

WithOnePlanet

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Investigate

Lesson 3

Teacher notes

Let's play with carbon

Years

1 to 2



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Let's play with carbon

Lesson 3: Teacher notes

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This document provides the teacher with the details of the lesson.

At a glance

To provide students with hands-on, investigation experiences of carbon as a component of living things.

To provide students with hands-on, investigation experiences of the natural processes that allow living things to change and how this affects the carbon they contain.

Lesson focus

The *Investigate* phase is designed to provide students with hands-on experiences of the science phenomenon. Students explore ideas, collect evidence, discuss their observations and keep records. The *Investigate* phase ensures all students have a shared experience that can be discussed and explained.

In the *Investigate* phase students develop a literacy product to represent their developing understanding. They discuss and identify patterns and relationships within their observations. Students consider the current views of scientists and deepen their own understanding.

Assessment guide

This assessment guide supports teachers in identifying the types of assessment that are appropriate for this lesson.

Formative assessment is an important aspect of the *Investigate* phase. It involves monitoring students' developing understanding and giving feedback that extends their learning. It involves monitoring students' developing understanding of:

- > carbon as a substance that makes up all living things
- > the changes that living things experience that affect the carbon they contain.

You will also monitor their developing science inquiry skills.

Summative assessment of the science inquiry skills is another important focus of the *Investigate* phase. Rubrics can be used to gauge the level of student achievement on performance tasks.

Key lesson objectives

Science

Students will be able to:

- > observe living things in a variety of different states – alive, dead and burnt
- > draw, use and describe these different forms of living things.

Literacy

Students will be able to:

- > contribute to discussions about living things and what they are made of
- > record ideas and descriptions in drawings and words.

This lesson also provides opportunities to monitor the development of students' general capabilities.

Teacher background information

The entire body of any living thing, such as a human or the tallest tree, is made mostly of carbon, combining with many other different elements. For this reason, scientists sometimes call living things 'carbon-based life forms'.

When living things are burnt, the resulting charcoal left behind primarily consists of carbon. There is a general relationship between the amount of carbon the living thing contains and the amount of charcoal it will leave behind if it is burnt. The carbon content of trees can also be calculated without being burnt. A relationship exists between the girth (circumference) of a tree, the tree type (hardwood, softwood or tropical) and its carbon content.

Products that are made from living material, but are no longer living themselves, such as paper, also consist largely of carbon. Hence, when they are burnt, they also result in charcoal being left behind.

Equipment

For the Class

- > a large format copy of the *Carbon in trees – Group worksheet*.

For each Student

- > a copy of the *What is charcoal made from? – Student worksheet*
- > a piece of charcoal that can be used to draw with.

Preparation

- > Find a natural setting in which to conduct the activity for the *Carbon in trees – Group worksheet*.
- > Refer to section below, 'Calculating carbon in trees Teacher notes', for necessary equipment and instructions.

Lesson steps

1. This lesson is best conducted outdoors in a natural setting, which includes trees of various ages and heights.
2. Hold up a piece of charcoal and ask students the following questions:
 - > What is it?
 - > Where does it come from?
 - > How was it formed?
 - > What was it before it was burnt?
3. Invite students to draw a picture of one or more of the living things that could have been burnt to produce it using the *What is charcoal made from? – Student worksheet*.

4. Explain to students that charcoal is mostly made up of carbon. Ask students the following questions:
 - > How could the piece of charcoal be made up of carbon if they think it came from wood that was burnt?
 - > What would be left over if we burnt other things, like bread or paper? (A black substance like charcoal?)
 - > What do you think bread and paper are mostly made out of? (Carbon)
 - > What happens when the meat on a barbecue is cooked for too long?
 - > What do you think meat is mostly made out of?
 - > Where does meat come from?
5. Explain to students that scientists have found that every living thing is mostly made up of carbon. They can tell this because when they remove all the water by burning the living thing, they are left with charcoal. Ask students the following questions:
 - > Do we have carbon in our bodies?
 - > Where? (Everywhere)
 - > What forms does the carbon take? (Everything ... skin, blood, muscles, bones. Carbon can form many different materials.)
6. Ask students to observe a very small tree and a large tree. (If you are not in an outdoors setting, you will need to show images of the trees instead.) Ask students the following questions:
 - > Are both the very small and the large tree made up of carbon?
 - > Is there any difference between the amounts of carbon making up the trees?
 - > Which tree has more carbon? (The large tree)
 - > If the very small tree and the large tree were both burnt in a bushfire, which one would produce the most charcoal?
7. Explain to students that as well as burning trees, scientists have other ways they can work out how much carbon a tree contains. They do this by measuring the size of the tree and then using a special calculator that tells them how much carbon a tree of that size contains.
 Demonstrate this for the students with trees of two different sizes. Refer to section below, 'Calculating carbon in trees Teacher notes', for instructions.
8. Record rounded figures from your calculations in the *Carbon in trees – Group worksheet*.
 There are two other pictures of trees on the worksheet – one is a seedling and one is a very mature tree with a large circumference. They appear in order of ascending age and size. Ask students to suggest how much carbon (either as a value or whether the amount will be higher or lower than the values already provided) the seedling and the mature tree are likely to contain. Write their responses onto the worksheet.
9. Return to the questions posed in the *Agree or disagree? – Group worksheet Introduce* phase of the unit.
 Repeat the questions one by one and ask students whether they want to change their minds for any of their answers. Update the class worksheet as necessary.

Calculating carbon in trees

Activity teacher notes

You will need:

- > two trees of the same species but of different heights and trunk girths
- > a tape measure
- > access to the North Sydney Carbon Calculator website:
<http://www.northsydney.nsw.gov.au/carbon/carbon.html>

What to do:

1. Record the type of tree – native hardwood, softwood or rainforest tree - you are measuring.
2. Using a tape measure, measure up the tree to breast height (130 cm from the ground).
3. At breast height, use the tape measure to measure the circumference (in centimetres) of the tree (i.e. around the trunk).
4. Record the circumference of the tree.
5. Using the carbon calculator at <http://www.northsydney.nsw.gov.au/carbon/carbon.html> calculate the amount of carbon captured in each tree in kg.
6. The calculator will also provide you with a carbon dioxide equivalent (CO₂-e) in kg that the tree has removed from the atmosphere.