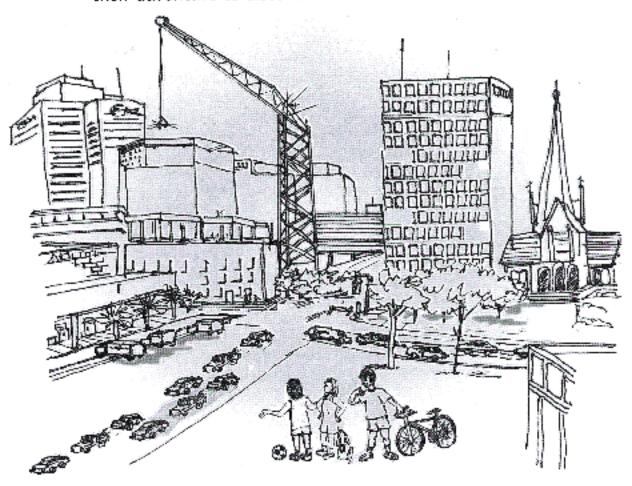


# A FOREST IN THE CITY, imagine that! Discovering the Urban Forest

This book is about the forest in cities and towns. It is also about the environmental benefits the city forest offers to the people who live there.

Join Herb, Ann and Doris, the urban forest kids, on their adventure to discover the urban forest.



To the teacher or activity coordinator:

A FOREST IN THE CITY, imagine that! is a book designed for elementary grade levels beginning 4 through grade 7.

This book has two purposes. The primary purpose is to acquaint students with the Urban Forest and the vital environmental benefits it awards those who plan and care for it. At the same time, each activity gives students additional practice in the educational skills for elementary school.

The book may be used as a unit in forest conservation or environmental stewardship.

We would appreciate your comments on the book and any suggestions you might have for making it a better tool for teaching urban forestry to students.

Special thanks — to the team of teachers, students, and forestry professionals who worked to make this book fun and accurate. They are: Gloria Freeman, Jennie Morris, Michelle Johnson with the S.C. Forestry Commission; Alexa Hubright, 4th grade student; Colton Hubright, 6th grade student; Alan Watford, 4th grade student; Wendy Mott, 7th grade student; Jonathan Kyle, 5th grade student; Paul Morris, high school student; Sherri Whitlock, teacher - Forest Lake Elementary School; Audrey Andreski, teacher, Forest Lake Elementary School; Carter Newman, teacher Frances Mack Elementary School; Liz Gilland, Urban Forestry Coordinator, teacher- Frances Mack Elementary School; Liz Gilland, Urban Forestry Coordinator, S.C. Forestry Commission; Ed Macie, Urban Forestry Coordinator, U.S.D.A. Forest Service, Atlanta Georgia.

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Produced in cooperation with the Urban and Community Forestry Program.

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A Forest in the City! Imagine that.

Meet Herb, Ann, and Doris, the *urban forest* kids. Join them on a treasure hunt.

"Guess what, there's a forest in our city!" said Herb.

"I don't think so," answered Ann. "There's no forest in the city! Look, all you see are streets, highways, concrete buildings and cars and trucks. This city has heat, loud noises and lots of people moving around. There is always construction going on. You have to go to the country to find a forest!" "No you don't!" said Herb, "There is a forest right in my backyard and allower our city."

DIRECTIONS: Riddle: What did Herb and Ann find?

12 WORDS are hidden in the grid of letters. Look across, back, down, up and diagonally in the letters. When you've circled all the WORDS, write the unused letters from the grid on the blank spaces at the bottom, and you'll find the puzzle answer.

#### THE hidden words

building
cars
concrete
construction
heat
highways
loud
moving
noise
people
streets
trucks

n	0	i	t	С	u	r	t	s	n	0	С
а	0	q	е	0	р	1	е	t	f	0	0
b	u	i	1	d	i	n	g	r	s	r	n
t	е	s	s	r	а	С	t	е	k	1	С
а	r	i	g	е	h	t	i	е	С	0	r
		i m									
е	n		У	b	а	С	k	t	u	u	е

Ridde Answer:



### What is an Urban Forest?

Doris, the word expert of the group, said, "The word *urban* is an adjective which relates to a city or town. A *forest* is a group of trees with plants in an area. So, what is an urban forest?"

(write the definition here)

"That's right!" said Doris. "It is all of the trees and plants within our city." "WOW," exclaimed Ann. "So we do have a forest here. You could say we live in an urban forest!"

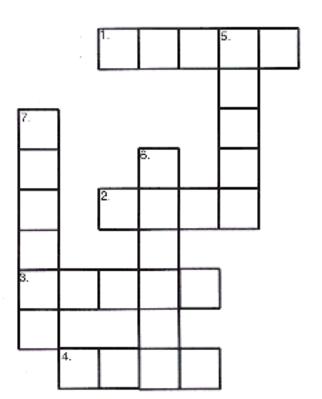
DIRECTIONS: After reading the definitions above, complete the crossword puzzle.

#### ACROSS

- 1. A forest is a \_\_\_\_\_ of trees with plants.
- Urban can describe a city or \_\_\_\_\_.
- A forest is a group of large plants called \_\_\_\_\_.
- People live in an urban town or an urban \_\_\_\_\_

#### DOWN

- The adjective in the paragraph above which describes a city or town.
- A group of trees and plants is called a \_\_\_\_\_\_.
- A forest has trees and \_\_\_\_\_\_in an area.



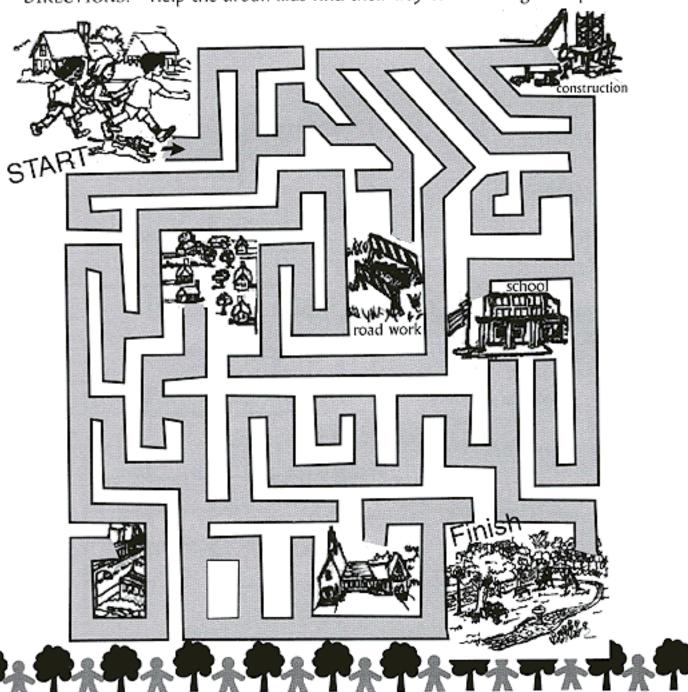


# Green Space in the City

Herb said a brand new city park, filled with trees, had just opened for the public. The kids take off in search of the park. When they find it, Ann exclaims, "Wow, this is fabulous! I hear the sounds of nature like birds and squirrels and bugs. Listen, hear the wind through the leaves of the trees?"

Officials who planned the park call it a green space. Why? In the middle of concrete, asphalt, metal, and steel of the city, there is a space filled with living green things. This green space has large, old trees and newly planted trees.

DIRECTIONS: Help the urban kids find their way to the new green space .



# A Tree a Day keeps the Doctor Away!

Did you know that trees make a city a healthy place in which to live?

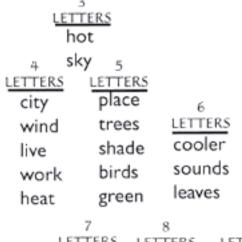
That is because trees create feelings of relaxation and make people feel good?

Have you ever stood in the shade of a tree when the temperature was in the 90s? It's cooler! Sometimes as much as 20°.

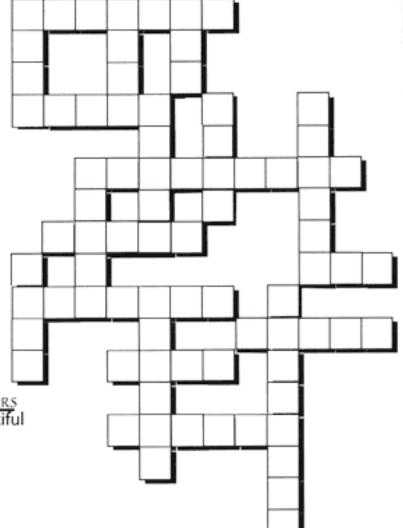
How does the sound of the leaves rustling and the birds and insects moving around in the tree make you feel? These sounds are pleasant. The air seems cleaner to breathe. The green leaves or needles are beautiful against the sky. Trees make a city a healthy place to live and work. They are valuable to the health of people.

#### DIRECTIONS: Place th

Place the words below into the crisscross diagram so that they interlock as a crossword.









### Gifts from the trees.

Trees are working for us 24 hours a day. They are improving the environment and the quality of life for us all.

4 @E#



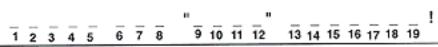
- · Did you know, Urban Trees cool the air up to 20°.
- · Urban Trees buffer noise in the city.
- Urban Trees filter the dust and gasses out of the air.
- Urban Trees provide homes and food for birds and bugs.
- Urban Trees hide unattractive views.

Urban Trees prevent erosion.

- Urban Trees are playgrounds for squirrels, birds, and lizards.
- · Urban Trees provide great playground areas for people.
- · Urban Trees give us relaxing sounds.

DIRECTIONS: Each word in column 1 combines with a word in column 2 to make the gifts of trees listed above. Unscramble the words in column 2 and draw a line to their match in column 1. Then, copy the letters in numerical order in the spaces at the bottom from left to right to answer the riddle: WHAT ARE TREES?

COLUMN 1	COLUMN 2	
FILTER	ROSIONE	<u>-</u> <u>-</u> -
HIDE	USTD	16 1
PREVENT	WIEVS	
ANIMALS	EISNO	<del>3</del>
BUFFER	SEOHM	
URBAN	DUNOSS	5 - 18 15 - 19
RELAXING	IRA	$\frac{-}{6}$ $\frac{-}{2}$
COOL	STEER	9 10 14 12





# It's too BIG to handle!

"Does the urban forest cover the entire city?" asked Ann. Yes or No Yes it does. Who takes care of this forest since there are many different property owners in a city?

There are officials in the city who know that trees play an important role in the health of their city. They want to protect and plant urban trees. The mayor, city council members, city planners, and urban foresters are some of the officials who get together to decide how to protect the forest in their city. They will take an inventory of all of the trees. This inventory is a map that shows where the trees are located, the age and health of the trees and the type of tree species.

The mayor will ask the citizens if they would like to spend some of the city's money to protect and care for these urban trees. The citizens like this.

DIRECTIONS: Parts of each of the 10 words below have been removed, leaving them incomplete. Put each group of letters from the right into one of the sets of empty spaces on the left to complete the word.

1.	M R	AYO
•	IVI II	, , , , <sub>C</sub>

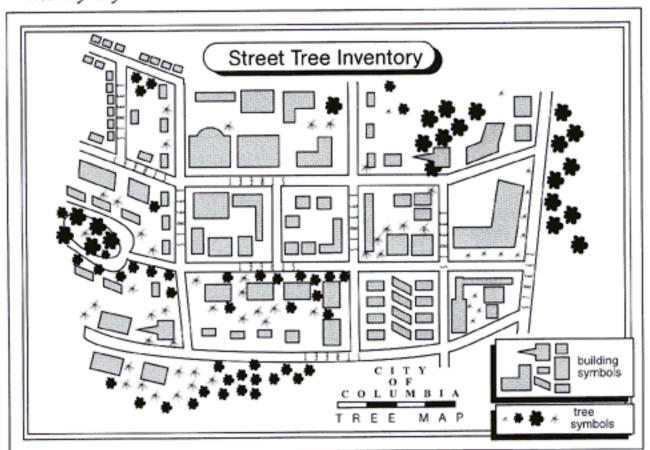
- 2. COUN\_\_\_ BAN
- 3. PROT\_\_\_ CIL
- 4. UR\_\_\_ IZE
- 5. CIT\_\_\_N ECT
- 6. MO\_\_\_ ANT
- 7. PL\_\_\_ VEN
- 8. G\_\_\_P ROU
- 9. PE\_\_E OPL
- 10. IN\_\_\_TORY NEY



# A Tree Map - what is that?

The friends stop to watch a city forester examining trees in their neighborhood. "What are you doing?" the kids ask. "I'm conducting a Street Tree Inventory," replies the forester. "A road map tells us where places are located. Well, a Tree Map tells us where our city trees are located. It also tells us the age and health of each tree. From this map, we can decide which trees have problems and need attention and where trees should be planted."

Doris asks a good question. "How many trees for each person should be in a healthy city?"



#### DIRECTIONS:

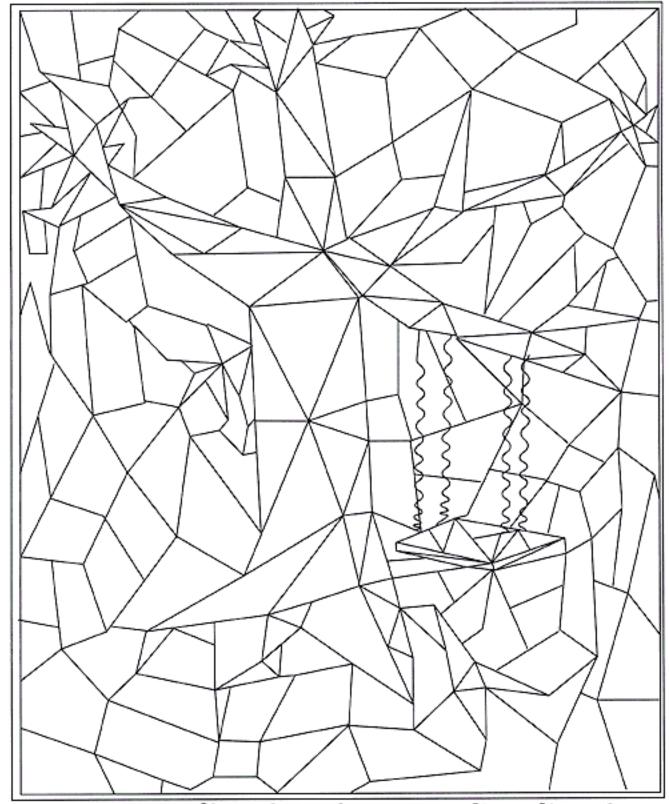
- 1. Count the number of trees on the Street Tree Inventory Map.
- 2. Count the number of buildings in the city.
- 3. Multiply the number of buildings by 4. (Line 2.) x 4 = \_\_\_\_\_\_

  (This is an average of 4 people in each building.)
- 4. Divide the number of trees (1.) into the number of buildings x 4 (Line 3.) using decimals. line 3 divided by line 1 = How many trees per person are in this city?



Doris and Ann discovered a big treasure on their search for the urban forest.

DIRECTIONS: Color in each area that has exactly three sides, and you will discover what they found.



**የ**ፈዋልዋልዋልዋልዋልዋልዋልዋልዋልዋ

\_\_) that will tell you the health of a tree.

# Call the Doctor, My Tree is Sick!

"That tree looks sick," said Herb. "Look at those dead branches. Why is that sap oozing from that wound? That looks like saw dust on the ground around the trunk. Somebody call a tree doctor." Trees give us clues when they are not healthy.

Herb's mom is an urban forester. She comes to examine the tree to determine what may have caused the problem and whether the tree can be helped -just like a doctor examines people and comes up with a diagnosis and treatment.

Construction work, lawn mowers, insects, and lightning can injure trees. Piling up too much soil on the roots can hurt the tree. Not enough water or too much water can hurt the tree. If a tree is injured, diseases like fungus can enter the tree and begin to destroy it. Because there are not as many trees in the city as in the country, every tree is important. Sometimes it is too late and the tree needs to be cut down. Another tree can be planted in its space.

DIRECTIONS:

Unscramble the words from the list below that might make the tree sick. Then draw a line to the clue on the tree of that problem. Solve the riddle by copying the letters with a number under them in numerical order in the blank in the sentence.

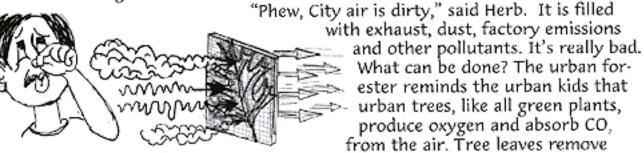
1. ghingtlin
2. nwalrewom
3. struconiontc
4. ectsins
5. seaedis
6. on tewar
7. lios no stoor
8. oto chum wtaer
9. sfugnu

PIDDLE: Copy the letters in numerical order to complete the sentence below.

If you look closely you may see ( \_

# City Air is dirty! somebody get a vacuum

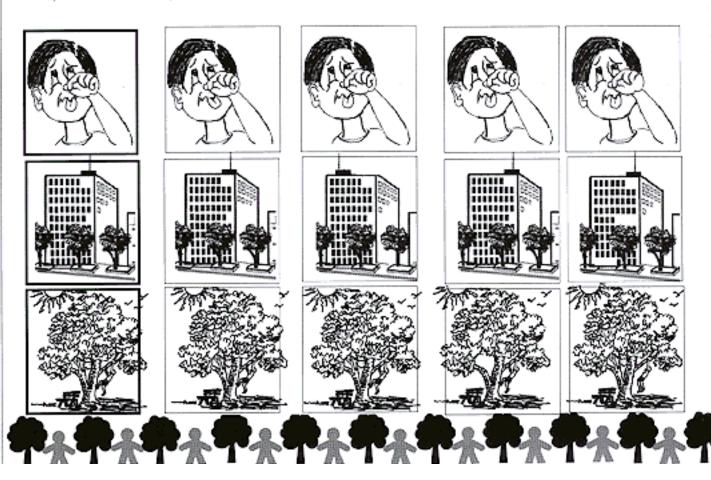
A Tree is a Living Vacuum cleaner.



gaseous pollutants from the air by absorbing them through the pores in the leaf surface. Dust, ash, pollen and smoke are trapped and filtered by leaves, stems and twigs and washed to the ground by rainfall.

"Well," replied Doris, "you can plant a vacuum cleaner that will suck up CO, into its leaves. This living vacuum will also filter the dust, ash, pollen and smoke out of the air. AND, while it's cleaning the air, the tree is also releasing oxygen into the air for us to breathe."

DIRECTIONS: The pictures in each row look very similar, but only one matches exactly the picture in the square on the left. Can you find the two that match?



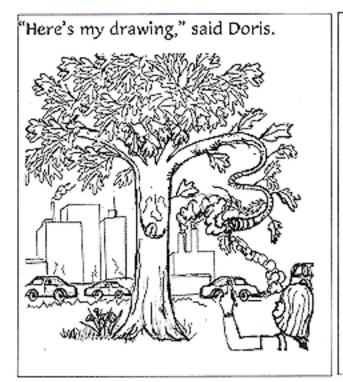
# Memory Page How good is your memory?

DI	IRECTIONS: Answer the questions true or false.	TRUE FALSE
1.	Doris said you could plant a vacuum cleaner that would suck up CO;	
2.	If there were no cars in the city, there would be no air pollution.	
3.	Smoke and ash are not pollutants to the air.	
4.	Factory emissions can pollute city air.	
5.	Green leaves act as a trap to city dust.	
6.	A tree is a living air pollutant remover by absorbing gaseous	
	pollutants through its leaf pores.	
7.	Herb said the air smelled good because the wind was blowing.	
8.	Tree branches and twigs catch pollen and dust from the air.	
9.	Rain washes pollutants to the ground.	
10.	Oxygen is released into the air by all green plants.	

#### AMAZING TREE FACTS

One acre of trees can filter 13 tons of dust and gases every year from the surrounding environment. (A tree vacuum cleaner)

One healthy urban tree 60 years old inhales 8,000 pounds of carbon dioxide and exhales 6,000 pounds of oxygen in its life. (A tree air purifier)



Now, you draw one. How do you see a tree clean the air?

aSed yeek on age; and of sawon



### What to Plant and Where to Plant

The Urban forest kids meet a person who has a crew of workers planting trees along the street. She is a city horticulturist and she is tree smart.

Since trees make such a big difference in the city, people want to plant trees along the streets. But, can you plant any kind of tree along a street? No! You need to consider many things first.

- Watch those power lines. Is the tree near power lines?
   Plant only a tree that does not grow as tall as the power lines.
- Heat, heat, and more heat. Since the sun bakes hot in the city, plant a tree that can tolerate hot temperatures.
- How about water? Urban trees need water. Make sure that someone can water the new trees until they are well established and can survive on their own.



DIRECTIONS: Connect the dots in order from 1 to 97 to find out what you have to watch out for.

# now How to Plant a tree just right.

Measure the height and width of the root ball.

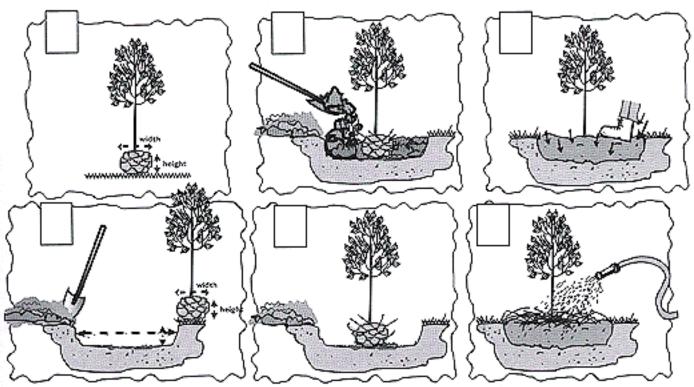
Dig a hole that is 3 times the width of the root ball and about the same height.

Place the new tree into the center of the hole, remove the wrapping cord from the root ball.

 Fill the hole with the dirt from the hole. Don't pile dirt up on the root ball or tree trunk.

Pack the dirt with your foot to remove air pockets.

6. Mulch with pine straw or light hardwood mulch and water. Keep watering the tree every day for 10 days and then every two weeks.



DIRECTIONS: Read the following paragraph. There are 10 incorrect statements that make the directions for planting wrong. Circle the incorrect statements. See if you can find 10. Then write the correct statements on the line underneath.

Doris said, "I can plant a tree. Here's how. First, you dig a hole twice the width of the root ball and deeper than the height. Then mix the old dirt with new dirt and loosely fill the hole up over the top of the root ball. Next you water the tree

and put some sand or leaves on the dirt. Water the tree once a month."

### How Does the Urban Tree Grow?

The Parts of a Tree

The Crown:

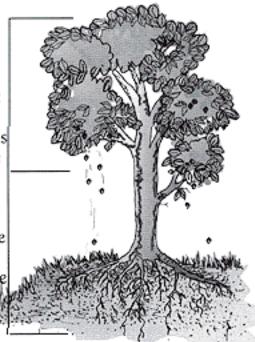
Each leaf or needle absorbs sunlight, carbon dioxide from the air, water and nutrients from the soil and turns them into sugars the tree needs to grow. (photosynthesis)

The Trunk :

The tree trunk is covered with bark that is unique to that species of tree. The trunk also produces wood cells and carries water, nutrients and sugars to parts of the tree. It is also the part that holds the tree up.

The Roots:

The roots anchor the tree into the ground. They store starch for the tree's use and they absorb water and nutrients from the soil. Most of the roots are only one foot underground, but they may spread beyond the tree's leaf canopy.



The sapwood or "xylem"

The sapwood or "xylem" is also a pipeline but it moves water to the leaves. Sapwood is new wood. As newer rings of sapwood are created, inner cells lose their vitality and turn to heartwood.

The heartwood The heartwood is the central supporting pillar of the tree. It is dead wood, but, it will not decay while the outer layers are intact. It is made of cellulose fibers glued together by a chemical glue called lignin and is in many ways as strong as steel!

The outer bark

The outer bark is the tree's protection.
It is constantly renewed from within.
It insulates against cold and heat and
wards off insect enemies.

The inner bark or "phloem"

The inner bark or "phloem" is a pipeline. Food is passed through this pipeline to the rest of the tree. It lives for a short time and dies and becomes part of the protective outer bark.

The cambium cell layer

The cambium cell layer is the
growing part of the trunk.

It produces new bark and
new wood annually.



"O.K.." said Herb, "let's see what we know." You get 10 points for every question you answer correctly. Make 100 and you are ready to become a forester. SCORE Here goes: I. What part of the tree is the water pipeline?\_\_\_\_\_\_ What anchors the tree to the ground?\_\_\_ What part of the tree uses sunlight, carbon dioxide, water and nutrients to make sugars for the tree to grow?\_\_\_ 4. The growing layer of a tree that produces new wood annually is the 5. What part of the tree is dead wood, but is as strong as steel?\_\_\_\_\_ The outer bank does what for the tree?\_ What part of the tree is the food pipeline?\_\_\_\_\_ 8. True or False? Most of the tree roots are deeper than 1 foot in the soil.TRUE FALSE 9. What is the name of the chemical glue that holds the cellulose fibers together.?\_ 10. TRUE FALSE All the different kinds of trees have the same bank. EXTRA CREDIT QUESTION: What do you call new wood?\_ =Total points. DIRECTIONS: First identify each picture. Then add and subtract the letters as indicated. If you do the puzzle correctly you will finish the sentence: Every year a tree adds a \_ \_ \_ \_ ring.

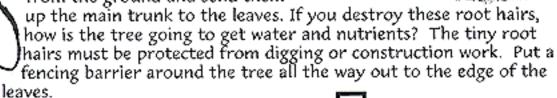
# Trees have Hairs, not on top, but at the bottom.!

Did you know trees have root hairs?

To protect the urban tree when you are digging or building around a tree remember this: tree roots

go out as far as the leaves on the tree.

That's much farther out than most people realize. The tiny roots on the main root branches are called root hairs. Their job is to absorb water and nutrients from the ground and send them



DIRECTIONS: Place the words below into the crossword diagram so that they interlock as a crossword.

> 4 letter words tiny tree

5 letter words

water roots hairs

urban

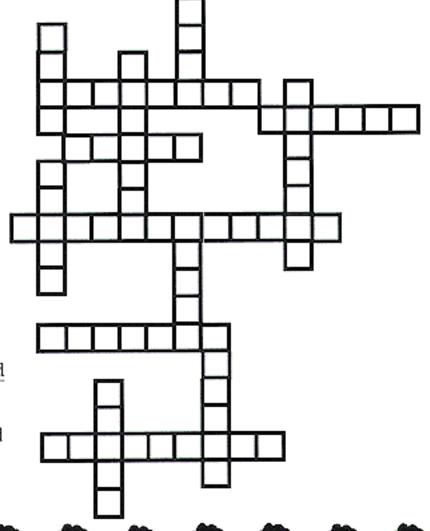
<u>6 letter words</u> ground leaves

7 letter words

digging protect destroy 8 letter word nutrient

9 letter word buildings

12 letter word construction

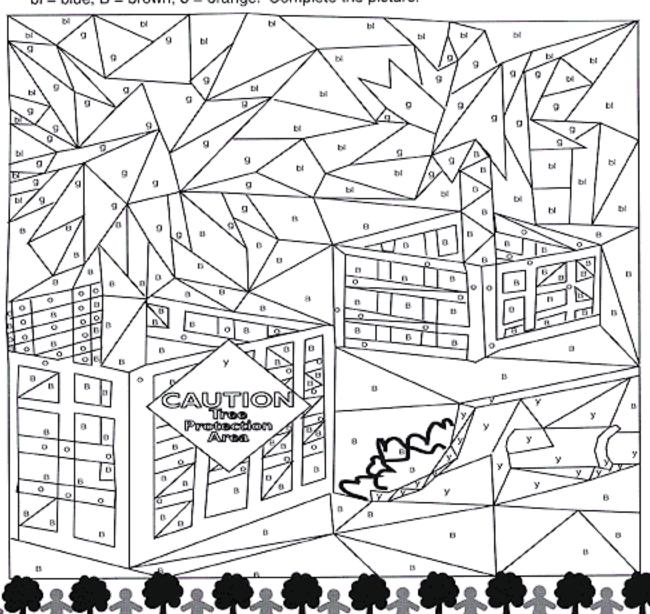


# Leave the Trees, if you can, please!

On their way back home, Herb sees bulldozers clearing land for a new building. Some trees have been pushed over. But the trees standing have a bright orange fence around them. The bulldozer operators are going around these trees. Someone decided to protect those particular trees. Who was it?

The architect drew up the plans for the new office building. He knew that trees would increase the value of the land and also make a beautiful place for people to work. So, he very carefully drew plans that would save the best trees. He had to work a little more, but it was worth it.

Directions: Color the areas according to the letters: y =yellow, g =green, bl = blue, B = brown, o = orange. Complete the picture.



# Urban Trees are FOOD Machines!

# POTOSYNTHESIS "put together with light"

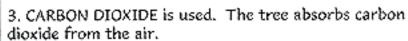
Photosynthesis is the process by which green plants convert the energy of sunlight into chemical energy in sugar and thus produce food for themselves. Therefore, trees make their own food. It is a simple form of sugar called glucose. This is what the tree uses to make more complicated food substances so that it can grow.

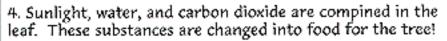


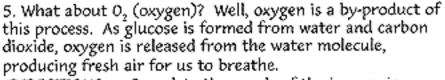
Here is how it happens:

FOOD FACTORY. There is a tiny food factory within the cells of the tree. In these cells, in tiny bodies called chloroplasts, there are layers of chlorophyll, the green coloring matter of plants.

- SUNLIGHT. When sunlight strikes a chloroplast, a chain reaction occurs almost instantly.
- 2. WATER is used. The tree absorbs water through its roots from the soil.



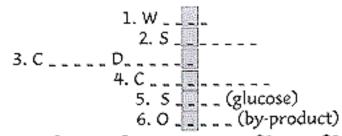




DIRECTIONS: Complete the words of the inorganic matter that a tree uses to produce food. Read down the shaded column to find what the sun uses.









### The Streets are Flooded, Get an ark!

As Herb, Ann, and Doris started home, the skies opened up and rain poured in the city. The kids ran for cover inside the doorway of a building. They noticed the street flooded with water up to the curb. Cars were splashing dirty water all over them. "It's like a flood," cried Ann.

Across the street there were large trees along the curb. Ann noticed there was no flooding at all. What made the difference?

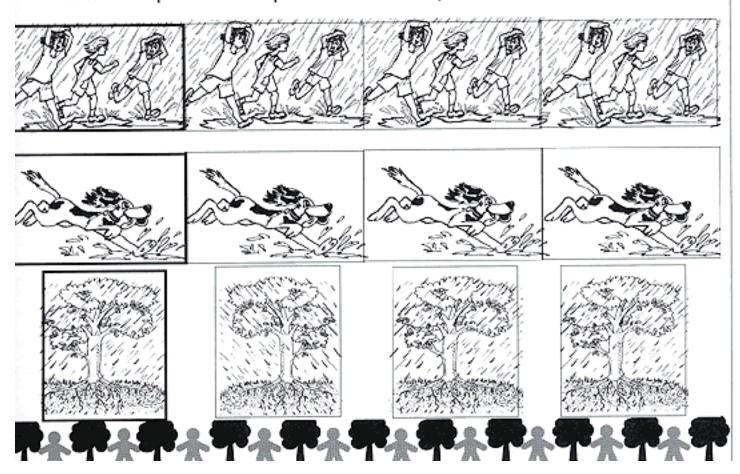
Because: Tree roots break up the hard ground and reduce runoff.

Because: Trees roots absorb water from the soil to make their food.

Because: Tree leaves and branches divert the heavy rainfalls

You could almost say, a tree is an ark. You build an ark from wood But the living tree is also saving the city from flood waters in parking lots and streets. "Just think," said Ann, "Without trees, our city would have to build more sewers and storm drainage channels to handle heavy rainfall." Thanks trees.

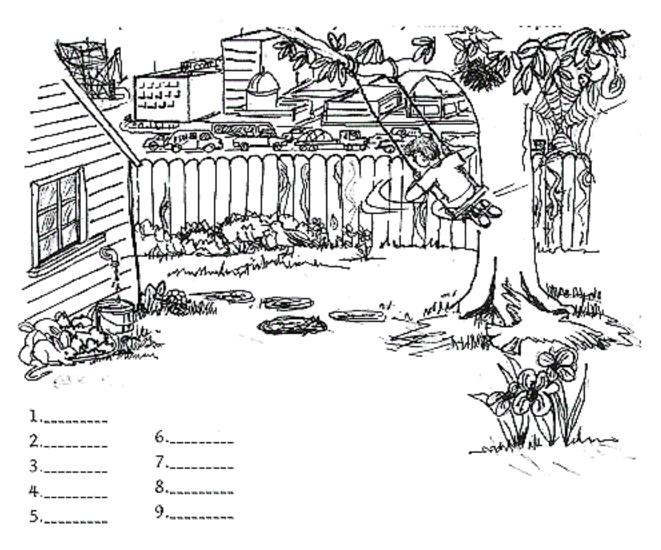
DIRECTIONS: The pictures in each row look very similar, but only one exactly matches the picture in the square on the left. Can you find the exact match?



Where the Wild Things Grow!!

Is there wildlife in the urban forest? Ann said to remember the saying, "If you plant them, they will come." Well, if trees are growing in a city, then the wildlife will come. What kind of wildlife would you find? Lions or tigers or dinosaurs? I don't think so. But you will find snakes, birds of prey such as hawks and vultures, bats, squirrels, rabbits, song birds, snails, crawly bugs, insects, turtles and lizards. Spiders spin their web in the city lights, because they can capture great meals.

DIRECTIONS: There are 9 wildlife species hidden in the urban backyard. Circle them.





# It's ALL Connected!! "Wow," said Herb

Herb, Ann, and Doris made a discovery.

"It is all connected, like the web-of-life,"

Ann said. She remembered learning about the ecosystem in science. The word ecosystem refers to the relationships

between living and non-living parts of the community.

Just imagine what it would be like if there was no urban forest in the city!

Study the illustration here of the circle of life. Are trees, animals, insects and non-living matter connected. HOW?

connected. HOW?

DIRECTIONS: 16 words are hidden in the grid

DIRECTIONS: 16 words are hidden in the grid of letters. Look across, back, down, up and diagonally in the letters. When you've circled all the WORDS, write the unused letters from the grid in the blank spaces at the bottom, and you will complete the sentences.

Sun energy
life circle
dead plants
green organic
eater predator
decay decomposer
matter scavengers
animals begin again

Complete the sentences.

The living parts of the forest ecosystem are \_\_\_\_s and \_\_\_\_s.

The non-living parts are air and \_\_\_\_\_

The sun is the source of \_ \_ \_ \_ \_.

_		$\overline{}$	_		_			_		$\overline{}$	_
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	е	n	s	t	n	а	1	р	r	а	t
1	g	а	0	1	n	е	а	t	е	r	рl
	i	У	r	У	а	С	е	d	g	m	r
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L	n	d	e	С	0	m	р	0	s	е	r
		_		_						_	



### There is a forest in the city, imagine that!

Amazed with the forest they found all over their city, the urban forest kids started for home. All the way, they talked about what they had learned. "A forest in the city, imagine that," said Ann. "And, it's so important to all of us who live here," replied Doris.

Herb, Ann, and Doris couldn't wait to tell their families about the forest right in their own back yards. They also wanted to tell their class about the importance of planting and caring for trees in the city.

#### NOW - IT'S TIME TO GET INVOLVED.

As a class, you can get involved helping your urban forest. How?

Your class can come up with a project about your urban forest. What?

Walk around your yard at home and at school and check out the urban forest around you. See if it is healthy. Do you need to plant some trees?

After completing this activity book, what did YOU learn that interested you the most about the Urban Forest?

#### Urban Forestry Resources:

Listed in your local phone book you will find:

- S.C. Forestry Commission County Office, urban forester
- Your local City Council
- The Mayor's office
- Tree experts
- Architects in your city
- City planners

Call these professionals and ask them to come and give your class a program on their work in urban forestry.

, Write and tell us about any class projects you do involving the urban forest. We just might develop a booklet for publication with all the projects listed by school. Our address is on page 2 of this booklet.

Look us up on the web- http://www.state.sc.us/forest



T.T. 2. F, 3. F, 4.T. 5.T. 6.T. 7. F, 8.L. 9.T. 10.T



