Michigan Grade Level Content Expectations:

Science: S.IP.04.11, S.IP.04.12, S.IP.04.14, S.IP.04.16, S.IA.04.12, S.IA.04.13, S.RS.04.11, S.RS.04.18, L.OL.04.15, L.OL.04.16, L.EV.04.21, L.EC.E.1, L.EC.04.11, L.EC.E.2, L.EC.04.21

Social Studies: 4-H3.0.8, 3-G4.0.1, 3-G5.0.1, 3.G5.0.2

Learning Objectives, Materials, and Assessments: Included with the individual lessons. An end of unit comprehensive assessment is at the close of this unit.

Lesson One (1-2 Sessions): Meet the Tree - Up Close and Personal.

Learning Objectives:
The student will
1. Determine the basic needs of a tree to grow and thrive.
2. Learn the different parts of a tree and the function of each.
**Benchmarks:**
L.OL.04.15 - Determine that plants require air, water, light, and a source of energy and building material for growth and repair.
S.IP.04.11 – Make purposeful observations of the natural world using the appropriate senses.
S.IA.04.12 – Share ideas about science through purposeful conversation in collaborative groups.
S.IA.04.13 – Communicate and present findings of observations and investigations.
S.RS.04.18 – Describe the effect humans and other organisms have on the balance of the natural world.

**Materials:**
- Tell Me, Tree: All About Trees for Kids by Gail Gibbons.
- Hands on Nature by The Vermont Institute of Natural Science. Lesson: A Tree Are We, pg. 131.
- Project Learning Tree by The American Forest Foundation. Adapted from Activity 76: Tree Cookies, pg. 327.
- Forestry Journals
- Note cards filled in with different tree parts.
- Tree cross sections.
- Hand lenses.
- Student page “Reading Tree Cookies” from above Project Learning Tree lesson.

**Lesson Outline:**
1. Create a chart by brainstorming the question “What does a tree need to grow and survive?”

2. Read aloud and discuss Tell Me, Tree. Have the students write the following vocabulary words in their Forestry Journals as the book is read (trunk, bark, phloem, cambium layer, xylem/sapwood, heartwood, roots, photosynthesis, chlorophyll, deciduous, and conifer). After the book has been read, the students will enter the definitions for each term in their journals.

3. Do the “A Tree Are We” activity on pg. 131 of Hands on Nature. Students are given a note card with a tree part listed on it. Together they act out the formation of a tree as the teacher reads the script. When the tree is all together, ask the students what changes would occur to our tree through the course of a year.

*Note that a similar activity can be found in Project Learning Tree (Activity 63: Tree Factory, pg. 269) that includes many good, leading questions to tie in tree structure and the basic needs of trees to survive.*

4. In the Project Learning Tree book, do Activity 76, Tree Cookies, on pg. 327 (only do Part A – Cookie Counting). This activity has the students examine a tree cross-section cutting. After breaking into groups of four, they will estimate the age of their tree, observe and label the parts of their cross-section, and learn how to read the growth rings and scars on a tree cookie to determine trauma to a tree.

**Assessment:**
- The students will be assigned the student page “Reading Tree Cookies” from Project Learning Tree.
- Go back to the chart from the beginning of the lesson and update any missed conceptions or new information the students have learned through today’s lesson.
- Do a “Think, Pair, Share” with the students to review their new vocabulary words.
Lesson Two (2 Sessions): A Tree by Any Other Name.

Learning Objectives:
The student will
1. Learn physical characteristics used in tree identification.
2. Use field guides to correctly identify different trees.
3. Create individual books with 3 different tree species in each.

Benchmarks:
L.EV.04.21 - Identify individual differences in organisms of the same kind.
S.IP.04.11 – Make purposeful observations of the natural world using the appropriate senses.
S.RS.04.11 – Demonstrate scientific concepts through various illustrations, performances, models, exhibits, and activities.

Materials:
- Forestry Journals
- Various samples of tree leaves and branches
- Paper and pencil
- Bags
- Dark crayons for rubbings.
- Tree identification field guides.
- Tree Identification Key from Wisconsin’s K-12 Forestry Ed. Program
- Wax paper or laminating machine

Lesson Outline:
Day 1:
1. Brainstorm and chart ideas from students on ways to identify a tree using the question “What characteristics help you to know what kind of tree you are looking at?”

2. Have the students get out their Forestry Journals. Show them key identifying factors of various leaf and branch types. Demonstrate how to draw the basic leaf outlines in their journals and label the following identifying characteristics: Simple, Compound, Alternate, Opposite, Lobed, Serrated, Tapered, Rounded, and Heart shaped.

3. Introduce the students to the tree field guides and how they are set up. Show the students how to use a dichotomous key. Use the guides to identify a few of the tree and branch samples used earlier in the lesson. Copies of the Tree Identification Key from the

4. Take the students outside and have them choose three different trees (not of the same species). Have them identify each of the trees using their field guides (this might be good to do in groups of 2 or 3 students). Then collect leaf samples from the ground and take rubbings of the bark. Have them make miscellaneous notes on tree shape, seeds, or any other identifying factors they notice. Back in the classroom store the leaf rubbings, notes, and leaf samples carefully keeping the 3 species separated.

Day 2:
5. The students will use their 3 tree samples to create a 9-page book. The book will include a cover with a title, artwork, and the author. Each of the three tree sections will include:
o An introduction page with the name of the tree and the leaf sample laminated or ironed with wax paper.
o On the next page the students will make an accurate drawing of the leaf. They will label the drawing with the tree name and identifying characteristics from the terms learned the day before (such as compound, serrated, opposite, etc.). This page will include any other interesting information the student noticed or learned about that particular tree from their observations or the field guide.
o The last page will be the bark rubbing taken the day before, properly labeled with the name of the tree.

Assessment:
- Review the brainstorming chart from the previous day. Have the students suggest how to update the chart with complete and accurate information they have obtained during the lesson.
- The books created by the students will be graded paying special attention to correct tree identification and the page with identifying characteristics.
- The students may present their books to the class highlighting the characteristics that led to the identification of each tree.

Lesson Three (1 Extended class period): Wanted – Dead or Alive – Trees!

Learning Objectives:
The student will
1. Learn how trees and forests provide food and habitat for many living organisms.
2. Examine a rotting log to identify some of the organisms that depend on it for survival.
3. Learn about the process of decomposition.

Benchmarks:
L.OL.04.16 - Determine that animals require air, water, and a source of energy and building material for growth and repair.
L.EC.E.1 – Interactions- Organisms interact in various ways including providing food and shelter to one another. Some interactions are helpful; others are harmful to the organism and other organisms.
L.EC.E.2 – Changed Environment Effects- When the environment changes, some plants and animals survive to reproduce; others die or move to new locations.
L.EC.04.21 – Explain how environmental changes can produce a change in the food web.
S.IP.04.11 – Make purposeful observations of the natural world using the appropriate senses.
S.IP.04.12 – Generate questions based on observations.
S.IP.04.14 – Manipulate simple tools that aid observation and data collection.
S.IA.04.12 – Share ideas about science through purposeful conversation in collaborative groups.

Materials:
- A Log’s Life by Wendy Pfeffer.
- Forestry Journals
- Clip boards
- Paper and pencils
- Clear containers with lids
- Field guides on insects
- Hand lenses
- Student copies of worksheet (found at end of lesson)
Lesson Outline:
1. Read and discuss *A Log’s Life* with the class. Have the class get out their Forestry Journals and divide a page into 2 columns. Label the columns Living Tree and Fallen Tree. The students will independently list as many living organisms as they can that depend on each for survival. Compare and expand lists with a partner and then whole class.

2. Take a “Woods Walk”. Look for signs that the trees support life such as animal sightings, nests, chewed leaves, things growing on the trees… Have the students make a list in their Forestry Journals of the evidence found.

3. Go over rules with students about staying within boundaries, how to carefully examine logs and living organisms, etc. Do Activity 23, The Fallen Log, found on pg. 105 of *Project Learning Tree*. Begin by asking the students why the woods aren’t piled high with fallen leaves, twigs, and branches. Tell the students they are going to observe and analyze a log to determine the answer. Have students work in groups of 3-4. They will need to find a rotting log to examine. The students will answer the questions on the student worksheet (found at the end of this lesson) and record each different kind of plant or animal they find in, on, and around their log. They will also watch for and record evidence of animal activities such as insect holes, eggs, spider webs, woodpecker holes, and so forth. Once back in the classroom the students will continue to find answers to their questions, compare data, and share their findings with the rest of the class.

4. Bring the lesson together by explaining what a decomposer is. Encourage the students to actively ask questions and draw conclusions based on what they have observed.

Assessment:
- Use the worksheet the students filled out about their logs to check for understanding.
- Have the students draw a series of pictures depicting a tree that has just fallen in a forest and what will happen to it over the next fifty years.
The Fallen Log

1. How might your tree have died?

2. Has your tree been dead a long time or fairly short time? Why do you think so?

3. What kinds of animals live in the bark? Under the bark? Inside the log? Under the log? Use the back of this paper for extra space or to draw any animals you cannot identify.

4. Where do you think the animals get the food they need?

5. Do any plants live on the log? How do you think they can live there without soil?

6. What evidence of animal activities did you see in and around your log besides actual animals?!
Lesson Four (1 session): Hey, You’re Stuck in a Web!

Learning Objectives:
The student will
1. Learn terminology related to food chains and webs.
2. Understand the interdependency and complexity of food webs.
3. Recognize the effects on a food web due to natural and man-made changes in the environment.

Benchmarks:
L.EC.04.11 – Identify organisms as part of a food chain or food web.
L.EC.04.21 – Explain how environmental changes can produce a change in the food web.
S.IP.04.16 – Construct simple charts and graphs from data and observations.
S.RS.04.11 – Demonstrate scientific concepts through various illustrations, performances, models, exhibits, and activities.

Materials:
- Who Eats What? by Patricia Lauber
- Web of Life activity adapted from Project Learning Tree (Activity 45, pg. 194) and Interpretive Naturalist activity, Obatanga Provincial Park, Ontario Provincial Parks (1998).
- Index cards
- Forestry Journals
- Large index cards labeled with names of various forest plants and animals.
- Safety Pins

Lesson Outline:
1. Make vocabulary cards. On one side gave the students write the vocabulary word and definition for the following terms: predator, prey, producer, consumer, scavenger, decomposer, herbivore, omnivore, and carnivore. On the other side the students need to write 3 examples of each. Share examples with the class.
2. In Forestry Journals have kids write as many living organisms found in the forest as they can. This can be done alone or in small groups.
4. Hand out, one by one, a large index card with a hole punched into it and a forest plant or animal written on it. Pin the card to shirts so others can easily read them.
5. Have students get in a large circle (this works best outside or in the gym where the center of the circle is open). Choose a producer and hand them the end of a ball of string. Ask them to name one plant or animal from the other students’ organism cards that they would interact with (be eaten by or rely and depend on). The teacher passes the ball of string to that student/organism who in turn names another organism that his/her organism interacts with. Continue this process until all of the organisms have been linked to the food web at least once. This activity lets the students clearly visualize the idea of a food “web” and its complex nature.
6. Have the students pull the web taut and hang on tight. Make up a natural or man-made situation that would stress a species (Example – Pesticides are killing many bumblebees). Have the
bumblebee tug on his string. Tell the students that anyone who feels a tug should likewise start tugging their string. Keep this going until the vibration has spread to all organisms of the web. Discuss how harm to just one organism can affect the entire web. Brainstorm other natural and man-made situations that could cause stress.

7. Ask the student to pick one organism that does not seem as important as the others and have that organism drop out of the web. Any other organisms that relied on that organism should drop out next. Do this for a few rounds. Ask the students what happens when we remove a few links from our web? Do the changes seem more pronounced when there are lots of parts to the web or when the web has been whittled down? Is there a relationship between how many parts the web has (more complex) and how stable it is?

Assessment:
- The students will draw a diagram of a 10-part food web. The diagram will have lines clearly showing the interactions between organisms. The organisms will include its name and a label of producer, consumer, etc.

**Lesson Five (2 Sessions): Man – Friend or Foe to the Forest?**

**Objectives:**
The student will
1. Learn the history of the logging and forestry industry in Michigan.
2. Identify the many ways forests are used today and how forests are currently managed to meet those needs.

**Benchmarks:**
S.IP.04.12 - Generate questions based on observations.
S.IA.04.12 - Share ideas about science through purposeful conversation in collaborative groups.
4-H3.0.8 - Describe past and current threats to Michigan’s natural resources: describe how Michigan worked in the past and continues to work today to protect its natural resources.
3-G4.0.1 – Describe major kinds of economic activity in Michigan today, such as agriculture, manufacturing, services and tourism, research and development, and explain the factors influencing the location of these economic activities.
3-G5.0.1 – Locate natural resources in Michigan and explain the consequences of their use.
3-G5.0.2 – Describe how people adapt to, use, and modify the natural resources of Michigan.

**Materials:**
- The Forests of Michigan by Dickmann and Leefers (reference material)
- “Made in Michigan Wood Products” transparency
- Forestry Journals
- Michigan Logging Video
- Paper
- Poster board
- Crayons, markers, scissors
- Old magazines
Lesson Outline:

1. Ask students to point out various items in the room that are wood products. Do we need these things? Is cutting down trees good or bad? How do we get the wood here and looking like this? Lead the discussion so that students see the need for wood products but understand it must be done responsibly. Write the words *preservation*, *conservation*, and *forestry* on the board. Have the students write these terms and definitions in their Forestry Journals. Next have them make a list of things made from trees in their journals. Display the “Made in Michigan Wood Products” transparency and go over the many items made by Michigan wood products.

2. Go over the history of the Michigan logging industry (see *The Forests of Michigan*). Discuss how our trees once seemed like an endless supply, how inventions helped speed up the harvesting process, new trees were not planted, little thought was given to the future, and any thoughts given to clear cutting were that it would open the way for farmers.

3. Show the *Michigan Logging* video. Have the students write 3 things in their journals that they learned from the video and share some. Next ask them to journal an answer to the question, “What went wrong with early logging and what could have been done better?”

4. Ask the students what happened to all of this cleared land? Explain how farming did not work out and many of the farmers went bankrupt. Show the correlation between this and how we now have a great deal of Federal and State Forests in our state. Display a map of Michigan that illustrates the State and Federal land so the students can see how much of northern Michigan is covered by public land.

5. Do *Project Learning Tree* Activity 32, Part B, pg. 135, “A Forest of Many Uses”. In this activity the students must answer the question of ways we use or benefit from our forests. Write the words *Wildlife*, *Recreation*, and *Products* on the board. Have the students share ideas from their lists that would go under these headings. Explain that people manage forests with these in mind. The class is split in 3 groups (one for each term) and they become forest managers to meet the needs of their word. When the students are done, the ideas are brought together and examined for ways forests are managed that work together and ways they conflict. This leads them to see that often the forest can meet multiple uses.

Assessment:

- The students will create posters that exemplify their management focus. They may draw pictures or use magazine photos. Display these in the hall or wherever other students can see them.
Name _____________________

4th Grade Forestry Unit Test

1. To tell how old a tree is you can:
   A. Look at its height.
   B. Count the rings in a cross section.
   C. Look at how much moss is growing on it.
   D. Check out its cambium layer.

2. The ________ carries food made in the leaves to other parts of the tree.
   A. roots
   B. photosynthesis
   C. water
   D. phloem

3. Which of the following is NOT a type of deciduous tree?
   A. White Pine
   B. Sugar Maple
   C. Red Oak
   D. Walnut

4. A red oak leaf is an example of a simple and lobed leaf.
   A. True
   B. False

5. Where an organism lives is its:
   A. nest
   B. food chain
   C. habitat
   D. consumer

6. When a tree falls to the ground organisms called ___________ will break it down.
   A. producers
   B. decomposers
   C. scavengers
   D. predators

7. Which of the following is an example of a producer?
   A. white tailed deer
   B. beetle
   C. water
   D. aspen tree
8. Draw a six part food web.

9. If you were managing a large forest, what are 3 needs you would want to keep in mind and manage for?

10. Was clear-cutting land the way they did in the late 1800’s a good forestry practice? Why or why not?

11. What are 2 things foresters do today when harvesting trees that are better than 100 years ago?

Extra Credit. List 3 things a tree needs to grow and survive.

______________________, ________________________, _______________________