

PRIMARY (England, Northern Ireland and Wales)

KS1

Rock circus (for years 1/2)

The workshop and its activities provide the following outcomes:

- insights into how minerals, rocks, fossils and other things 'found in the ground' can be sorted, classified and identified most effectively;
- the use of evidence to distinguish fossils from non-fossils;
- an opportunity to explore the vicinity of the school for the natural materials found there;
- an opportunity to investigate sedimentary rock formation processes;
- the potential to use Earth materials for a wide range of cross-curricular and creative activities;
- practical activities that develop skills of exploration, discussion, argumentation and creativity;
- guidance on how the elements of Earth science in the curriculum can be taught most effectively.

Lower KS2

Spot that rock: sorting rocks the scientific way (for years 3/4)

The workshop and its activities provide the following outcomes:

- an introduction to a structured scheme of rock description and identification based upon the reliable characteristics of rocks, involving:
 - identifying key terms in describing rocks;
 - identifying key terms in describing the grains in rocks, using a magnifier/ hand lens;
 - testing for permeability;
 - modelling rock structures;
 - classifying and naming rock groups;
- practical activities giving opportunity for investigation and discussion;
- a focus on the main types of rocks likely to be used in teaching the National Curriculum.

Exploring rock, soil, water, fossil (for years 3/4)

The workshop and its activities provide the following outcomes:

- insights into how rocks can be sorted, classified and identified most effectively;
- opportunities to investigate to investigate soils through a range of activities;
- an approach to understanding the different states of water and how these link to the water cycle;
- an introduction to fossils and what they can tell us about life in the past;
- practical activities that develop skills of investigation, discussion, argumentation and creativity;
- background information on some of the Earth-science processes active in the UK;
- exploration of the elements of science and geography that provide the underpinning to later Earth science study;
- guidance on how the elements of Earth science in the curriculum can be taught most effectively.

Upper KS2

Active Earth – active fossil (for years 5/6)

The workshop and its activities provide the following outcomes:

- insights into what fossils are, how they form and what they can tell us about evolving life on Earth;
- how organisms inherit characteristics and the processes that result in evolution;
- insights into the life of a fossil hunter;
- opportunities for exploring landscape-forming and potentially hazardous Earth processes
- practical activities that develop skills of investigation, discussion, argumentation and creativity;
- exploration of the elements of science and geography that affect the landscape;
- guidance on how the elements of Earth science in the curriculum can be taught most effectively.

SECONDARY (England, Northern Ireland and Wales)

KS3 Science

Investigating Earth's structure

The workshop and its activities provide the following outcomes:

- insights into the structure of the Earth and the dimensions of the Earth's layers;
- discussions and demonstrations about the state (solid/liquid) of the layers;
- the evidence we have for the dimensions and state of the layers;
- means of addressing common misconceptions about the Earth's structure;
- links to the science and geography of Earth's structure;
- guidance on how the elements of Earth science in the curriculum can be taught most effectively.

KS3/4 Science

The carbon question – cycling, releasing, capturing

The workshop and its activities provide the following outcomes:

- insights into the processes and products of both the short and long carbon cycles;
- perspectives on the vital role played by carbon dioxide in Earth cycles;
- understandings of how oil/gas fields operate and could be used for carbon sequestration;
- the implications of the carbon cycle for climate change;
- links to the science and geography of Earth's structure;
- guidance on how the elements of Earth science in the curriculum can be taught most effectively.

KS3 Science and Geography

Spot that rock: rock identification

The workshop and its activities provide the following outcomes:

- an introduction to a structured scheme of rock description and identification based upon the reliable characteristics of rocks, involving:
 - identifying key terms in describing rocks;
 - identifying key terms in describing the grains in rocks, using a magnifier/ hand lens;
 - testing for permeability;
 - modelling rock structures;
 - classifying and naming rock groups;
- practical activities giving opportunity for investigation and discussion;
- a focus on the main types of rocks likely to be used in teaching the National Curriculum.

The dynamic rock cycle

The workshop and its activities provide the following outcomes:

- identification and terminology of rock cycle products, including soils, sediments and rocks;
- knowledge and understanding about rock cycle processes and timescales, including weathering, erosion/transportation, deposition, compaction/cementation, metamorphism, melting, crystallisation, extrusion and deformation;
- methods of teaching the abstract concept of the rock cycle, using a range of teaching approaches;
- introduction to a range of Earth science laboratory activities, from simple modelling to more complex investigations;
- approaches to activities designed to develop the thinking and investigational skills of pupils;
- links between laboratory models and planetary processes, some of which are locally active and therefore relevant to pupils;
- an integrated overview of the geological Earth science commonly taught to 11 – 14 year olds, based on the National Curriculum.

Earth science around your school

The workshop and its activities provide the following outcomes:

- apply Earth science principles in a range of opportunities provided by the school buildings and grounds;
- use the outdoor opportunities identified for enhancing the teaching of Earth science at KS3 and KS4;
- approach Earth science more effectively through a 'How science works' context.

Will my gravestone last?

The workshop and its activities provide the following outcomes:

- apply Earth science principles in a range of opportunities provided by the school buildings and grounds;
- use the outdoor opportunities identified for enhancing the teaching of Earth science at KS3;
- approach Earth science more effectively through a 'How science works' context.

Any quarry guide

The workshop and its activities provide the following outcomes:

- use of outdoor opportunities identified for enhancing the teaching of Earth science at KS3;
- approach Earth science more effectively through a 'How science works' context.

KS3 Geography

The plate tectonics story

The workshop and its activities provide the following outcomes:

- an introduction to plate tectonics;
- distinction between the 'facts' of plate tectonics and the evidence used to support plate tectonic theory;
- a survey of some of the evidence supporting plate tectonic theory;
- an introduction to the evidence for the structure of the Earth and the links between the structure of the outer Earth and plate tectonics;
- explanation of some of the hazards caused by plate tectonic processes - earthquakes and eruptions;
- methods of teaching the abstract concepts of plate tectonics, using a wide range of teaching approaches, including practical and electronic simulations;
- approaches to activities designed to develop the thinking and investigational skills of students;
- an integrated overview of the concepts involved in teaching the processes of plate tectonics, as described in the KS3 geography curriculum.

Earth's surface activity – from quick to very, very slow

The workshop and its activities provide the following outcomes:

- Insights into ways of distinguishing and identifying different rocks based on their properties.
- Demonstrations of how rock properties affect landscape formation.
- Focus on the key processes of weathering, erosion, transportation and deposition by both water and ice.
- Different approaches to considering geological time and the rate of geological processes.
- Discussions and demonstrations about the state (solid/liquid) of the layers.
- Means of addressing common Earth science misconceptions.
- Links to the geography and science of Earth processes.
- Guidance on how the elements of Earth science in the curriculum can be taught most effectively.

CURRICULUM FOR EXCELLENCE (Scotland)

Earth science workshops for Social Studies and Science

Early Level to First Level

Scotland Rocks!

The workshop and its activities provide the following outcomes:

- insights into how rocks and stones can be; sorted, classified and identified most effectively;
- opportunities to investigate rock-forming processes, including; erosion, deposition, eruption, natural changes of state in water, and the properties and uses of Earth materials;
- practical activities that develop skills of investigation, discussion, argumentation and creativity;
- background information on many of the Earth-science processes active in Scotland and their products, the sediments and rocks;
- exploration of the elements of science and geography that affect the Scottish landscape;
- guidance on how the elements of Earth science in the experiences and outcomes of the Curriculum for Excellence (CfE) can be taught most effectively (see pages 38-41 for a chart providing CfE references for each activity).

Upper Primary Second Level

Scotland beneath your feet I: rock and soil

The workshop and its activities provide the following outcomes:

- an overview of the geology of Scotland;
- an introduction to identifying and describing soils, minerals and rocks;
- a way of describing and identifying rocks from first principles;
- introduction to a range of Earth science activities, from simple modelling to more complex investigations;
- approaches to activities designed to develop the thinking, research and investigational skills of pupils;
- links between classroom models and planetary processes, some of which are locally active and therefore relevant to pupils;
- an integrated overview of the geological Earth science commonly taught to upper primary pupils, based on the experiences and outcomes of the Curriculum for Excellence (CfE) (see the page and the end of this booklet for a chart providing CfE references for each activity).

Scotland beneath your feet II: disaster and resource

The workshop and its activities provide the following outcomes:

- introduction to the scientific principles behind some global natural hazards and their impact in Scotland;
- introduction to the range of Earth resources used to build classrooms and schools and thus, most buildings;
- a review of some common misconceptions linked recovering oil and gas from North Sea oilfields;
- approaches to activities designed to develop the thinking and investigational skills of pupils;
- links between classroom models and planetary processes, some of which are locally active and therefore relevant to pupils;
- an integrated overview of the geological Earth science commonly taught to upper primary pupils, based on the experiences and outcomes of the Curriculum for Excellence (CfE) (see the pages at the end of this booklet for a chart providing CfE references for each activity).

Upper Primary Second Level to Lower Secondary Third Level Scotland's Rocky Journey

The workshop and its activities provide the following outcomes:

- an overview of the geology of Scotland.
- identification and terminology of rock cycle products including sediments and rocks;
- knowledge and understanding about rock cycle processes and timescales, including; weathering, erosion/transportation, deposition, compaction/cementation, metamorphism, melting, crystallisation, extrusion and deformation;
- methods of teaching the abstract concept of the rock cycle, using a range of teaching approaches;
- introduction to a range of Earth science laboratory activities, from simple modelling to more complex investigations;
- approaches to activities designed to develop the thinking and investigational skills of pupils;
- links between laboratory models and planetary processes, some of which are locally active and therefore relevant to pupils;
- an integrated overview of the geological Earth science commonly taught to upper primary and lower secondary pupils, based on the experiences and outcomes of the Curriculum for Excellence (CfE) (see pages 94-99 for a chart providing CfE references for each activity).

Secondary Third Level to Fourth Level

Scotland on a Plate: understanding Scotland's rocky journey

The workshop and its activities provide the following outcomes:

- an introduction to plate tectonics;
- distinction between the 'facts' of plate tectonics and the evidence used to support plate tectonic theory;
- a survey of some of the evidence supporting plate tectonic theory;
- an introduction to the evidence for the structure of the Earth and the links between the structure of the outer Earth and plate tectonics;
- explanation of some of the hazards caused by plate tectonic processes - earthquakes and eruptions;
- methods of teaching the abstract concepts of plate tectonics, using a wide range of teaching approaches, including practical and electronic simulations;
- approaches to activities designed to develop the thinking and investigational skills of students;
- an integrated overview of the plate tectonic concepts commonly taught to secondary pupils in geography and science, based on the experiences and outcomes of the Curriculum for Excellence (CfE) (see pages 64-71 for a chart providing CfE references for each activity).

Earth physics for ages 14-19

Geophys: using Earth physics to probe the ground

Expected learning outcomes:

Participants will be able to:

- demonstrate how magnetic induction works;
- demonstrate how magnetic field strength can be monitored;
- demonstrate the electrical resistance method of surveying practically;
- describe how carbon 14 dating is used;
- understand how these processes can be applied to 'real world' situations;
- understand how to use these methods to enhance their A-level or GCSE physics teaching.

Tackling climate change through Earth physics

Expected learning outcomes:

Participants will be able to:

- explain the mechanisms behind climate change, particularly the CO₂ content of the atmosphere;
- use computer simulations to model climate change;
- explain and practically demonstrate how a 'geothermal' heat pump works;
- practically investigate a model wind turbine, wind generator and photovoltaic cell;
- understand how to use these approaches to enhance their A-level or GCSE physics teaching.

The seismology story

Expected learning outcomes:

Participants will be able to:

- demonstrate in the science lab the cause of earthquakes and the propagation of seismic waves;
- demonstrate the effects of seismic waves;
- devise methods to detect seismic waves;
- discuss how seismic waves and other methods are used to investigate the structure of the Earth;
- describe how to protect yourself in an earthquake;
- understand how to use these activities to enhance their A-level or GCSE physics teaching.