

WithOnePlanet

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Carbon
- > Level:
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Making inquiries about carbon
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Question carbon

Lesson 2

Teacher notes

Making inquiries about carbon

Years
3 to 4



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INQuIRY



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Making inquiries about carbon

Lesson 2: Teacher notes

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

At a glance

To elicit students' questions about carbon, its various forms, as a substance and a component of living and non-living things.

To use the understandings, information and questions developed during the *Introduce* phase of the *INQuIRY* process to help students determine the essential questions that will form the basis of their investigation.

Students:

- > distill the learning from the *Introduce* phase and consider the key questions that arise for them from this learning
- > develop one or more essential questions about carbon for use in the *Investigate* phase of the *INQuIRY* process.

INQuIRY focus: Question

The focus of the *Question* phase is for students to develop an essential question, or a small number of essential questions that accurately reflect their ideas and thoughts from the *Introduce* phase and can act as a springboard for their learning in the *Investigate* phase.

Key lesson objectives

Science

Students will be able to represent their current understanding as they:

- > generate questions regarding their understandings
- > suggest ways in which they can seek answers to their questions
- > develop essential question(s) about carbon in its various forms, as a substance and a component of living and non-living things.

Literacy

Students will be able to:

- > reflect on their ideas from the *Introduce* phase
- > contribute to discussions about the key concepts and components of the essential question.

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

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Teacher background information

Essential questions

Wiggins & McTighe and OCM BOCES outline the following core attributes of successful essential questions:

Core-Focused, Inquiry-Based, Reinforce Thinking Skills, Interdisciplinary, and Engaging.

At Years 3 and 4, it is likely that the teacher will need to facilitate the development of the essential questions based on the questions and ideas that students contribute during whole class discussions. Students can be provided with 'question starters' to help scaffold their questions. Use the *Making inquiries about carbon* document to assist students in the development of their questions and the *Essential questions guide* document to help with the development of essential questions from students' contributions.

The development of questions, and ultimately the class's essential question(s), is a natural progression from the students' understandings, thoughts and observations that have arisen in the *Introduce* phase of the *INQuIRY* process.

Student ideas from the *Introduce* phase and their questions in this phase of the learning can be used in the development of the essential question. The teacher can act as a facilitator in this process through the processes of summarising and paraphrasing.

The *WithOnePlanet Carbon module: Science* curriculum is based on 5 essential questions that are considered at each stage in the students' schooling from F–10. These are shown in Table 1 on page 3. In addition, the specific *WithOnePlanet Big ideas for Years 3 and 4* are also a key stimulus for the development of the essential question(s) at this stage in the *INQuIRY* process. These are shown in Table 1 on the next page.

These essential questions can provide a stimulus for, and form the basis of, the essential questions that students develop in the *Question* phase of the *INQuIRY* process. However, the questions that the students arrive at may not necessarily be exactly the same as these *WithOnePlanet Big ideas* essential questions. This is preferable as it is important that the questions are student-driven rather than provided by the teacher. In terms of student ownership and engagement in the unit. However, it is also important that the teacher plays the role of effective facilitator and gently guides the students' thinking in an appropriate direction using the techniques outlined above.

Sources:

Wiggins, G & McTighe, J 1998, *Understanding by design*, Association for Supervision & Curriculum Development, Alexandria, VA.

OCM BOCES 2013, *Curriculum Mapping Essential Questions Guide*, viewed 1 December 2013, <http://www.ocmboces.org/tfiles/folder1682/OHS_essentialquestions.pdf>.

Table: WithOnePlanet Big ideas for Years 3 – 4

Big Ideas	What is carbon?	What is the carbon cycle?	What is climate change and what role does carbon play in it?	What is my carbon footprint and how can I reduce it?	What can be done to mitigate climate change on a regional scale?
Years 3 to 4	Pure carbon is a chemical that exists naturally in the environment in a range of different forms; these forms have different properties.	Living things take and use carbon from the environment and return it to the environment in a variety of natural and man-made processes.	<p>The greenhouse effect is a natural and essential process for life on Earth.</p> <p>The enhanced (man-made) greenhouse effect causes the Earth to heat up as a result of too much carbon being present in the atmosphere.</p>	<p>I can calculate my carbon footprint, using digital technologies, by providing information about the lifestyle of myself and my family.</p> <p>My carbon footprint can tell me how many planet Earths would be needed if everyone's lifestyle was like mine.</p>	My actions and decisions can have an impact on the livelihoods and lifestyles of people in other places in the Asia-Pacific region.

Some examples of possible essential questions derived from student contributions include:

- > Why is carbon such an important part of the Earth?
- > Why does carbon exist in so many different forms that look so different from each other? (A difficult question!)
- > Is there a way to capture carbon from the earth?
- > Why is carbon so versatile?
- > What could happen if we solve the case and trap carbon?
- > What decisions can we make as carbon detectives that will help to reduce the amount of escaped carbon?

Equipment

- > *Making inquiries about carbon – Group worksheet*
- > Pens, pencils, textas

Preparation

- > Read the *Essential questions guide* document.
- > Review and summarise students' ideas from the *Introduce* phase from the *Carbon confidential – Group worksheet*.

- > Using students' ideas and the WithOnePlanet *Big ideas* (see Table 1 on page 3), generate some possible essential questions that can act as a teacher reference guide when facilitating student discussion of the essential question during the lesson.
- > Make copies of the *Making inquiries about carbon – Group worksheet*.

Lesson steps

1. Students to review the ideas on the *Carbon confidential – Group worksheet* from the *Introduce* phase, as well as any other ideas they have.
2. Explain to students that as good detectives, they need to work out what they need to find out. The best way to do this is to produce a list of questions.
3. Introduce *Making inquiries about carbon – Group worksheet* to the students, and assist groups to record their questions on this worksheet.
4. Each group to provide feedback from their discussions and their *Making inquiries about carbon – Group worksheet*. The teacher can record student responses as a list of the key questions. (As well as assisting in the development of the essential question(s), this will also inform teacher planning of the *Investigate* phase of the INQuIRY process.)
5. Use the *Essential questions guide* to introduce, paraphrase, clarify and summarise student questions into one or more essential questions.
6. Ask for student feedback to modify the essential question(s) until a class consensus is reached. Display the agreed essential question(s) in the classroom.

Source:

OCM BOCES 2013, *Curriculum Mapping Essential Questions Guide*, viewed 1 December 2013, <http://www.ocmboces.org/tfiles/folder1682/OHS_essentialquestions.pdf>.

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