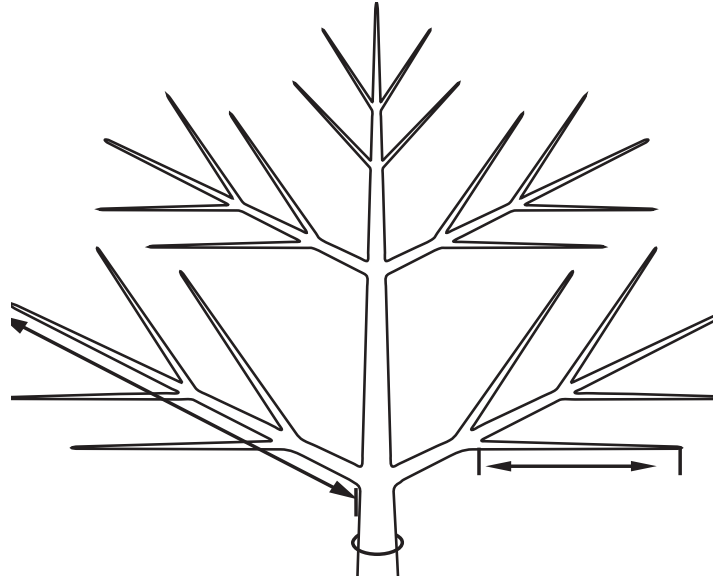


Lesson 6

Trees: Fall Measurements



A QUICK LOOK

Big Idea

All living organisms have life cycles that include being born, growing up, reproducing, and, eventually, dying. Physical growth and change are natural parts of the tree life cycle.

Overview

Children take baseline measurements of the class tree in order to track its physical growth from the fall to the spring.

Key Notes

- This lesson is suitable for flexible implementation with mathematics.
- Since children spend part of the day outdoors, remind them to dress appropriately.
- Invite three or four volunteers (parents or older children) to assist the children with their tree measurements.
- Visit the tree a day or two before teaching the lesson to note changes since the last visit.
- If the children in your class need experience measuring length or circumference, consider teaching the Skill Building Activity “Measuring Length and Circumference,” on page 312.
- For more information about the science content of this lesson, see the “Trees” section of the Teacher Background Information.

Lesson 6

Standards and Benchmarks

When measuring the class tree, children focus on Physical Science Standard B (Properties of Objects and Materials): “Objects have many observable properties.... Those properties can be measured using tools, such as rulers...”

While tracking the class tree’s physical growth, the children develop Science as Inquiry Standard A and Common Themes Benchmark 11C (Constancy and Change). They use rulers and measuring tapes to “provide more information than scientists obtain using only their senses” and “make quantitative estimates of familiar lengths.” The children recognize that physical growth occurs so slowly that it is hard to see, but that by taking measurements, they can detect the small changes that occur over the school year.

Lesson Goals

1. Discover how physical growth can be tracked by taking periodic measurements of the tree over time.
2. Accurately take and record a baseline measurement.
3. Make and discuss predictions about tree growth.

Assessment

Assess children on their measurement skills using Assessment 1. Additionally, you can review the predictions and justifications in the children’s science notebooks and use Assessment 3 to evaluate their prediction skills.

NOTES

Life Cycles Assessment 1: Measuring Length and Circumference
Use this sheet to assess children’s ability to measure length and circumference.

Date of Observation: _____ Lesson _____

Children’s Names	Assessment Criteria:				
	A. Uses the appropriate measurement tool for the task.	B. Lines up ruler or tape measure at “zero”	C. Identifies the correct unit of measurement.	D. Selects an appropriate dimension to measure.	E. Rounds to the nearest unit of measurement.
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Assessment 1: Measuring Length and Circumference Life Cycles Teacher Master 2

Teacher Master 2, Assessment 1

Life Cycles Assessment 2: Observing and Describing
Consider the children’s abilities to make and communicate observations, and determine whether the following elements are reflected.

TEACHER NOTE: Some children are acute observers, but have difficulty communicating what they have observed. Offer multiple avenues for description, including drawings as well as verbal or written descriptions.

Children’s Names	Assessment Criteria:		
	A. Observations and descriptions are accurate; they reflect actual characteristics or events.	B. Observations and descriptions are detailed.	C. Uses multiple senses and perspectives when making observations.
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Assessment 2: Observing and Describing Life Cycles Teacher Master 3

Teacher Master 3, Assessment 2

Materials

Item	Quantity	Notes
ExploraGear		
Tape measures	1 per group	To measure trunk and branches.
Classroom Supplies		
Clipboards (optional)	1 per group	To use when recording tree measurements.
Marker, permanent	1	To mark the tree.
Pencils	1 per child	To record tree measurements.
Previous Lesson		
Family Link "Trees: Tree Inventory"		
List of class tree growth and change predictions	1	To use during discussion.
Curriculum Items		
<i>Life Cycles Science Notebook, pages 39-40</i>		
Teacher Directions "Making Paper," page 98		
Teacher Master "Tree Diagram"		
Family Link "Household Items"		
Family Link "Tree Cross Section Request"		
Life Cycles Assessment 1: Measuring Length and Circumference (optional)		
Life Cycles Assessment 3: Predicting (optional)		
Skill Building Activity "Measuring Length and Circumference," page 312		

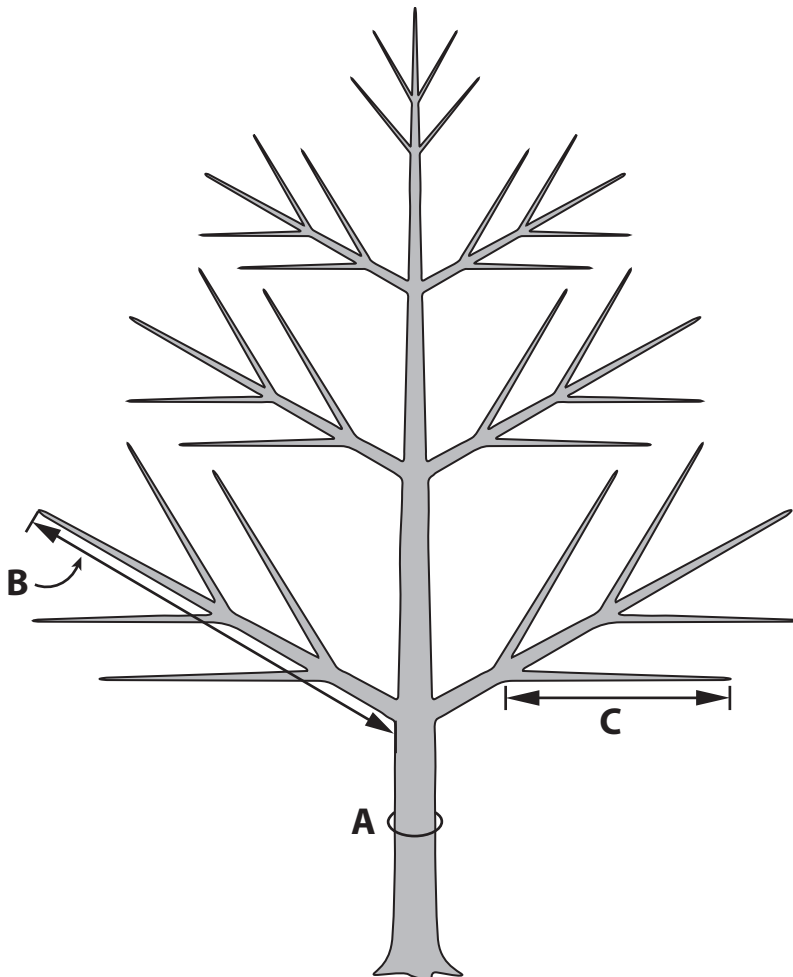
For the most current list of all ExploraGear materials, please visit our web site: www.sciencecompanion.com/exploragear

NOTES

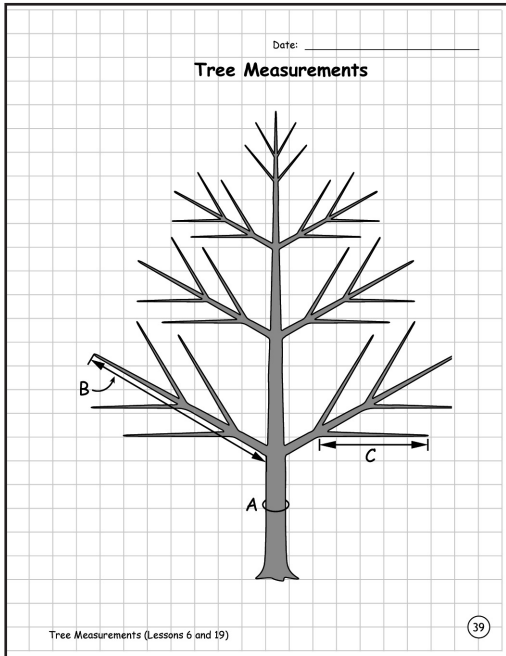
Preparation

- Locate the list of tree growth and change predictions the class developed during Lesson 5.
- Make an overhead transparency of the **Teacher Master "Tree Diagram."**
- Assign volunteers (parents or older children) to the groups to assist the children when they measure the tree.
- Make one copy of the **Family Link "Household Items"** and the **Family Link "Tree Cross Section Request"** for each child.

- ☐ To prepare for the measurements, do the following:
- **Trunk circumference** (see letter A in the illustration): With the permanent marker provided in the ExploraGear, mark a place at least 50 cm (20 in) from the ground. Children will measure the circumference at this spot now and in the spring.
 - **Main branch length** (see letter B in the illustration): Mark a place where the branch meets the trunk by drawing a ring around the branch. Children will measure this branch now and in the spring.
 - **Secondary branch length** (see letter C in the illustration): Mark a place where this branch meets the main branch by drawing a ring around it. Children will measure this secondary branch now and in the spring.



MANAGEMENT NOTE: Try to provide each group of children with their own marked branch.



Science Notebook page 39

Date: _____

Fall Tree Measurements

- Trunk circumference (measurement A).
Fall: _____ Spring Prediction: _____
- Main branch length (measurement B).
Fall: _____ Spring Prediction: _____
- Secondary branch length (measurement C).
Fall: _____ Spring Prediction: _____
- Did you predict that any tree measurements would be different in the spring? Why or why not?

40

Fall Tree Measurements (Lesson 6)

Science Notebook page 40

Vocabulary

- baseline**..... The first measurement, or starting point, scientists make to prepare for tracking something.
- blade**..... The flat surface of a leaf.
- circumference**..... The measurement around the outside of a cylinder or round object.
- deciduous**..... Trees that drop their leaves every year.
- evergreen**..... Trees that do not drop their leaves every year.

Teaching the Lesson

Engage

Introductory Discussion

- Have the children recall what they did the last time they visited the tree. (*They observed and described the tree. They predicted which parts of the tree and its surroundings might grow or change during the year.*)

TEACHER NOTE: To stimulate discussion, refer to the growth and change predictions you and the children developed during the sharing discussion in Lesson 5.

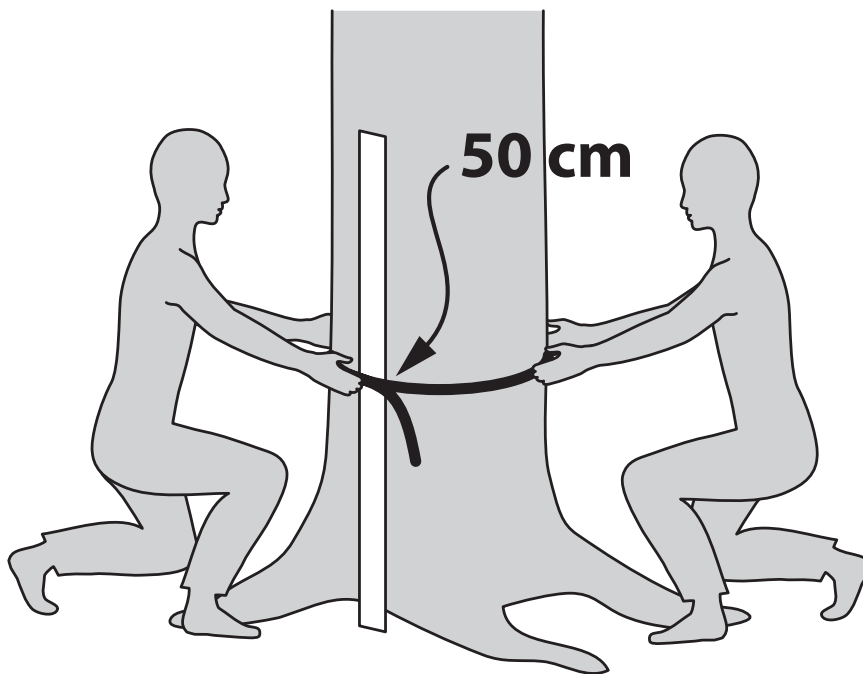
- Explain that today the children will measure three parts of the tree that might grow during the year. Inform the children that:
 - They will take physical measurements to establish a baseline, or starting point, followed by a second set of measurements in the spring.
 - By comparing measurements in the spring to their baseline measurements they will be able to determine whether the tree has grown.
- To prepare the children for making and recording their measurements:
 - Display the overhead transparency of the Teacher Master “Tree Diagram.”
 - Familiarize them with the measurement questions on page 40 of their science notebooks.
- Divide the class into small groups.

MANAGEMENT NOTE: Make sure to record the names of the children in each group in order to group them the same way in the spring tree measurement lesson.

Explore

Demonstration

1. Take the class to the tree. Remind the children to bring pencils and their science notebooks.
2. Have the children stand in a semi-circle while you demonstrate how to take the measurements. Remind them to measure accurately in order to detect changes.
3. Demonstrate how to take the following measurements:
 - Trunk circumference (See the graphic below)
 - Main branch
 - Secondary branch

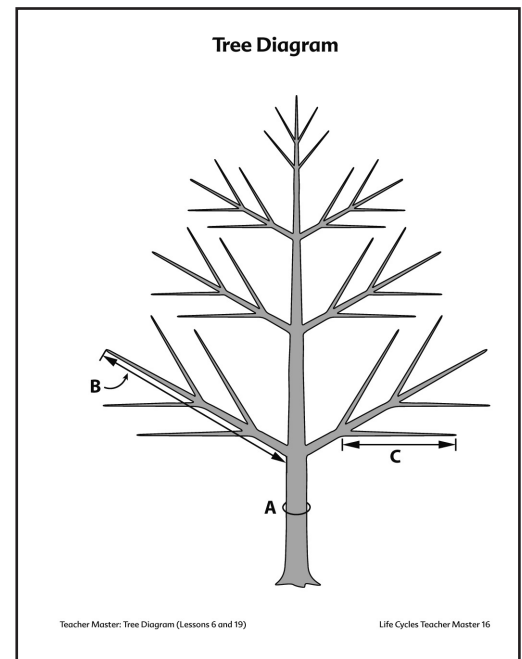


Measuring Our Tree

Have the groups make their measurements and record them in their science notebooks, page 40.

MANAGEMENT NOTE: Assigning roles to the group members helps all members participate. Tasks include measurers, instruction readers, and recorders. You may find it helpful for one child from each group to carry a clipboard on which the group records their measurements. The children can transfer this information to their science notebooks when they return to the classroom.

NOTES



Teacher Master 16

 **assessment opportunity**

While the children are making predictions, evaluate those skills using Assessment 3.

Name: _____ Date: _____

Family Link with Science

Household Items

Our class is studying trees in science.

Ask your child to identify and list at least 10 household items that are made from trees.

Family Link: Household Items (Lesson 6) Life Cycles Teacher Master 36

Teacher Master 36, Family Link

Name: _____ Date: _____

Family Link with Science

Tree Cross Section Request

In January our class will be examining tree growth rings.

Please consider sending some tree cross sections to school with your child.

The cross sections can be made by cutting off a 7-10 cm (3-4 in) diameter section from any tree that has already been cut down.

Clean and smooth cuts are best. Good sources would include:

- Dry, unsplit firewood
- A cutting from the bottom of a holiday tree

Family Link: Tree Cross Section Request (Lesson 6) Life Cycles Teacher Master 37

Teacher Master 37, Family Link **Reflect and Discuss****Sharing and Synthesizing**

1. Have the groups share their measurements with the class.

TEACHER NOTE: If the children get different results for their trunk measurements, you might discuss errors that occur while measuring (transposing numbers, having slack in the tape measure, measuring at the wrong spot on the trunk). Reinforce the idea that careful measurement of the tree is very important to accurately determine growth.

2. Ask the children to share what they found most interesting or difficult about their tasks.
3. Have the children open their science notebooks to page 40. Instruct them to predict the change they expect to see in the three tree measurements by spring, and to record their predictions.
4. Encourage some of the children to share their predictions. Do they think the tree will grow a lot? Why or why not?
5. Have the children discuss how their own growth during the year might compare with the growth of the class tree. Will they grow more or less than the tree? Why do they think so?

TEACHER NOTE: You might want to make copies of the groups' findings and display them in the Science Center so the children can look at them and compare their measurements.

Ongoing Learning**Family Link**

1. Send home Family Link "Household Items" and have the children identify several household items that are made from trees.
2. Send home Family Link "Tree Cross Section Request." The children examine tree cross sections in Lesson 10, "Trees: Growth Rings." Although the ExploraGear contains tree cross sections, having more available gives the children additional opportunities to observe the growth rings in detail.

Maintenance

Review the results of the Family Link “Trees: Tree Inventory” from the previous lesson. Discuss the different types of trees children noticed and the criteria they used to decide what “type” of tree they observed.

Extending the Lesson

Further Science Explorations

Paper Making

See the Teacher Directions “Making Paper” on page 98 for details. You will need one or two additional class sessions for this project.

Other Tree Investigations

1. Have the children measure the circumference of the class tree at the ground, 20 cm (8 in) above the ground, 50 cm (20 in) above the ground, and 100 cm (40 in) above the ground. Why are the measurements different? Which measurement is the best to use? Why?
2. Have the children bring leaves from their neighborhood to compare with those of the class tree. Record comparisons and in the blank pages at the back of their science notebooks.

Language Arts Extensions

Have the children write stories describing:

- What life was like at the time when a 50-year-old tree sprouted
- What will happen to their tree over the next 10, 20, or 50 years

Art Extension

Have the children draw a picture of what their class tree will look like in 50 years.

Planning Ahead

For Lesson 7

Invite parents or older children to assist the children as they measure their heads, heights, hands, and feet at four measurement centers.



Name: _____ Date: _____		
Family Link with Science		
Name: _____ Date: _____		
Family Link with Science		
Tree Inventory		
Group Name	Number of Trees	Common Characteristics

Family Link: Tree Inventory (Lesson 5), Page 2 of 2 Life Cycles Teacher Master 35

Teacher Masters 34-35, Family Links

Teacher Directions

Making Paper

Modern paper-making is a very technical science. However, you can create a fun classroom or home experiment that simplifies the paper making process. Basically, paper is a thin, flat mat of fibers that cling together. Because of their roughness, paper fibers literally “snag” each other. Therefore, paper can be made from almost any fibrous material, including leaves, bark, twigs, flower petals and used paper.

This project is divided into three parts. Preparation is very important, so read all the instructions and gather all the materials before you begin.

- Part 1—Prepare the materials and construct the deckle (about 30 minutes, plus soaking the materials overnight)
- Part 2—Make the pulp (about 10 minutes)
- Part 3—Make the paper (about 40 minutes)

MANAGEMENT NOTE: CAUTION! This is a wet and messy project. Protect surfaces and yourself.

Materials

Item	Quantity	Notes
Classroom Supplies		
Basin, 10 L	1	Large enough to submerge wooden frame, plus room for your hands.
Blender	1	To blend paper making supplies.
Bowl, large	1	To soak paper making materials.
Dishtowels, cloth	Several	To dry wet paper.
Electric iron	1	To dry wet paper.
Fibrous material (leaves, thin bark strips and/or twigs, grass, flower petals)	A small pile	To make into paper.
Frame, wooden, 20 cm x 25 cm (8" x 10")	1	To use as a deckle to make paper.
Paper, scraps torn into 3 cm square pieces (stationery, construction paper, magazines)	Many	To combine with fibrous material.
Screening, nylon or wire	1 piece	To attach to wooden frame, or deckle.
Sponge	1	To soak up water from under deckle.
Staples	Several	To attach screening to deckle. Make sure the screening is as tight as possible.
Starch, liquid (optional)	A small amount	To give body to the paper.
Strainer	1	To strain blended paper pulp.

Part 1—Preparing the Materials

1. Prepare the scrap paper by tearing it into small pieces and removing any staples.
2. Soak the pieces of paper and any other fibrous materials, such as bark and twigs, in the large bowl overnight.
3. Buy or build a wooden frame.
4. Staple or tack screening tightly to the frame to make a “deckle.” (The deckle should fit the frame snugly. The tighter the fit, the better.)


Part 2—Making the Pulp

1. Fill the blender half full with warm water and add a handful of the soaked paper and other fibrous material.
2. Blend at medium speed until the individual pieces of paper are pulverized and the pulp is the consistency of thick soup.
3. Pour the pulp into the strainer and rinse with water to remove inks and fillers (used in manufacturing the paper) and bits of other material that don’t blend well.
4. Pour the pulp into the basin and mix thoroughly until the ingredients are evenly dispersed. Add a few ounces of liquid starch, if desired. (Starch will give “body” to your paper.)
5. Blend a piece of construction paper in warm water and add the mixture to the pulp for color. Stir in leaves, flower petals, and tiny tree pieces for an interesting texture. (Do not blend these additions—stir only!)



Part 3—Making Paper

1. Slide your deckle into the basin containing the pulp you prepared.
2. Hold the deckle under the pulp and gently move it back and forth to get an even layer of fibers on the screen. Be sure to keep the deckle flat.
3. Lift the deckle out of the water, still keeping it flat. Drain off most of the water. There should be an even layer of pulp on the screen.
4. Press the pulp gently with your hand to remove more moisture. Use a sponge to soak up the water from under the screen.
5. Place a clean dishtowel on a flat surface and turn the deckle paper-side down on the towel or paper.
6. Lift the deckle carefully, leaving the new paper behind.
7. Quickly cover the new paper with another dishtowel and iron it at a medium dry setting.
8. When the paper is dry, pull the dishtowel gently from both ends to loosen your new paper, and then carefully separate the paper from the dishtowel.

 **SAFETY NOTE:** CAUTION! Do not pour any leftover pulp down the drain. Throw it in the garbage or freeze it for future paper making projects.

Date: _____

Tree Measurements

Tree Measurements (Lessons 6 and 19) 39

Date: _____

Fall Tree Measurements

1. Trunk circumference (measurement A).
Fall: _____ Spring Prediction: _____

2. Main branch length (measurement B).
Fall: _____ Spring Prediction: _____

3. Secondary branch length (measurement C).
Fall: _____ Spring Prediction: _____

4. Did you predict that any tree measurements would be different in the spring? Why or why not?

40 Fall Tree Measurements (Lesson 6)

Teacher Master 2, Assessment 1

Life Cycles Assessment 1: Measuring Length and Circumference

Use this sheet to assess children's ability to measure length and circumference.

Date of Observation: _____ Lesson _____

Children's Names	Assessment Criteria:				
	A. Uses the appropriate measurement tool for the task.	B. Lines up ruler or tape measure at "zero".	C. Identifies the correct unit of measurement.	D. Selects an appropriate dimension to measure.	E. Rounds to the nearest unit of measurement.
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Assessment 1: Measuring Length and Circumference

Life Cycles Teacher Master 2

Teacher Master 4, Assessment 3

Life Cycles Assessment 3: Predicting

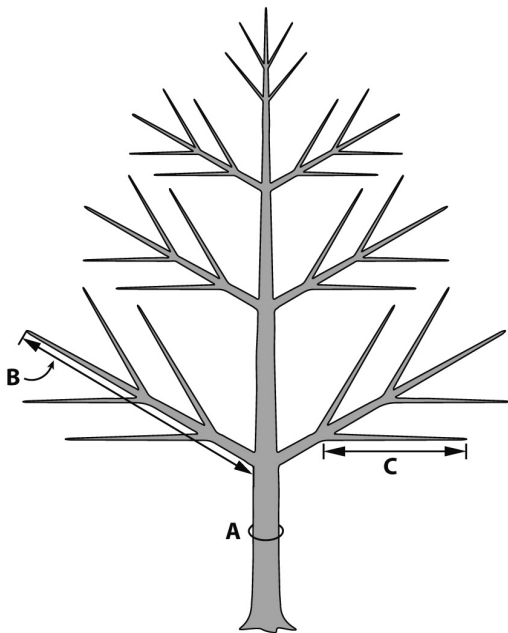
Children's Names	Assessment Criteria:		
	A. Makes relevant predictions.	B. Provides rationale for predictions using related understandings, observations, and/or data.	C. Revises predictions as pertinent information is discovered.
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Assessment 3: Predicting

Life Cycles Teacher Master 4

Teacher Master 16

Tree Diagram



Teacher Master: Tree Diagram (Lessons 6 and 19)

Life Cycles Teacher Master 16

Teacher Master 34, Family Link

Name: _____ Date: _____

Family Link with Science

Tree Inventory

Throughout the school year our class will be studying a tree and examining how it grows and changes.

To increase awareness of the number and variety of trees around us, please help your child conduct a survey of the trees in your yard or on your street.

1. Describe the area (yard, street, park, etc.) you studied.
2. Organize similar trees into groups. The trees don't need to be exactly the same and you can create your own names for the groups. For each group, list the number of trees and the characteristics the trees have in common. (See the example below.)

Group Name	Number of Trees	Common Characteristics
Pointy Needle Group	5	Long and pointy needles, large cones, rough bark

Family Link: Tree Inventory (Lesson 5), Page 1 of 2

Life Cycles Teacher Master 34

Teacher Master 35, Family Link

Name: _____ Date: _____

Family Link with Science

Tree Inventory

Group Name	Number of Trees	Common Characteristics

Family Link: Tree Inventory (Lesson 5), Page 2 of 2 Life Cycles Teacher Master 35

Teacher Master 36, Family Link

Name: _____ Date: _____

Family Link with Science

Household Items

Our class is studying trees in science.

Ask your child to identify and list at least 10 household items that are made from trees.

Family Link: Household Items (Lesson 6) Life Cycles Teacher Master 36

Teacher Master 37, Family Link

Name: _____ Date: _____

Family Link with Science

Tree Cross Section Request

In January our class will be examining tree growth rings.

Please consider sending some tree cross sections to school with your child.

The cross sections can be made by cutting off a 7-10 cm (3-4 in) diameter section from any tree that has already been cut down.

Clean and smooth cuts are best. Good sources would include:

- Dry, unsplit firewood
- A cutting from the bottom of a holiday tree

Family Link: Tree Cross Section Request (Lesson 6) Life Cycles Teacher Master 37