**Forestry England**

Calculating carbon in a tree

Trees and carbon

Through the process of photosynthesis, trees use light energy to change water and carbon dioxide into sugar (in the form of glucose) and oxygen. The glucose contains carbon, and this is transported around the tree and used as energy to grow during respiration. Trees do produce carbon dioxide during respiration; however, they absorb much more carbon than they produce.

Photosynthesis

Carbon Dioxide + Water $\xrightarrow{\text{Light}}$ Sugar + Oxygen

$$6CO_2 + 6H_2O \longrightarrow C_6H_{12}O_6 + 6O_2$$
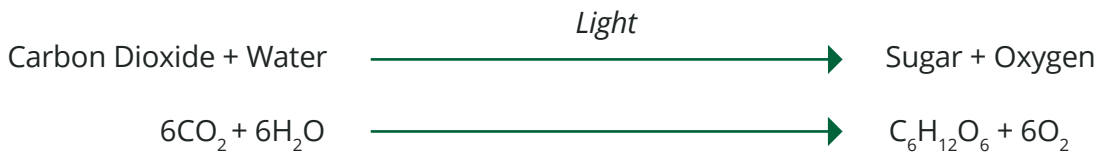
Any extra glucose that isn't needed straight away is stored as starch within the tree's trunk and roots. This starch can be broken down and used in respiration during the night and through winter when photosynthesis is limited.

What happens to the carbon once a tree dies?

More carbon is stored in the centre of the tree where it is locked away until the tree dies or is cut down. If the tree is harvested for timber then the carbon stays locked up in the wood. If the wood is burned, or if the tree is left to rot then the carbon is slowly released back into the atmosphere.

How much carbon can a tree store?

We can calculate how much carbon is stored in a tree by working out the dry weight of a tree. Head out into your school grounds, local park or woodland with a tape measure to investigate.

- First measure 1.3m up the tree trunk from the ground.

- At 1.3m measure the circumference of the tree.

- Look at the table and find the nearest value closest to your measurement to find an estimation of the dry weight.

- Approximately half of the dry weight is carbon so divide your dry weight by 2. This answer tells you how many kg of carbon is stored in the tree.

- If you multiply that number by 3.67 you will find out how many kgs of carbon dioxide has been absorbed by the tree through it's lifetime.
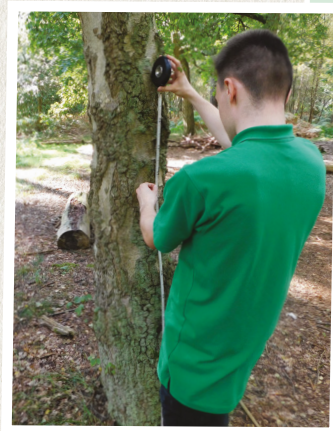
Circumference (cm)	Dry Weight (kg)
50	106
100	668
150	1964
200	4221
225	5771
250	7641
275	9842
300	12410
325	15350
350	18700
400	26674

For example

An Oak tree has a circumference of 220cm

Its dry weight is approximately 5771kg

The carbon stored in the tree is 5771 ÷2 = 2885.5kg

Over its life time the tree has absorbed 2885.5 x 3.67 = 10,590kg which is 10.6 tonnes of carbon