DO PLACE AFTER SCHOOL CURRICULUM

Beyond School Bells
nebraskachildren

IN THIS FILE:

- Tree-A-Thon
  - Overview
  - 7 Topics, 22 Lessons
  - Tree Flash Cards
  - Accompanying Images and notes
  - List of Local, State, and National Standards addressed

Thank you so much for your interest in this after school content that teaches why trees are so important, how to plant a seedling, how to care for newly planted trees and a lot more! This content is provided to you free of charge. If you could please complete this short 5-question survey after you use the content, it will help us to improve the quality of the lessons. Thank you, again! LINK to the Survey **To say thank you once more, all participates who reply to the survey will be entered into a prize drawing!**

This curriculum was developed by UNL students during the winter 2020 Design Studio.

Overview of the full 6-8-week Tree-A-Thon

After School Lessons

Developed by the winter 2020 Design Studio Team

Notes to the teacher/site director:

1. It might be helpful to center Topic 7, Change the World, which involves the actual tree planning and follow-up care, around a family night. This could deepen the learning for youngsters as a caring adult would be "on the team." Also, this would help with the last message – lasting care for your tree. Additionally, this would be a good time for students to share some of the projects that they have created in this unit.
2. We suggest that you connect with an arborist in your geographic area. If you need a contact, here is the Nebraska Arborist Association website.
3. Topic 7, tree planting, requires that the tree roots be soaked in water for 3-6 hours before planting.
4. Please capture some video of the lessons, especially the planting part. Once submitted, we will have a compilation video made and share it back with you for your use.
5. There are images that relate to certain lessons on the back page of the lesson plan.
6. Follow-up tree care – after this unit could be a home-based activity, especially

Each lesson 45 minute lesson starts with a "setting the stage" question for whole group or small group input followed by a short (3-5 minute) video that further sets the stage. Then, kids will work as a team to complete a project related to the topic at hand. Reflections follow projects. Those can be oral, written, or podcasty or some combination of all the above.

1. **Topic 1 – Intro to Trees?**
    - Lesson A – Why trees? And Why are they important to me?
    - Lesson B - Why do trees matter?
    - Lesson C – Why do I value trees?
2. **Topic 2 – How Trees Work**
    - Lesson A – Transporting Water and Nutrients, a two page lesson plan
    - Lesson B – The Story of a Tree's Life in Rings
    - Lesson C – Your Life in Tree Rings
3. **Topic 3 – Build a Tree**
    - Lesson A – Trees and their Seeds
    - Lesson B – Let's Plant Our Socks!
    - Lesson C – Trees and Their Leaves
4. **Topic 4 – Mysterious Trees**
    - Lesson A – What is Pollination?
    - Lesson B – Let's Play Wind Pollination Basketball!
    - Lesson C – Seeds and Their Lunch!
5. **Topic 5 – Who Knew**
    - Lesson A - What are the benefits of Trees?
    - Lesson B - What are some tree products?

In the footer of each lesson, you will find a reference to National, State, and Local Standards addressed by each lesson.

- Lesson C - What careers are related to trees?

6. **Topic 6 – Tree Habitat**
    - Lesson A - What wild life lives in trees?
    - Lesson B - What pests live in trees?
7. **Topic 7 – Change the World!**
    - Lesson A - What are the important steps in planting a tree?
    - Lesson B - How do I care for a newly planted tree?
8. **Vocabulary flash cards:**
    - Bare-root tree - are not grown in a pot and will not have any soil around their **roots**
    - Arborist – is a professional in the practice of arboriculture, which is the cultivation, management, and study of individual trees, shrubs, vines, and other perennial woody plants in dendrology and horticulture.
    - Tree trunk - is the stem and main wooden axis of a tree
    - Tree root ball - is the main mass of roots at the base of a plant such as a shrub or tree
    - Root flair – where the tree trunk and the roots meet
    - Grade – where the existing ground is. We plant a tree below the grade.
    - Biodiversity – is all the different plants and animals living near or in the tree.
    - Contributing – means giving to or helping.

9. **State, local, and national standards are listed for each lesson:**
    - Nebraska Academic Standards
        i. SC2.3.1.B Identify the basic needs of living things (food, water, air, space, shelter)
        ii. SC2.3.2.B Describe how living things change as they grow
        iii. SC5.3.1.B Identify how parts of plants and animals function to meet basic needs (e.g., leg of an insect helps an insect move, root of a plant helps the plant obtain water)
    - College and Career Ready Standards
        i. SC.2.7.2.A Plan and conduct an investigation to determine if plants need sunlight and water to grow.
    - National Standards Benchmarks for Science Literacy
        i. 5C/P2 Most living things need water, food, and air.
        ii. 5E/P1 Plants and animals both need to take in water, and animals need to take in food. In addition, plants need light.
        iii. 8A/P1BC To grow well, plants need enough warmth, light, and water. Crops must be protected from weeds and pests.
        iv. 5C/E1 Some living things consist of a single cell. Like familiar organisms, they need food, water, and air; a way to dispose of waste; and an environment they can live in.
        v. 5D/E3B Many plants depend on animals for carrying their pollen to other plants or for dispersing their seeds.
        vi. 5E/E2 Some source of "fuel" is needed for all organisms to stay alive and grow.
    - Next Generation Science Standards Grade Level Disciplinary Core Ideas
        i. 2-LS2.A.3 Plants depend on water and light to grow.

In the footer of each lesson, you will find a reference to National, State, and Local Standards addressed by each lesson.

Hi Pals! Access Prior Knowledge: ASK! What is a tree? And WHY are they important? WRITE Student responses on the board/poster paper. Play the video below.

TAT – Topic 1 – Intro to Trees - A – Why Trees?

Set the stage: Click here for the video, 4 minutes, 27 seconds

Big Questions – What are trees and why are they important to me?

Terms: See flash cards, next page

Materials Needed:

- Internet connection, computer, projector,
- Board/white board, or poster paper
- Brown roll paper, backdrop of the mural
- Art supplies

Procedure: After the intro video – Engage - Follow-up – Were we correct with our guesses?

Think, Pair, & Share

Talk with a partner and discuss the following questions:

- What do trees look like?
- Where do trees grow?
- What is the coolest/biggest/most interesting tree you have seen & where did you see it?

Main Activity:

1. Use art supplies and materials to draw your idea of a tree--be creative!
2. Add them to the class mural!
3. Review the flash cards and their meaning.
    - Add them to the mural too!

Reflection - To communicate their observations: "I saw…"
To reflect on their predictions: "I thought…but then…"
To demonstrate science community skills: "I liked…" or "I respected…"
To make a conclusion: "If we care more about trees, …
he should…" These could be oral or podcasty.

Enrichment – Be thinking about what we learn here after school and how we can expand that further into my community?

BSB – The Do Place: Nebraska: SC3.3.1.B, SC2.3.2.B, SC5.3.1.B; College & Career Ready: SC2.7.2.A; National: 5C/P2, 5E/P1, 8A/P1BC, 5C/E1, 5D/E3B, 5E/E2; and NGSS: 2-LS2.A.3

Hi Pals! Access Prior Knowledge: ASK! Pair & Share
Have you ever climbed a tree? Have you ever had a bonfire? What benefits do trees provide YOU? What products/services do you use that trees provide? (Toilet paper, pencils, shade, recreation, fresh air, timber, etc.)
WRITE Student responses on the board/poster paper.

TAT – Topic 1 – Intro to Tres Lesson B – Why do trees matter?

Set the stage: Your discussion above sets the stage. There is no video for this lesson.

Big Questions – Why should students care about trees?

Terms: Continue to add to your class forest mural.

Materials Needed:

- Internet connection, computer, projector,
- Board/white board, or poster paper
- Collect materials from outside
  - Pine cones
  - Twigs
  - Rocks
  - Flowers, etc

Procedure: Warm up activity

Tree Link
Assign 2 students to be the start of the "tree link". Have them link arms, or "branches", and direct the remaining students (trees) to roam/run/skip/walk freely around the area. Once the "tree link" links arms, "branches", with another student, that student joins the "tree link". The game ends when all "trees" (students) are linked together in one big line.
(For older children, you can add the additional rule of allowing the "tree link" to split up (but only in pairs of two). This will make it easier for the "tree link" to collect other students as they spread out.

Main Activity - Build a tree model (indoors or outdoors) Students could work in teams or separately. See images on the next page.

Reflection - To communicate their observations: "I saw…"
To reflect on their predictions: "I thought…but then…"
To demonstrate science community skills: "I liked…" or "I respected…"
To make a conclusion: "If we care more about trees, …
he should…" These could be oral or podcasty.

Enrichment – Be thinking about what we learn here after school and how we can expand that further into my community?

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1. Hi Pals! Access Prior Knowledge: ASK! Pair & Share WRITE Student responses on the board/poster paper.

TAT – Topic 1 – Intro to Trees Lesson C – Why do I value trees?

Set the stage: Divide the class into two teams. Let's Play Tree Jeopardy! Interactive game – 20 min.

Big Questions – Why do I value trees?

Terms: Continue to add to your class forest mural.

Materials Needed:

- Internet connection, computer, projector,
- Board/white board, or poster paper
- White paper, 8.5 X 11
- Markers
- Crayons
- Craft materials

Procedure: After the class plays Tree Jeopardy:

Pair & Share
Talk with a partner and tell each other ONE (or more) reason why trees are important or why they should care about trees.

Main Activity - Children come up with their own "tree story" or poem. They can develop a main "tree character(s)" or "tree hero", give them names, and share their stories with peers, family members, teachers, etc. This could be a written work or a play, comic strip, video, or any other creative display of their story. Challenge the students to identify how their "tree hero" helps people or benefits the community they are in.

Take home connection:
Challenge students to pick one (or more) challenges to commit to doing before the next club meeting.

- Tell a family member, sibling, friend not in the club, neighbor, etc. the ONE (or more) reason trees are important and why we should care about them.
- Share your "Tree Story" with a family member, sibling, friend not in the club, neighbor, etc.

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Hi Pals! Access Prior Knowledge: ASK! What do you know about how a tree sends water, nutrients and food through its system? WRITE Student responses on the board/poster paper. Play the video below.

TAT – Topic 2 – How Trees Work -Lesson A – How Trees Work Transport of Water and Nutrients

Set the stage: How do the Xylem and Phloem move water and nutrients? 3 minute video. Use part 1

Big Questions – How do trees transport water, nutrients and sugar? Where do these things go?

Terms: See diagram, next page/previous file.

Materials Needed:

- Stopwatch (cell phone app)
- Masking Tape
- 3 Objects to represent water, nutrients and sugar. (Note: just use one object to represent all of three.)
- Example Objects:
- Tennis Balls, two colors – one to represent the Xylem, the other the Phloem
- Lego
- Something easy to pick up and set down.
- Ideally, do this game in a large open space:
- Gym or open classroom.

Set-Up:
Using masking tape, create a large outline of a tree (see diagram next page for details). The size could be anywhere from 10-30ft depending on the room you have. You will outline:

- 3 roots
- 3 branches with 1 leaf on each branch
- 1 tree stem separated into two sides (one for phloem and one for xylem). You can add arrows to minimize confusion (see diagram).
- 1 soil line (taped perpendicular to the tree stem and right above the roots).

Next, place the objects you decided to use to represent water, nutrients, and sugar at the end of each root.

Explain to the students:

- Xylem take water and nutrients from the roots that are absorbed through the soil and take them all the way up to the leaves.
- Phloem take sugar the leaves produce from photosynthesis down to the roots.
- The Cambium separate the Phloem from the Xylem.
- The _____ object represents the water, nutrients, or sugar.

Relay Race Instructions:

1. Separate students into two equal teams. If teams are unequal one student will need to volunteer to go twice.
2. Half of the team will be lined up at the roots (xylem) and the other half of the team will be lined up at the leaves (phloem). The other team will wait their turn.
3. Once students are ready and organized say "Go!" Use your timer to see how fast the group completes the relay, which goes as follows:
   The xylem student will go first. They will take the object from the roots and run up to the leaves and place it there. This student will distribute all three objects to each leaf. Once they have completed this, they will then high five one of the phloem students' hands. The phloem student will then take the objects down from the leaves to the roots. Placing the object at the end of each root. (Note: the students can only take one object at a time!!!)

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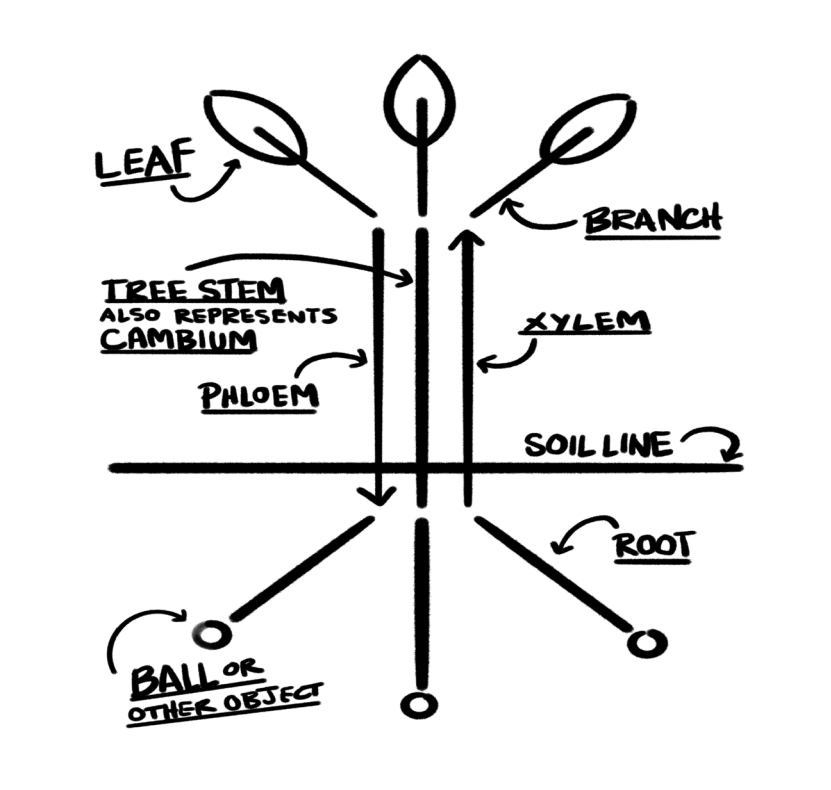
Hi Pals! Access Prior Knowledge: ASK! What do you know about how a tree sends water, nutrients and food through its system? WRITE Student responses on the board/poster paper. Play the video below.

TAT – Topic 2 – How Trees Work - A – Part 2 - How Trees Work Transport of Water and	**Set the stage**: you have done this in the previous lesson.
Big Questions – How do trees transport water, nutrients and sugar? Where do these things go?	**Resource:** The diagram below helps you set the tape correctly on the gym/café floor. Also see the refelection suggestion below**.**

Diagram:



Reflection questions: Which way does the xylem travel (up or down)? What does the xylem transport?
Which way does the phloem travel? What does the phloem transport?
What is the Cambium (it separates the xylem from the phloem)?

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Hi Pals! Access Prior Knowledge: ASK! Do you know how we can tell the life story of a tree? WRITE Student responses on the board/poster paper. Play the video below.

TAT – Topic 2_B – How Trees Work – Understanding the life of a tree

Set the stage: Life as a Tree video, 5 minutes

Big Questions – What can we learn about a tree's life from its rings?

Resource: Interactive Game to understand tree rings: https://scied.ucar.edu/tree-ring-interactive

Materials Needed:

- Tree cookies
- Paint or markers
- Paper
- Tree diagrams
- Masking tape

Procedure:

Part 1: Students will be separated into small groups and will each be given a tree cookie.

1. Using the diagram attached, students will then identify the following:
   - Heartwood
   - Sapwood (Xylem)
   - Phloem
   - Cambium
   - Wet and Dry years
   - Spring/Early Summer growth
   - Late Summer/Fall growth

   Lastly,
   - The age of the tree cookie

Have students identify all of this by painting or drawing (use different colors) a separate piece of paper. This was you can reuse the tree cookie next year.

2. Have students organize their tree cookies from oldest to youngest.
3. Now, have students stack their tree cookies, starting with the oldest tree cookie on the bottom and the youngest tree cookie on top.
4. Have students make observations about the tree cookies size and age. Are some of the younger tree cookies bigger than older tree cookies? Why would this be?

Enrichment: Place our tree cookies in year order, oldest to youngest.

Reflection: What are three things that you learned today about the life story of a tree?

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Hi Pals! Access Prior Knowledge: ASK! If you were going to tell the story of your life in an object, how would you go about it? WRITE Student responses on the board/poster paper.

TAT – Topic 2 – How Trees Work - Lesson C –Your Life in Tree Rings

Set the stage: Say – remember how we were able to learn a lot yesterday about the life of a tree in their rings? Well today, we are going to tell our own story!

Big Question – Can we create a tree circle to represent our own lives?

Resource: Students spend a few minutes thinking about their lives, trials and triumphs.

Materials Needed:

- Paint or markers
- Paper
- Tree diagrams
- Pens, pencils

Procedure:

Students will illustrate their life history through annual tree rings.

1. Each student will draw out their life in tree rings.
2. The center of the tree (the pitch) will be their birth date.
3. Bigger tree rings = lots of growth (did they get taller or bigger?) or did they do something that made them feel good or confident? Exciting events: Getting a new pet, vacations, etc… These tree rings represent wet years.
4. Smaller tree rings = These years could represent lots of challenging experiences. These rings represent dry years.
5. Draw scars = Where they got sick or broke a bone.
6. The number of rings drawn should be the students age.

If there is time have the students share their life tree rings with a friend or as a large group.

Afterwards, allow the students to add their tree rings to the class mural. Make sure their names are on the drawing.

Reflection: What are there differences and/or similarities in how we count human and tree lives?

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Hi Pals! Access Prior Knowledge: ASK! students if they have seen flowering trees. Ask them if they know how flowers are pollinated. WRITE Student responses on the board/poster paper. Play the video below.

TAT – Topic 3 – Build a Tree Lesson A – Trees and their seeds

Set the stage: Race/hike to find seeds outside, 10-15 minutes.

Big Questions – Can students identify and distinguish seeds from different trees?

Resources: Project the image called "Images of trees seeds" here in these files.

Materials Needed:

- If students can't go outside to find seeds, bring some in that you have collected

  OR, bring in some of the following for students to dissect:
  - Acorns
  - Oranges w/ seeds
  - Apples
  - Grapes w/ seeds
  - Cherries
  - Pine cones
  - Mulberries
  - Pecans
  - Almonds

Procedure: After the intro video – Engage

Take students outside to looks for tree seeds. Usually seeds will collect near the base of the tree they fell from, but you can also look in other places (gutters, gardens, fences, etc.)

Lay all the seeds out on a table and have students group them by shape, size, or other distinctions they feel are important.

Help students point out similarities and differences between the seeds/groups of seeds. Do they know if some of these seeds came from the same tree? If yes, how do they know? (If they don't know, that's okay!)

Have students look at pictures of tree seeds and see if they can match the ones they found to the pictures and identify the species of tree it came from.

Explain that usually, tree species that are in the same family produce similar seeds, but they might look slightly different. For example, some oaks produce tiny acorns (like pin oaks), while others produce big acorns (like bur oaks or chestnut oaks).

Enrichment – Follow-up activity next day – Have students draw the tree that their seeds came from.

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Hi Pals! Access Prior Knowledge: ASK! students if they have ever planted seeds before. If so, what were the steps? How long did it take to grow plants? WRITE Student responses on the board/poster paper. Play the video below.

TAT – Topic 3 – Build a Tree – Lesson B - Let's Plant our socks!

Set the stage: Planting our socks, 2 minutes, 27 seconds.

Big Questions – Can students identify and distinguish seeds from different trees?

Resources: Ask a couple students to add a drawing of old socks to the class mural.

Materials Needed:

- A pair of old socks for each student
- A pot to plant socks and dirt in
- Dirt
- Water

Procedure: After the intro video – Engage

- Start by having kids watch Plant Your Socks!, a short animated video about wearing fuzzy socks outdoors to collect seeds on the ground.
- Then, head outdoors for Seed Travels, a hands-on activity in which kids go on a scavenger hunt to find different kinds of plants and seeds in their socks.
- Students then come inside and place some dirt in the pot, their socks, and top with more dirt. Water planting and place near a window or sunny place.
- If time, student can play seed racer. Players explore the different ways that seeds are dispersed (as burrs in fur, consumed by birds or transported by mammals, floating on the wind or water, or spinning through the air), in this interactive game from PLUM LANDING. Along the way, players learn about the plants in a mountain ecosystem, how their seeds travel, and how animals rely on them. This activity can be saved for tomorrow if you run out of time.

- **Enrichment** – Watch what happens at the 10, 20, 30, and 40-day mark. Keep dirt moist, but not too wet. Have students make short observations in the journals about the changes that they see. See at an upcoming family night.

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Hi Pals! Access Prior Knowledge: ASK! students if they have ever planted seeds before. If so, what were the steps? How long did it take to grow plants? WRITE Student responses on the board/poster paper. Play the video below.

TAT – Topic 3 – Build a Tree – Lesson - Trees and their leaves

Set the stage: Classifying leaves different ways to do this. 15 minutes

Big Questions – how can we tell different kinds of trees apart? Can differences in leaf shape and size help us identify a tree?

Resources: Tree Leaf on-line game – Could be as much as 20 minutes, if needed.

Materials Needed:

- Outdoor space where students can collect leaves
- …or tree leaves (fresh are best) if they can't go outside
- White bandanas or paper
- Crayons

Optional: Leaf ID sheets or Morton Arboretum Website

Optional: Leaf ID

Use the provided leaf ID sheets to explore different types and shapes of leaves. See if students are able to match their leaves to the types and shapes listed. They might even be able to tell what kind of tree a leaf is from (e.g. oaks, maples)

Procedure: After the intro video – engage

Ask: what kinds of trees can you name? Think, pair and share, and/or make a list as a group.
Ask: how can you tell different trees apart?

- Evergreens have leaves all year; deciduous trees lose their leaves in fall and grow new ones in spring
- Leaves, twigs, bark, seeds, flowers, and fruit often look different from species to species and can help us tell trees apart. *Today we are talking about leaves, and tomorrow/next week we'll talk about others*

Activity: Leaf rubbings

How many different leaves can students find? Have students collect leaves outside (or provide leaves if the weather is bad).

1. Have students place their leaf upside down on the table
2. Place a bandana over the leaf
3. Hold the bandana in place and rub the side of a crayon over the spot covering the leaf
4. You can have students trade leaves so they can cover their bandana in leaf rubbings.

Reflection: Communicate observations: how many different leaves did we find? How are they similar? How are they different?
Personal connection: do you have a favorite leaf/which leaf did you find most interesting? what makes it stand out to you?
(After leaf ID) This week, can they look at the trees around school or home and recognize some of the species we talked about?

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Hi Pals! Access Prior Knowledge: ASK! students if they have seen flowering trees. Ask them if they know how flowers are pollinated. WRITE Student responses on the board/poster paper. Play the video below.

TAT – Topic 4 – Mysterious Trees - Lesson A – Pollination

Set the stage: Thank a bee!, 3 minutes and 46 seconds.

Big Questions – How does pollination happen and why is that important?

Materials Needed:

- Paper
- Tape
- Markers/crayons
- Cotton balls

Notes to the teacher:

- The video covers bees, but butterflies, moths, birds, and bats can be pollinators, too.
- Some tree species are "wind pollinated:" a strong wind blows pollen from a male flower to a female flower.
- Sometimes, like in orchards, humans pollinate flowers by hand.
- Explain that every fruit was once a flower that was successfully pollinated, by wind or by a pollinator.

Procedure: After the intro video – Engage

Art activity: Have students draw a flower on one side of the paper, and their favorite fruit on the other. In the center of their flower, place a piece of double-sided (or doubled-over) tape, and attach a cotton ball to the flower. Have them color the cotton ball with marker to distinguish their pollen from the other flower's in the class.

Pollinator tag:
Choose 2-3 students to be "it"; they are the pollinators. Everyone else should carries decorated paper with the cotton ball attached; they are the flowers. The pollinators chase the flowers in a game of tag. When a flower is tagged, it gives its cotton ball "pollen" to the pollinator. If a pollinator is already carrying a cotton ball when they tag a flower, they trade their cotton ball with the flower to pollinate it. The tagged flower is now "out"; they turn over their piece of paper to show that they have been pollinated and turned into a fruit. The game ends when most of the flowers have been pollinated and turned into fruits.

Enrichment – Follow-up activity next day – Wind Pollinator Basketball Game. See next page.

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Hi Pals! Access Prior Knowledge: ASK! students if they can predict how wind pollination would work. WRITE Student responses on the board/poster paper.

TAT – Topic 4 – Mysterious Trees - Lesson – Wind Pollination Basketball Game

Set the stage: You have done this above. There is no video for this lesson, unless you capture one!

Big Questions – How does wind pollination happen and why is that important?

Materials Needed:

- Gym/large space
- Circled area in the middle of the room
- Small balls for throwing
- Baskets or bins

Notes to the teacher:

- This simulates how wind-pollinated trees wait for strong winds to blow pollen from a male flower to a female flower.
- Tie it back to the pollinator tag game by point out that wind pollination is "risky" because the wind can't direct the pollen to the flower the same way pollinators can.

Procedure: After the intro video – Engage

Physical Activity:

- Kids all stand in a group in the center of the gym; label the directions N, E, S, W
- The facilitator calls out a wind direction. The students all throw balls in the direction of "the wind" (point in a direction). There will be baskets scattered around in several directions.
- Count how many balls made it into a basket.

Share in wrap up – Trees that use wind pollination often produce many more flowers and more pollen to make up for this indirect method of pollination. Another important strategy these trees use: they grow flowers that can collect pollen from any direction, so they look very different from how we usually imagine flowers. Trees are pretty smart!

BSB – The Do Place: Nebraska: SC3.3.1.B, SC2.3.2.B, SC5.3.1.B; College & Career Ready: SC2.7.2.A; National: 5C/P2, 5E/P1, 8A/P1BC, 5C/E1, 5D/E3B, 5E/E2; and NGSS: 2-LS2.A.3

Hi Pals! Access Prior Knowledge: ASK! What do you know about seeds? Hand them some sunflower seeds. WRITE Student responses on the board/poster paper.

TAT – Topic 4 – Mysterious Trees - Lesson_C – Seeds and their lunch!

Set the stage: Sunflower seed to sunflower, 1 minute, 7 seconds

Big Questions – What is a seed made of, and how does it become a plant?

Materials Needed:

- Sunflower seeds
- Drawing utensils and craft supplies
- Optional: food magazines, scissors, and glue
- Outline of a seed handout, see next page

Procedure: After the intro video – Engage

Physical Activity:

If you did the previous seed lesson, let students add some of the seeds they collected to the class forest mural/tree models. If they did not, send them outside for a quick seed scavenger hunt.

Setup: "A seed is just a baby plant in a box with its lunch."

Ask students if they have ever planted a seed and watched it grow. What kind of seed was it? What did it take for the seed to grow? If you need another video resource – "How Does Your Garden Grow?"

Seeds have 3 major things inside: a baby plant, called an *embryo*; food for the seed to "eat"; and a protective coating or shell.

Ask: "If you were a seed, what food would *you* pack for the winter?"

Give each student a seed outline sheet and have them draw their chosen food inside the seed, or cut pictures out of magazines and glue them to the paper

Have students share their choices with the group, and why—OR, have students create their seed "in secret" and then have the group guess which one is whose.

Reflection: to communicate their motivations: "I chose… because…" (it's okay if they're silly!)
To think strategically about their choice: would it last the winter? Would they get bored of eating it? Seeds eat just barely enough "food" (sugars) to survive, then consume the rest in spring to become a plant. Water and warm temperatures are what make seeds "germinate" (sprout) into a plant.

BSB – The Do Place: Nebraska: SC3.3.1.B, SC2.3.2.B, SC5.3.1.B; College & Career Ready: SC2.7.2.A; National: 5C/P2, 5E/P1, 8A/P1BC, 5C/E1, 5D/E3B, 5E/E2; and NGSS: 2-LS2.A.3

Hi Pals! Access Prior Knowledge: ASK! Ask students what they think the benefits of trees are. WRITE Student responses on the board/poster paper.

Title: Topic 6 – Who Knew? - Lesson A
Benefits of Trees

Reinforce the stage: Let's go on a nature walk. 1 minute and 20 seconds.

Big Question: Can students explain the ways that trees positively impact them?

Materials Needed:

- Thermometers
- Wind gauges
- Paper
- Nature Walk Observation Notebooks (next pages)
- Pencils
- Clipboards

Procedure: Tree Benefits Data Collection

- Students will take a nature walk to identify the benefits of trees.
- To measure the cooling effect of trees, students will take the temperature of the shaded soil and compare it to the temperature of the soil in the sunlight.
- Students will measure the air temperature and wind speed to represent the air cleaning properties of trees.
- A survey of animals and insects that are in the trees should be taken to represent the increased biodiversity that trees contribute to.
- Upon returning to the classroom, students can chart/graph their findings.

Reflection: Do the benefits of trees outweigh the negative impacts? Are there negative impacts of trees?

BSB – The Do Place: Nebraska: SC3.3.1.B, SC2.3.2.B, SC5.3.1.B; College & Career Ready: SC2.7.2.A; National: 5C/P2, 5E/P1, 8A/P1BC, 5C/E1, 5D/E3B, 5E/E2; and NGSS: 2-LS2.A.3

Hi Pals! Access Prior Knowledge: ASK! What deo you know about careers related to trees? What are careers that work with trees? WRITE Student responses on the board/poster paper.

Title: Topic 5 – Who Knew? - Lesson B - Careers working with Trees

Reinforce the stage: You did this with the discussion above.

Big Question: Can students identify careers related to trees?

Materials Needed:

- Internet
- 5 computers for teams to do career research on

Procedure: Students work in teams to find out specifics related to one of these careers:

Traditional Forester-->evaluate how much wood you can get out of a tree

Utility Forester-->trims trees around power lines, must know a lot about electricity

Climbing Arborist-->climbs up a tree using ropes and a saddle to cut branches you can't reach from the ground

Plant Health Care Specialist-->protect trees from pests and diseases

Landscape Architect-->designs gardens and parks

Activity: Students will then share information with classmates. Embedded movies are samples of what could be shared. They should also talk about the types of tools to a specific job that may use them (ex. climbing arborist will need ropes, utility forester may need a bucket truck)

Enrichment: Students share their hare learning at the upcoming family night related to tree planting for Arbor Day.

BSB – The Do Place: Nebraska: SC3.3.1.B, SC2.3.2.B, SC5.3.1.B; College & Career Ready: SC2.7.2.A; National: 5C/P2, 5E/P1, 8A/P1BC, 5C/E1, 5D/E3B, 5E/E2; and NGSS: 2-LS2.A.3

Hi Pals! Access Prior Knowledge: ASK! Can you see tree products in your daily life? Look around! WRITE Student responses on the board/poster paper.

Title: Topic 5 - Who Knew? - Lesson C - Tree Products

Reinforce the stage: What things are made from tree? 1 minute, 16 seconds

Big Question: Can students identify things that are made from trees?

Materials Needed:

- Four Baskets
- Signs, one for each basket type: Live trees, Solid Wood, Pulping of wood, Bark)

Procedure: Activity 1: Race to see who can find the most items made from trees in the classroom. Create 4 baskets (live trees, solid wood, pulping of wood, bark) and students have to put the item in the appropriate basket. (use website this website for more ideas)

Enrichment: Show and Tell: Students can bring in a unique item from home that is made from trees to share with the class.

BSB – The Do Place: Nebraska: SC3.3.1.B, SC2.3.2.B, SC5.3.1.B; College & Career Ready: SC2.7.2.A; National: 5C/P2, 5E/P1, 8A/P1BC, 5C/E1, 5D/E3B, 5E/E2; and NGSS: 2-LS2.A.3

Hi Pals! Access Prior Knowledge: In pairs - ASK! Can you name some animals you have seen in or around trees? WRITE Student responses on the board/poster paper. Play the video below.

Title: Topic 6 – Tree Habitat - Lesson B
Wildlife and Trees Adaptation of Animals

Reinforce the stage: Basics of Habitats, 2 minutes

Big Question: What adaptations have animals evolved to climb and live in trees?

Resources: See attached Notes and Images

Materials Needed:

- Art & Crafts supplies
- Cardboard
- Recycled goods
- Construction paper
- Pipe cleaners
- Scissors
- Glue
- Tape

After the video - Procedure: The unique features you are identifying are called Adaptations. These are special characteristics that animals have evolved to help them live in trees: Long claws/toes (sloths and squirrels) for climbing, prehensile tails (porcupines, monkeys) for holding onto branches, membrane gliding structures (bats) for flying between trees. Can you think of anymore?

As the students look through the images ask them the following questions:
Birds:

- How do bird feet allow them to grab onto branches?
- What birds have beaks that allow them to puncture tree bark and find food?

Animals with tails:

- What animals use tails to climb trees? How do tails work? Are all tails the same? How do they differ between animals. What animals in Nebraska use tails to climb trees? (Squirrels, porcupines, raccoons, possums, and mountain lions)

Beavers:

- What animals have teeth that allow them to bite tree branches and make shelter?

Animals with claws and paws:

- What are the shape of the claws? Are the animals paws shaped in a way that would help them climb trees (lizard or monkey).

1. Students will then pick an animal(s) (option to pick one from Nebraska and one from another environment around the world).
2. Using the image as a guide, students will then model their animals unique feature using cardboard, recycled goods, or any other arts and crafts supplies.
3. They will then put on their unique animal feature as a costume.
4. At the end, students will explain to a small group what their animal is and how their unique feature works.

Reflection: Are there any adaptations that are similar between different animals? Do these adaptations have more than one use for the animals? (Tails for balance and to hang from, claws for climbing and protection etc…)

BSB – The Do Place: Nebraska: SC3.3.1.B, SC2.3.2.B, SC5.3.1.B; College & Career Ready: SC2.7.2.A; National: 5C/P2, 5E/P1, 8A/P1BC, 5C/E1, 5D/E3B, 5E/E2; and NGSS: 2-LS2.A.3

Hi Pals! Access Prior Knowledge: In pairs - ASK! Can you name some animals you have seen in or around trees? WRITE Student responses on the board/poster paper. Play the video below.

Title: Topic 6_Tree Habitat - Lesson A Wildlife and Trees

Reinforce the stage: Play the "Who lives in trees some and book?" – 4 minutes and 10 seconds

Big Question: What do I know about wildlife that live in or around trees?

Resources: What do you find in a forest? If needed, 3 minutes and 20 seconds

Materials Needed:

- Internet, computer, projector
- Access to a chalk or white board
- Animal cards – provided, next page
- Utensils for adding to the class forest mural (pens, markers, magazines with animals, scissors, glue)

Procedure:
Activity: Guess Who?

- Students will be in groups
  1. Every student will be given a card with an animal on one side, cards should be face down, no peeking!
  2. Students will take turns holding their card to their forehead so they can't see the animal but the rest of their group can
  3. Students holding the card will ask yes or no questions to try to guess their animal
     a. Does it have four legs? Is it a mammal? Is it smaller than a dog?...
  4. After every one guesses their cards the groups should discuss how they think their animal uses the tree

Reflection:
What kinds of animals live in trees? Why? How does wildlife benefit trees?

BSB – The Do Place: Nebraska: SC3.3.1.B, SC2.3.2.B, SC5.3.1.B; College & Career Ready: SC2.7.2.A; National: 5C/P2, 5E/P1, 8A/P1BC, 5C/E1, 5D/E3B, 5E/E2; and NGSS: 2-LS2.A.3

Hi Pals! Access Prior Knowledge: In pairs - ASK! Can you name some animals you have seen in or around trees? WRITE Student responses on the board/poster paper. Play the video below.

Title: Topic 6_Tree Habitat - Lesson C Wildlife and Trees Adaptation of Animals – Let's Make a Nest!

Reinforce the stage: A Nest Made out of Mud, 5 minutes, 37 seconds

Big Question: What adaptations have animals evolved to climb and live in trees?

Resources: See attached images that follow

Materials Needed:

- Twigs
- Leaves
- Branches
- Grass
- Pine needles
- Glue
- Tape

After the video - Procedure:

Students will build a nesting site for an animal using twigs, branches, leaves, grass, pine needles and anything else they can find outside.

Explain to the students what a nesting site is:

Nesting site – Birds nest in trees and so do squirrels. When winter comes and its cold lots of mammals will den in trees for the winter and sleep there (bears, porcupines, skunks).

1. Students will pick an animal they want to build a nest for that lives in Nebraska. Examples: squirrels, porcupine, skunk, robin, bluebird, woodpecker etc…
    - Explain to students the difference between open nests and cavity nests. Open nests are built in branches and cavity nests are made inside decayed trees.
2. Allow students to collect nest materials outside.
3. Students can use images as a guide to build their nests.
4. If necessary, students can use hot glue, wood glue, or tape to keep their nest together.
5. Once they are done students can add their nest to the class mural.

Reflection: How do animals rely on trees to make nests? Do animals use dead or decayed trees to nest? Do you think it is important to leave dead and decayed trees for animals?

BSB – The Do Place: Nebraska: SC3.3.1.B, SC2.3.2.B, SC5.3.1.B; College & Career Ready: SC2.7.2.A; National: 5C/P2, 5E/P1, 8A/P1BC, 5C/E1, 5D/E3B, 5E/E2; and NGSS: 2-LS2.A.3

Hi Pals! Access Prior Knowledge: As a class Look at a picture of the infected wood (project the image here). ASK! what do you think made happen to the tree? WRITE Student responses on the board/poster paper. (It is made from the larva of the Emerald Ash Borer beetle) Play the video below.

Title: Topic 6 – Tree Habitat - Lesson D - Trees & Pests

Reinforce the stage: Play the Emerald Ash Borer Video. 3 minutes, 4 seconds

Big Question: Can I identify natural threats to trees?

Materials Needed:

- Internet, computer, projector
- Access to a chalk or white board
- A space for activity

Activity: EAB Tag

Procedure:

1. Have all the students line up on one side of the "environment" (field, room, etc)
    a. Everyone is a tree the first time
2. Have the students get to the other side of the room (running if outside, walking if inside, etc.)
    a. Everyone will make it to the other side
3. Now assign a handful of students to be EAB infected trees
    a. These students come to the middle of the "environment" – EAB has now been introduced to the environment!!
    b. Their goal is to tag as many trees as they can while the trees try to get to the other side
4. Now the trees try to get to the other side again without getting tagged by the EAB
5. All trees tagged now join the EAB trees in the middle
6. Repeat until all "trees" (students) have been tagged/infected
    a. This can demonstrate how a pest spreads through a population
    b. Why did less of the trees get across/"survive" after the EAB was introduced to the "environment"?

Enrichment: Designate a few of the students to be "immune" (but instruct them not to divulge this information to the other students playing the game). By the end of the game, the only remaining students will be those tagged as "immune". Ask the students why they think these trees were not killed by EAB and explain that some trees are immune to diseases, pests, and other hazards—these trees survive longer than those who are not immune.

BSB – The Do Place: Nebraska: SC3.3.1.B, SC2.3.2.B, SC5.3.1.B; College & Career Ready: SC2.7.2.A; National: 5C/P2, 5E/P1, 8A/P1BC, 5C/E1, 5D/E3B, 5E/E2; and NGSS: 2-LS2.A.3

Hi Pals! Access Prior Knowledge: ASK! What are the important steps in planting anything in the ground? Is planting a tree much different than that? WRITE Student responses on the board/poster paper. Play the video below.

TAT – Topic 7 – Change the World - Lesson A Planting a Tree

Set the stage: Click here for the video, 1 minute, 13 seconds

Big Questions – What are the important steps in planting a tree?

Terms: Can still be added to the class mural

Materials Needed:

- Shovels
- Large sheet of cardboard to lay dirt on top of
- Scissors
- Mulch
- Tree cage (chicken wire)
- Water
- 5-gallon bucket
- Flagging material
- "How to plant a seedling" handout
- Digital camera

ACTIVITY - Procedure: Planting *Ahead of Time*

- Flag out planting locations
- Soak trees in water for 3 to 6 hours before planting

Planting day steps:

- Review the "How to plant a seedling" handout
- Dig the hole
- Place the tree in the hole, first root at soil line
- Backfill the soil around the tree and lightly compress
- Mulch the area in the shape of a dog dish, keep mulch away from the trunk
- Place a cage around the tree
- Water the tree
- Repeat for each bare root tree that you have
- Take images/videos and share them

Reflection - To communicate their observations: "I saw…"
To reflect on their predictions: "I thought…but then…"
To demonstrate science community skills: "I liked…" or "I respected…"
To make a conclusion: "If we care more about trees, …
he should…" These could be oral or podcasty.

Enrichment – Take the Plum Tree Challenge

BSB – The Do Place: Nebraska: SC3.3.1.B, SC2.3.2.B, SC5.3.1.B; College & Career Ready: SC2.7.2.A; National: 5C/P2, 5E/P1, 8A/P1BC, 5C/E1, 5D/E3B, 5E/E2; and NGSS: 2-LS2.A.3

Hi Pals! Access Prior Knowledge: ASK! What do you think might be a step or steps in caring for our recently planted tree? WRITE Student responses on the board/poster paper. Play the video below.

TAT – Topic 7 – Change the World - Lesson B - Caring for our newly planted tree planting

Set the stage: ABC's of Tree Pruning, 3 minutes and 19 seconds.

Big Questions – What are the important steps in caring for our newly planted tree?

Terms: Can still be added to the class mural

Materials Needed:

- Cardboard
- Poster paper
- Markers
- Scissors
- Colored paper

Ask:

Why do you think we should prune trees?

Activity:

Students will trace or draw their tree with a trunk and branches. And prune off a few of their tree's unwanted branches to simulate proper pruning method.

1. Draw or trace the outline of the tree on cardboard.
2. Cut out the tree shape, and a small square of cardboard.
3. Make a small slit at the trunk base and a slit half way through the square and connect them.
4. Next is pruning the branches, Cut the cardboard about a ⅓ of the way through the branch, but staying just outside the thick part (branch bark collar).
5. Make your second cut above the cut you just made all the way through cutting the branch off.
6. The final cut is a clean up, if there is any left of the thin part of the branch clean that off.
7. Next (optional) decorate their trees with colored paper for leaves.

Click here for an online annual tree care calendar. Plan follow-up activities.

Reflection - To communicate their observations: "I saw…"
To reflect on their predictions: "I thought…but then…"
To demonstrate science community skills: "I liked…" or "I respected…"
To make a conclusion: "If we care more about trees, …
he should…" These could be oral or podcasty.

Enrichment – Propose taking your tree knowledge on the road! Make time to share what you have learned as a club with your site director and grounds keeper. Maybe you can plant and maintain trees in other locations!

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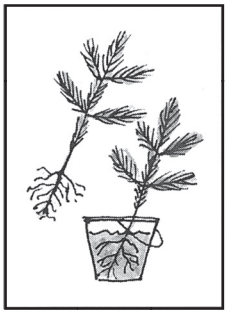
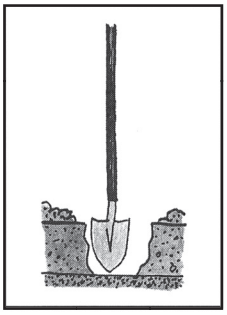
Arbor Day is a special holiday for planting trees.
If you have one to plant today, here's how.

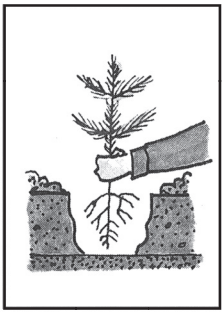
How to Plant a Seedling



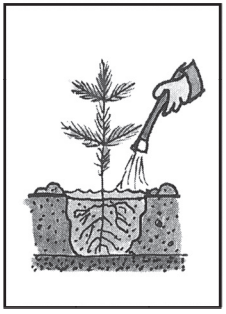
Unpack your tree. If the tree roots are bare, soak for 3–6 hours. Do not allow roots to dry out.



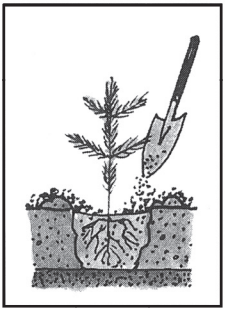
Dig a hole, wider than seems necessary, so the roots can spread without crowding. Remove any grass within a 3-foot circular area. To aid root growth turn the soil in an area up to 3 feet in diameter.



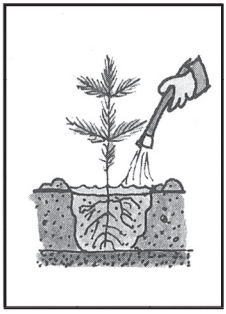
Plant the tree so all of the stem is above ground, without crowding the roots. Partially fill the hole, firming the soil around the lower roots. Do not add anything to the soil.



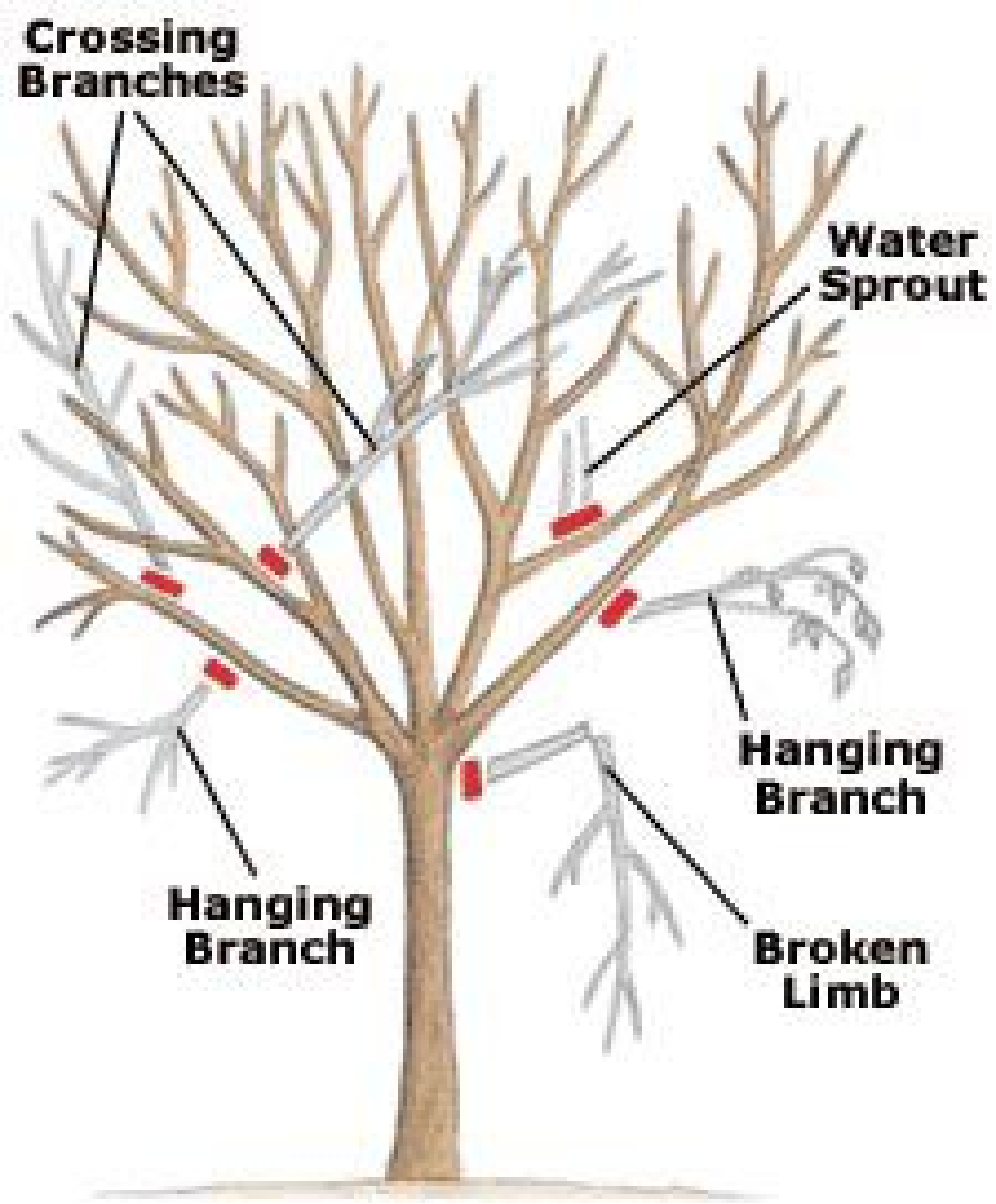
Shovel in the remaining soil. It should be firmly, but not tightly packed. Build the soil in a donut shape around the tree. Give the tree plenty of water.



After the water has soaked in, place a 2-inch deep layer of mulch in an area 3 feet in diameter around the base of the tree (but not touching the trunk).

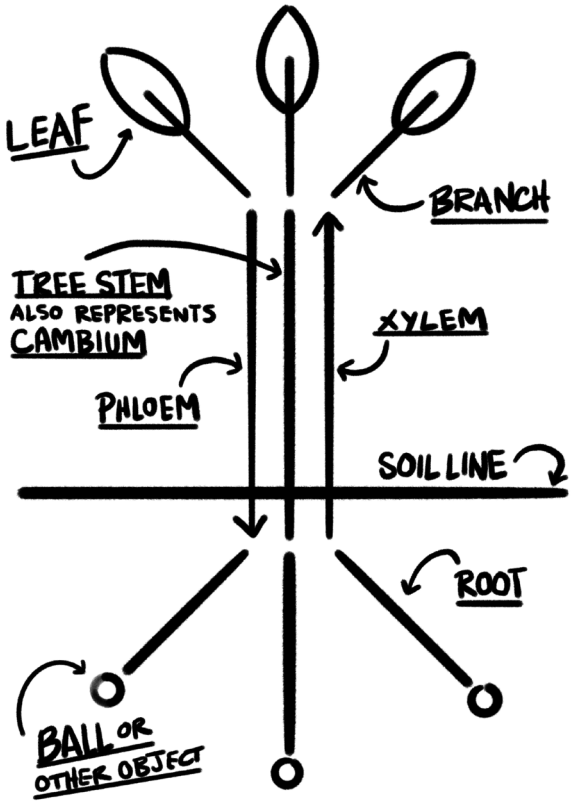


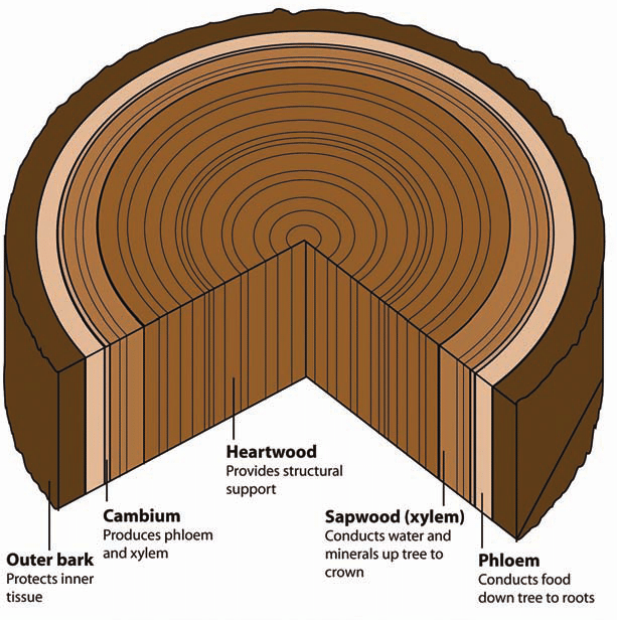
During dry weather, water the tree generously every week or 10 days during the first year.


Crossing Branches
Water Sprout
Hanging Branch
Hanging Branch
Broken Limb

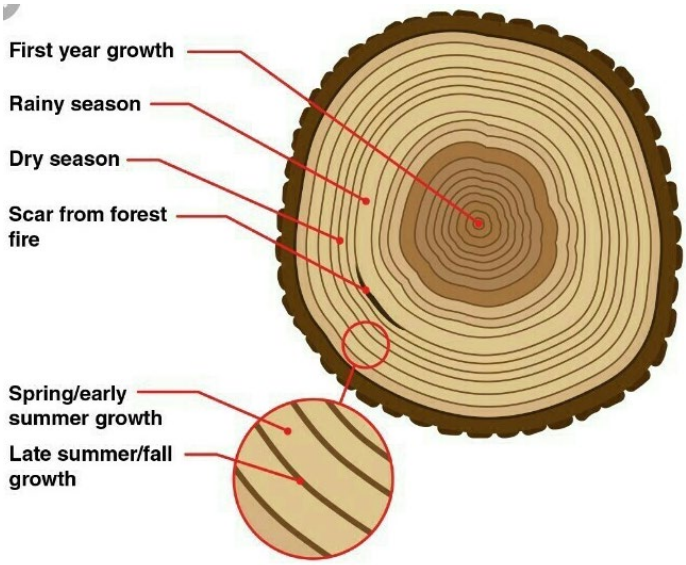
Two 2 How Trees Work - Lesson 1 & 2: Diagrams

Lesson 1: Transport of Water and Nutrients





Lesson 2: Your Life in Tree Rings



Week 6 Wildlife & Pests Lesson 1: Wildlife & Trees
Activity Option 1

Week 6 Wildlife & Pests Lesson 1: Wildlife & Trees
Activity Option 2

Week 6 Wildlife & Pests Lesson 1: Wildlife & Trees
Activity Option 2

Education lesson: Benefits to wildlife, how wildlife benefits trees

- Habitat for wildlife – lots of animals use trees as their home. Animals that live in trees or spend most of their lives in trees are called arboreal. There are arboreal animals native to Nebraska and lots of exotic arboreal animals (i.e. bears, leopards, sloths..)
- Seed dispersal – animals are another way for seeds to be dispersed. Animals will eat fruits and nuts from trees and then will digest and pass the seed somewhere else, spreading the seed to a new area where it can grow into another tree. Some trees actually have fruits that are supposed to look very appetizing to animals so that they will eat it and disperse the seed. Some fruits only taste good to animals once the seed is old enough to be dispersed.
- Food source – trees are a good source of food for lots of animals. There are animals that will eat all parts of a tree, fruit, leaves, and even bark. What animals do you think would eat the different types of trees (deer eat leaves, squirrels eat nuts (fruit), elephants eat bark...)
- Nesting site – trees are a good place for animals to nest or den in as well. Birds nest in trees and so do squirrels. When winter comes and its cold lots of mammals will den in trees for the winter and sleep there (bears, porcupines, skunks)

- *Arboreal*: lives most of its life in trees. Animals that spend the majority of their life living in trees. Can you name some animals that might be arboreal?
- *Adaptations*- special characteristics that animals have evolved to help them live in trees- long claws/toes (sloths and squirrels) for climbing, prehensile tails (porcupines, monkeys) for holding onto branches, membrane gliding structures (bats) for flying between trees. Can you think of any more?

Notes:

Animals that use/live in trees
- Squirrels – eating, nesting, climbing
- All kinds of birds – nesting
- Fun Fact: Bald eagles like to build their nests in Eastern Cottonwoods – that's our state tree!
- Raccoons – climbing, scavenging
- Bats – roosting, feeding
- Beavers – use tree wood to build beaver dams/lodges
- Skunks – den in hollow trees
- Porcupine – den in hollow trees
- Antelope – rub on trees, graze on small ones
- Exotic
- Bears – den in hollow trees
- Leopards – eat their prey in trees, sleeping
- Monkeys – live in trees, use them to travel (swinging), some arboreal
- Snakes – some climb trees, some arboreal
- Lizards – some arboreal
- Tree frogs - arboreal
- Sloths – arboreal
- Elephants- eat bark, rub on trees

Week 6 Wildlife & Pests Lesson 2: Pests

Education lesson:

- Talk about different types of pests and diseases and how they affect trees
    - Pine bark Beetle – most damaging bark beetle species, red pine and Norway pine are often most affected
    - Asian Longhorn Beetle – native to China and Korea, accidentally introduced to U.S., feeds on hard woods
    - Dutch Elm Disease – caused by fungus, affects elm trees, spread by elm bark beetles
    - Chestnut Blight – caused by fingus, affecting American chestnut trees, first seen in 1904 in NY, accidentally imported from Asia, decimated American Chestnut populations, enter wounds, grows under bark
- Prevention
    - Tree injections (like a shot for a tree) can help to prevent some of these pests and diseases. If trees have been too badly affected by pests or disease the tree will most likely have to be removed.
- Tree diversity importance – having diversity in neighborhood or city trees is important. If a disease or pest comes into an area and all the trees are the same species, they could all be wiped out if it is the right pest.

Wrap up: How do you think these pests and other diseases spread to trees? How can you help prevent this?
Answer: Do not transport firewood or other elements found in nature across state or country lines
"Leave only footprints, take only memories" (Leave No Trace Principle)

Take home connection:
Share ONE (or more) thing you learned about pests with a family member, neighbor, or friend outside of this club.


Nuts in Bladder-Like Bract
(Hophornbeam)
Acorn
(Oak)
Nut in Husk
(Pecan)
Multiple Seed
(Mulberry)
Multiple Seed
(Sycamore)
Samara
(Maple)
Samara
(Elm)
Samara
(Ash)
Berry
(Texas Persimmon)
Pod
(Redbud)
Drupe
(Hackberry)
Drupe
(Cherry)
Seeds in Prickly Bur
(Ohio Buckeye)
Cone
(Baldcypress)
Cone (Pine)
Winged Seed
Hairy Seed
(Willow)
Seeds in Spiny Bur
(Sweetgum)
Nut-Like
Drupe
(Basswood)

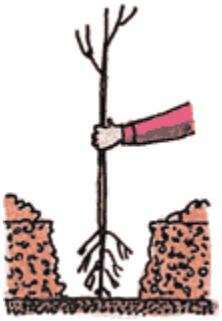
Images to Accompany 3hr_A Why Trees?

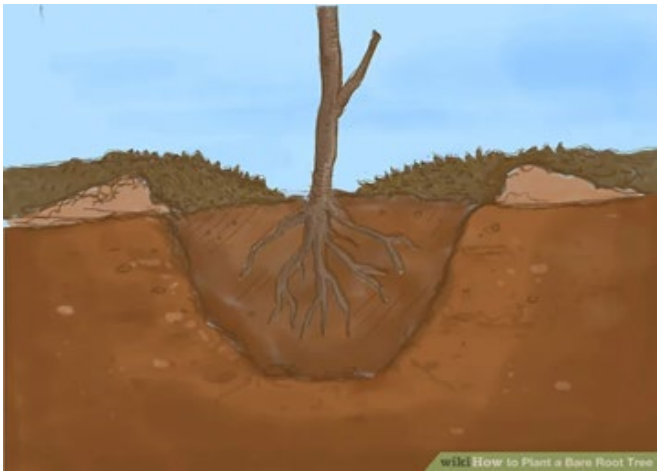
Developed by the winter 2020 Design Studio Team

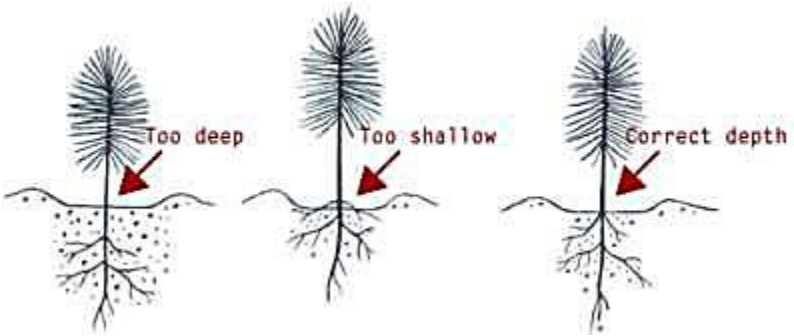
In the footer of each lesson, you will find a reference to National, State, and Local Standards addressed by each lesson.

Images to Accompany 3hr_B_How to plant trees?

Developed by the winter 2020 Design Studio Team







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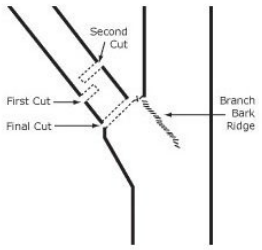
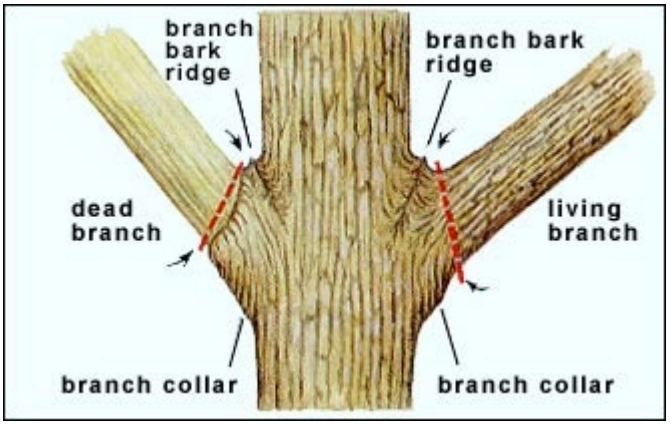
Images to Accompany 3hr_C_Care for new Trees?

Developed by the winter 2020 Design Studio Team





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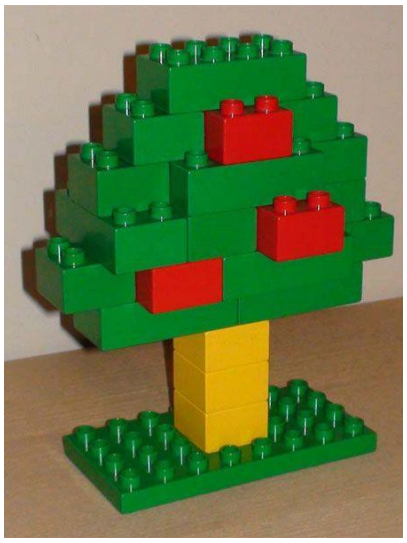
Images to Accompany Week 1_Lesson_B Why Trees?

Developed by the winter 2020 Design Studio Team



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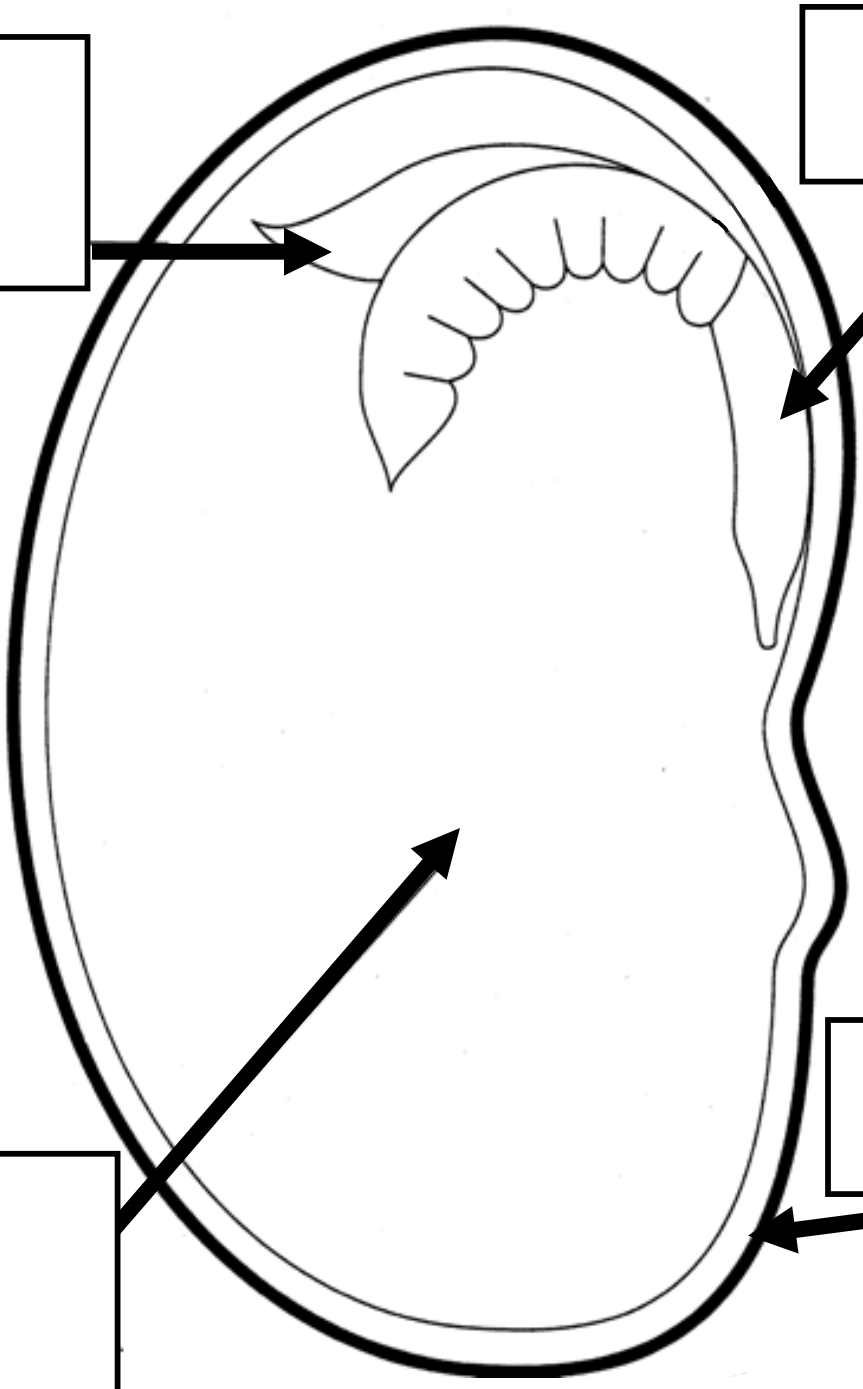
Scientist: _____

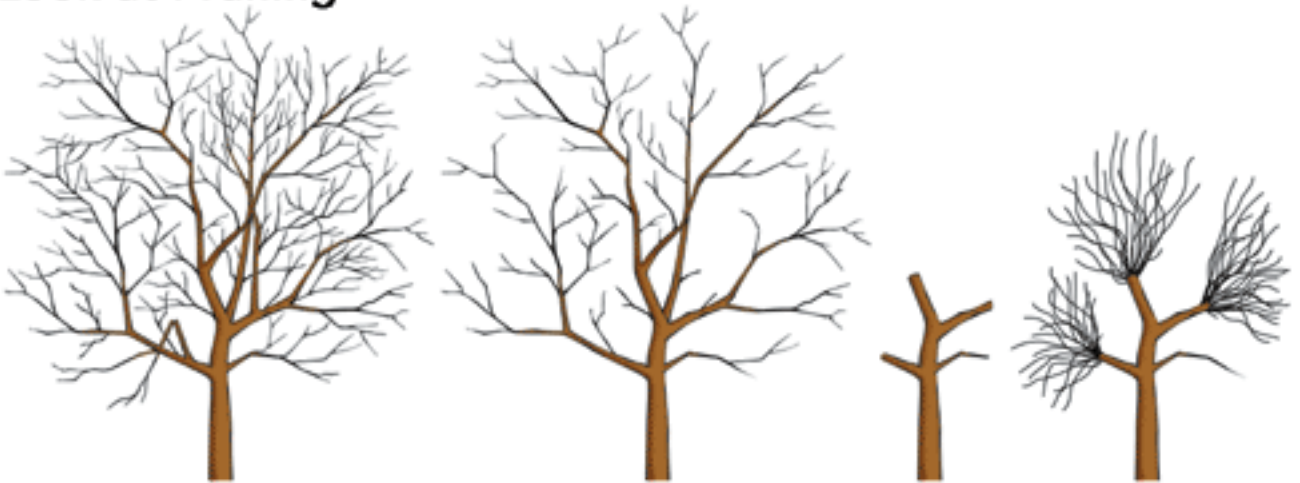
Parts of a Seed



Word Bank

seed coat root leaves food

A Look at Pruning



Bare-root Tree	A tree not grown in a pot and will not have any soil around their roots.
Arborist	A professional in the practice of arboriculture, which is the cultivation, management, and study of individual trees, shrubs, vines, and other perennial woody plants in dendrology and horticulture
Tree Trunk	Is the main stem and main wooden axis of a tree.
Tree root ball	Is the main mass of roots at the base of a plant such as a shrub or tree

Root flair	Is where the tree trunk and the roots meet.
Grade	Is where the existing ground is. We plant a tree below the grade.
Biodiversity	Is all the different plants and animals living near or in a tree.
Contributing	Is helping or giving to. We are contributing to cleaner air when we plant trees.