



KidsGrow KidsCook



STAGE 2 LESSON PLANS

Sequence of Garden lessons:

1. Check your soil type
2. Test and Prepare Soil
3. Soil Porosity
4. Cycles in our world
5. People and their beliefs
6. You are what you eat

Allow 50 minutes per lesson

Some lesson plans were originally developed by Dan Bakker from Bournda Environmental Education Centre and these were adapted by Healthy Kids Association.



Check Your Soil Type - Stage 2

Title: Soil Porosity & Structure (Links to Step 6 KidsGrow- Check your soil type. Test and adjust soil properties if necessary.)

Aim: To investigate the properties of different types of soil within the garden before considering applying remedies.

Outcomes	Indicators
INVS2. 7 Conducts investigations by observing, questioning, predicting, testing, collecting, recording and analyzing data and drawing conclusions.	<ul style="list-style-type: none">Analyse different soil types and concludes what properties make for the best soil for their vegetable garden.
LTS2.3 Identifies and describes the structure and function of living things and ways in which living things interact with other living things and their environment.	<ul style="list-style-type: none">Works collaboratively to research and identifies what environmental conditions impact soil porosity and structure.
ESS2.6 identifies some of the features of the solar system and describes interactions that effect conditions on earth.	<ul style="list-style-type: none">Explains the effect of climatic conditions on soil.

Resources:

- 'Types of Soil' worksheet
- sample of ideal garden soil
- sample of dry coarse sand
- half a cup of powdered clay (plaster will also suffice – just call it white clay)
- sample of friable clay soil
- chalk
- optional mapping of garden on paper
- garden forks/shovels
- Dirt: The Movie (www.dirtthemovie.org) or at least consider screening the website trailer. Suitable for stage 3 students.
- www.kidsgeo.com/index.php website.
- http://urbanext.illinois.edu/firstgarden/basics/dirt_04.cfm

Activity:

Demonstrate to the class the following activity and then have students complete the worksheet.

Before you start this lesson it is important to have a discussion about the importance of always washing hands when handling the soil samples.

Refer to 'Safety tips for learning outdoors' and 'School friendly gardening practices'.

1. Review findings & terms from the prior lesson.
2. Add to prior lesson by demonstrating friability: the capacity for soil to just 'cling' to itself – often an indicator of moderate porosity. Use the sand dry, then use water, then consider adding powdered clay for best effect. Then model the sample of 'ideal soil'.
Ask the following:
Why does this sand not hold onto itself?
Why does the addition of water help it to cling?
How does the clay assist?
3. Explore different sites around the school property and its garden. Collect a variety samples from 5cm under the surface of the soil and place the samples on a map of the garden-chalk-drawn on concrete outside or (optional) on large sheets of paper.
4. Analyse, assess, determine & report on soil structure, porosity, friability and fertility in comparison with the 'ideal soil' sample.
Ask the following:
How does our soil's health/structure measure up?
Will our soil condition be the same throughout the garden? No – why not?
How might we remedy a compacted or nutrient poor soil?
What can we do to ensure soil doesn't lose its structure in the first place?
5. With reference to the last lesson students then propose what applications might be employed to enhance the productivity of the soil (adding sand or clay or organic matter).
Ask the following:
Are there other ways to improve soil health that we are unaware of?
How could we come to discover these strategies?
Who could we ask?
6. Then explain how soil porosity can be lessened over time with soil sedimentation/erosion, through compaction (feet, tractors) or via the loss of organic matters (disease, mineral imbalance and pH are factors to consider later). Conversely explain how porosity can be altered through the use of chemical/organic additives or physically by pioneer plant root-growth and by hand (or foot): forks, shovels. Have students reconsider their proposal.

Apply student proposals by having them map, test and altering small samples from around the garden before physically remedying the garden on mass.

Types of Soil

Name: _____

Find 3 soil samples from different sites around the school. Complete the table using the word bank.

Watery, lots of organic material, airy, lots of soil porous and quick, solid and slow, crumbly and moderate, grainy, slippery, crumbly, sticky, high organic content, medium organic content, low organic content, sandy, clay

Soil samples	Structure	Porosity	Friability	Fertility
Ideal soil				

What remedies need to be applied to the soil samples and why?

What needs to be applied to the soil for your Munch & Crunch garden?



Activity:

Demonstrate to the class the following activity and then have students complete the worksheet.

Before you start this lesson it is important to have a discussion about the importance of always washing hands when handling the soil samples.

1. Review findings and terms from the prior lesson.
2. Add to prior lesson by demonstrating friability: the capacity for soil to just 'cling' to itself – often an indicator of moderate porosity. Use the sand dry, then use water, then consider adding powdered clay for best effect. Then model the sample of 'ideal soil'.
Ask the following questions:
Why does this sand not hold onto itself?
Why does the addition of water help it to cling?
How does the clay assist?
3. Explore different sites around the school property and its garden. Collect a variety samples from 5cm under the surface of the soil and place the samples on a map of the garden chalk-drawn on concrete outside or (optional) on large sheets of paper.
Ask the following questions:
Why does this sand not hold onto itself?
Why does the addition of water help it to cling?
How does the clay assist?
4. Analyse, assess, determine and report on soil structure, porosity, friability and fertility in comparison with the 'ideal soil' sample.
Ask the following questions:
How does our soil's health/structure measure up?
Will our soil condition be the same throughout the garden? No – why not?
How might we remedy a compacted or nutrient poor soil?
What can we do to ensure soil doesn't lose its structure in the first place?
5. With reference to the last lesson students then propose what applications might be employed to enhance the productivity of the soil (adding sand or clay or organic matter).
Ask the following questions:
Are there other ways to improve soil health that we are unaware of?
How could we come to discover these strategies?
Who could we ask?
6. Then explain how soil porosity can be lessened over time with soil sedimentation/erosion, through compaction (feet, tractors) or via the loss of organic matters (disease, mineral imbalance and pH are factors to consider later). Conversely explain how porosity can be altered through the use of chemical/organic additives or physically by pioneer plant root-growth and by hand (or foot): forks, shovels.
7. Have students reconsider their proposal.
Apply student proposals by having them map, test and altering small samples from around the garden before physically remedying the garden on mass.
Extension: Have students consider what can be seen and what is unseen in their garden soil.

Propose the garden had been poisoned with i.e. salt or acid, infected with a disease or depleted from overuse. Have students consider 'asking an expert' for advice on how to investigate what they don't know and can't see (i.e. the next consideration is pH testing before nitrogen and then weed-seed/disease/pests).

8. Summary:

What can we learn from this investigation that might teach us about soil health and fertility?

What are some significant factors to consider in the preparing and maintaining of garden soil? (structure, moisture retention, porosity, variety of ingredients, sedimentation)

Test and Prepare the Soil - Stage 2

Title: Suspend and Settle (Links with Step 6 KidsGrow-‘Test and prepare the soil’ and ‘investigate safe gardening practices’.)

Aim: To explore/investigate the components/ingredients of soil.

Outcomes	Indicators
INVS2. 7 Conducts investigations by observing, questioning, predicting, testing, collecting, recording and analyzing data and drawing conclusions.	<ul style="list-style-type: none">Researches in a scientific, thoughtful and ordered way to correctly identify the components of soil.
LTS2.3 Identifies and describes the structure and function of living things and ways in which living things interact with other living things and their environment.	<ul style="list-style-type: none">Conducts soil experiment to its expected conclusion and identifies environmental factors that cause different soil types.

Resources:

‘Ingredients of soil’ worksheet.

For each small group (3-5 students) you will need:

- 1 large PET bottle (i.e. 3-4 litres)
- 1 cup sample of ‘loam’ (rich topsoil or an aggregate soil which will separate in a fluid)
- magnifying glass
- water

Note: For best effect: add small amounts of sand, loose clay and/or semi-decomposed organic matter to the soil sample to exaggerate composition & separation.

- Dirt: The Movie (www.dirtthemovie.org) or at least consider screening the website trailer.
- www.kidsgeo.com/index.php website. Select Chapter one: Examining the soil.
- http://urbanext.illinois.edu/firstgarden/basics/dirt_04.cfm

Activity:

Before you start this lesson it is important to have a discussion about the importance of always washing hands when handling the soil samples. Refer to 'Safety tips for learning outdoors' and 'School friendly gardening practices' in KGKC resource.

1. Discuss with students what they think 'soil' is and what it is made of. Have students consider soils as 'a living thing' and also compare with a cake-mix in how it requires a certain variety and proportion of ingredients.
Ask the following questions:
Why is soil important?
Is your sample alive? How/why?
In what ways is your handful of soil similar/different to an animal or plant?
2. Provide students a sample of the rich loam and let the children examine it. Highlight the texture, moisture, and smell and look through the magnifying glasses to observe and explain colour and consistency.
Ask the following questions:
Which senses could we use to examine this sample of soil?
Describe the texture, moisture, smell and colour of the soil.
Complete the worksheet - Teacher Resource 1
3. Put a sample of soil into a large bottle with some water. Screw the lid on firmly and shake the jar until the soil is fully suspended in the water. Have students predict and justify what will happen. Now set the jar aside for at least half an hour so the contents can separate and settle.
Ask the following: What is happening now?
What effect has the water had on the soil?
What effect has the soil had on the water?
What will have happened after a few minutes?
What might happen after a few hours.... days?
4. Later: go back to the jar of soil and water that you set aside to observe what has happened. Hopefully, the soil will have separated & sedimented and the children can see the various components. They can then compare what they observe with what their predictions were at the beginning.
Ask the following:
Describe what has happened? Why?
Compare with your prediction?
5. Next: visit selected sites around the school to analyse the soil and determine texture, moisture, ingredients (composition) and friability (the capacity for the sample to cling to itself).

Summary:

What can we learn from this investigation that might teach us about soil health and fertility? What are some significant factors to consider in the preparing and maintaining of garden soil? (Structure, moisture retention, porosity, variety of ingredients, sedimentation).

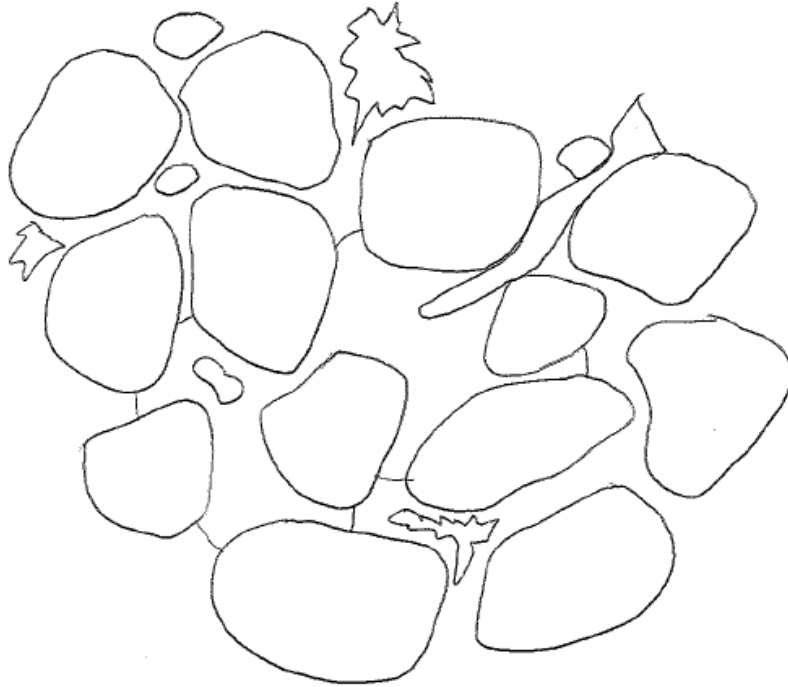
Teacher Resource 1

Ingredients of Soil

Student Name: _____

On the diagram below label the following parts soil:

Organic material (green), inorganic material (grey), soil (brown), air (leave white) and water (blue).



How is soil formed?

What components make the best soil for growing your garden?

Soil Porosity - Stage 2

Title: Soil Porosity & Structure (Links to Step 6 KidsGrow- Check your soil type. Test and adjust soil properties if necessary.)

Aim: To investigate the properties of different types of soil so as to discover that by balancing soil structure they can enhance its capacity to retain/drain water also increase its fertility.

Outcomes	Indicators
INVS2.7 Conducts investigations by observing, questioning, predicting, testing, collecting, recording and analyzing data and drawing conclusions.	<ul style="list-style-type: none">Completes soil experiment and correctly concludes the properties of different soils.
LTS2.3 Identifies and describes the structure and function of living things and ways in which living things interact with other living things and their environment.	<ul style="list-style-type: none">Accurately predicts which factors will improve soil productivity.
ESS2.6 Identifies some of the features of the solar system and describes interactions that effect conditions on earth.	<ul style="list-style-type: none">Explains what climatic conditions will impact on soil productivity.

Resources:

- A small plant with exposed roots.
- Glass container of water
- 'Types of Soil' worksheet

Per class

- 3 x 1 litre PET bottles pre-cut 1/3 down from top. The cut top will act as a funnel.
- in buckets, samples of 3 different types of soil:
 - course sand (i.e. riversand)
 - fine clay (ideally crushed potting clay) add plaster for desired effect
 - ideal garden loam or potting mix mixed with soil
- Coffee filters or muslin-cloth cut into 30cm circles
- access to tap water
- Measuring jugs
- 3 paper cups
- Stopwatch
- Dirt: The Movie (www.dirtthemovie.org) or at least consider screening the website trailer. Suitable for stage 3 students.
- www.kidsgeo.com/index.php website.
- http://urbanext.illinois.edu/firstgarden/basics/dirt_04.cfm

Activity:

Demonstrate to the class the following activity and then have students complete the worksheet.

Before you start this lesson it is important to have a discussion about the importance of always washing hands when handling the soil samples. Refer to 'Safety tips for learning outdoors' and 'School friendly gardening practices'.

1. Begin by taking a small plant and placing its roots in the glass container underwater. Question students on the probability of that plant's survival.
Ask the following:
Why won't this plant survive?
A plant's roots need water – so why will this plant suffer in 100% water?
What else does this plant and its roots need to flourish?
2. Provide students with soil samples. Demonstrate how they can feel the soil and describe its texture: Pick up a handful of moist soil and squeeze. Clay soil will form a tight sticky ball. Silt feels slippery. Sandy soil feels grainy and won't hold its shape. Loamy soil will hold its shape but it crumbles easily.
Ask the following:
Using your senses describe your sample of soil. Complete the 'Types of Soil' worksheet. Why shouldn't we 'taste' our samples?
3. Sand: allows for water passage thus aiding porosity. Clay: inhibits porosity by absorbing water and by filling cavities in the sand. Organic matter: in combination with sand and clay can regulate porosity and thus enable roots air, water and structure.
Ask the following:
What does your soil need to have changed to improve its growing properties?
What might be the difference between soil, dirt and loam?
What is similar/different between these samples?
Where do they come from?
How would they combine?
4. Measure equal amounts of the 3 soil samples before placing level into the coffee filters and their baskets. Measure 3 equal portions of water into cups.
Students then predict which sample will filter through more quickly and more slowly.
Ask the following:
Why should we add the water to the three samples at the same time?
Why was the sand the fastest – 'most porous' Why clay the slowest – 'least porous' Why?
Why did almost all the water pass through the sand and yet little (in some cases none) of the water passed through the clay?
Which sample has retained most of the water?
5. Explain to the children that the water and nutrients contained in the soil provide growing plants with two of the components needed for growth - a third being light.
Then explain how air pockets in the soil's structure balance porosity by providing room for water to accumulate while also permitting excess water to pass through: thus aiding water contact, drainage and aeration around the roots.
Sand: allows for water passage thus aiding porosity
Clay: inhibits porosity by absorbing water and by filling cavities in the sand
Organic matter: in combination with sand and clay can regulate porosity and thus enable roots air,

water and structure.

Summary:

- What conditions do plants need to grow?
- What type of soil is best for plants to grow in their garden?
- What needs to be done to improve their soil?

Types of Soil

Name: _____

Find 3 soil samples from different sites around the school. Complete the table using the word bank .

Watery, lots of organic material, airy, lots of soil porous and quick, solid and slow, crumbly and moderate, grainy, slippery, crumbly, sticky, high organic content, medium organic content, low organic content, sandy, clay

Soil samples	Structure	Porosity	Friability	Fertility
Ideal soil				

What remedies need to be applied to the soil samples and why?

What needs to be applied to the soil for your Munch & Crunch garden?



Science and Technology: Stage 2

Title: Cycles in Our World

This lesson and its outcomes integrate within the above unit or can be used as a stand-alone lesson.

Aim: Students are to identify the advantages and the plants that are suitable for their school Munch & Crunch garden for companion planting and crop rotation.

Outcomes	Indicators
LTS2.3 Identifies and describes the structure and function of living things and ways in which living things interact with other living things and their environment	<ul style="list-style-type: none">Identifies companion planting and its purpose and puts this into practice by designing the school Munch & Crunch garden.
INVS 2.7 Conducts investigations by observing, questioning, predicting, testing, collecting, recording and analysing data, and drawing conclusions	<ul style="list-style-type: none">Researches, defines and identifies crop rotation and analyses what would be best for their school Munch & Crunch garden.

Resources:

- Kitchen Garden Companion by Stephanie Alexander
Page 731 Pest and Weed Control
- The Kitchen Gardener By Julian Mathews
Page 50 Companion Planting and Crop Rotation
- One Magic Square by Lolo Houbein
Page 149 What to do about weeds?
Page 152 Crop Rotation
Page 161 Pests and Predators
Page 165 An A-Z of Pests and Problems
Page 173 Companion Planting and Intercropping

Activity:

- Students research crop rotation and companion planting. Then analyse the data and plan for the following planting season for their school garden. Complete the worksheet questions on crop rotation and companion planting.

Summary:

Discuss the ways composting could benefit the garden and assist the crop rotation and companion planting process. List the different types of ground cover that would prevent weeds or pests.

Student Name: _____

Crop Rotation

What are your Munch and Crunch garden soil type and pH?

What adjustments have you made to improve your soil?

Are you planting a summer crop or a winter crop? _____

How many growing beds or containers do you have? _____

What are you hoping to plant?

In order to keep you soil nutritionally rich you will need to plan for crop rotation. What is crop rotation?

What are the benefits of crop rotation?

Define the following:

- Green crops

- Compost

- Manure

- Organic fertilizers

Companion Planting

Explain what companion planting is and why it is needed.

What plants are best to companion plant and why?

Companion Plants	Purpose

Draw an aerial view of your garden beds and number them. See pages 156/157 of the resource book 'One Magic Square' for simple crop rotation examples. Draw and label the plants that you intend for your garden. Remember to companion plant and plan for rotating the crops.

Everyone in the class presents their garden plan and discusses what the school garden should have planted. Draw the agreed final plan.

A large, empty rectangular box with a thin blue border, intended for drawing the agreed final garden plan. The box occupies the majority of the page below the text.

Kitchen Lessons - Stage 2

Title: People and their Beliefs

Learning Sequence 2: Religious Beliefs-What are Some Major Religions and Their Beliefs?

This lesson and its outcomes integrate within the above unit or can be taught as a stand alone lesson.

Aim: Students identify and sample ingredients that are acceptable to the major religions that were studied. They then use garden produce to make a vegetarian pizza recipe.

Have students investigate three or four case studies of major religions or beliefs, eg Buddhism, Christianity, Hinduism, Judaism, Islam. Have students include Aboriginal beliefs in their case studies (see BOS website under 'HSIE K-6 Resource List' for references to investigate the different religions). (Reference: BOS>K-6 Syllabus; HSIE People and their Beliefs Stage 2)

Outcomes	Indicators
Science and Technology ICS2.2 Creates and evaluates information products, demonstrating an understanding of the needs of particular audiences	<ul style="list-style-type: none">Prepares a recipe using produce from the garden and other appropriate ingredients for a specific world religion

Resources:

- Information to aid discussion on how to have a nutritionally balanced vegetarian diet. Select the following link:
http://www.betterhealth.vic.gov.au/bhcv2/bhcarticles.nsf/pages/vegetarian_eating
- Religions and food worksheet
- Vegetarian pizza recipe
- Evaluation worksheet

Activity:

1. Students research what foods are acceptable or taboo for the major religions and complete the worksheet.
2. A lot of the major religions are vegan or vegetarian. Students research suitable pizza topping and then complete a stock take of ingredients in the garden that could be used for a healthy vegetarian pizza. Don't forget to include herbs and tomatoes as a great tomato base can be made from these.
3. Students create their own unique gourmet pizza. The sauce, base and toppings can be prepared from scratch or convenience items can be used. For example, muffins, flat bread or small pizza bases can be purchased. Pre made pasta, tomato and BBQ sauces can be purchased. Identify suitable garden produce to use.
4. Students complete an evaluation of their pizza or do a peer assessment and draw conclusions on how to improve their recipe.

Summary:

- Can pizza be classified as a healthy food?
- What ingredients is a concern when purchasing premade pizzas?
- What nutrients are in the gourmet pizza you prepared?
- What are the advantages of making your own homemade pizza?
- How can vegetarians obtain a balanced diet?

Teacher Resources

World Religions and Food

Student Name: _____

Research the following religions and complete the table:

Define the word 'taboo';

Religion	Acceptable Foods	Taboo Foods
Hindu		
Muslim		
Judaism		
Islam		
Confucianism		
Christian		