

OpenUp Science

CAMBRIDGE
SCIENCE
CENTRE

In this issue, we're thinking
about trees.

Find out more
with the fun
activities and
puzzles inside!

**What does
bark do?**

Why do trees lose
their leaves in the
autumn?

**Measure the
height and age
of a tree.**



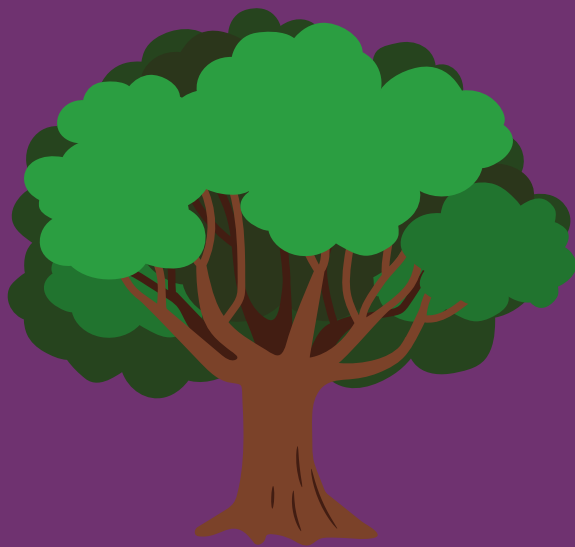
Welcome to OpenUpScience from Cambridge Science Centre.

This issue is all about trees, how they grow, how they change with the seasons, and how we study them.

Trees are an important part of our world. They provide habitats (homes) for all sorts of insects, birds and other animals. Many types of fruits and nuts come from trees – including apples, oranges, walnuts, pears and peaches. Trees provide wood for building and pulp for making paper. Trees also help to keep our air clean and our ecosystems healthy.

Deciduous trees

Lose their leaves in Autumn/ Winter. New green leaves grow in the Spring.



Oak, Maple, Birch, Beech

Evergreen trees

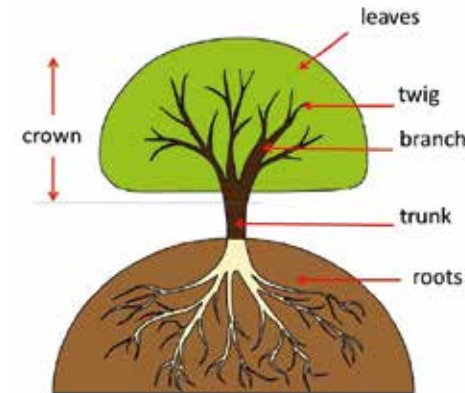
Keep their leaves all year. The trees look the same throughout the year.



Pine, Yew, Juniper, Holly

Parts of a tree

Roots: Underground roots help to support the tree and collect water and nutrients from the soil.



Trunk: Provides a central support and transports water and nutrients from soil, and sugar from leaves.

Branches: Provide support to distribute leaves evenly. Store extra sugars.

Leaves: Food factories of the tree. They are green because they contain chlorophyll. Chlorophyll is used in photosynthesis, where leaves use the sun's energy to convert carbon dioxide and water into sugar and oxygen. The tree uses the sugar as food and the oxygen is released back into the atmosphere.

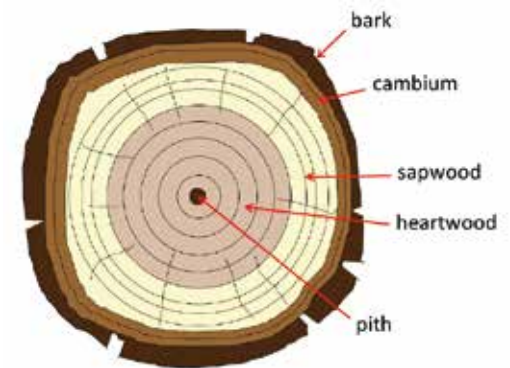
Inside the trunk

Bark: Protects the inside of the tree. The inner layer of bark is also called phloem. The phloem carries sap full of sugar from the leaves to the rest of the tree.

Cambium: Makes new cells allowing the tree to grow wider each year.

Sapwood: Made of cells that bring water and nutrients from the roots to the branches and leaves. Also called the xylem.

Heartwood: Strong, dead sapwood in the centre of the trunk. The hardest wood of the tree. Darker in colour than the sapwood.



Pith: Spongy living cells in the centre of the trunk. Carries essential nutrients. Most protected from damage by insects, animals or the weather.

<https://www.kidzone.ws/plants/trees.html>

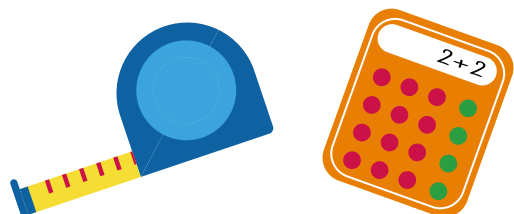
How old is my tree?

Trees grow in two ways. The tip of every branch grows, making the tree taller and more spread out. At the same time the trunk and branches grow fatter, making the tree wider.



What you'll need

- A measuring tape or a long piece of string
- A tree
- A calculator



Every year that the trunk grows, it produces a ring. Counting these rings can reveal the age of the tree. This is called **dendrochronology**. If the rings are far apart, the tree grew quickly in that year. When the rings are close together, the growth was slower in that year.

But, how do you estimate the age of a living tree?

Can you find the oldest tree in your playground or local park?

What to Do

Measure around the trunk of the tree, about 1m from the ground. This is the girth, or circumference, of the tree.

On average, every 2.5cm of girth represents one year of growth. To estimate the age of the tree divide the girth (in cm) by 2.5cm. For example, a tree of 60cm girth will be 24 years old.

Some species of tree will grow faster or slower than 2.5cm per year, but this gives a good estimate!

Tree word search puzzle

Can you find all of the words listed below? If any of the words are new to you, look for their meanings in the magazine.

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

BEECH, BIRCH, BRANCH, CHLOROPHYLL, CLINOMETER,
DECIDUOUS, DENDROCHRONOLOGY, EVERGREEN,
HEARTWOOD, LEAVES, MAPLE, OAK, PHOTOSYNTHESIS,
SYCAMORE, WILLOW



Did you know..?

When attacked by insects, trees flood their leaves with chemicals that insects find unpleasant. When one tree is attacked it can 'signal' to other nearby trees, so that these trees can produce chemicals even before they are attacked!

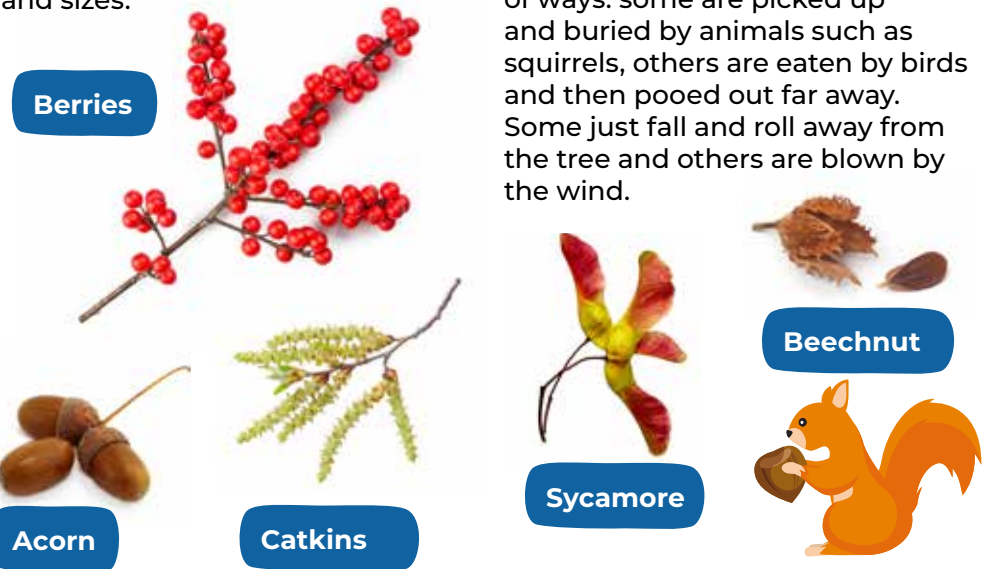
Circle of life

Like all living things, trees need to make new trees. They do this by producing seeds.

Seeds come in all shapes and sizes.

To successfully grow into a new tree, the seeds will need space and light so the trees have to send their seeds away, This is called dispersal.

Seeds are dispersed in a range of ways: some are picked up and buried by animals such as squirrels, others are eaten by birds and then pooped out far away. Some just fall and roll away from the tree and others are blown by the wind.



Matching Game

Can you match the seed to the method it is dispersed?

Acorn

Berries

Sycamore

Catkins

Beechnuts

Wind

Squirrel

Bird

Seed speed trials

Seeds dispersed by the wind often have 'wings'.

We can put how they fall to the test.

What to do:

- 1. Drop each seed from a height (e.g. stand on a chair or over the bannister but check with an adult that you are safe).
- 2. Get your helper to time how long it takes to fall to the ground.
- 3. Repeat the test another 2 times with each type of seed.

What you'll need

- As many different winged seeds as you can find (3 of each if you can)
- A helper
- A stopwatch or timer



Tip:

Make sure you drop them from the same height each time. To find the average time - add your 3 times for each seed together and then divide by 3.

Type of seed	Time in seconds			
	Drop 1	Drop 2	Drop 3	Average time

Why do leaves change colour?

Leaves of deciduous trees change colour through the seasons, but what causes this change?

Leaf colour comes from pigments. There are three main pigments in leaves: chlorophyll (green), carotene (yellow and orange) and anthocyanin (red and pink). Shorter days and colder nights trigger changes in the tree which have consequences for its leaf colour.

A new leaf is usually bright green. Its colour comes from a pigment called chlorophyll.

As the leaf starts to die it starts to change colour. There is less chlorophyll in the leaf and other colours or pigments that were hidden by the green colour start to show through.

As Autumn nights get darker, trees have less light to make food. The chlorophyll breaks down, and orange and red pigments can be seen.

In Winter, when light levels and temperatures drop, chemicals in the tree signal the tree to drop old and dead leaves.



Tree adding puzzle

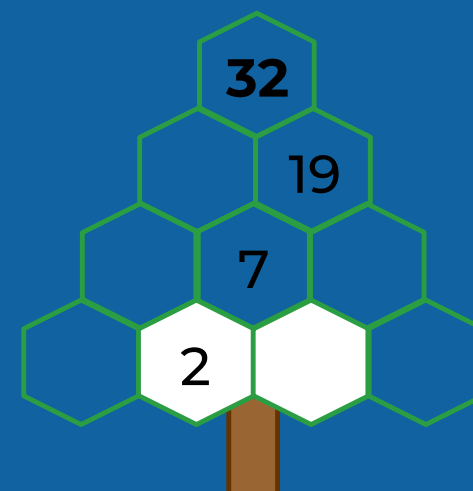
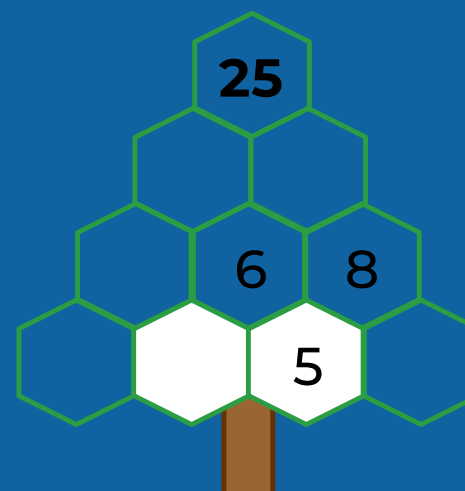
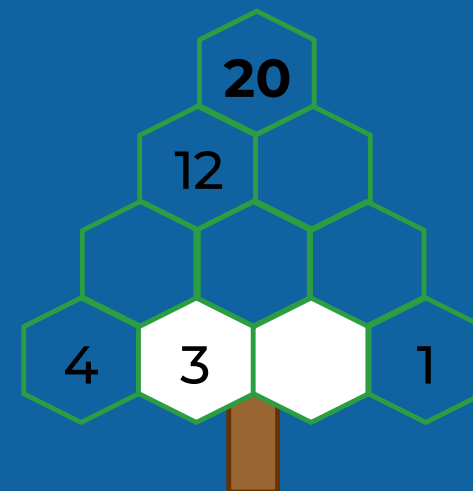
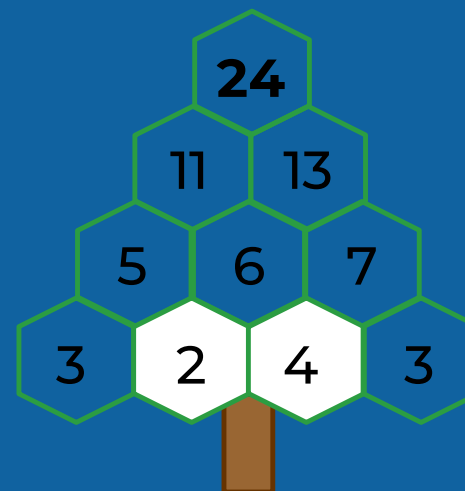
Each number is the total of the two numbers below it.

Find a solution for each of the trees below.

There are many possible solutions!

The first one is completed as an example.

Example:



Tree Quiz

(answers on the back page)

1. What is the process called where trees produce their own food (and oxygen)?

- A. Deciduous
- B. Carbon cycle
- C. Photosynthesis
- D. Nitrogen cycle



3. Why do trees produce seeds?

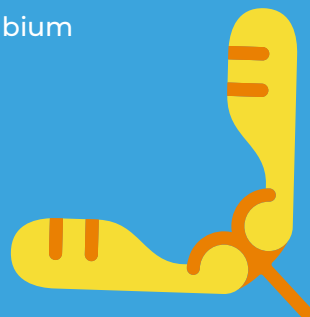
- A. For food
- B. To make new trees
- C. To look pretty
- D. Give squirrels something to hide

4. What is the orange pigment in the leaves of a deciduous tree called?

- A. Carotene
- B. Chlorophyll
- C. Anthocyanin
- D. Cambium

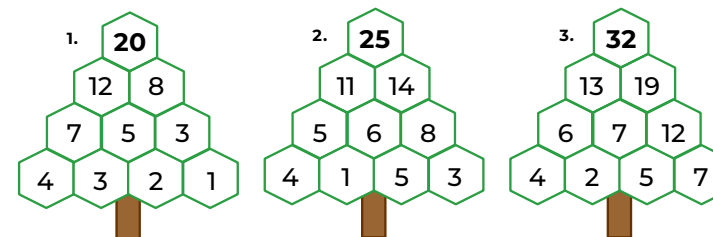
2. To find the age of the tree you use?

- A. Biology
- B. Dendrochronology
- C. Paleontology
- D. Anthropology



Puzzle solutions

Tree Adding puzzle



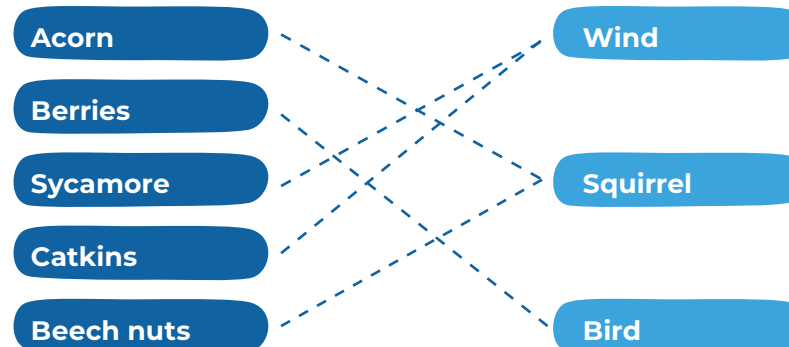
Tree word search puzzle



Tree quiz answers

1. C. Photosynthesis
2. B. Dendrochronology
3. B. To make new trees
4. A. Carotene

Matching Game



Cambridge Science Centre is all about empowering children and young people to discover science for themselves through hands-on activities. While the centre isn't open as normal at the moment, we're finding new ways to reach the families that need us most – like this magazine!

Staying in Touch

Please get in touch if you have any questions. We'd love to hear from you.

Email:

openupscience@cambridgesciencecentre.org

Website:

cambridgesciencecentre.org

**We are kindly supported by
our Executive Council:**

