TREES FOR LEARNING

TREES THROUGH TIME

Department for Environment Food & Rural Affairs

Manchester City of Trees

GROWING MORE TREES FOR GREATER MANCHESTER

LESSON PLAN

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

Introduction/warm-up - 10 minutes
Introduce that trees help us reduce the amount of carbon in the atmosphere, 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.

Warm up to explain about different tree species. How can we recognise different tree species? Get children into pairs and send them on a scavenger hunt to find two different leaf shapes. After 5 minutes get everyone back into a group and show some examples. Talk about different leaf shapes, colours and sizes.

Stimulus – 10 minutes
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.
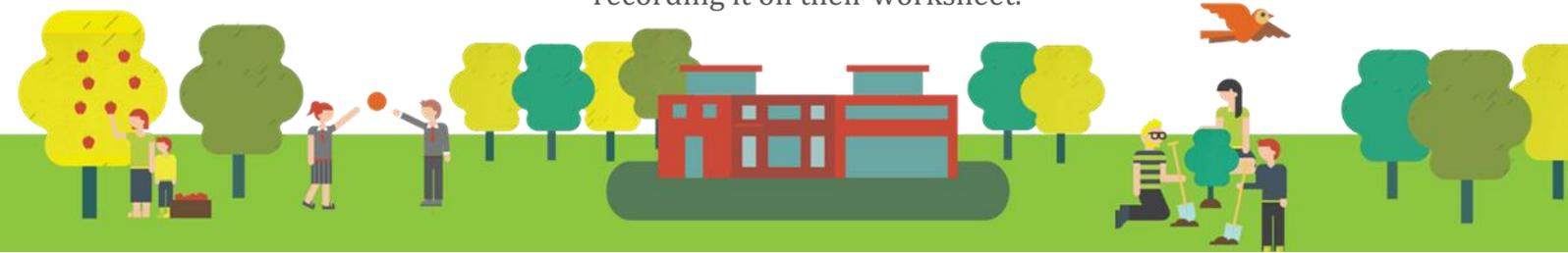
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Main learning and activity – 35/45 minutes

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

$$** \text{Diameter} = \text{circumference} \div \text{by } 3.14 \text{ (pi)} **$$

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 who's 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, trunks 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.

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Afterwards, compare each of the groups findings & discuss which trees stored the greatest amounts of carbon.

Are older or younger trees greater at storing carbon?

To help explain why trees storing carbon is so beneficial to us, the next section is a brief guiding explanation.

Why trees are good for storing carbon:

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' and icecaps melt, seas rise, and causes 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 – 5 minutes
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.
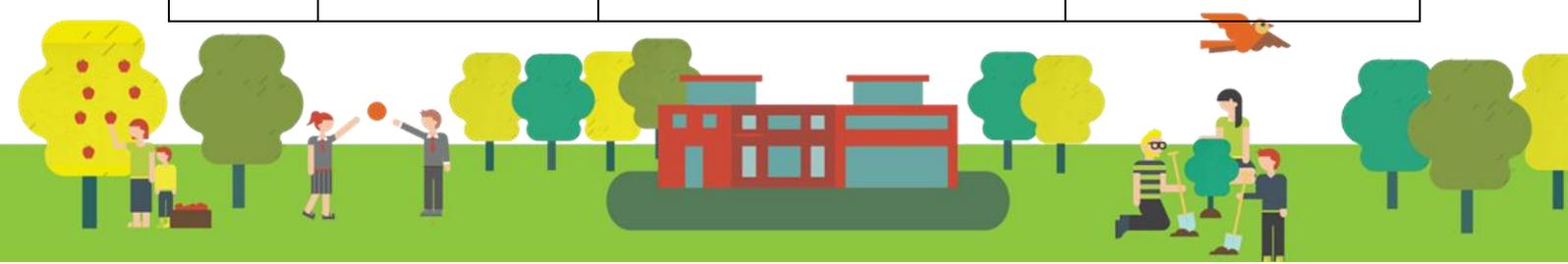
TREES FOR LEARNING

LEARNING RESOURCE 1

Team members: _____

Name of woodland location: _____

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

How				
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.