

LEVEL 3
4th - 5th



CO₂



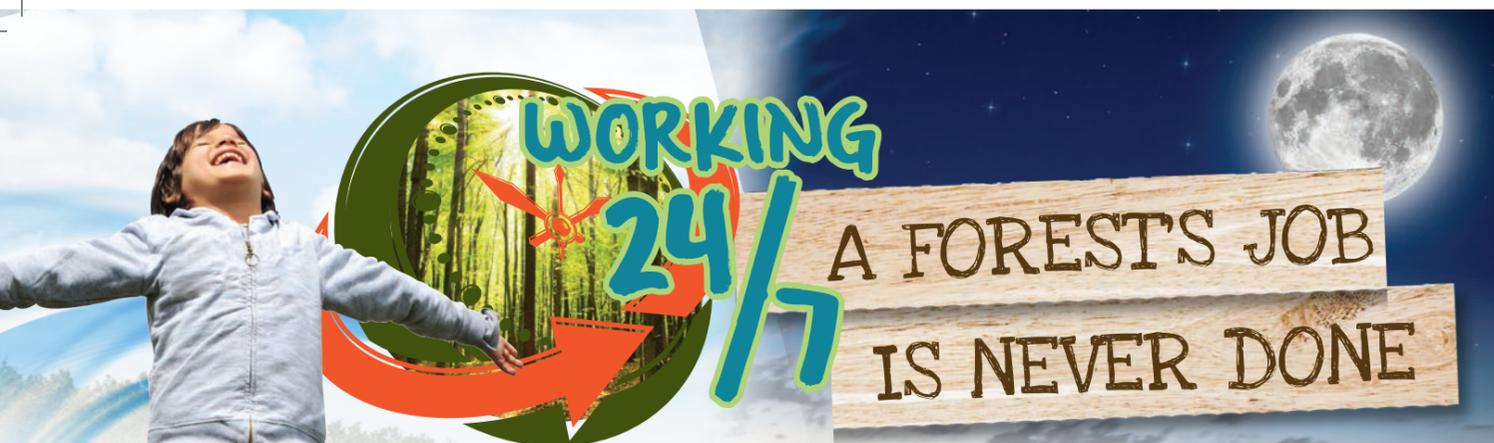
Trees Help Us Breathe!

O



H₂O





Forests are alive and working 24 hours a day and 7 days a week. You should be very happy that they never stop working because you need something 24 hours a day and 7 days a week that they provide for you – the **OXYGEN** in the air that you breathe! One large tree can make enough oxygen in one day for 2 people.

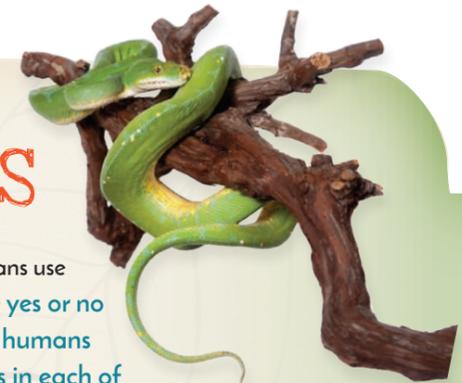


How many people live in the town or city nearest you?

How many trees are needed to make the oxygen for the people living there to breathe?

$$\text{City Population} \div 2 = \text{Total \# of trees needed}$$

How do trees get on the internet?
Answer on page 6



US OR THEM: SHARING TREES

We aren't the only ones that need the oxygen from trees. Animals need it to breathe too. Animals need trees for lots of reasons. Arorean animals are animals that spend most of their time in trees. A few of these animals are mammals like squirrels, bats and monkeys. Some are amphibians like frogs or snakes. A LOT of birds live in trees.



Sometimes animals and humans use trees in the same way! Circle **yes** or **no** to answer whether or not humans and/or animals use trees in each of the ways listed. Some answers can be found in this booklet!

List animals that live in trees near you.

Ways to use trees	Humans	Animals
Cut down trees to BUILD homes	YES / NO	YES / NO
Live IN trees	YES / NO	YES / NO
Eat fruit that grows on trees	YES / NO	YES / NO
Use shade from trees to keep cool	YES / NO	YES / NO
Store food in trees for the winter	YES / NO	YES / NO
Raise babies in trees	YES / NO	YES / NO
Gather honey made by bees from trees.	YES / NO	YES / NO

Thanks To TREES

Solve the puzzle to discover more ways we use trees.

TREE TERMS
Cellulose: a fiber found in plant cells. 50% of wood is cellulose.
Lignin: an adhesive chemical that holds the fibers in wood together.

ACROSS

- You might look a little messy after lunch if you didn't wipe your mouth with a _____ napkin.
- Thanks to _____ you have a roof over your head!
- Your dentist appreciates it when you use _____ every day, and it contains cellulose.
- If you like to shop you need to pay attention to the _____ tags made from paper.
- That comfortable rayon shirt you wear is made with tree _____.
- You couldn't play _____ without helmets and they contain wood products.

DOWN

- You wouldn't want your baby brother or sister to sit on your lap without a disposable _____, and they contain wood pulp.
- Pancakes and _____ from a Maple tree are a great way to start the day.
- The _____ seat you sit on everyday could contain cellulose fibers mixed with other ingredients to make plastic.
- _____ wouldn't taste so good without fruits that grow on trees.
- Cellulose powder keeps the grated _____ you sprinkle on your spaghetti from getting lumps in it.
- Tar from pine trees is used by _____ players for a good grip.
- Nothing tastes better than a hamburger grilled over hardwood _____.
- A lot of people depend upon _____ from trees used to treat diseases.

CROPS & TREES: Sharing Space

Agroforestry makes good use of both agricultural and forestry practices and brings lots of benefits to YOU! Trees and shrubs are grown around, or even in, crop fields or pastures.



What is Agroforestry?

It is a land management practice that optimizes the benefits of interactions with trees and/or shrubs are deliberately combined with crops and livestock.

Agroforestry:

- increases soil fertility for the food crops YOU need.
- helps YOU have cleaner water by cutting down on nutrient and soil runoff.
- reduces deforestation so YOU have all the benefits you need from trees.
- cuts down on the need for toxic chemicals like insecticides, making the environment safer for YOU.

DID YOU KNOW?? Most members of the Kolufo tribe in Papua New Guinea live and raise their families trees.

TREES HAVE SEEN IT ALL!



TREE TERMS

Germination: the process by which a plant grows from a seed.

Many forests and trees living in the United States today have been alive for hundreds and even thousands of years. They have survived through good times and bad, droughts and floods, and have shared shade with some pretty famous people!

3051 BC AND STILL ALIVE!

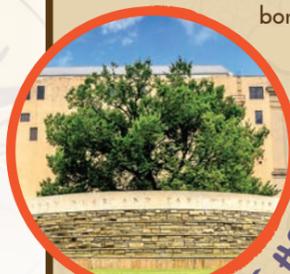
Well over 5,000 years ago a seed germinated on a mountain in what is now Inyo County, California. The seed grew into the oldest LIVING organism on earth, a Bristlecone Pine tree! This tree has grown through generation after generation of the Native Americans that still call the area home. The name "Inyo" came about when the first white settlers asked the local tribe the name of area mountains and tribe members replied that it was the "land of Inyo".



BRISTLECONE PINE

THE SURVIVOR TREE

On April 19, 1995 a federal building in Oklahoma City was bombed. Because of the blast, 168 people lost their lives, another 680 people were injured and over 300 buildings in a 16 block area were either destroyed or damaged. An American elm tree stood across from the federal building and some of its limbs and bark were blown off, car parts and other pieces of debris were buried in the tree. But, it was still standing. People from the community worked with the Oklahoma Forestry Services to save the tree. It is now part of the memorial site for the victims of the bombing and has become a symbol of hope and resilience.



A SYMBOL OF HOPE

NOT ALL FORESTS ARE ALIKE

Forests are found all over planet Earth. One of the ways forests are classified is by the types of trees most commonly found in them. There are two basic types of trees to look for—deciduous and coniferous.

Deciduous trees



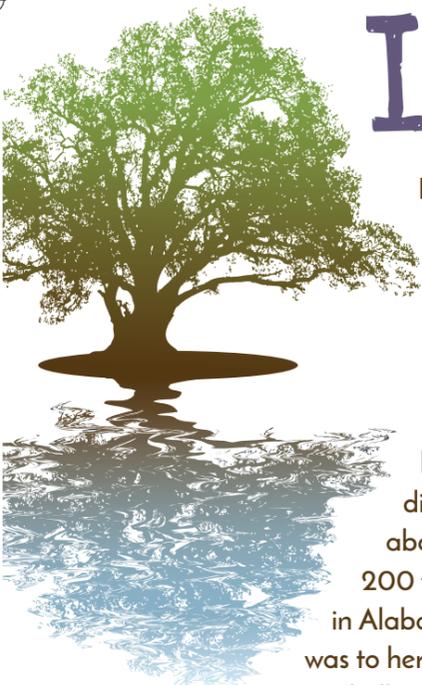
Deciduous trees are also referred to as hardwoods. These trees have broad, flat leaves that change colors as chlorophyll production diminishes in autumn preparing the tree for winter. Their seeds are produced in clusters or in fruits.

Coniferous trees



Coniferous trees are referred to as softwoods. Most conifers have needle-shaped leaves that stay green year round and their seeds are produced in cones.

INSPIRATION



Helen Keller is one of the most amazing women in history. Born in 1880, she was a writer, a political activist and a lecturer. She was also deaf and blind. She learned to communicate with Braille and was the first deaf and blind person to earn a bachelor degree in the U.S. She dedicated her life to helping those who suffered with the same disabilities all over the world. She often wrote about trees. One of her favorite trees is now over 200 years old and is living at the Ivy Green estate in Alabama. She wrote about how important this tree was to her as a child, feeling its bark and even crawling into a hollow of the tree!

"To me a lush carpet of pine needles or spongy grass is more welcoming than the most luxurious Persian rug." — Helen Keller

Use the Braille Alphabet Key to fill in the blanks below and discover the name of one of Helen Keller's favorite trees.

A	B	C	D	E	F	G
H	I	J	K	L	M	N
O	P	Q	R	S	T	U
	V	W	X	Y	Z	

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Unscramble the tiles and put them in order to find some examples of deciduous and coniferous trees that may grow in your neighborhood.

PRUC	OAK,	TRE	MAP	ARE	EROU	ES A
E, S	US.	ORY,	PIN	ONIF	S.	HICK
REES	RE C	ARCH	IR A	E, F	IDUO	
APP	LE T	LE,	ND L	AND	DEC	

DID YOU KNOW?? Beavers use their sharp teeth to cut down trees and use the logs to build dams and to build lodges they call home!

SNACK TIME!



Unless you are a certain type of beetle or maybe a termite, a tree cookie probably isn't what you'd like for a snack. A tree cookie is a slice cut from a tree trunk that shows the layers that make up a tree. The number of layers, also called rings, tells us the age of a tree. Each layer can also tell us something about the climate that year and any trauma the tree could have survived, like forest fires or insect invasions. The oldest layers of the tree are in the center and the newest layers are closer to the bark. Wider rings indicate a good growing season - plenty of rain, mild temperatures, etc. Narrow rings can indicate a poor growing season - drought, extreme hot or cold temperatures, etc. Dark, uneven spots can be a scar left by a fire or an injury to the tree from lightning. Small tunnels are usually a sign of damage done by insects. One light colored ring and one dark colored ring equals one year of growth.



1. In the year 2001 germination took place. Write "2001" on the line pointing to the center of the tree.



2. Write "fire" on the line pointing to a scar. What year did the fire occur?



3. Write "rainy" on the line pointing to the wide layer. How old was the tree that year?



4. Write "drought" on the line pointing to the narrow ring.



5. Pretend the growth of this tree represent your life, draw lines and label them with the year and event: you were born, you lost your first tooth, you learned to ride a bike and when you started school.



Answer:
They log in!

Trees Are COOL

Trees help lower the temperature when it's hot outside with their shade and the evaporation of water through their leaves. The evaporation from a single tree can cool the air temperature as well as 10 room size air conditioners.

"TO EXIST AS A NATION, TO PROSPER AS A STATE, AND TO LIVE AS A PEOPLE, WE MUST HAVE TREES." - Theodore Roosevelt



Leaves & Roots → CO₂

AND WHY THEY MATTER TO ME

THE CARBON CYCLE

Leaves + Me = Less Carbon Dioxide

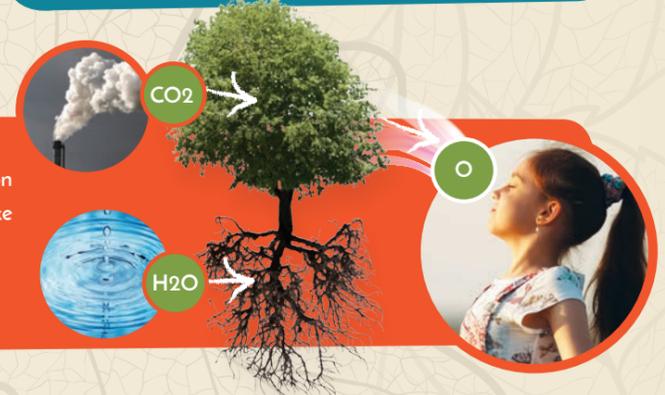
Less carbon dioxide is being put into the air when we burn fossil fuels, like coal and oil, to power our energy needs. Trees are an important part of the climate solution, because they take carbon dioxide from the air, and produce oxygen. Moving to use of renewable energy sources is another part of the solution. We breathe in oxygen - made by the leaves of plants and trees - and exhale carbon dioxide (CO₂). We aren't the only thing putting out the CO₂ - it is put into the air by furnaces, car exhausts, etc. During photosynthesis, CO₂ enters leaves through tiny pores called stomata. Trees use the CO₂ from the air + hydrogen from water (H₂O) in the soil + energy from the sun to make sugars that they store in their tissues and use for energy they need to live and grow.

As a gallon of gasoline is burned by an engine, about 20 pounds of CO₂ is produced. The average mileage for a vehicle is 12,000 miles per year. It takes 12 trees to remove that CO₂ from the air if your car gets 30 miles per gallon.

THE OXYGEN CYCLE

Leaves + Me = Oxygen

Oxygen is required for survival and trees are required to make oxygen. In addition to the carbohydrates (sugar) made by trees during photosynthesis, they also make oxygen! During photosynthesis the hydrogen (H) molecules from water (H₂O) are combined with the carbon (C) molecule from carbon dioxide (CO₂) and the oxygen (O) molecules are released into the air. Just what we need to breathe!



THE WATER CYCLE

Roots + Me = Clean Water

Energy from the sun heats trees up like it does everything else. As trees warm up, they lose water through evaporation. This water ends up as vapor in the atmosphere and when it cools we end up with precipitation - rain, snow, sleet, etc. As the water hits the ground some of it soaks through the soil and becomes groundwater. Some of the water becomes runoff. This happens in urban areas where there are a lot of sidewalks, streets and other hard surfaces. Runoff flows into lakes, streams, ponds and the ocean. Tree roots are great because they help hold soil in place which keeps chemicals from runoff from being carried into surface water and ground water. They also keep the soil itself from ending up in our water supply! The roots also soak up groundwater for the trees to use once again and the cycle continues!

Find and circle the words that are underlined in the puzzle as you discover why leaves & roots matter to YOU!

E N S T R E A M S S S E C R P
G E O Q R D S E Z U U A H E H
A N U I R E L U R L R N Y T O
E E G A T U D V R B P A D A T
L R H A C A I I O F T M R W O
I G S E S V R H X A A T O D S
M Y L L A O Y O M O R C G N Y
W O R L E D L O P E I E E U N
M X X O R E T I E A X D N O T
E X H A U S T S N H V W R R H
E H T A E R B W A E K E O G E
C E C Y C L E L R U N O F F S
S N A B R U E Y L P P U S C I
K N O I T A T I P I C E R P S
U A S O I L S L N E G Y X O W

TRICKY TREES Let's pretend you just bought 8 trees and you want to plant them in 4 rows with 3 trees in each row. How are you going to do it? Answer on page 8

DO YOUR PART!

We can't survive without trees and forests. They are disappearing quickly. We all need to do our part when it comes to conserve forests. Here are a few ideas to get you started:

1. Cut down on the amount of paper you use. Use a box to collect reusable paper that can be used for scrap paper and always use both sides of paper.

2. Visit a forest and be sure to stay on marked trails. If you picnic or camp in a forest, always be very careful with grills and campfires.



3. Reduce, reuse and recycle. Try to live in a way that creates as little waste as possible. Recycle what you can and buy recycled when you can. Consider buying products with less packaging.

4. Go to Use organic and/or natural solutions for pests, weeds or fertilizing your yard.

5. Plant a native tree! If you don't have yard space, then plant one in a large pot and place it on your deck or porch. Volunteer at a local forest and help pull invasive weeds.



ASK MAXINE



Maxine worked for NACD for 47 years. That's why we always ask Maxine.



Question: I read that frogs are one of the animals that live in trees. I didn't know that - I thought that all frogs lived in water. Do you know about any frogs that live in trees?

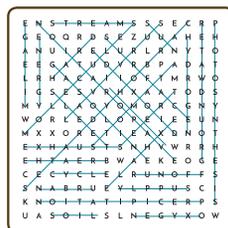
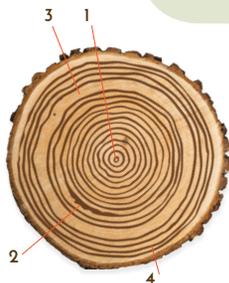
Answer: Why certainly! There are different species of frogs that live in trees all over the planet. One of my favorites is the Glass frog. Glass frogs are an arboreal amphibian. Most of their body is a light green in color but the flesh over the lower surface of their body is transparent. They are so interesting because you can see their heart, liver and gastrointestinal tract. You can even see their heart beating! These frogs are little critters - only 1.2 to 3 inches long and they live in the cloud forests of Central and South America, as well as the Amazon and Chococo rainforests. We have many types of frogs in the United States. You can hear them a night in the spring and summer.

FOREST TERMS

Cloud Forest: also called a fog forest, are usually evergreen with a warm, moist climate. They are often covered with clouds, hence the name.

Rainforest: a dense evergreen forest usually found in tropical climates with a yearly rainfall between 250 and 450 centimeters.

Answer: **TRICKY TREES**



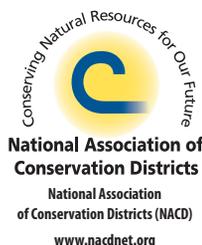
Answer Key Pg 2: Us or Them - Cut down to BULLD, yes, yes, yes. Live IN trees, yes, yes. Eat fruit, yes, yes. Use shade, yes, yes. Store food, no, yes. Raise babies in trees, yes, yes. Gather honey from trees, yes, yes. **Pg 3:** Across - 4 paper, 7 lumber, 10 toothpaste, 12 price, 13 fibers, 14 football. Down - 1 diaper, 2 syrup, 3 toilet, 5 smoothies, 6 cheese, 8 baseball, 9 charcoal, 11 medicines **Pg 4:** Helen Keller's favorite tree: Water Oak **Pg 5:** Not all forests are alike - Oak, maple, hickory, and apple trees are deciduous. Pine, spruce, fir and larch trees are coniferous. **Pg 6:** tree



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National Association of Conservation Districts (NACD)
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Special thanks to the NACD S&E Committee and reviewers.
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Content Writer/Researcher: Teresa D. Southerland
Booklet designed by Willow Marketing, Indianapolis, IN
Visit: <http://www.nacdnet.org/education/we-all-need-trees> for the educators guide and additional resources
Booklet designed for use with Grades 4-5
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