



DREAMING TREES 2024: THE ELEMENTS

Activities for Key Stages 3 and 4 / 11-16 years

INTRODUCTION



Dreaming Trees aims to encourage people of all ages outside to enjoy and rediscover the beauty of our parks and to think about the wonder of trees.

This pack includes a selection of our favourite activities for secondary school age children.

The activities can be used by practitioners, learners and families to support key stages 3 and 4 of the curriculum.

CONTENTS



Page 4:	<u>Meeting curriculum objectives</u>
Page 5:	<u>Tree survival - photosynthesis</u>
Page 6:	<u>Tree survival - part of a community</u>
Page 7:	<u>Measuring a tree</u>
Pages 8:	<u>Measuring carbon absorption</u>
Page 9:	<u>All about pollution</u>
Page 10:	<u>Greenhouse gas dodgeball</u>
Page 11:	<u>Biomimicry</u>
Page 12:	<u>Jersey tree map</u>
Page 13:	<u>Describe Dreaming Trees</u>
Page 14:	<u>What are trees dreaming of?</u>
Page 15:	<u>Tree jokes</u>

MEETING CURRICULUM OBJECTIVES

This pack and our activities help to support the following areas of learning and development for the key stage 3 and 4 curriculum (secondary school). We hope they are also fun to try at home!

Maths

- Select and use appropriate concepts and calculation strategies to solve problems
- Develop mathematical knowledge through solving problems, evaluating the outcomes and interpreting the limits of accuracy
- Use mathematical language and properties precisely

Science

- The development of scientific thinking
- Experimental skills and strategies
- Measurement
- Analysis and evaluation
- Transport systems in plants
- Photosynthesis
- The interdependencies of an ecosystem
- Human impact / pollutants
- Structure of the human skeleton

English

- Imaginative writing
- Consideration of audience and purpose

Physical Education

- Take part in outdoor activities in a range of environments which present intellectual and physical challenges

Geography

- Interpret maps and aerial and satellite photographs

Languages

- Read literary texts in the language (such as stories, songs, poems and letters), to stimulate ideas and develop creative expression
- Write creatively in the language

TREE SURVIVAL - PHOTOSYNTHESIS

Photosynthesis takes the raw ingredients of water and carbon dioxide and uses light energy from the sun to make glucose and oxygen.

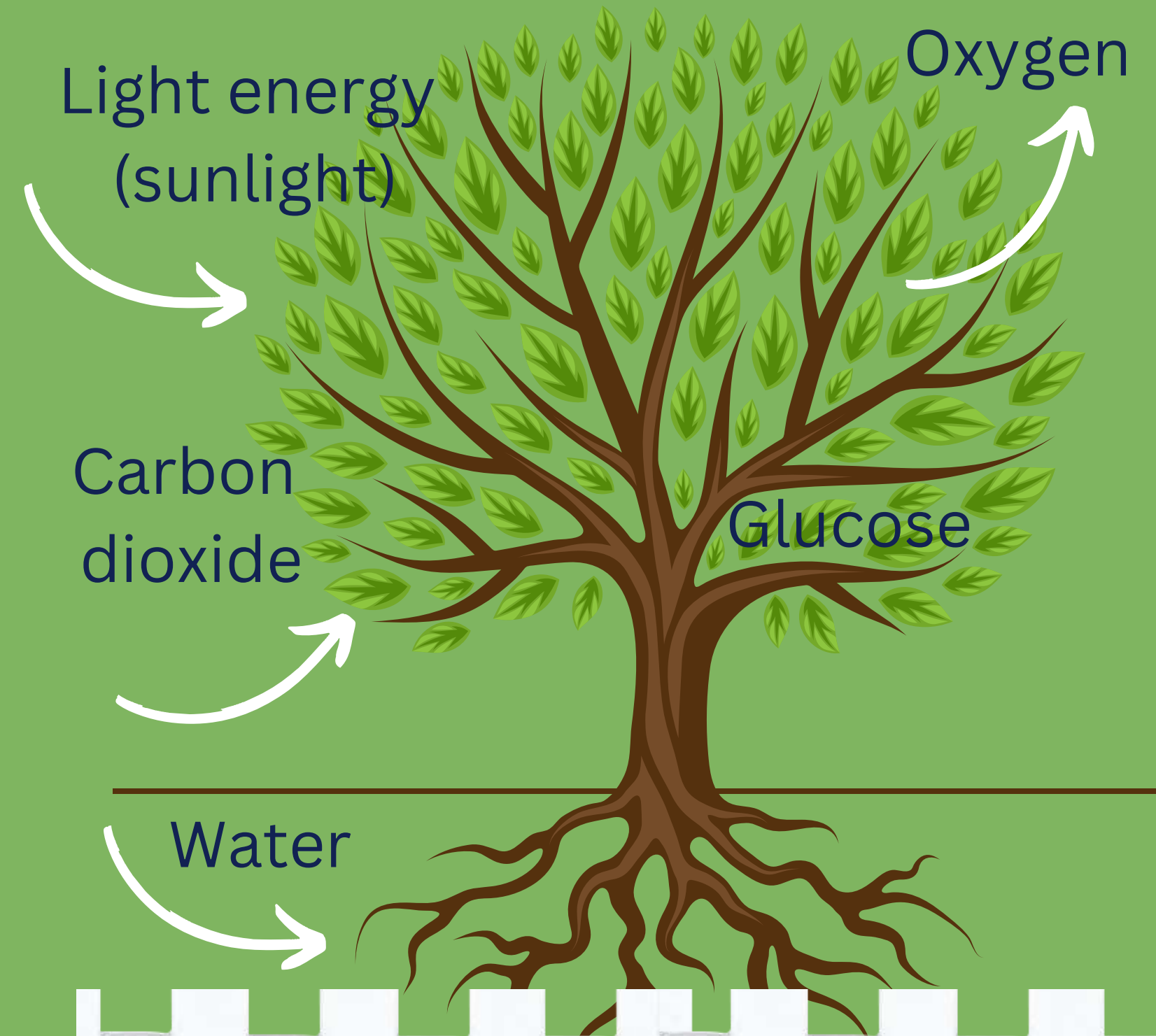
It is the job of the tree roots to search out and absorb **water** from the ground. The **xylem cells** in the tree's trunk and branches then transport the water up to the leaves, where it is needed for photosynthesis.

Trees collect **carbon dioxide** from the air using tiny holes on the underside of their leaves called **stomata**. The stomata allow the gases of carbon dioxide and oxygen to pass in and out of the leaf.

The cells of each leaf contain **chloroplasts**, which contain **chlorophyll**. It is the chlorophyll in the leaf that absorbs the **light energy**.

The **oxygen** made from photosynthesis is released back into the atmosphere via the leaf stomata, becoming a critical part of the air we breathe.

The **glucose** provides the tree with energy to live and also for growth and repair. Trees also store some of the glucose for future use.



Photosynthesis in trees occurs on a huge scale: a fully grown oak tree may display over 700,000 leaves and soak up 1,400 litres of water a day.

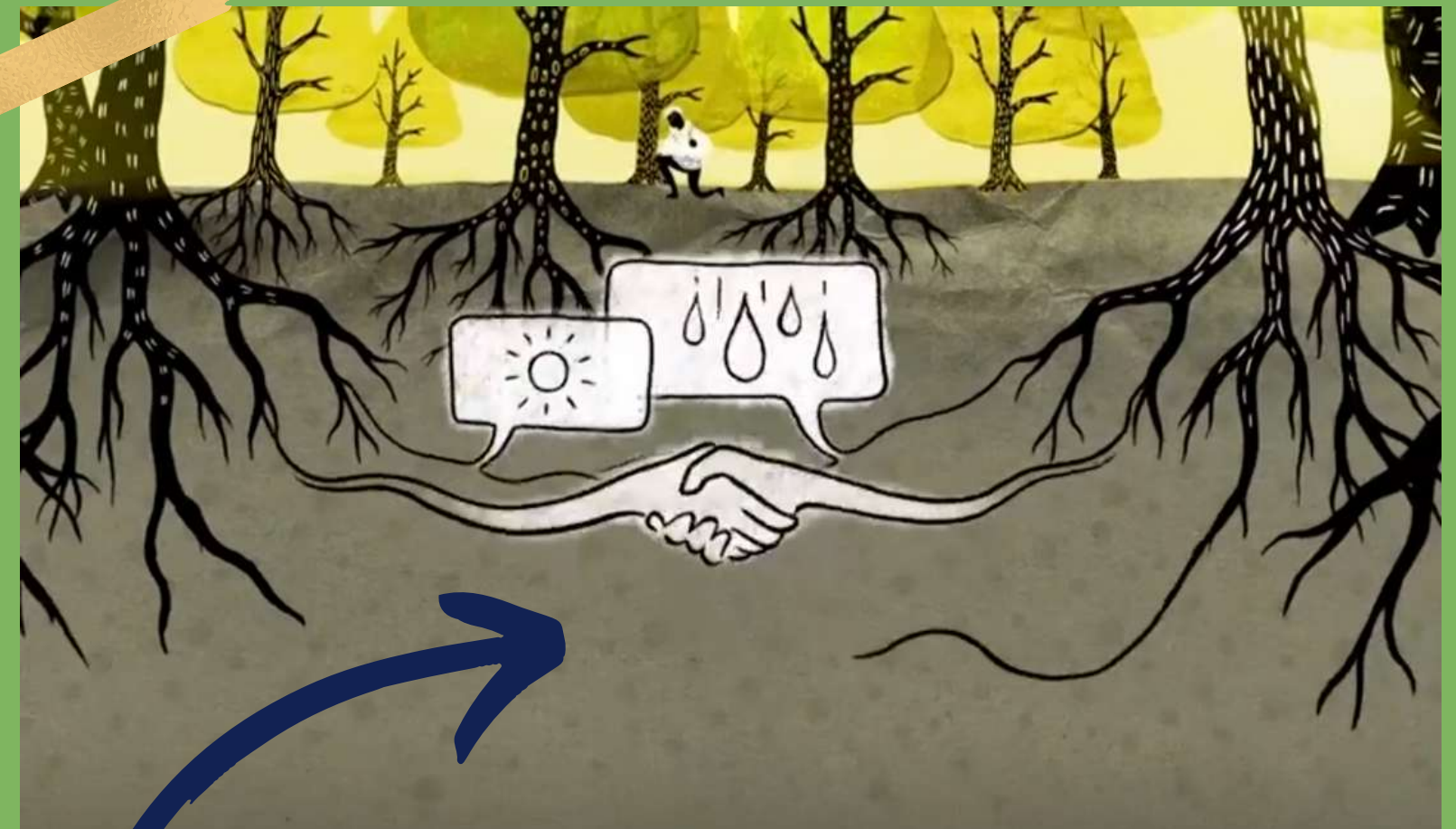
TREE SURVIVAL - PART OF A COMMUNITY

Trees share sugars, water and nutrients such as nitrogen and other minerals with other trees using a **Wood Wide Web**.

This web is made up of a mass of tiny threads of fungi called **mycelium** that grow around and inside the tree roots. Together, the mycelium becomes what is known as a **mycorrhizal network** which connects individual plants together to transfer water, nitrogen, carbon and other minerals.

This **symbiotic relationship** provides the tree with nutrients, and provides the mycelium with sugars absorbed from the tree roots. The term for this relationship is **mycorrhiza** which comes from the Greek words for fungus and root.

This fungal network also allows trees to share resources with each other. For example the oldest and biggest trees known as **Mother Trees** supply shaded seedlings with sugars, dying trees can pass their resources to their neighbours and trees can share messages with one another by sending chemical signals.



Watch this two minute video from the BBC 'How trees secretly talk to each other': <https://youtu.be/yWOqeyPIVRo>

MEASURING A TREE

There are **different ways to measure** the height of trees. Think scientifically and try some of the different methods. **Record and present your data** to see if the different methods created different results and think about **limits of accuracy** for each method.

10 ways to measure a tree, compare the results from each method:

https://outdoorclassroomday.org.uk/wp-content/uploads/sites/2/2019/05/lesson-activity_ways-to-measure-a-tree-1.pdf

Future growth predictions: You can also measure how big the tree is all the way around (the tree's girth or circumference). On average a tree grows approximately 2.5cm per year in girth. Measure how big the tree is all the way around and divide this by 2.5 to estimate its age. Predict the girth of the tree for the next 5 years. What will the tree's girth be when you finish secondary school?



Can you put your arms all the way around a tree? Look for the largest tree, how many pairs of arms do you need?

What are the benefits and limitations of this type of measurement?

MEASURING CARBON ABSORPTION

Trees clean the air we breathe by absorbing carbon dioxide and other pollutants from the atmosphere.

Human activity releases carbon dioxide primarily through the burning of **fossil fuels** and too much carbon dioxide in our atmosphere is leading to **climate change**.

Trees absorb carbon and so can play an important role in helping to slow down climate change.

But how much carbon does a tree contain?

Step 1: Using a tape measure, measure the circumference of the tree about 1.5 metres from the ground. Repeat this 3 times and record the average.

Step 2: Find the nearest circumference value to the average circumference of your own tree using the table. You can also see the dry weight value of your tree.

Step 3: The carbon stored in a tree is half the dry weight of the tree.

Circumference (cm)	Tree Dry Weight (kg)
50	106
100	668
150	1,964
200	4,221
225	5,771
250	7,641
275	9,842
300	12,410
325	15,350
350	18,700
400	26,674

Thank you to Just One Tree for this activity.

A worksheet is available at:

https://www.justonetree.life/uploads/1/2/5/8/125855028/measuring_carbon_absorption.pdf

ALL ABOUT POLLUTION

Trees help to clean the air we breathe by trapping dust and absorbing pollutants. Do you know what air pollution is around you?

Make your own pollution catcher or make a number of catchers to explore the different levels of pollution around you, for example at the school entrance and in the playing fields or playground.

You will need: a piece of card (use the side of an empty cereal box), scissors, Vaseline, a piece of white paper, string and some sticky tape.

- Step 1: Cut out a square or rectangular piece of cardboard, roughly the size of your open hand and cut out a matching piece of paper.
- Step 2: Make a hole in the centre top of your piece of cardboard. Cut a piece of string as long as the distance between your elbow and fingertips. Pass the string through the hole and tie the two ends together.
- Step 3: Put the paper on top of the card and fix them together at the corners using the sticky tape.
- Step 4: Using your fingers or a butter knife, spread some Vaseline on the stuck down paper. Now hang it up outside.



After a week, you should be able to see pollution particles stuck to the Vaseline. If you live in an area with very clean air, you might have to be a bit patient.

Thank you to Woodcraft Folk for this activity which is available at: <https://dreambigathome.uk/activity/pollution-catcher/>

GREENHOUSE GAS DODGEBALL

Learning through Landscapes has designed a team game that demonstrates the effects of greenhouse gases on the earth and explores what can be done to slow down climate change.

The instructions are available here:

<https://ltl.org.uk/wp-content/uploads/2023/09/climate-change-dodgeball-outdoor-lesson-idea-ltl.pdf>



BIOMIMICRY

Biomimicry

Biomimicry is using ideas from nature to solve problems.

This 1.3 minute video explains why oak trees can inspire the design of hurricane-proof buildings: <https://youtu.be/6eNEHUMNJQ0>

Trees are also inspiring new technologies such as:

- Non-stick coatings: The leaves of trees have a unique surface composition that prevents dirt and insects from sticking to the leaf and damaging or even destroying it
- Solar panels: Trees maximise the energy efficiency of their leaves. The structure of leaves is being studied to improve the capture of solar energy

Stick skeleton

Collect different size sticks to make your own stick skeleton. Use the resource from Trees for Schools to check you have all the parts!

https://www.treetoolsforschools.org.uk/activities/pdfs/pdf_twig_skeleton.pdf

**BIOMIMICRY = INNOVATION
INSPIRED BY NATURE**



JERSEY TREE MAP

The Jersey Tree Map shows the locations of more than 650,000 trees that are over 3m tall. The map was created from aerial imagery taken in 2021.

The interactive map allows you to zoom in to individual trees and see an estimate of canopy areas and heights.

[Jersey Tree Map on gov.je](https://www.gov.je/Environment/Tree-Map)

Use the map to explore an area and then go outside and look for yourself. Remember that the storm in November 2023 may have had a damaging impact.

Can you find a **mother tree** - the oldest and biggest tree in an area?

Now consider the **wood wide web** or **mycorrhizal network** (see page 6) that connects the roots of different trees together. What trees are connected in the area of the map you are looking at? How many trees are there in this area and what different species are connected?



Watch this two minute video from the BBC 'How trees secretly talk to each other': <https://youtu.be/yWOqeyPIVRo>



DESCRIBE DREAMING TREES



Look at photos taken of the Dreaming Trees illuminations in Howard Davis Park in February 2023.

Think about what you see, for example the different colours and textures and how this makes you feel.

Write a **story or poem** with the title 'Dreaming Trees'.

If you **study another language**, find and read poems, stories or songs in that language to learn about trees and woods in other countries.

Write your own own poem, song or story about dreaming trees in the language you are learning.

WHAT ARE TREES DREAMING OF?



Research shows us that trees can communicate, share resources and react to the world around them.

With these characteristics of intelligence, can trees dream?

What do you think trees dream of?

Please share your ideas with us. Your ideas can be creative writing or artwork.

Send an email with the title 'Dreaming Trees' to dfi@gov.je

We may share your ideas at the Dreaming Trees illuminations and in our communications. All ideas we share will be anonymous.

Thank you and enjoy Dreaming Trees 2024!

TREE JOKES

How does a tree get on the internet?

They log on!

Why do you never want to invite a tree to your party?

Because they never leaf when you want them to!

What is a tree's favourite subject at school?

Geometree!

What is every tree's favourite shape?

A tree-angle!

How do trees make themselves heard?

Amp-leaf-ication!

DREAMING TREES 2024

gov.je/dreamingtrees

dfi@gov.je

