Lesson Number: MS.NR.5.1

You Are Barking up the Right Tree!

Middle School Food and Agricultural Literacy Curriculum

Precepts

B. Relationships

B5. Participate effectively as a team member.

National Standards

NRS.01.02.01.a. Describe morphological characteristics used to identify trees and other woody plants.

PS.01.02. Apply knowledge of plant anatomy and the functions of plant structures to activities associated with plant systems.

NL-ENG.K-12.4 – Communication Skills

NL-ENG.K-12.12 – Applying Language Skills

NS.5-8.3 – Life Sciences

Student Learning Objectives

As a result of this **unit** the students will…

Explain the basic concepts of the forestry industry.

As a result of this **lesson** the students will …

Identify tree parts (crown, trunk, roots, bark, etc.) in relationship to their use.

Content Outline

Objective 1. Identify tree parts (***crown***, ***trunk***, ***roots***, ***bark***, etc.) in relationship to their use.

I. Tree parts and functions

A. ***Crown***: composed of the leaves, branches, twigs, and flowers. The ***crown's*** primary function is food production.

B. Roots: underground structures that anchor the tree and take up water, nutrients, and minerals from the soil.

C. ***Trunk***: transfers water and nutrients from the roots to the ***crown***. The ***trunk*** is the source of the most useful wood in a tree.

1. ***Heartwood***: composes most of the ***trunk*** and is made up of dead ***xylem*** cells. Like the backbone that supports the tree.
2. ***Sapwood (scientific name xylem)***: the living ***xylem*** that transports water and nutrients up from the ***roots***.
3. ***Cambium Layer***: cell layer that produces new bark (***phloem***) and new wood (***xylem***) every year.
4. ***Inner bark (scientific name phloem)***: supply line that carries food from leaves to branches, stem and ***roots***

Time

Instruction time for this lesson: 45 minutes.

Resources

National FFA Organization. (2003). LifeKnowledge Precepts and Signs of Success. — Forest Science Unit 3 Dendrology Lesson 3 Plant Parts. Retrieved July 25, 2009. From Georgia Ag Ed Curriculum Web site. — http://aged.ces.uga.edu/Browseable_Folders/Curriculum/Lesson%20Plans/Forest%20Science%20I-03451/Unit_03_Dendrology/03451-3.1%20Tree%20Parts.doc — Tree Anatomy. Retrieved July 25, 2009. From The National Arbor Day Foundation Web site. http://www.arborday.org/trees/RingsTreeNatomy.cfm

Tools, Equipment, and Supplies

Writing surface
Transparencies and projector
Bags – one per group
Ball
MS.NR.5.1.TM A – one per student
MS.NR.5.1.TM.B – one per teacher (tree diagram with parts and functions)
MS.NR.5.1.TM.C – one per teacher (blank trunk diagram)
MS.NR.5.1.AS.A – one per student (diagram of trunk with blanks)
MS.NR.5.1.AS B – one per group (to copy and cut for Party Host e-Moment®)
MS.NR.5.1.ASSESS.A – one per student

Key Terms

The following terms are presented in this lesson and appear in ***bold italics:***

Crown
Roots
Trunk
Heartwood
Sapwood (scientific name xylem)
Cambium Layer
Inner bark (scientific name phloem)
Outer bark

5. ***Outer bark***: dead ***phloem*** cells that protect the tree from diseases and insects.

Interest Approach

The activities today are helping the students learn the different parts of a tree and the function of those parts. Have ready for your class a medium to large size ball (volley ball, basketball, or beach ball).

Welcome class. Thanks for coming to class ready to learn! This is a very important day because you will be analyzing what is happening beneath the surface of something that is a big part of sustaining life on this planet. You probably pass many of these every day and at some time in your life you probably enjoyed sitting or even playing in the shade of one. Yes, I am talking about trees, and today we will be learning the parts of the tree and the functions of these parts so that we can understand how trees contribute to our lives. You need to be focused and attentive as we begin to take a closer look at our friend, the tree!

If you have ever tried to walk on your hands, please raise your hand. Describe the experience when you tried to learn to walk on your hands.

Allow several students to share their experiences.

Thank you for sharing. Walking on your hands can definitely be a challenging task for some of us. Now let's try a task that will challenge us in another way.

Choose six to eight students to sit in a small circle with their feet extended straight out to the center of the circle. (Choose students of different sizes and leg lengths if possible.)

When I say GO, you will have one minute to pass this ball in a clockwise direction all the way around the circle from one team member's feet to the next person's feet without using any other body parts, including your hands. If the ball falls, we will start over with the beginning person. Questions? GO.

Put the ball between the first person's feet allowing them to pass the ball around the circle in a clockwise motion only using their feet! If the ball falls, put it back between the feet of the first person to pass the ball. Hopefully this will be difficult and the students will not accomplish the task.

Great try!! You may return to your seats.

Let's give them a snap/clap for their hard work!

As you model snapping your finger and then giving a clap have the students copy your actions as a model for positive feedback from the class.

Why was it hard to accomplish this challenge?

Allow students to respond, guiding them to the point that walking on your feet and passing a ball with your hands is more effective because these are functions those body parts are more suited to because of their anatomy.

Yes, I heard you say that it is easier to use hands for passing balls and our feet for walking because those are tasks that are much easier to perform when you use the body part more suited to complete the activity. That is so true and today we are going to discover how trees also have parts that perform certain functions and with all of the tree parts performing their intended functions, this allows the tree to grow and supply our lives with many important benefits.

Summary of Content and Teaching Strategies

Objective 1. Identify tree parts (***crown***, ***trunk***, ***roots***, ***bark***, etc.) in relationship to their use.

Project **MS.NR.5.1.TM.A** and allow students time to copy the tree diagram in their notebooks. You will be using this tree diagram to help the students learn the external tree parts and their functions.

When I say the word COPY, you will have one minute to copy the tree diagram complete with blanks into your notebook. What questions are there? COPY.

Allow students to copy the diagram.

I. Tree parts and functions

This tree diagram has three tree parts that you are probably very familiar with. When I say TREE, you will have two minutes to turn to a neighbor and identify the tree parts you know. Then you will come to an agreement on the main function each part performs and be ready to share.

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What questions do you have? TREE.

Allow students to share their responses. Discuss their responses and guide them to be sure that ***crown***, roots, and ***trunk*** and their functions are written in their notes according to **MS.NR.5.1.AS.A**

Great job! It sounds like everyone has a very good idea of these tree parts and their important functions. The information you are responsible for having on your tree diagram notes page are:

Project **MS.NR.5.1.TM.B** and discuss the following parts and functions. Allow time for students to copy onto their notes page.

A. ***Crown***: composed of the leaves, branches, twigs, and flowers. The ***crown's*** primary function is food production.

B. ***Roots***: underground structures that anchor the tree and take up water, nutrients, and minerals from the soil.

C. ***Trunk***: transfers water and nutrients from the ***roots*** to the ***crown***. The ***trunk*** is where the most useful wood is found in a tree.

Thank you for completing and labeling such interesting tree drawings! We have the parts of the tree down pat, or do we? What parts of the tree are left that we have not covered yet?

Allow students to respond. Guide them to taking a closer look at the ***trunk*** and its parts.

You are right! There are more parts that we must consider if we want to understand how trees grow and provide us with so many materials that we will use throughout our lives.

Pass out copies of **MS.NR.5.1.AS.A**.During this part of the lesson you will be using a drawing of the internal structures of the tree to help students identify those parts.

There are five additional parts of a tree that we are identifying today. Again, we must be able to explain what function each part performs for the tree. In order to explain those functions, we will be using a drawing of a cross section of a tree ***trunk***. Let's capture the parts and their functions on our notes page.

1. ***Heartwood***: composes most of the ***trunk*** and is made up of dead ***xylem*** cells. Functions like a backbone that supports the tree.

Project **MS.NR.5.1.TM.C** and allow students to copy information. Prior to teaching this lesson, the teacher will need to have some examples of motions ready to share with the students. Ideas have been included with each one but students are great at creating their own motions.

Wow! Those cross section diagrams are full of information! Since this information may be new to some of us, let's put a motion to each of these words so we can better understand what the function of each part is. Stand up.

Students will use the *Motion e-Moment®* to review the functions of the tree parts. The Motion Moment challenges students to utilize or create a hand or body movement that represents a concept. Call on a student to explain ***heartwood***.

Right, the ***heartwood*** functions like a backbone and supports the tree. Thinking about what that means, let's create a motion or action that will help us remember the function of each tree part. What motion do you think represents the ***heartwood?***

Allow student responses or use the following example.

Let's stand stiff and straight just like a backbone!

Model standing stiff and straight and have the students follow the motion.

Stop! Good job as stiff, supportive ***heartwood***. Now we've learned the first part of the tree's internal anatomy and what function it provides for the tree. Before we move on to the next part, turn to the person on your left and say, "Way to support that tree!"

Call on a student to explain sapwood.

2. ***Sapwood (scientific name xylem)***: the living ***xylem*** that transports water and nutrients up from the ***roots***.

Correct, the ***sapwood*** is the living cells called ***xylem*** that transport water and nutrients from the ***roots*** to the tree. Let's make this motion to represent the flowing of that water and nutrients.

Model upwards flowing motion with your hands starting below the waist and flowing up over your head and have students follow the motion.

OK, stop. Excellent motion representing how ***sapwood*** has nutrients flowing up from the ***roots*** to the entire tree. Let's continue to look inside the tree and consider the next part but first turn to the person on your right and say, "I never knew so much movement was going on inside a tree!"

Call on a student to explain ***cambium layer***.

3. ***Cambium Layer***: cell layer that produces new bark (***phloem***) and new wood (***xylem***) every year.

Right! The ***cambium layer*** is a layer of cells that produces both new bark or ***phloem*** and new wood or ***xylem***. Please follow this motion to represent the ***cambium layer*** as it carries on its dual function of producing both new bark and new wood.

Model pushing outward away from your body with one hand as you push inward towards your body with your other hand and have the students follow the motion.

Great, stop! Awesome ***cambium layer*** motions showing how it produces both new ***phloem*** that becomes ***bark*** and new ***xylem*** that becomes wood. Now continue to remain attentive as we are going to consider the next part of the internal anatomy of the tree.

Call on a student to explain ***inner bark (scientific name phloem)***.

4. ***Inner bark (scientific name phloem)***: supply line that carries food from leaves to branches, stem, and ***roots***

Yes! The ***inner bark or phloem*** is the supply line that carries the tree's food from the leaves to the branches, stem, and ***roots***.

Model a downward flowing motion with your hands starting the motion from above your head and flowing down your sides toward your feet and have the students follow the motion.

OK, stop! Excellent motions representing the ***inner bark or phloem*** carrying the tree's food from the leaves down to the other parts of the tree.

Now continue to remain curious and let's consider our last tree part and its very important function.

Call on a student to explain the ***outer bark***.

5. ***Outer bark***: dead ***phloem*** cells that protect the tree from diseases and insects.

All right! The ***outer bark*** is made up of dead ***phloem*** cells that function to protect the tree from insects and disease. How could we model this part of the tree to represent its function?

Allow students to suggest motion and use their motion or model this function by holding your hands out palms forward in a stop or halt motion.

Excellent, stop! That was tremendously fun! To help us remember the parts and functions we have learned today, let's practice our motions for each function and explain what that motion is representing. When a student is called on to model the motion, the class should also complete the motions. What questions do you have?

Call on different students to model the motion and explain what that motion represents. Have all students repeat the motion each time.

Wow! That was awesome and those motions will really come in handy to remember the tree parts and their functions.

Review/Summary

Students will use the Party Host e-Moment to review the parts of a tree in relation to its function. This is a group activity. Groups can be predetermined; however, the groups should have nine students representing the eight party guests (tree parts) and the party host. If a group is smaller than nine, groups can be combined and there can be more than one for each tree part. Each group will draw from a bag with pieces of paper representing all of the tree parts and the host as the choices.**MS.NR.5.1.AS.B**. This activity sheet should be cut and placed in the groups' bags before class. Students take on the role they draw and act out that role as they are greeted by the Party Host. Guests enter and stay in character. The Party Host uses their clues (words and actions) to guess who they are after the last guest has entered the party.

If time is running short just reviewing using the Motion e-Moment again.

You Are Barking up the Right Tree!

Now that you have learned the parts of the tree and how they function in relation to the tree as a whole, we are going to continue to seek mastery of this information by using this information in another way.

Each group will have a bag with the parts of the tree. When I say GO, you will move into your groups, and each person in the group will draw a role from the bag. You will then wait silently for further instructions. What questions are there? GO.

Allow the students to draw their roles from the group's bag.

Today you will be attending a special party. Each group's party host will be welcoming you when you knock on their door.

Modeling each step using previously learned content will help students understand the process if they have never done this activity before.

When I say PARTY, you will be acting out the role you drew from the bag. Be careful not to say who you are. After you knock on the door and you are greeted by the host you will be allowed to enter the party. Stay in character and continue to visit with all of the other guests. When the final guest arrives, the party host will guess each guest's identity. What questions are there? PARTY.

Allow students to have their parties. If needed, allow the group members to give clues if the host gets stuck.

Great work! Please return to your seats. Everyone has been so creative and today we have identified the different tree parts in relationship to their use. Way to go! Even though we have had fun going to our party, we have realized that all of the parts of the tree are important and must work together. Take a moment to think about how we can relate this idea to teamwork. What advantages would a diverse team have over a team with all of the same kind of people? How did the other members of your group bring their own unique talents to the activity? What would a team be like if everyone on that team was exactly the same?

Allow students to discuss or answer in their journals.

Today we have learned the anatomy of a tree and the function of each tree part. This will be very important tomorrow as we continue to learn about trees by discovering the thousands of products that come from those tree parts! Thank you so much for being so involved in the lesson today and for the great teamwork you exhibited. Be sure to bring that attitude back with you to class tomorrow!

Application

Extended classroom activity:

Use cross sections of a tree ***trunk*** (tree cookies) and have students label the tree parts.

FFA activity:

Have a forester visit a FFA meeting and share about careers in forestry.

SAE activity:

Take a trip to a state park or national forest to discover the role trees play in providing benefits to man.

Evaluation

MS.NR.5.1.ASSESS.A

Answers to Evaluation

1. crown
2. roots
3. trunk
4. backbone
5. transports
6. sapwood, phloem
7. outer bark
8. bark, wood

Name_____

Directions: Read each statement and fill in the blank with the word or words that best completes the statement.

1. **The _____ , whose primary function is food production, is composed of the leaves, branches, twigs, and flowers.**

2. **Underground structures that anchor the tree and take up water, nutrients, and minerals from the soil are called _____.**

3. **The main function of the _____ is the transport of water and nutrients; however, this is also where the most useful wood is found in a tree.**

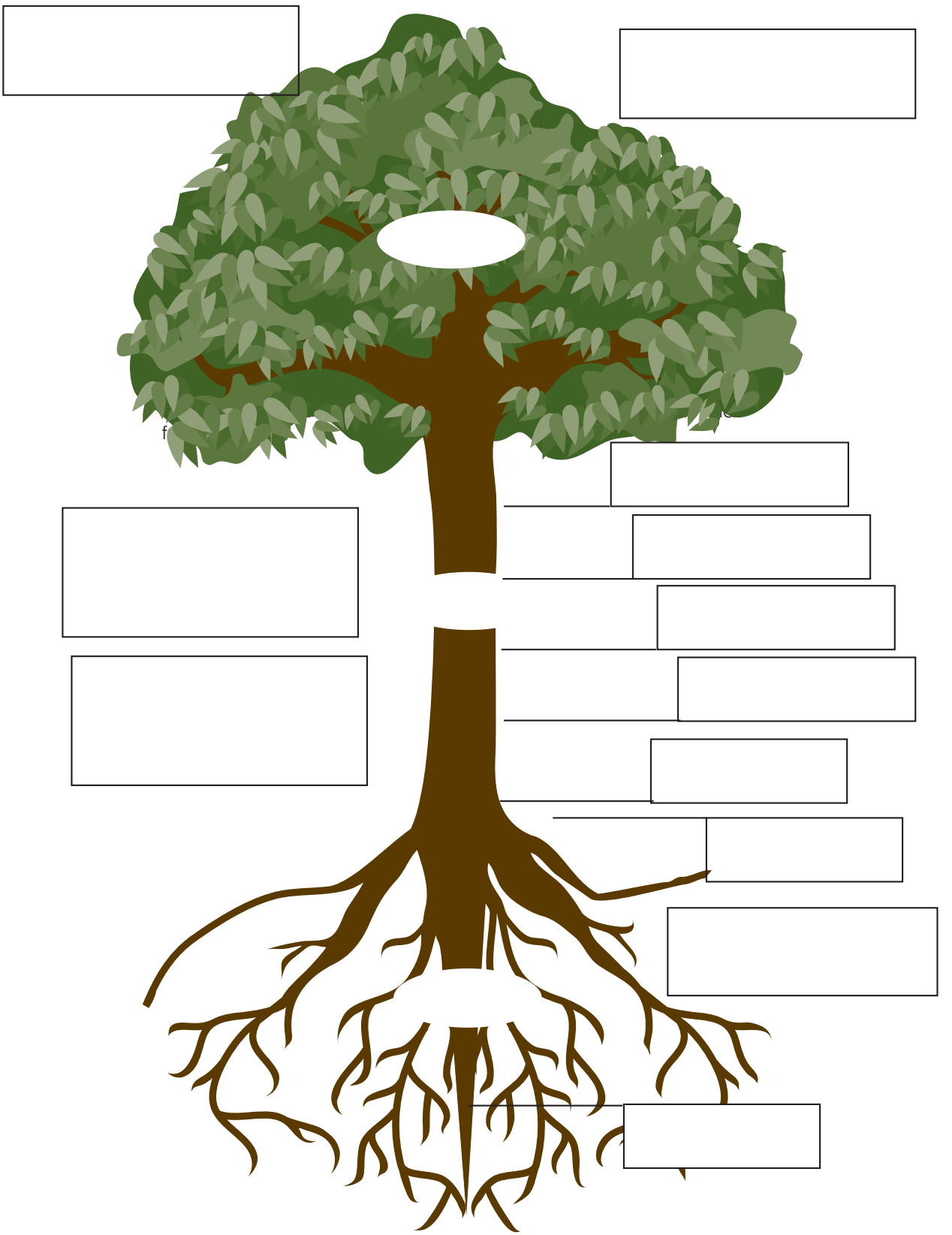
4. **The heartwood composes most of the trunk and is made up of dead xylem cells. It functions like the _____ that supports the tree.**

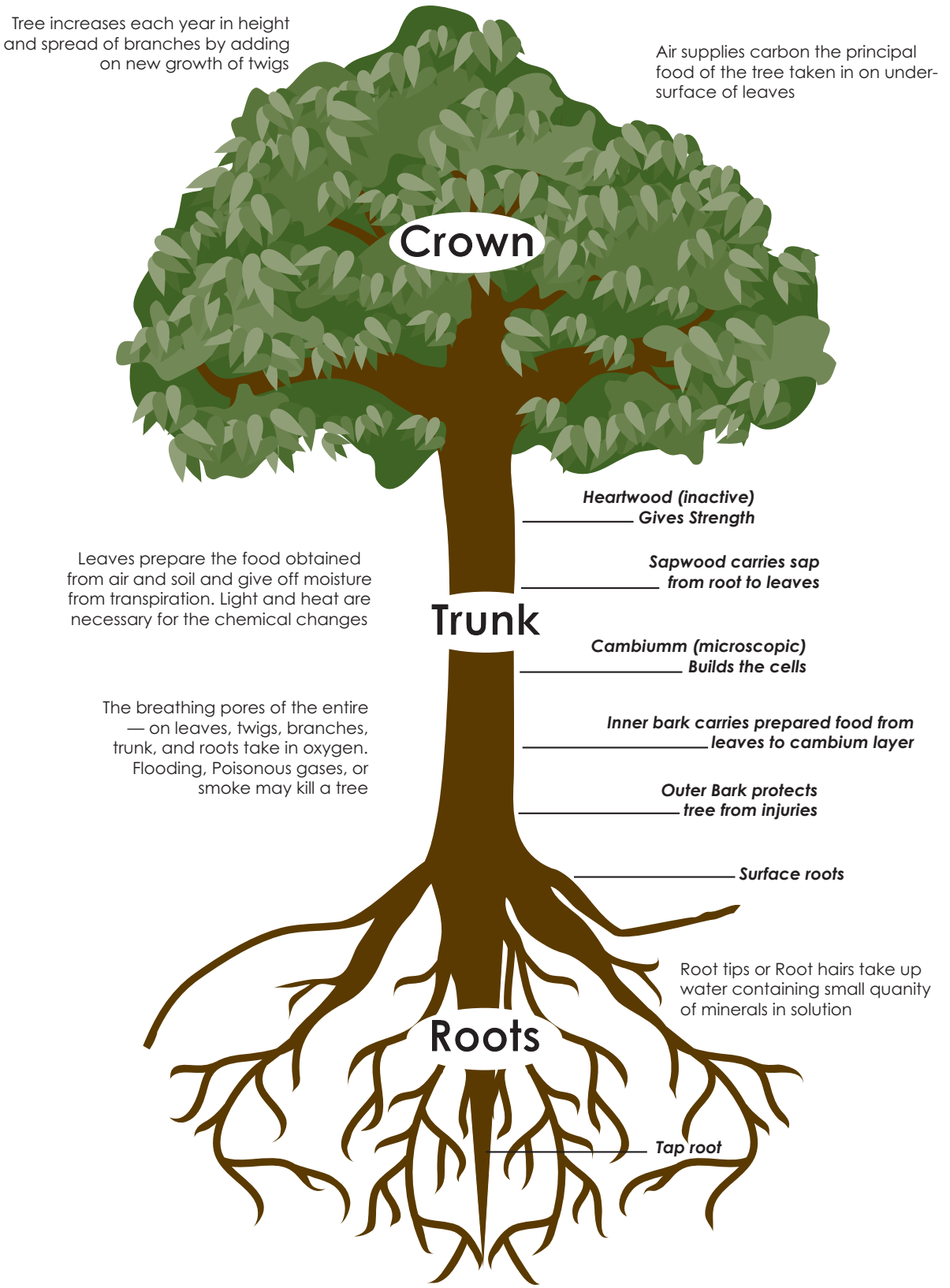
5. **The sapwood is the living xylem that _____ water and nutrients up from the roots.**

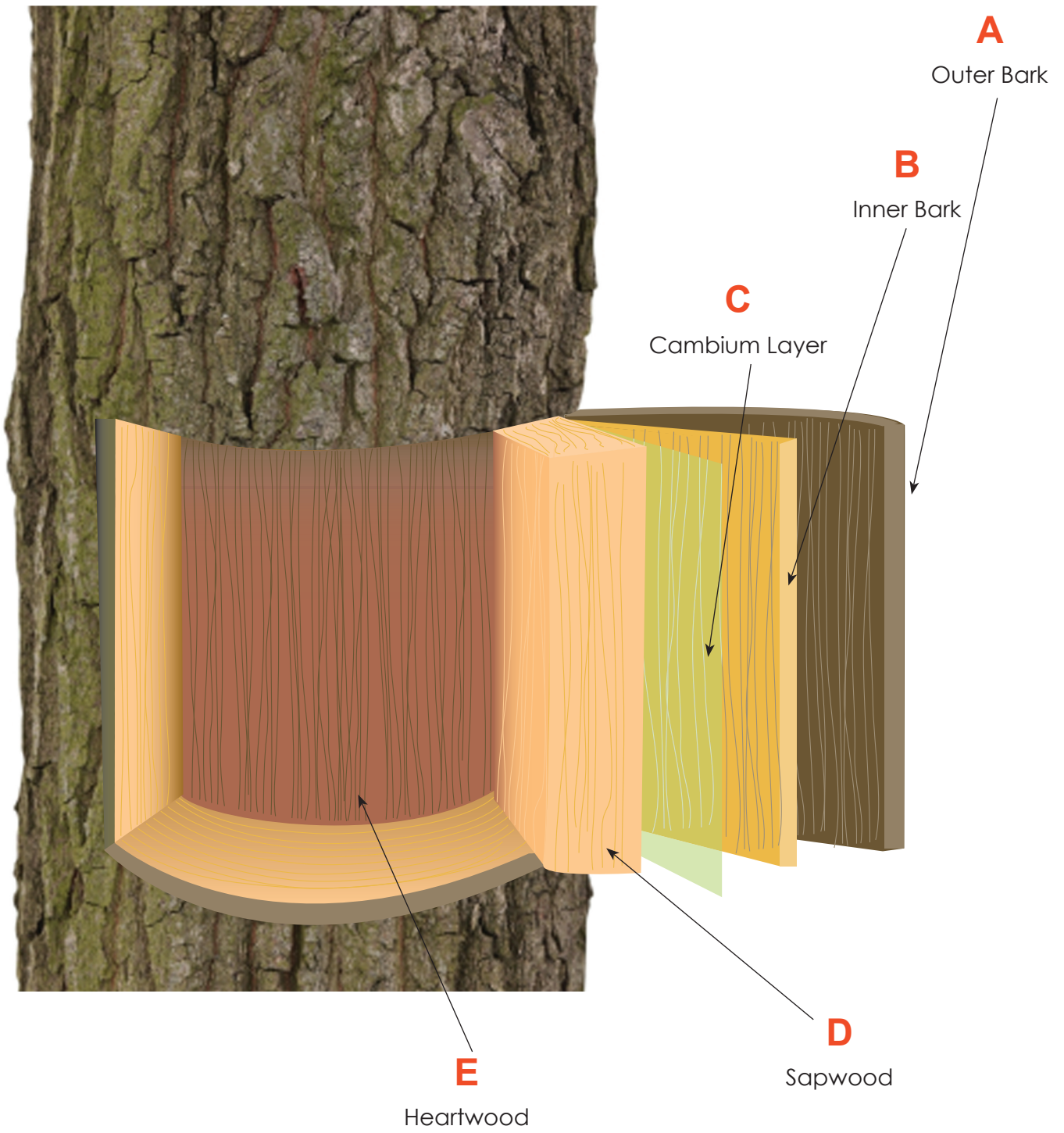
6. **The supply line that carries food from leaves to branches, stem, and roots is called the _____ but is also known by its scientific name _____.**

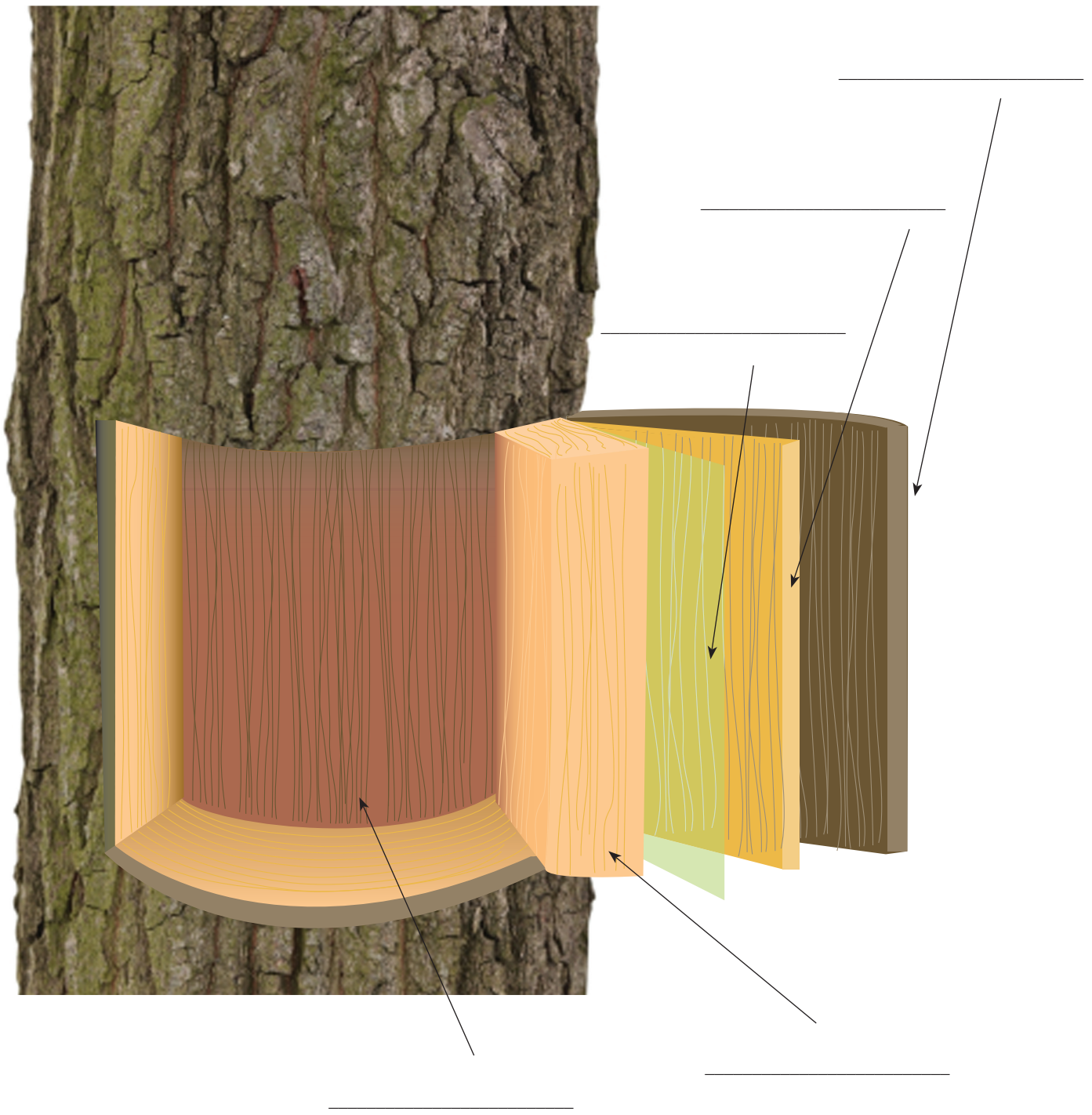
7. **The _____ _____ protects the tree from diseases and insects.**

8. **The cambium layer produces new _____ and new _____every year.**




Tree increases each year in height and spread of branches by adding on new growth of twigs
Air supplies carbon the principal food of the tree taken in on under-surface of leaves
Crown
Heartwood (inactive) Gives Strength
Sapwood carries sap from root to leaves
Leaves prepare the food obtained from air and soil and give off moisture from transpiration. Light and heat are necessary for the chemical changes
Trunk
Cambiumm (microscopic) Builds the cells
The breathing pores of the entire — on leaves, twigs, branches, trunk, and roots take in oxygen. Flooding, Poisonous gases, or smoke may kill a tree
Inner bark carries prepared food from leaves to cambium layer
Outer Bark protects tree from injuries
Surface roots
Root tips or Root hairs take up water containing small quanity of minerals in solution
Roots
Tap root


A
Outer Bark
B
Inner Bark
C
Cambium Layer
D
Sapwood
E
Heartwood



Crown

Roots

Trunk

Heartwood

Sapwood (scientific name xylem)

Cambium layer

Inner bark (scientific name phloem)

Outer bark