Schools

Trees Through Time (KS2)

This session lets children estimate the size and age of a tree, introducing them to the role of trees in the carbon cycle.

This outdoor session is suitable for upper KS2 pupils. The lesson will last 60/75 minutes and introduces pupils to the importance of trees for carbon storage, drawing links with its age and size.

What you'll need

- Outdoor area with a minimum of 3 mature trees
- Paper & pen (for numbering trees)
- Learning resources 1–3 (one per group)
- Measuring tape & calculator (one per group)
- Clipboards
- Pencils

Subjects

Science
Mathematics

Lesson plan:

Set up

Label 3 to 6 known species of mature trees with numbers.

Introduction/Warm-up:

Introduce the fact that trees help us reduce the amount of carbon in the atmosphere and too much carbon causes global warming. But how do trees do this, and which trees are better at it? That's what we shall be finding out.

Explain about the different tree species and how we can recognise different species. Get the children into pairs and send them on a scavenger hunt to find two different shaped leaves. After 5 minutes get everyone back into a group and show examples. Take about the different shape, colours and sizes.

Stimulus

Divide children into groups and give each group a copy of Learning Resource 1: recording worksheet. Ask them to make a guess of the ages of 3 trees just by looking at them, recording it on their worksheet.

Main learning and activity

Bring all the children back together and introduce a more accurate way of measuring tree age using maths and survey equipment. Give each group a measuring tape and Learning resources 2 and 3.

Get groups to pick 3 trees and measure DBH (Diameter at Breast Height) by wrapping the tape around the circumference of the tree at approx. 1.4metres from the ground.

They calculate the diameter using the formula below and recording it on the worksheet:

Diameter = circumference ÷ 3.14 (pi)

Children then calculate the age of the same 3 trees using the table in Learning Resource 1 and then record the difference between their estimation and their measurement.

Discuss whose guess was closest. What is the oldest/youngest tree? Is the biggest the oldest? Explain how different species grow at different rates; i.e. oak grows slowly but lives for 600+ years, birch grows faster but only lives till 70–80years.

Carbon – Ask what trees/plants take from the air during photosynthesis – carbon dioxide, CO_2. Tree/plant cells convert the carbon from CO_2 into sugars, storing it in their leaves, trunk and roots, using it to grow. Approximately half (50%) of the dry weight of a tree is carbon.

Ask groups to calculate how much carbon is stored in their 3 trees, record results.

1. Use the circumference measurement and round it up/down to fit with the table in Learning Resource 3, record the matching dry weight figure.
2. Divide the dry weight figure by 2, because ½ the total tree weight is carbon.

Afterwards, compare each of the groups findings & discuss which trees stored the greatest amounts of carbon. Are older or younger trees better at storing carbon?

<u>Why are trees good for storing carbon?</u>

The burning of fossil fuels is required to create components for industrial and technological institutions, creating products such as cars, phones, plastics, cement etc. These industries create an enormous amount of waste Carbon dioxide, CO_2 which is released into the atmosphere.

CO_2 is a greenhouse gas which means it traps heat from the Sun in the atmosphere around Earth, this is very important or else the seas might freeze. However, when humans add extra CO_2 into the atmosphere the Earth gets too warm, creating 'global warming'. Icecaps melt, seas rise, and we have extreme weather changes, all known as a Climate Crisis.

More trees mean less CO_2 in the atmosphere and reduces the effect of a Climate Crisis. Different tree species and ages are important in a woodland so that when a tree dies there are new ones already growing to re–store the carbon.

Plenary

If you have additional time you can calculate how much CO_2 has been absorbed by the tree by multiply the amount of carbon stored by 3.67.

Other resources:

Tree ID sheets, along with other great activities, can be downloaded from the City of Trees Go Wild resources:
http://www.cityoftrees.org.uk/gowildfamilies

We would love to see your children learning more about trees! Share your photos with us on Instagram or twitter /cityoftreesmcr

Manchester City of Trees

Learning Resource 1:

Team members: _____

Name of woodland location: _____

Can you guess how old the tree is?		
Tree number	Species/Type	Age estimation

Can you calculate how old the tree is?				
Tree number	Circumference (cm)	DBH (cm) (circumference ÷ 3.14)	Average annual growth rate (cm)	Age measurement

How far away was your guess?		
Tree number	Species	Difference between age estimation and measurement (highest – lowest)

How much Carbon has been stored & absorbed?			
Tree number	Dry weight (kg)	Carbon stored (kg) (Tree dry weight ÷ 2)	CO_2 absorbed (kg) (Carbon stored x 3.67)

Learning Resource 2:

Average annual growth rate (cm)	Tree species
1.25	Holly, Yew, Hawthorn
2	Oak
2.5	Ash, Beech, Elm, Hazel, Cherry
2.75	Sycamore
3.25	Pine and Spruce
These values are for example only. Trees will grow at different rates across the UK depending on, for example, soil, drainage, slope aspect and climate conditions. Data accessed 29/08/2019 from: https://nationalparks.uk/students/teachersarea/teaching-resources/act_nf_talltrees/tall_trees_-_calculating_tree_age.pdf	

Divide circumference (cm) by average annual growth rate (cm) to find trees age.

Learning Resource 3:

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
These values, provided by Forest Research, are for example only. Trees will grow at different rates across the UK depending on, for example, soil, drainage, slope aspect and climate conditions. Data Accessed 29/08/2019: www.forestsforthefuture.co.uk/wp-content/themes/FFTF/downloads/PDF/Unit_2/unit2_activity4.pdf	

Find the closest circumference to your measurement. Divide the total dry weight figure by 2, this is because ½ of the total tree weight is carbon.

Optional: Multiply your result by 3.67 to find how much CO_2 was absorbed by the tree throughout its lifetime.