

SC Farm Bureau Ag in the Classroom Post Office Box 754 Columbia, SC 29202



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From Wood to Pencils (Who Made My Stuff?)

By: Cari Meister

# Do you know how all your favorite things are made?

A child wonders how pencils are made and learns about how trees are grown, cut down, and processed in a pencil factory. This illustrated narrative nonfiction book includes a map showing forest areas and pencil factories, a glossary, and further resources. With clear process explanations and charming illustrations, this book answers the question: who made my stuff? 1



### Did You Know? (Ag Facts)

- 1. Americans use over 5,000 wood products daily.
- 2. One acre of trees can remove around 13 tons of dust and greenhouse gases every year from the surrounding environment.
- 3. The sabal palm (palmetto tree) is the official tree of South Carolina.

### **Discussion Questions**

- What is forestry?
- Talk about a time when you have been in a forest. What did you see? Feel? Smell?
- Explain how pencils are made from wood. Which part of the process surprised you?

Click here or scan the QR code for ready to use slides.



### Grade Level(s): 2-5

**Purpose:** Students will identify the variety of forest products that we use in our everyday lives as well as identify wood as one of earth's renewable, recyclable, and biodegradable resources.

### Vocabulary:

- **natural resource**: material from our environment for housing, clothing, food, energy, etc.
- renewable resource: has the capability of replenishing itself in a human lifetime
- **non-renewable resource**: exists in a limited amount that takes thousands of years to replenish (i.e. fossil fuels like coal, oil and natural gas)
- recyclable: able to be utilized again, often by being reconstructed into something else
- **biodegradable**: able to be broken down or decomposed by natural means
- cells: the basic building blocks of all living things
- **cellulose**: the material that makes up plant cell walls
- fiber: thin threads that bind together to form animal and plant matter
- lignin: the sticky substance that binds plant cells together
- pulp: the mash that forms when wood chips are cooked

#### **Background Agricultural Connections:**

Trees are a renewable resource, meaning it can be replaced or replenished after it is used. Unlike other major building materials like steel and concrete, we can replant and replace trees. The forest products industry in South Carolina is responsible for making over 5,000 products that we use every day. Lumber, cardboard boxes, paper, sports equipment, medicines, and even cosmetics all have one thing in common-wood!

South Carolina's forests are among the state's most valuable natural resource. Forests provide a variety of ecosystem services to our environment like clean air, clean water, healthy soil, cooling shade, habitats for wildlife and climate regulation. Beyond these benefits, forests also contribute positive social and economic impacts.

There are over 13 million acres of forestland in South Carolina, so the forestry industry is a big deal. Forestry defined is the science or practice of planting, managing, and caring for forests. In SC, this industry has an economic impact of over \$20 billion. The value of timber trees is based on the value of the products that can be made from them. This is dictated by size (height and diameter), species, and quality of the trees. Timber, like any other commodity, experiences price fluctuation according to the laws of supply and demand; prices may vary significantly from one part of the state to another. The price paid for any product class also varies according to quality.

### Nature's Treasure Chest

Materials:

- "Nature's Treasure Chest" story and answer key
- Large square pan, about 3 inches deep
- 3 cups of water
- A whole section of newspaper
- A rolling pin
- Large bowl

Procedures:

- 1. Establish the concept of the word "paper" by identifying the Latin word "papyrus" named after the Egyptian reed from which paper was first made. Ask the students if they can guess how paper is made today. Ask them to think of the things they know are made from wood. Make a list of their answers on the board.
- 2. Establish the value and variety of forest products by having students read the story *Nature's Treasure Chest.* After they have finished reading it, have the students circle or highlight all the wood products that they can find in the story. Review with the class the answers and explanations of the many surprising products derived from wood.
- 3. Ask students, "Is paper made from a renewable or non-renewable resource?" Discuss what each term means and examples of each. Conservation is a big part of the forestry industry and recycling is important to conserving resources. Recycled paper accounts for 37% of the fiber used to make paper in the country. Every recycled ton of paper saves 3.3 cubic yards of landfill space. Explain to students that they will be making recycled paper that can be used to create a variety of things
  - Tear 1-2 pages of newspaper into small pieces of 2 inch or less.
  - Put the paper chips into a large bowl and add all the water to it. Keep adding paper, tearing it and squeezing it, until the mixture looks like thick oatmeal.
  - With the pan turned UPSIDE DOWN, place about 1 cup of the blended pulp over the bottom of the pan. Spread it with your fingers evenly across the entire area.
  - Lay several sheets of newspaper over the pulp, and then carefully turn the pan over. Remove the pan. Your pulp "square" is now sitting on the newspaper.
  - Close the newspaper over the pulp. Using the rolling pin, roll over the newspaper to blot out the extra water.
  - Uncover and let the new "paper" dry completely. When it is thoroughly dry, peel your new "recycled paper" away from the newspaper.

### Fire in the Forest

### Materials:

- Sticky notes
- Chart paper
- Forestry in Virginia sheet
- <u>Forest Fire Forest Fact Break</u> video
- Fire in the Forest sheet
- Journal

### Procedures:

 Ask students, "What does a forester do?" Also, ask students "what do you know about forest fires?" Have them record answers on a sticky note. Have chart paper with the following five titled columns: "What I think I know"; "Yes, we were right!"; "Misconceptions"; "New Information"; and "Wonderings"



- 2. Students will place their sticky note about what they know about forestry and forest fires in the "What I think I know" section of the chart.
- 3. Read the Forestry in Virginia sheet. Invite students to move their sticky notes to another column if necessary.
- 4. Explain to students that foresters have many important jobs, including trying to prevent forest fires. Watch the Forest Fact Break video and read the Fire in the Forest sheet.
- 5. Invite students to move their sticky notes to another column if necessary. There should be new information or wonderings at this point.
- 6. With students' new knowledge of forestry and forest fires, research any current wildfires as a class. Discuss with students some of the reasons these fires may have happened. Have students brainstorm any solutions and "think like a forester". Have them record in their writing or science journals.

#### **Extension Activities:**

- Have student groups make posters about the forestry industry. Students should illustrate their posters. Have students present their posters. Display posters in your classroom.
- Have students create a Fact or Opinion class quiz on wildfires vs. prescribed burns.

### Suggested Companion Resources:

- <u>American Farm Bureau Forestry Ag Mag</u>
- North Dakota Horticulture and Forestry Ag Mag
- <u>Alabama Forestry Ag Mag</u>
- ABC's of Forestry
- What is Forestry? (video)

### Sources/Credits:

- 1. Meister, Cari. From Wood To Pencils (Who Made My Stuff?), The Creative Company, 2019.
- 2. SC Forestry Commission
- 3. NC Forestry Commission
- 4. Georgia Forestry Commission

#### Suggested SC Standards Met:

English/Language Arts:

- 2.RI.5.1 Ask and answer literal and inferential questions to demonstrate understanding of a text; use specific details to make inferences and draw conclusions in texts heard or read.
- 2.RI.5.2 Make predictions before and during reading; confirm or modify thinking.

- 2.RI.6.1 Retell the central idea and key details from multi-paragraph texts; summarize the text by stating the topic of each paragraph heard, read, or viewed.
- 2.RI.7.1 Compare and contrast topics, ideas, or concepts across texts in a thematic, author, or genre study heard, read, or viewed.
- 3.RI.5.1 Ask and answer literal and inferential questions to determine meaning; refer explicitly to the text to support inferences and conclusions.
- 3.RI.12.3 Read and respond according to task and purpose to become selfdirected, critical readers and thinkers.
- 4.RI.5.1 Ask and answer inferential questions to analyze meaning beyond the text; refer to details and examples within a text to support inferences and conclusions.
- 4.RI.12.3 Read and respond according to task and purpose to become selfdirected, critical readers and thinkers.
- 5.RI.5.1 Quote accurately from a text to analyze meaning in and beyond the text.
- 5.RI.12.3 Read and respond according to task and purpose to become selfdirected, critical readers and thinkers.

Science (2021 standards):

- 2-PS1-3. Make observations to construct an evidence-based account of how an object made of a small set of pieces can be disassembled and made into a new object.
- 2-LS4-1. Make observations of plants and animals to compare patterns of diversity within different habitats.
- 2-ESS3-1. Design solutions to address human impacts on natural resources in the local environment.
- 3-LS3-2. Use evidence to support the explanation that traits can be influenced by the environment.
- 3-LS4-3. Construct an argument with evidence that in a particular habitat some organisms can thrive, struggle to survive, or fail to survive.
- 3-LS4-4. Make a claim about the effectiveness of a solution to a problem caused when the environment changes and affects organisms living there.
- 3-ESS3-1. Make a claim about the effectiveness of a design solution that reduces the impacts of a weather related hazard.
- 4-ESS3-1. Obtain and combine information to describe that energy and fuels are derived from natural resources and how their uses affect the environment.
- 5-PS3-1. Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun.
- 5-ESS3-1. Evaluate potential solutions to problems that individual communities face in protecting the Earth's resources and environment.

Social Studies (2019 standards):

- 2.G.3 Explain how the distribution of human features, physical features, and natural resources within the U.S changes over time and impacts economic activity.
- 2.CG.4 Use evidence to propose and communicate a resolution to a national issue.
- 3.3.1.ER Identify the range of natural hazards facing people and explain how some populations are more vulnerable than others.
- 3.4.2.HS Investigate the economic and land use characteristics of places and regions around the world.
- 5.5.CX Contextualize the changes in rural communities in South Carolina within national and global industries.

# **Nature's** Treasure Chest

# Name

Read the story below then circle the items in it that you think are made from a tree. When you finish, check your answers with the key that starts on the next page.

"Hurry, Randy, or you'll be late for school," Mrs. Carter called out from the kitchen.

Randy's hand slid over the smooth handrail as he raced down the stairs. He skipped the last three steps and landed with a thud.

"Coming, Mom," he mumbled through the thick sweatshirt that he put on over his new rayon shirt. He walked down the corridor, his shoelaces tapping on the shiny wood floor.



"What's for breakfast? I'm starved," he said. Randy slid across the bench to his place next to his father's chair at the head of the table. The smell of vanilla coming from the stack of steaming pancakes made his mouth water. The

> aroma of the spicy sausage on his plate made his stomach grumble. "Pass me the maple syrup, please." Randy reached for the carton of icy cold milk.

"And good morning to you, too," Mr. Carter said, folding the newspaper and setting it down beside him. "Did you finish that report you were working on last night? I've got two tickets to the basketball game this evening and lots

of film in the camera. I'd hate to go by myself."

"No problem, Dad. It's done." Randy drank the last drop of milk then wiped his mouth with his napkin and slid off the bench. "See you tonight."

Mrs. Carter opened the cabinet door and pulled out a box of apple juice and a box of chocolate chip cookies. She added them to the cellophane wrapped

sandwich and orange already in the brown lunch sack.

"Brush your teeth before

you leave, Randy," she said.

"No time. Besides, I can't find my toothbrush, and I'm out of toothpaste," Randy answered. He

picked up his books and pencils, his football helmet, and his lunch sack then headed for the front door. "Bye, Mom."

As Randy closed the door, he saw the school bus round



the corner, its shiny, black tires gleaming in the morning sun. He hopped over his mom's planter boxes and ran across the lawn. Down the street he raced-past four houses, three picket fences, two signs, and a telephone pole. He reached the corner just as the bus came to a halt in front of the bus-stop bench. All of his friends were already lined up to get on.

Beth Parker, the funniest girl in his class, was the last in line. Beth wore lavender glasses, bright yellow polish

on her nails, and always smelled like

hairspray, strawberry lipgloss, and peppermint candy. She turned around and smiled at Randy.

"You were lucky today," Beth said.

"That wasn't luck. That was perfect timing."

"Well, someday you're not going to make it to the bus in time," she said.

"Never," he answered, as he stuck a piece of gum in his mouth. Randy climbed the steps, then walked along the black rubber matting to the wide seat at the back of the bus.

The doors closed with a hiss as the bus rumbled down Hudson Street.



# ANSWER KEY

# **Nature's Treasure** Chest

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### **ANSWER KEY**

# **Nature's Treasure Chest**

Many people know that furniture, lumber for building houses, paper, and books are wood products. But did you know that over 5,000 different products come from trees? Some of them are pretty surprising. Through the magic of modern science, man has learned how to take the fiber from trees and create wonderful items that make our everyday lives better and more enjoyable. How do they do it?

A tree is like any other plant, only bigger. It is built of plant **CELLS** made of **CELLULOSE** that are held together by **LIGNIN**. The lignin acts as a type of glue holding all the cells together in bundles of fibers. If the wood is cut into chips and then cooked into **PULP**, the lignin dissolves. The cellulose can now be separated out and cooked again. Soon it is a stew of fibers and a liquid called **CELLULOSE ACETATE**.

Some wood products come directly from the tree. Some come from the cellulose pulp, the lignin, or the cellulose acetate. Many medicines, clothing, foods, cosmetics, paints, even some "plastics" are wood products. So the next time you use a bowling ball, put on your new rayon dress, rinse with mouthwash, eat a cookie, or play your drums— **THANK A TREE**—and thank Oregon's foresters who keep our forests healthy and growing for all of us to enjoy.

Below are the items made from trees that were included in the story you read about Randy. How many of them did you find? If you got them all, you are...

### TREE-RRRR-FIC!

#### HANDRAIL, STAIRS, STEPS, FLOOR, DOOR, CUPBOARDS:

Many homes have stair parts and floors made of oak, pine, or Douglas-fir because these woods are sturdy and attractive. Do you have a staircase in your home? What kind of wood was used to make it? Sometimes maple is used for a highly polished wood floor. Doors are most often made of pine and fir, but sometimes they are made of oak or even redwood. Many kitchen cabinets are made of pine or oak. Some are made of cherry. Make a tour of your house. Do you have a wood floor, or does carpet cover it? What kind of front door do you have? Are your cupboards wood? Are they painted or are they natural colored? **RAYON:** This fabric is very popular because it is light and comfortable and can be made into clothes used for fancy occasions or clothes made for fun. Rayon is produced from cellulose acetate. Check the closets and drawers in your house. How many things do you and your family use that are made from rayon?

**BENCH, CHAIR, TABLE:** Furniture comes in all shapes and sizes and is made from many different materials. Today, it is often made from pine, oak, and red alder Makers of fine wood furniture like using walnut, cherry, and mahogany. These woods do not splinter easily and look beautiful when they are sanded smooth and polished.

**VANILLA:** Artificial vanilla is used in many baked goods that are found in the stores or are baked at home and is sometimes called vanillin. It is made from lignin. Lignin is used in some baby foods, pet foods, and deodorants to help hold the ingredients of these products together. Some medicines that help with high blood pressure and Parkinson's disease also come from lignin.

**PANCAKES, COOKIES:** Baked goods sometimes contain an ingredient called torula yeast. It comes from the wood sugars that are produced when pulp is made. Torula contains lots of protein. It has five times more iron in it than Popeye's spinach or good old California raisins. Torula yeast is also found in baby foods, cereals, imitation bacon, beverages, and many diet

foods. Torula even seems to make bees and lobsters grow faster! What products in your kitchen have torula yeast or artificial vanilla in them?

**SAUSAGES:** No. Meat inside the

sausage is not made from wood! But the casings that hold the meat in links usually are cellulose, a wood product. Cellulose is tasteless and comes in several varieties. Sausage casings are made from ethyl cellulose. So are hard hats, combs, brushes, luggage, and fishing floats. **MAPLE SYRUP:** The ingredient that soaks into our hot pancakes and shines on top of our puddings is the forest product we call maple syrup. It is the sap that flows through the cells of the sugar maple tree. This wonderful treat is tapped from the tree in early spring when the sap begins to move through the tree again after a winter rest.

ADMIT ADMIT ADMIT ADMIT as wo to break down

CARTON, NEWSPAPER, REPORT, TICKETS, NAPKIN, BOX, BOOKS, SACK: Ordinary paper is most often made from softwoods such as pine and fir. In paper mills,

wood chips are cooked in order to break down and soften the fibers. Next,

they are washed clean and put into a beater. Beating makes the fibers fluffy so that they will hold together better. The mixture is now called wood pulp. At this point, dyes are often added to the pulp to give it color. Then it is spread out very thinly on a wide, wire screen. The pulp moves along a conveyor belt where most of the water drains out through the mesh. The rest is squeezed out by a series of rollers. As the fibers dry, they bind themselves together and become paper. Many paper products that are manufactured today are made from recycled paper. What does recycled mean? The next time you buy greeting cards, toilet paper, paper towels, facial tissues, cereal and other grocery boxes, check to see if they are made from recycled paper. What is printed on your paper grocery store bags? Does it show how much of the paper used to produce these bags is recycled? Making recycled paper is easy and fun. A recipe for making it is included in this lesson.

**APPLE JUICE, ORANGES:** Most of the fruit we eat comes from a tree. We squeeze fruits into juice, cook them to make jams, jellies, and syrups, use them to help flavor other foods such as pies, and eat them fresh. What is your favorite way to enjoy fruit? What job does the fruit do for the tree? Here is a hint: What do we find hidden inside the fruit?

**FOOTBALL HELMETS:** Though they don't look like it, plastics are sometimes made by using wood. Wood flour is mixed together with other ingredients to form the plastic parts to many household appliances, like coffee makers, and sports equipment, like hockey helmets and baseball hard hats. Scientists believe that using wood fiber strengthens the plastic.

**TIRES, RUBBER MATS:** Rubber trees originally came from South America, but now large rubber tree plantations are also found in the tropical areas of Africa and Asia. Workers make a cut



into the bark of the tree and set a cup beneath it to catch the sap called latex. The latex is then made into rubber. What other items can you think of that are made from latex rubber? Can you think of another wood product that comes from tapping into the bark of the tree to catch its sap?

**PHOTOGRAPHIC FILM, CELLOPHANE, TOOTHBRUSH, EYEGLASSES:** These everyday items are made from cellulose. VCR tapes, sponges, and cellophane tape are also made from cellulose. Look at the knives and tools in your kitchen and workshop. Many of the handles are made from regular wood or from the wood product, cellulose.

NAIL POLISH, HAIRSPRAY, LIPSTICK, PEPPERMINT CANDY, GUM: The cosmetic and food industries make use of wood oils to give their products scent and flavor. Sandlewood is used in many perfumes and incense sticks. Eucalyptus is the smell we recognize in ointments, cough drops and syrups. Chewing gum uses both of these oils for fragrance along with chicle, an ingredient that is found in the forests of Central America. The drops of chicle that ooze out of the tree are what we find so much fun to chew!



PLANTER BOXES, HOUSES, FENCES, SIGNS, TELEPHONE POLES, BUS STOP BENCHES: The strong smelling oils in the wood are what makes redwood and cedar ideal for outdoor furniture, decks, planter boxes, and fences. These oils help protect redwood and cedar products from insects and also from damage by the rain, sun, and wet soil. Carpenters love to build with redwood and cedar because they have no knots in them. Their grain is straight and smooth. Some houses are made entirely out of wood. In other houses, the framework, the outside covering, and the shingles on the roof are made of wood. Douglasfir, white fir, and ponderosa pine are most often used to build houses. Douglas-fir is also used to make telephone poles and bus-stop benches, while ponderosa pine is used to make most wood signs. Does your house have wood siding? Do you have shutters on your windows or decks around your house? Is there a gazebo or a birdhouse in your backyard? Does one of your neighbors have a

wooden mailbox or a "FOR SALE" sign in his front yard? Take a walk in your neighborhood. How many things do you see made from a tree?

### **Forestry in Virginia**



# WHAT ARE "WORKING FORESTS" AND WHY DO WE NEED THEM?

Forests are full of trees, which are good for people, animals and the entire environment. A working forest is one that is actively managed and usually

gives its owner income at some time. Working forests not only supply products like paper and lumber, but also clean our air and water, protect the soil, produce oxygen, provide shade, create wildlife habitat, offer beautiful scenery and give us space for recreation.

## WHAT DOES A FORESTER DO?

A forester's job is to work with trees. Most foresters have jobs that allow them to spend some time outdoors and some time indoors. Tasks may include meeting with landowners to help them make decisions about caring for their forest; writing management plans; making maps; coordinating tree planting; fighting forest fires; visiting areas where trees are being cut to make sure good practices are being used; checking for diseases and insects that can harm trees; answering questions from the public, and making presentations to groups. Foresters who work for the government may do all of these things, and more, over the course of several weeks! Foresters who work in private business may specialize in particular forestry tasks.



# FIRE IN THE FOREST

Fire in the forest can be bad...but sometimes it can be good.

### **Bad Fire**

Wildfires - Fire in the forest that is out of control can harm people, homes, animals, and the forest.

The main causes of WILDFIRE in Georgia's forests are:

- Careless Debris Burning Wildfires can be started accidentally by people burning leaves, sticks, and other yard debris.
- Woods Arson Wildfires can be started on purpose by people who want to destroy or damage property or buildings.

### **Good Fire**

**Prescribed Fires** - Fire in the forest that is in control by professionals can help the forest to stay healthy.

### PRESCRIBED FIRE can:

- Help many plants reproduce and increase food for wild animals.
- Lessen the possibility of a wildfire by removing built up layers of dead leaves and forest material that could easily catch on fire.



leave the area for a few hours.



Answers: New plants and trees are reproducing, a bunny finds his favorite food growing in the woods, a forester sets a fire in the woods and manages it closely, lightning strikes and a small fire burns itself out, and a deer sees a small, low burning fire and has time to easily