in Touch with Trees #2*, and *Tree Factory #63*.

Next Generation Science Standards-3-Dimensions

Dimensions from the Framework	What Students are Doing
<p><u>Science and Engineering Practices</u></p> <ul style="list-style-type: none"> • Asking questions • Developing and using models • Planning and carrying out investigations • Constructing explanations • Obtaining, evaluating, and communicating information 	<p>Students:</p> <ul style="list-style-type: none"> • Ask questions, “<i>What does this tree/shrub look like?</i>” and “<i>Does a flat paper towel become dry quicker than a rolled-up paper towel?</i>” • Make observations about a tree. • Participate in a model of a tree parts and learning their function. • Use a model to answer the question about towels drying. • Construct explanations and communicate what they found through descriptions and drawings. • Give evidence for their explanations citing the details and patterns of their observations and describing which type of towel dried out the quickest. Communicate through words and pictures and obtain knowledge through books about trees.
<p><u>Disciplinary Core Ideas</u></p> <p>LS1.A: Structure and Function All organisms have external parts. Different animals use their body parts in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water and air. Plants also have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow. (1-LS1-1)-Mimicry</p> <p>K-2 ETS1-2: Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.</p>	<p>LS1. A. Students observe a tree and its parts, drawing and recording what they observe. They learn the function of those parts through books and a kinesthetic activity.</p> <p>K-2 ETS1-2. Students describe the shape of the tree and its parts including trunk, bark, branches, and leaves. They listen to a article about why conifers are pyramid shaped and how that helps solve the problems of snow, wind, and sun. Students do an investigation on how needle shapes dry slower than flat shapes using a model. Then they do a simple sketch to show how needle shaped leaves or pyramidal shaped conifers help their survival under adverse conditions.</p>
<p><u>Cross Cutting Concepts</u></p> <ul style="list-style-type: none"> • Patterns • Cause and effect • Systems and system models • Structure and function 	<ul style="list-style-type: none"> • Students look for patterns as they describe the physical characteristics of their trees. And they look for patterns in the type of shapes they find. • Student look for cause and effect about shapes of trees and leaves and adaptations. • Drawing and labeling the parts of a tree students are developing a model. • Students look at the structure of trees and obtain information about the function of those parts.

English Language Proficiency Standard:

ELP.1.2 participate in grade appropriate oral and written exchanges of information, ideas, and analyses, responding to peer, audience, or reader comments and questions.

Lesson 1: Preparing for Descriptive Investigation of Trees

Objectives

Students:

- Draw a tree from memory
- Practice observational skills on natural objects

Materials: Student journals/science notebooks, pencils/crayons, natural objects – one for each student such as cones, leaves, twigs, rocks, moss. 30 lunch size paper bags, large chart with touch, smell, and sight to make word bank, paint chips (optional), magnifiers (optional)

Learning Experience

Students will draw a tree from memory then practice the skill of observation using their sense of touch, smell, and sight to describe natural objects.

Engage

1. Have student close their eyes and think about their favorite tree. What did it look like? Did it have any special features? Have them describe their tree to their neighbor. Help them understand that there are so many different kinds of trees.
2. Have students draw their tree from memory in their journals/science notebooks using the **Tree from Memory** page.
3. Explain to students that tomorrow they will be going outside to observe trees (or shrubs) to learn about their characteristics. They will be answering the descriptive field investigation question, “*What does this tree/shrub look like?*” Scientists would often reword this to be asking, “*What are the physical characteristics of this tree/shrub?*”
4. Ask student what we mean by observations, using our senses to see, hear, touch, smell, taste. Have students think – pair - share their thoughts about observations and record on a classroom document or in their journals/notebooks.
5. Add any more details about observation skills you would like them to have. Tell students that they are now going to practice their observational skills

Explore

1. Hand out the student journal page **Observation of a Natural Item**.
2. Tell students that they are starting with their sense of touch. Remind them to use **multiple words when describing** how an item feels.
3. Give each student a paper bag with one natural object in it such as cones, seeds, leaves, and twigs. Or hand out items while students have their eyes close. This could be done while students are in a circle.
4. Students should work in pairs. One of the students in the pair starts and without looking describes how the object feels to their partner. You could have them record these words in their journals or just do it orally
5. Now they switch and the second student gets to describe how the object feels.
6. Make a list of the words students used for their sense of **touch**.
7. While items are still in the bag have students use their sense of smell and describe to their partner and record. Again, switch partners and make a list of words describing **smells**.
8. Again have one student start first and take their item out of the bag and now describe what the item looks like. Remind students to describe the **shape, color, size, and any patterns** they see. Have them record their observations and make a list of words for **sight**.
9. **Optional**-you could use paint chips to have students match colors or magnifiers to get other details with their sense of sight. You can also use crayons to have them make their own matching color charts with colors they are more familiar with.

Explain

Use think – pair - share with any of the following discussion questions:

1. Ask students if they could identify their item when they were just using their sense of touch? Why or why not?
2. What did they notice using their senses?
3. Which of the senses did they find most helpful? Why?
4. Ask students if there are more words in the lists for touch, smell, or sight? Why do they think that is?
5. Why is shape an important characteristic? How does the shape of an object help it function the way it does?
6. How does using observations help you learn about your world?
7. Why are accurate observations important?

Elaborate

1. Discuss why scientists need to be good observers.
2. Discuss why scientists look for patterns
3. Investigating their Tree-Lesson 2
4. Hand out reflection and assessment page **I used to think...But now I know page**. This page is desired to be cut into three.
5. Tell students they are going to reflect on their learn about observing natural items and using their senses like a scientist.
6. Using the sentence starters have students draw or write about their previous understanding and new learning. If you have never done a reflection like this before, you might want to model it for student or have students work in small groups. Scaffold this activity as needed dependent on student needs and time of year.

Evaluate

For this section you will need to provide a natural item for your students. Example: a plant, picture of natural item, large rock etc.

1. Hand out the reflection and assessment page **Observation of a Natural Item**.
2. Ask students to use their senses to describe the item.
3. Collect this for evidence of **progress towards standard K-2-ETS1-2. See the rubric for scoring.**

Lesson 2- Descriptive Investigation of a Tree or Shrub

Objectives

Students:

- Observe a tree and record their observations to answer the descriptive investigation question, ***“What does this tree/shrub look like?”***.
- Draw and label their tree.
- Add observational details to their drawings of the tree.

Materials: *Have You Seen Trees?* by Joanne Oppenheim, *Tell Me about Trees*, by Gail Gibbons, journals/science notebooks, clipboards, pencils or markers, fat crayons (papers off), paper (optional), magnifiers (optional), flags or string.

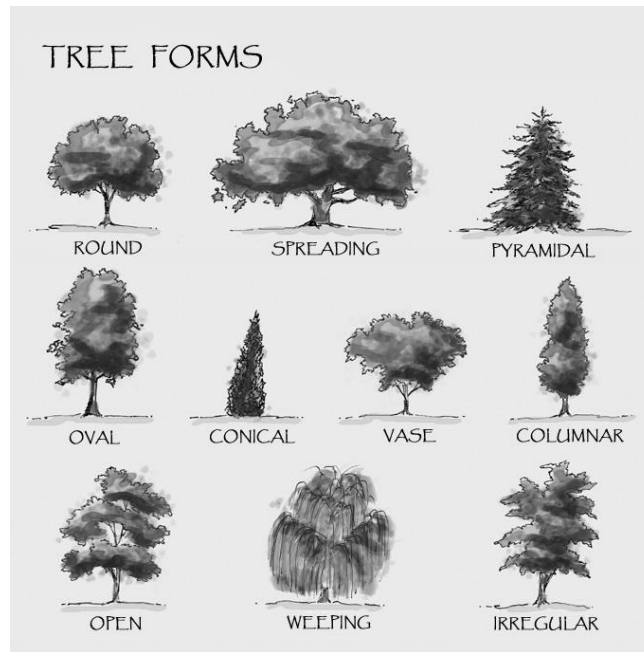
Teacher Note: You can decide to describe one tree with the whole class or have small groups of students observe a tree. There are many questions in this lesson, feel free to reduce the number if needed.

Engage

1. Read *Have You Seen Trees?* And reflect on how the author describes trees.
2. Remind students you will be looking at trees using the observation skills they practiced previously. Let them know this is what scientists do when they describe plants and animals.
3. Hand out the student page **What does this tree look like?**
4. Have students look in their journals at the investigation question: *What does this tree/shrub look like? or “what are the physical characteristics of my tree?”*. Explain that by observing the tree, recording their observations and drawing the tree they will be answering this question.
5. Review your behavior expectations for going outside and your signals to regain students’ attention.
6. If students choose their own trees provide them with flagging to “stake” out their tree.

Explore

1. When you first go outside, have students observe their trees from a distance and describe the overall shape of the tree-the top part is the crown. Have students follow along with you as you make that shape-rounded, pointed, etc. See illustration from <https://blog.lawneq.com/tree-forms/>



2. While standing near a tree have students act out the characteristic parts of the tree. Example-straight trunk, curved branches, fluttering leaves, bumpy roots underground.

3. Have students answer questions by turning and talking about the parts of the tree - the branches, leaves, and trunk - or put their observations in their journals (not all questions need to be used).
 - What shape is the trunk?
 - What shape are the tree branches?
 - What shape are the tree's leaves?
 - What color are the leaves?
 - How do the leaves feel?
 - What is the overall shape of the tree?
 - How does the tree smell?
 - Are there any flowers, fruits, nuts or cones on the tree?
4. Provide students with crayons and their journals or paper (can be added to their notebooks later) to do a bark rubbing after they have answered the bark questions:
 - How does the bark feel and smell?
 - What color is the bark?
5. After students have spent time observing their tree have them draw the tree and lines label the parts of the tree using the student page **Draw a sketch of YOUR tree.**
6. In the classroom have students add other information such as color and how the bark feels to their drawings.
7. **Optional**-do a class drawing of a tree and add details from students' trees.

Explain

1. Have students compare their initial drawings to the drawings of an actual tree for details and tree structures. Explain to students that these drawings are models and demonstrate what they have learned through observations of trees.
2. **Optional:** Hang students' first drawing next to their second and compare what is similar and different.
3. Have students reflect on what they learned about their tree through observation. Students observed tree parts when they drew and labeled their trees. Now have students learn about the function of those parts. Read *Tell Me about Trees* by Gail Gibbons. While creating a picture/vocabulary input chart ([see resources section](#)), review with the students:
 - a. roots provide water and mineral nutrients to the tree
 - b. the trunk supports the tree so it can grow tall and transports water and nutrients up to the leaves and sugars from the leaves to all parts of the tree
 - c. branches also transport water and nutrients to the leaves and sugars from the leaves to all parts of the plant
 - d. leaves make sugars to provide food for the tree

Teacher Note: Resource on the parts of a tree <https://www.ncforestry.org/teachers/parts-of-a-tree/>

Elaborate

Options include:

- Have students compare their tree to a neighbor's.
- Have students write a poem using the words describing the tree.
- Have students act out the function of tree parts - *Tree Factory*- activity from PLT preK-8 Guide.
- Have students create tree costumes - *To Be a Tree*- PLT preK-8 Guide.
- Continuing visiting your tree over time using ideas from *Adopt a Tree* –PLT preK-8 Guide

Evaluate

1. Hand out the **Tree Function** page from the reflection and assessment section.
2. Ask students to write the function of each part of the tree. These do not have to be full sentences and can be scribed for students that have trouble producing writing.
3. Collect this for evidence of **progress towards standard 1-LS1-1. See the rubric for scoring.**

Other formative assessments opportunities:

- Look for changes in drawings and details added after observations of actual tree outside.
- Do a group reflection questioning if their second pictures showed a greater understanding of the tree's structure and form?
- Correct labeling of parts on their outdoor tree drawing and the function of the tree parts.

Lesson 3-Adaptations: Shapes of Trees and Leaves

Objectives

Students:

- Explore tree and leaf shapes
- Conduct an investigation on needle versus flat shaped leaves

Materials: Journals/notebooks, pencils or markers, paper towels, plastic plates or trays, 1 tablespoon of water pre-measured into small cups

Background

Evergreen trees – such as spruces, pines and firs – have the shape of a pyramid. Why?

Evergreen trees – which are known collectively as conifers – often grow in places that have severe winters. An evergreen tree’s shape does help keep wet, heavy snow off its upper branches.

Conifers also tend to have shallow roots. In other words, they lack long, sturdy tap roots. So they’re subject to being knocked down by wind. Their shape reduces wind resistance and helps keep the tree standing upright. What’s more, the trees are mostly needle-leaved or scale-leaved, instead of having broad, flat leaves. The shape of the leaves is also an advantage in climates that sometimes feature abrasive, blowing ice crystals.

The tree’s shape also lets it get more light, because the top branches don’t shade the bottom ones. The major branches of conifers are layered, with an open area between the layers. This helps wind pass through, and it helps the tree get enough light, especially when sunlight comes in at a low angle, as it does during the winter months.

<https://earthsky.org/earth/evergreen-tree-shape>

<https://wonderopolis.org/wonder/why-are-many-evergreen-trees-shaped-like-a-pyramid>

Engage

1. Bring in a conifer branch.
2. If any of the trees you observed previously were conifers have students think about their shape.
3. Show students the Shape of Trees PowerPoint graphic. Remind students that all of their trees had different shapes. Click to where the conical and pyramidal shapes of the conifers are circled. Click to the image of the real trees that are pyramidal conifers. Remind them not all evergreen trees are shaped this way, but that the pyramid shape helps the tree grow and survive.
4. Read “Why are Many Evergreen Trees Shaped Like a Pyramid?”
5. Have students make the pyramid shape then act out how the pyramid shape might help these trees to survive:
 - a. **Snow** -Snow falling and the trees shaking it off
 - b. **Wind**-Staying upright in heavy winds-spread feet wide to be roots
 - c. **Light**-Sun shining on all the leaves when the sun is low in the sky
6. Remind students that in the summer months there is usually less rain or moisture. Trees, like all plants growing in soil, take up water to survive. Remind them that is the function of the roots. Tell students that they are now going to do an investigation about how conifer leaves, that are needle shaped, help them survive dry conditions.

Explore

Background

Modeling shapes of leaves with paper towels is a way to show if needle-like leaves lose their water slower than flat leaves. This would allow them to grow in drier places.


Optional (the day prior to the investigation)-place clear plastic bags over groups of leaves on a tree tying them tight around the stem. Three different groups would be fine. Leaves that receive sunlight are best.

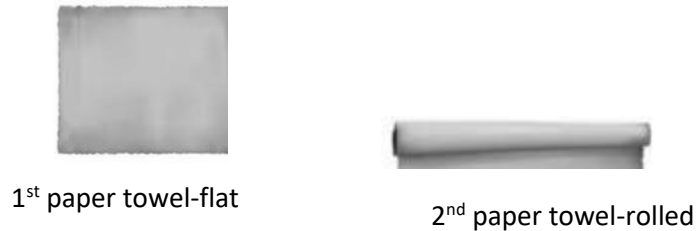
Teacher Note: do this investigation, if possible, at the beginning of the day. Try it out ahead of time to see how quickly the flat paper towel becomes dry.

1. If you placed bags over leaves, take the students outside to see if there is water inside the bags. Tell students that this demonstrates that the trees are losing water through their leaves.
2. Explain to students that they are doing an investigation on how a leaf’s shape allows a tree to lose less water. The investigation includes a model using paper towels to represent leaves.

3. Hand out the student page **Investigation Set Up.**
4. Tell students the comparative question for this investigation is: *Does a flat paper towel become dry quicker (in less time) than a rolled-up paper towel?*
5. Read over the procedure and have students draw a picture of what they will be doing. Describe to them that the flat towel represents flat shaped leaves and the rolled up towel represents needle shaped leaves.



Procedure:

- 1) Place both paper towels on a tray.
 - 2) Pour 1 Tbs of water onto each paper towel.
 - 3) Wait until all the water is absorbed.
 - 4) Lay 1 of the paper towels flat on the tray.
- 
- 5) Roll the 2nd paper towel into a tube and lay next to the other towel.



- 6) Leave paper towels to dry.
- 7) Check the towels every hour to see if either of them is dry and record wet or dry in the table.
- 8) Stop recording when either the flat or the rolled towel is dry.

Wet Towel Type vs Time to Dry

Towel Type	Time for towels to become dry				
	1 hour	2 hours	3 hours	4 hours	5 hours
Flat  Flat Shaped Leaves					
Rolled  Needle Shaped Leaves					

Explain

1. Hand out the student page **Claim and Model**.
2. Have students look at their data. At 4 hours which towel was dry, the flat or the rolled?
3. Have students think – pair - share to answer the question using claim and evidence:
Does a flat paper towel become dry quicker (in less time) than a rolled-up paper towel?
4. When students share write their claim and evidence on the board. Something similar to *“The flat paper towel was dry faster than the rolled up towel. The flat paper towel was dry after 4 hours, but the rolled up paper towel was still wet.”*
5. Now ask students to think – pair - share about what this information means about how a needled-shaped leaf helps a tree survive drought.
6. Write the ideas they come up with on the board and have students record in their journals.
7. Explain that we call this surface area-the needle shaped leaf has less surface area than a flat leaf for water to evaporate.
8. Explain to students that needle-shaped leaves often feel waxy to the touch. (distribute needles for students to carefully touch) so that along with less “surface area” allows them to keep water.
9. Have students develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function to solve the problem of drought, snow, or wind. Students could use the shape of the tree or the shape of the needles in this sketch, drawing, or model.

Elaborate

1. Have student explore other shapes of leaves. See how long it takes leaves to wilt from different plants.
2. Plan and carry out investigations to look at shape and wind or shape and sun.

Evaluate

1. Collect student page **Claim and Model**.
2. Evaluate students' drawings/model of how the shape of an object helps it function to help the tree survive. Make sure it is accurate and with details. Collect this for evidence of **progress towards standard K-2- ETS2-1. See the rubric for scoring.**
3. Hand out reflection and assessment page **I used to think...But now I know page**. This page is desired to be cut into three.
4. Tell students they are going to reflect on their learn about observing natural items and using their senses like a scientist.
5. Using the sentence starters have students draw or write about their previous understanding and new learning. If you have never done a reflection like this before, you might want to model it for student or have students work in small groups. Scaffold this activity as needed dependent on student needs and time of year.

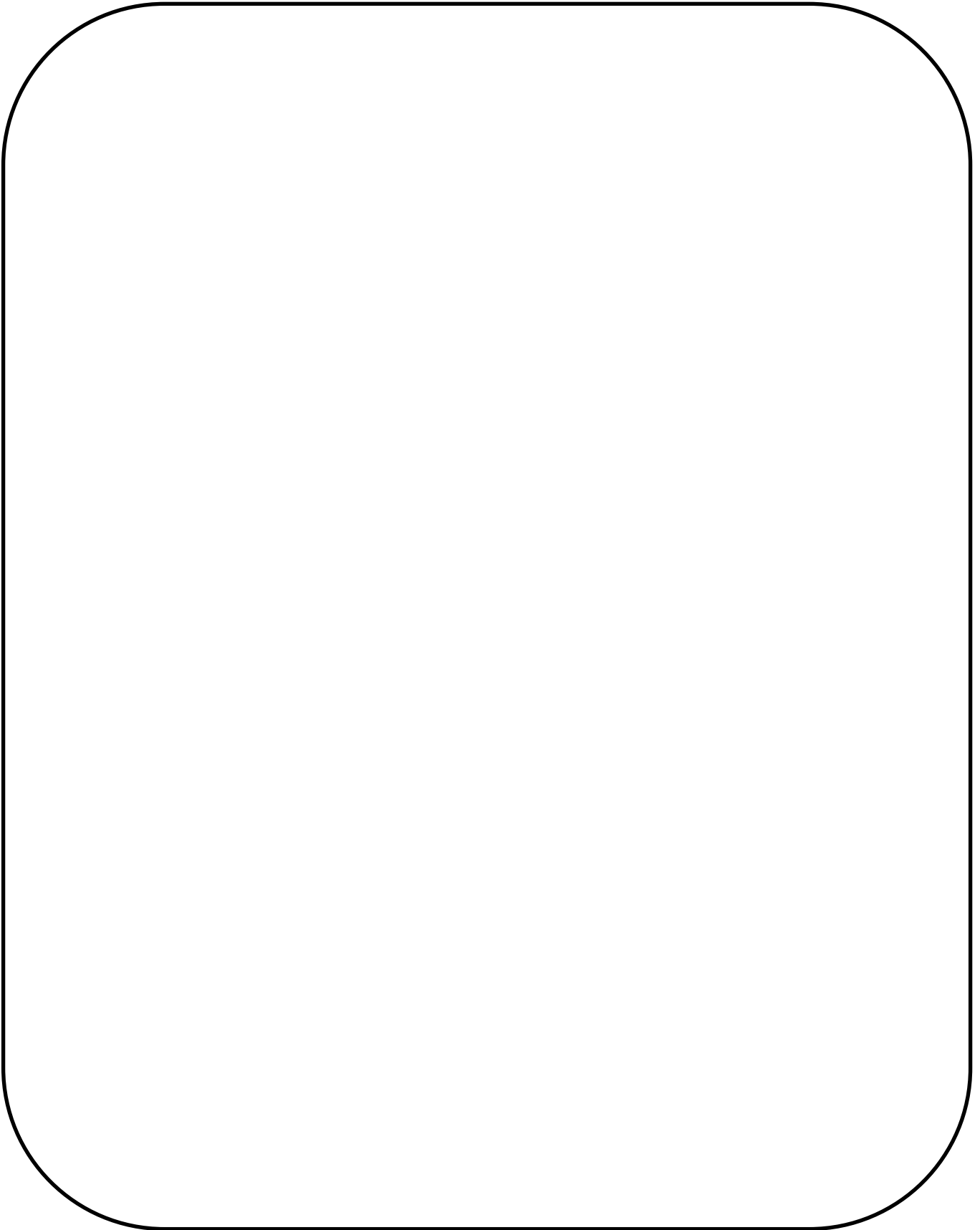


Get to Know a Tree or Shrub

Student Pages

Name: _____

Draw a sketch of a tree from memory



Observations of a Natural Item



Shape

Color

Size

Patterns



What does this tree look like?

Describe the parts of your tree:

- 1. What shape is the trunk?**

- 2. What shape are the tree branches?**

- 3. What shape are the tree's leaves?**

- 4. What color are the leaves?**

- 5. How do the leaves feel?**

- 6. What is the shape of the tree's crown?**

- 7. What does the tree smell like?**

- 8. Are there any flowers, fruits, nuts or cones on the tree?**

Do a bark rubbing of your tree

- 1. How does the bark feel and smell?**
- 2. What color is the bark?**
- 3. How does the bark look?**
- 4. What does the bark do to help the tree?**

A large, empty rounded rectangular box with a black border, intended for a drawing or writing. The box is centered on the page and occupies most of the lower half of the document.

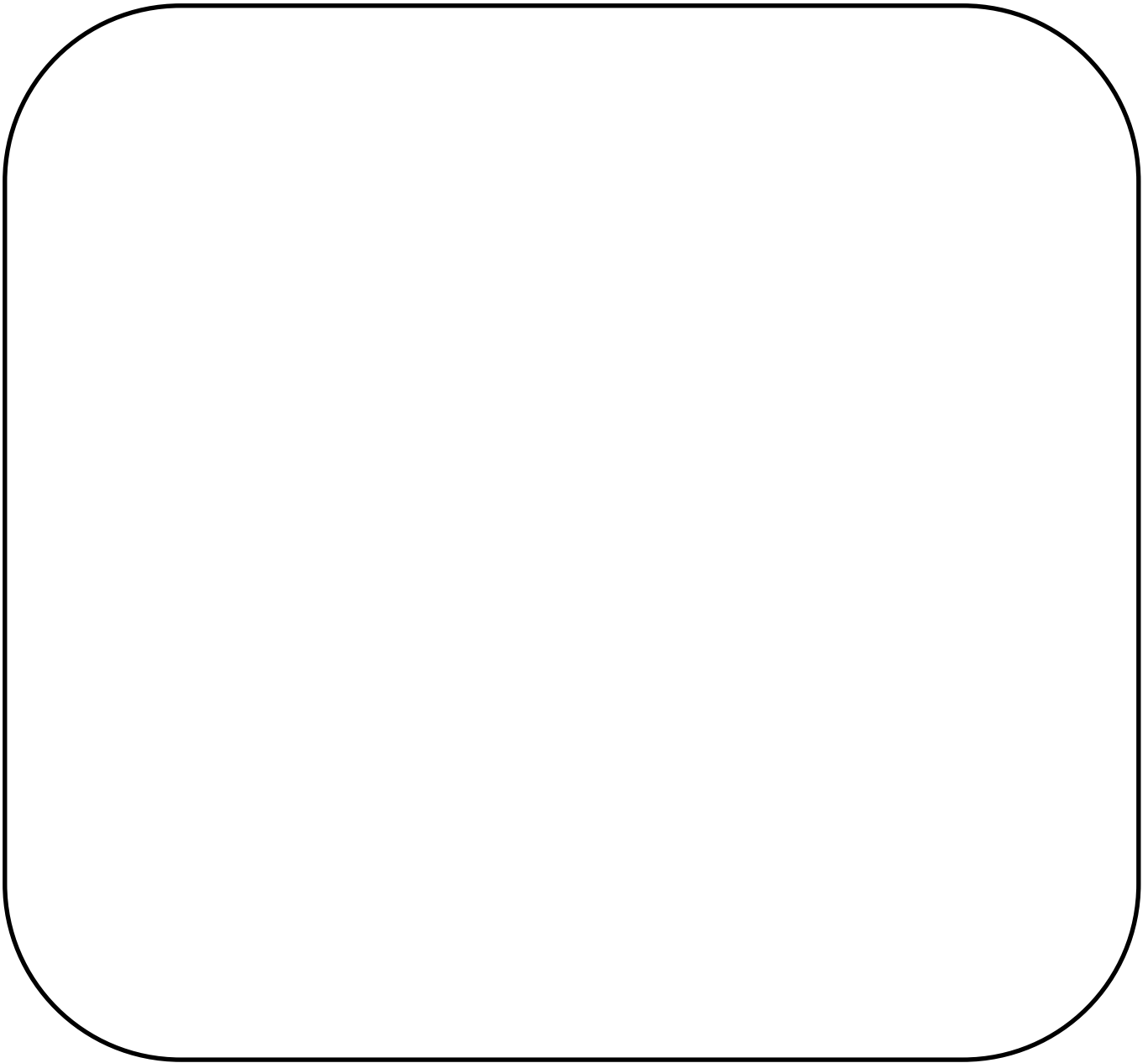
Write 5 words to describe your Tree

1. _____
2. _____
3. _____
4. _____
5. _____

Write a poem about your tree using your words.

Draw a sketch of *YOUR* tree

Draw lines from the labels to the tree parts



Trunk

Bark

**Branches
(Crown)**

Leaves



Roots

Draw the Investigation Set Up

Does a flat paper towel become dry quicker (in less time) than a rolled-up paper towel?

Data Table

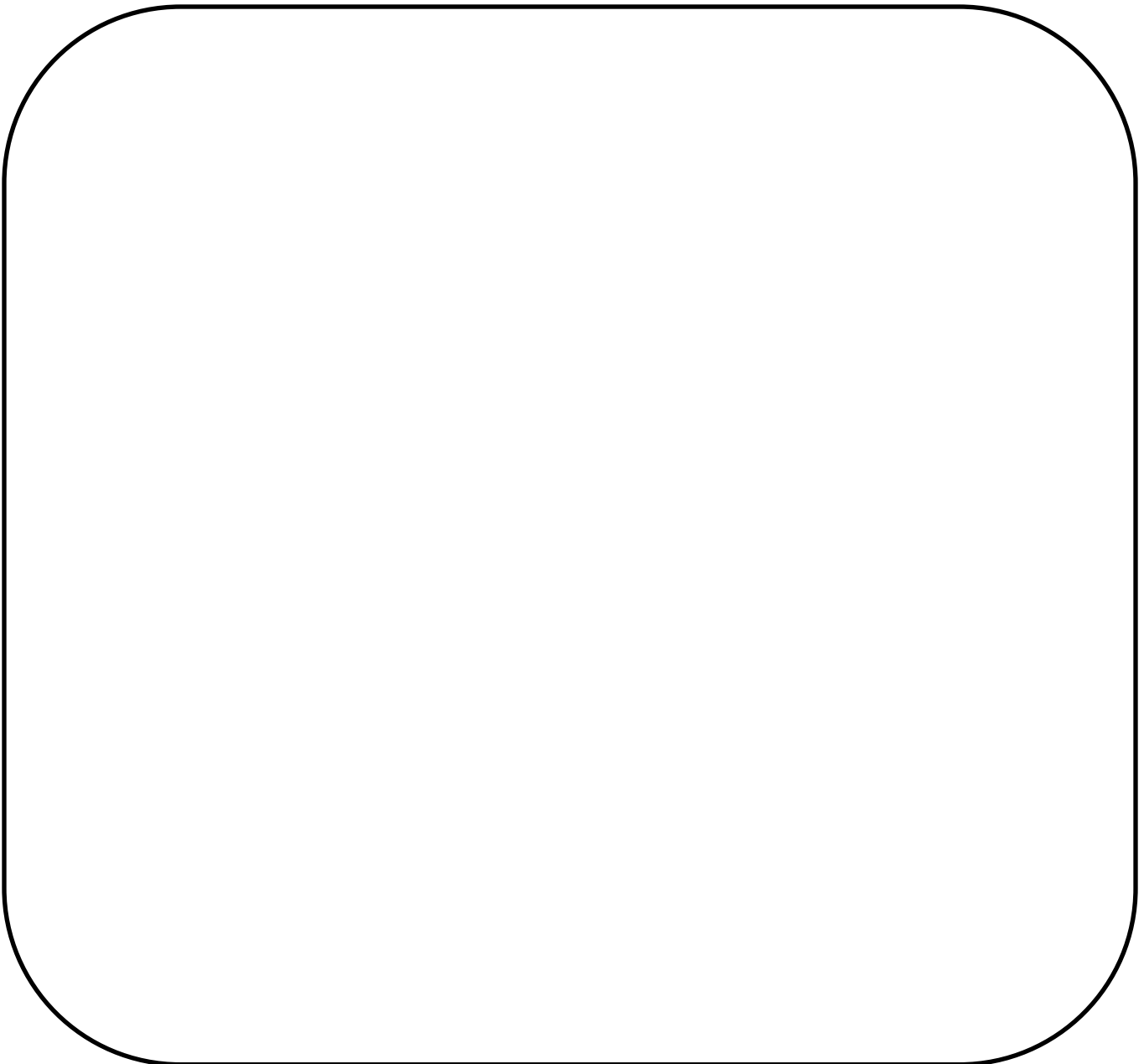
Wet Towel Type vs Time to Dry

Towel Type	Time for towels to become dry				
	1 hour	2 hours	3 hours	4 hours	5 hours
Flat-  Flat Shaped Leaves					
Rolled  Needle Shaped Leaves					

Does a flat paper towel become dry quicker (in less time) than a rolled-up paper towel?

Write the claim to answer the question:

Evidence: Make a drawing of how the shape of an object helps it function to solve a problem.

A large, empty rounded rectangular box with a black border, intended for a drawing. The box is centered on the page and occupies most of the lower half of the document.

Reflection and Assessment

Lesson 1

I used to think:

But now I know:

I used to think:

But now I know:

I used to think:

But now I know:

Observations of a Natural Item



Shape

Color

Size

Patterns

Rubric for Observations of a Natural Item

Standard: K-2-ETS1-2 Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

***This assessment is showing student progress towards achieving the full standard.**

Score of 4	Score of 3	Score of 2	Score of 1
Student was able to accurately describe the item using all of their senses.	Student was able to describe most of the item using their senses.	Student was able to describe some of the item using only one senses.	Student was not able to briefly describe the item.

What is the function of the following parts of a tree?

Tree Part	Function
Roots	
Leaves	
Bark	
Trunk	
Branches	

Reflection

- 1. Does my second drawing of my tree that I observed show more information about what trees look like?**

- 2. How was my tree similar or different to other trees?**

Rubric for Function of Tree Parts

Standard: 1-LS1-1 Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.*

*This assessment is showing student progress towards achieving the full standard.

*Only the function aspect is assessed. Reflections are not assessed.

Score of 4	Score of 3	Score of 2	Score of 1
Student was able to identify all the functions of the parts of a tree.	Student was able to identify all but one of the functions of the parts of a tree.	Student was able to identify two of the functions of the parts of a tree.	Student was able to identify one or less of the functions of the parts of a tree.

Rubric for Claim and Shape of An Object (from Lesson 3, Explain)

Standard: K-2-ETS1-2 Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

***This assessment is showing student progress towards achieving the full standard.**

Score of 4	Score of 3	Score of 2	Score of 1
Student was able to write a claim and show evidence using a model.	Student was able to write a claim and show evidence using a model but some details are missing.	Student was able to write a claim or show evidence using a model but not both .	Student was not able to briefly write a claim or create a model to provide evidence of the claim.

Lesson 3

I used to think:

But now I know:

I used to think:

But now I know:

I used to think:

But now I know:

Resources

Why are Trees Shaped as Pyramids?

Adapted from the website:

<https://wonderopolis.org/wonder/why-are-many-evergreen-trees-shaped-like-a-pyramid>

Have You Ever Wondered?

- Why are many evergreen trees shaped like a pyramid?
- Are all evergreen trees shaped like pyramids?
- How does an evergreen's pyramid shape help it survive?

When you see certain types of evergreen trees in the wild, such as spruces, pines, and firs, step back and look at those trees geometrically, you might notice that they resemble a certain three-sided shape. The wide base and narrow top of many evergreen trees forms a triangle. When you see that triangle from multiple sides on a real tree, you realize it's shaped like a pyramid!

Comparing pyramid-shaped evergreen trees to the many other trees you've seen, you get a sense of how unique they are. So why do some evergreens take such a unique pyramid shape when most other trees don't?

Experts believe the unique pyramid shape of certain evergreen trees is an adaptation that has evolved over thousands and thousands of years. Many of these evergreens, collectively known as conifers, live in places with long, snowy winters.

In these snowy areas, trees with traditional oval or circular tops would have a hard time surviving. The heavy, wet snow would collect in their upper branches and cause them to break off, damaging and possibly killing the tree. Evergreens, on the other hand, have narrow tops that help prevent heavy snow from building up.

Evergreens also tend to have shallow root systems. This makes them susceptible to being damaged by heavy winds. Being shaped like a pyramid, however, reduces their wind resistance, helping them stay upright even in the heaviest winds. Wind resistance is also reduced by the space between layers of branches, as well as the fact that they have thin needles rather than broad leaves.

The particular geography of pyramid-shaped evergreens plays an important role for another reason. The farther north you travel from the equator, the lower the angle is at which the Sun's rays reach Earth. Evergreens rely on sunlight year-round to fuel photosynthesis. Their pyramidal shape allows all their branches to receive more sunlight, since the upper branches don't shade the bottom branches.

Isn't nature wonderful? The next time you see a pyramid-shaped tree, you can marvel at how its shape has developed over time as an adaptation to snow, wind, and sunlight!

Lesson 1



Structure and Function input chart sample

