Te Kura
Te Aho o Te Kura Pounamu
THE CORRESPONDENCE SCHOOL

EARTH & SOIL

MAKING SENSE OF THE PLANET EARTH AND BEYOND

SCL233
CURRICULUM
LEVEL 2-3

2014/1

Science curriculum Level 2-3

Making sense of the material world

Learning Outcome

You will collect, observe and compare different soil samples.

Learning Intentions

I am learning to:

- gather information about different soils
- carry out experiments to compare soils and record and compare my observations of soils.

WHEN YOU SEE THESE ICONS:

Talk with your supervisor.

Your supervisor helps you write.

Contact your teacher.

Your teacher will look at your work.
(If you are not sending back this book, scan the pages where this symbol appears and email them to your teacher.)

Check your answers in the answer guide at the back of the book.

YOU WILL NEED:

- someone to work with you outside
- places where you can get soil samples (clay and sand too)
- a small bucket
- a trowel, spade or old spoon for digging
- old newspapers
- the magnifying glass that comes with this booklet
- a tray or tin
- sticks or toothpicks
- scissors
- a piece of aluminium or tin foil
- flowerpots, old pots or containers
- plastic bags or containers for collecting samples
- screw-top jars
- two sheets of A3 art paper
- coloured pencils
- gumboots may be handy.

HOW TO DO THE WORK

Spend about an hour on this booklet each day.

Contents

Part one: Get your hands dirty

Learning intention one

I am learning to gather information about different soils.

Activity 1

Under your feet

Go outside and observe the landscape. Maybe there are hills, mountains, dunes, a beach, river or town.

What are you actually standing on?

It may be concrete, stones or grass.

Think about what is under the ground you are standing on.

Imagine a large hole next to you. You climb into it and continue down, down until you reach the centre of the Earth! What would you see on your way down?

Think.

Share your ideas with someone.

Clarify your own ideas.

Trying is part of learning. Just have a go!

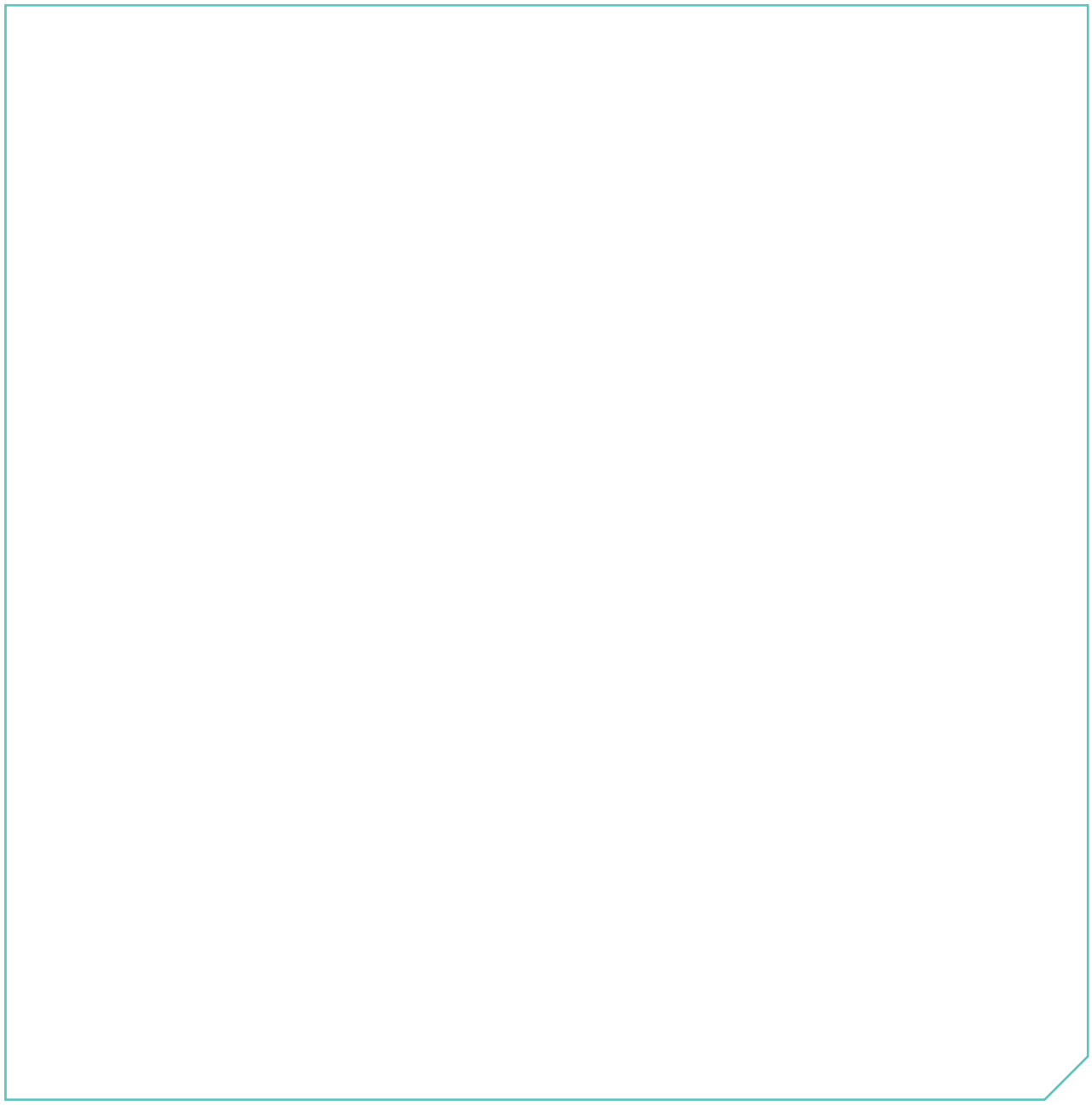
Draw what you think you'd see under the ground.

Start with the layer you are standing on.

Draw as much detail as you can. Spend about 30 minutes on this.

Write simple labels.

What I think is under my feet.



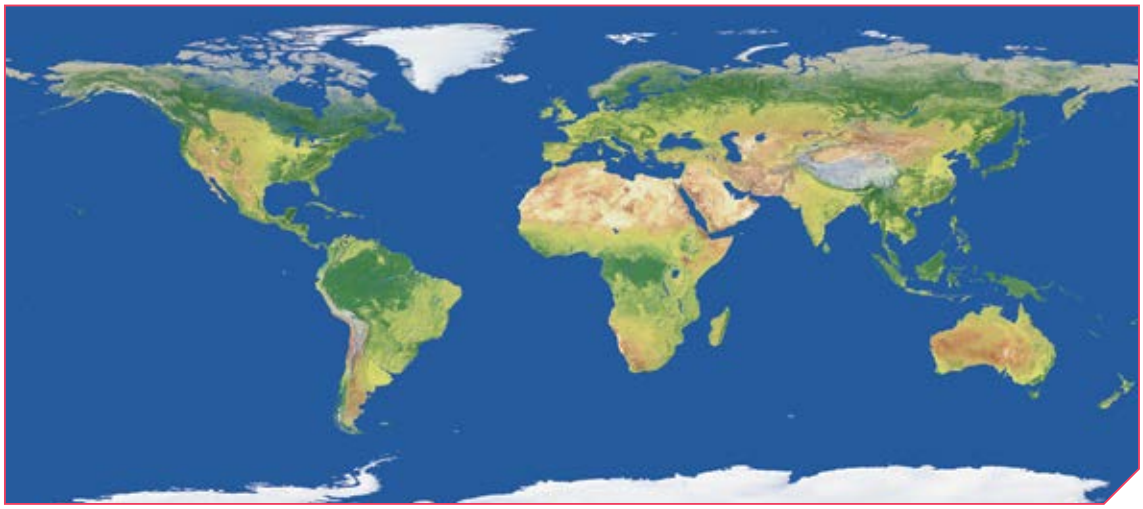
Your teacher will look at your work.

Check your answers.

Activity 2

What is in soil?

Soil covers 30 per cent of the Earth's land surface.



ISTOCKPHOTO

Write or draw what you already know about soil.

Find out what is in soil

You need:

- a small bucket
- a trowel, spade or old spoon
- newspaper
- a magnifying glass.

Dig some soil from a garden or park area.

Check with an adult that it's all right to dig there.

Spread it on the newspaper and look at it closely. Use the magnifying glass.

Don't forget to wash your hands afterwards.

Could you find things other than soil?

Describe them.

_ _

_ _

_ _

Other things I found:

_ _

_ _

Where I think they came from:

_ _

_ _

If you found any small creatures put them back in the garden.

Read this list of things you might find in soil.

Tick the ones you found:

- stones ☐
- sand ☐
- worms ☐
- other little creatures ☐
- dead bits of animals ☐
- dead bits of plants ☐
- dust ☐
- rubbish ☐
- water ☐

Your teacher will look at your work.

Geologists (ge-ol-o-gists) are scientists who study the Earth. They say that the four main things that make up soil are:

- air
- water
- organic material or humus (things that were once alive, like bits of plants and animals, that have decayed or rotted)
- inorganic material (things that have not come from animal or plant matter, like sand, clay and minerals).

This diagram shows things that are in soil.

Match each label with the correct picture.

air **water** **organic material** **inorganic material**

Check your answers.

Explore your dirt some more

Don't forget to wash your hands afterwards.

Rub some soil with your fingers. Smell it.

Write answers to the questions in the spaces.

Ask yourself:

- Is it wet or dry?
- Is it smooth or scratchy?
- Does it stick to your fingers?
- Are there any stones in it?
- Are there any plant bits in it?
- Are there any animal bits in it?

Describe its smell.

Describe its colour.

My Soil	Looks like	Feels like	Smells like
Now			
After two days			

Find a flat container like a tray or tin.

Spread out some soil in it. Put it somewhere warm like near a warm heater or on a sunny windowsill. Leave it for two days then answer the questions again.

Record any changes you notice. Use the second space in the table above.

Explain any changes you noticed, using your own words.

_ _

_ _

_ _

_ _

Your teacher will look at your work.

Activity 3

Dirty and rotten

There are other things in soil that are so small you can't see them. Soil is full of all kinds of bacteria. If dead plant or animal matter is buried in soil it rots away. Soil bacteria helps it to rot.

Investigate rot

You need:

- soil from a garden
- large flower pots or buckets full of soil
- something for digging
- sticks or toothpicks
- paper and pencil
- scissors
- things to bury like a piece of apple, orange peel, a piece of paper, a lettuce leaf
- some aluminium or tin foil.

Either:

bury each thing in a separate pot and label it

or

bury all in separate spaces in one big pot and label them

or

bury them in an empty bit of garden and label them.

Water each buried object.

Water them again in three or four days' time.

Do this for three weeks.

You'll record changes over three weeks.

Reminder: If two days have passed, check the soil you have left in a warm place. Go back and fill in the other side of the Looks like/Smells like/Feels like table now.

Activity 4

Sample some soils

You're going to compare soil samples to find out what's the same and what's different.

You need:

- to visit some local places or different places around your home and take small soil samples (about 1/2 cup each)
- someone to go with you
- a bucket and trowel, small spade or old spoon
- plastic bags, jars or pots for collecting samples
- gumboots perhaps.

Remember to:

- number each sample
- label each sample to say where you found it.

Spend this session collecting samples.

Spend the next session comparing them.

Explore each sample.

Spread some of each sample on a separate bit of newspaper.

Observe:

- colour
- wetness or dryness
- size of bits.

Feel:

- wetness or dryness
- stickiness
- hardness, softness, grittiness.

Compare your samples and fill in the table to show what you found out.

	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5
Where I found it					
Colour					
Size of bits (texture)					
Moist or dry					
Living things I found in it					
Dead things I found in it					

Read the chart of soil types on the next page.

Compare them to your own samples.

Soil types chart

		Texture of soil
Gravelly soil		Coarse soil full of small pebbles.
Coarse sandy soil		Feels coarse and gritty in your fingers.
Fine sandy soil		Feels fine and gritty in your fingers.
Silt soil		Feels slightly rough.
Clay soil		Very fine soil that feels smooth when it's dry and sticky when it's wet.

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Earth scientists classify different soils by the texture. They look at the size of the bits of rock in the soil. Clay soil has very fine bits of rock, so its texture is smooth and fine.

Keep your labelled samples to use in your next science session.

Activity 5

Be a soil detective

You need:

- SCL233A – My soil types chart
- a pencil and coloured pencils
- a ruler.

Use the chart on SCL233A to:

- draw each of your soil samples
- colour and draw the size of the bits as accurately as you can
- describe its texture
- label each one
- write why you think it is that type of soil.

Keep your labelled samples to use in your next science session.

Your teacher will look at your 'My soil types chart.'

Part two: Constant change

Learning intention two

I am learning to carry out experiments and record and compare my observations of soils.

Activity 6

Soil + water

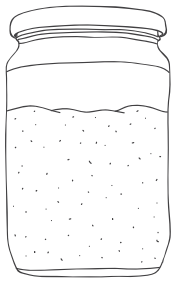
Kia tūpato – take care

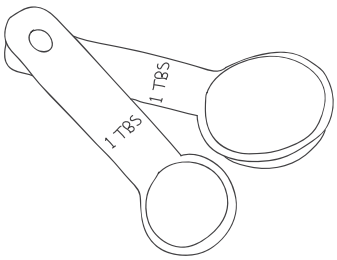
You need:

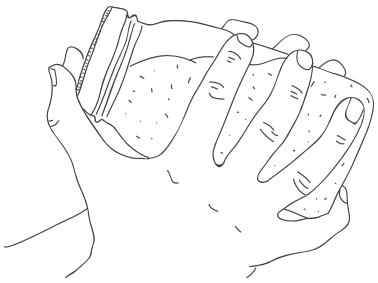
- SCL233A – My soil types chart
- screw-top jars or bottles
- your soil samples.

Fill each jar with water to about 3/4 full.

Put the same amount (two tablespoons) of each soil sample in separate jars of water and shake the jar.







Leave your samples overnight.

Watch what happens when the soil settles in each jar.

Use the activity 6 columns on insert SCL233A 'My soil types chart'.

Draw what you see in each jar.
Describe what happens in your own words.

Activity 7

What is rock?

Talk about rocks.

Where do rocks come from?

Where do you see rock near your home?

What is the difference between a rock, boulder, stone and pebble?

How do rocks get to the sea?

Is sand rock?

Draw or write what you think of when you talk about rocks.

Use the space freely.


ISTOCKPHOTO

boulders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rocky mountains

You may think of:

- big stones or boulders
- rocky mountains.

Earth scientists study the earth. They say that coal, clay and sandstone are kinds of rock too.

They say rock is:

- formed by natural forces
- made from minerals in the earth and may include things that were once living.


ISTOCKPHOTO

plant fossil in rock


ISTOCKPHOTO

animal fossil in rock

Activity 8

Is it rock?

Look at the photographs.

Talk about:

- how each object might be formed
- whether the objects are formed naturally or made by people.

Clarify your ideas by reading or talking to other people.

ISTOCKPHOTO

coal

Coal

Is it rock? _

Why? _

_ _

ISTOCKPHOTO

clay

Clay

Is it rock? _

Why? _

_ _


TE KURA

sandstone

Sandstone

Is it rock? _

Why? _

_ _


ISTOCKPHOTO

bricks

Brick

Is it rock? _

Why? _

_ _


ISTOCKPHOTO

concrete

Concrete

Is it rock? _

Why? _

_ _


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limestone

Limestone

Is it rock? _

Why? _

_ _

In your English time read the journal article, Our Rocks Rock! (SCL233C), that came with this resource and complete the guided reading activities (SCL223B).

What happens to rock?

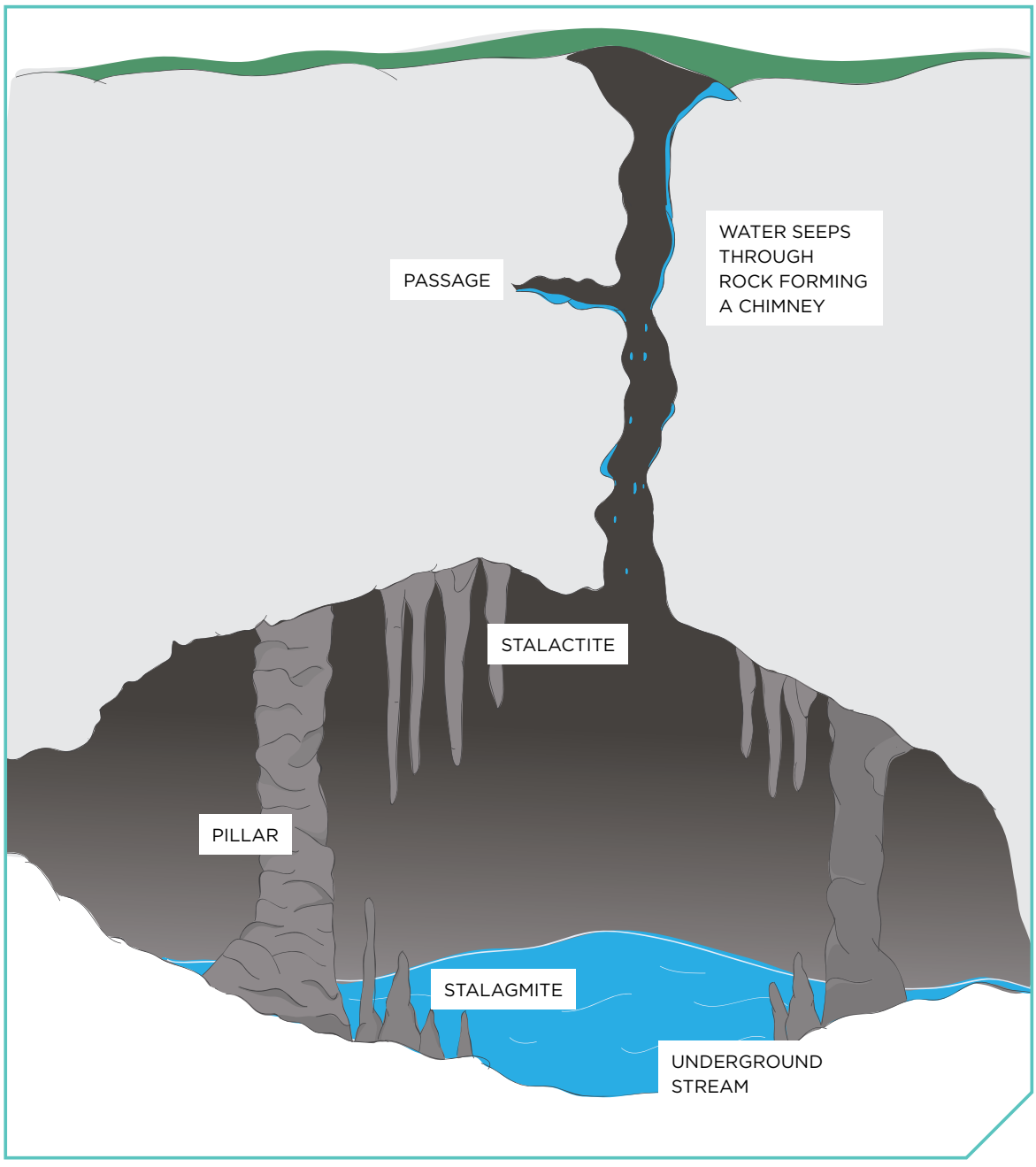
Rain, ice and wind erode (wear away) rocks on the Earth's surface.

Glaciers and rivers grind the rocks as they carry them down towards the sea.

Floods spread the river silt (fine fragments of rock) over the land. The silt is mixed up with bits of rotting plants and animals to create soil.

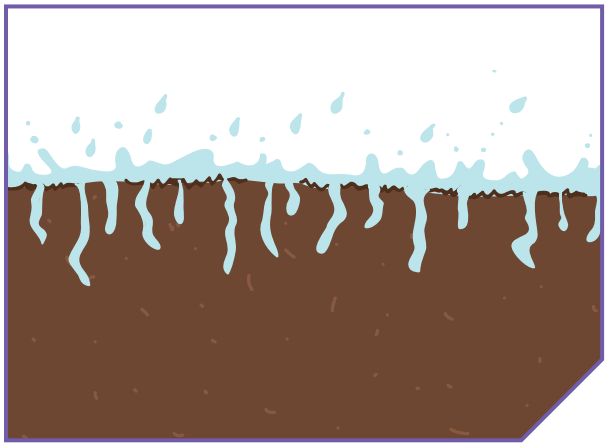
Soil is always being made.

Rain can eat away limestone rock over thousands of years and create tunnels and caves.



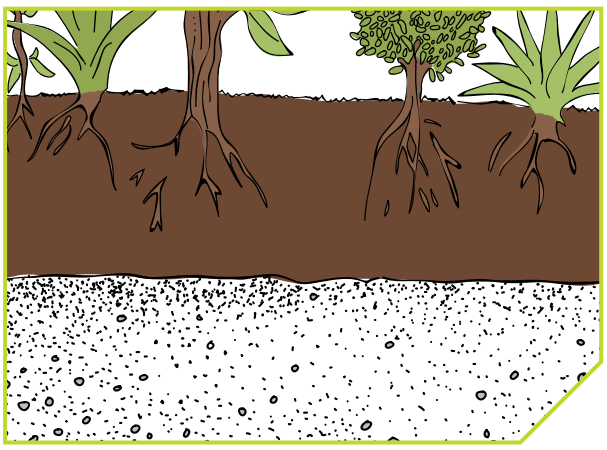
What happens to soil?

Rain and wind can erode it away.

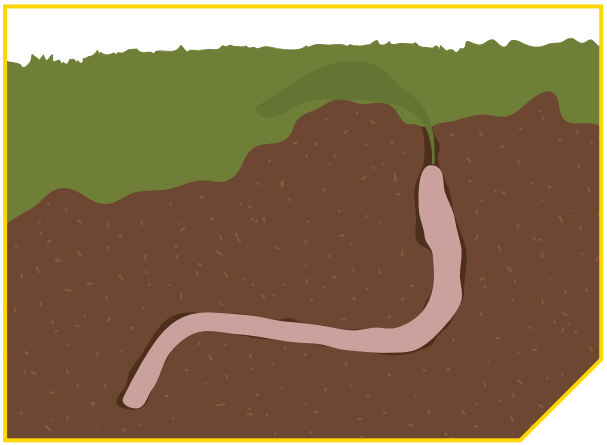


Rain washes minerals out of the top soil so it is not so rich – this is called leaching. People can add fertiliser to soil to replace the lost minerals.

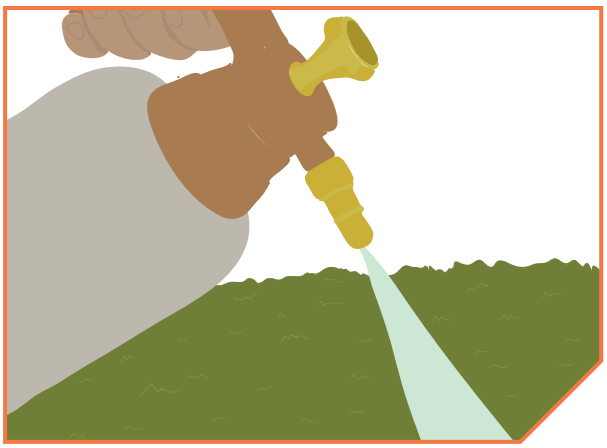
Animal waste helps to fertilise soil too.



Plant roots can keep soil in place and stop it from being washed or blown away.



Animals that live in the soil can shift it around and drag bits of organic matter down below the surface. This helps to enrich the soil.



Chemicals to kill insect pests and weeds can kill bacteria and worms too. To avoid this, some farmers and gardeners use more natural methods to keep their plants healthy.

Activity 9

Soil changes nearby

Walk around an area nearby for about an hour.

Look for clues that show how soil and rocks are affected by people, weather, development or anything else you can think of.

Take a pad and pencil to make notes.

I see animal tracks, and there are slips along our road, after all the rain.

What I saw.

What I think made it happen.

Your teacher will look at your work.

Activity 10

Dig it up

If three weeks have gone by since you started Activity 3:

Dig up the things you buried in soil.

Wash off as much of the soil as you can.

Look for signs of rot.

Feel each object.

Record your findings.

Work carefully.

What I buried	After three weeks I noticed these changes

What I buried	After three weeks I noticed these changes

Check your answers.

Write something that you found out from this activity.

If something rots we say it is biodegradable (bi-o-de-grad-a-ble).

bio means *living*

degrade means to *break down*

able means *having the power to do something.*

Living things, like bacteria, can break down biodegradable things.

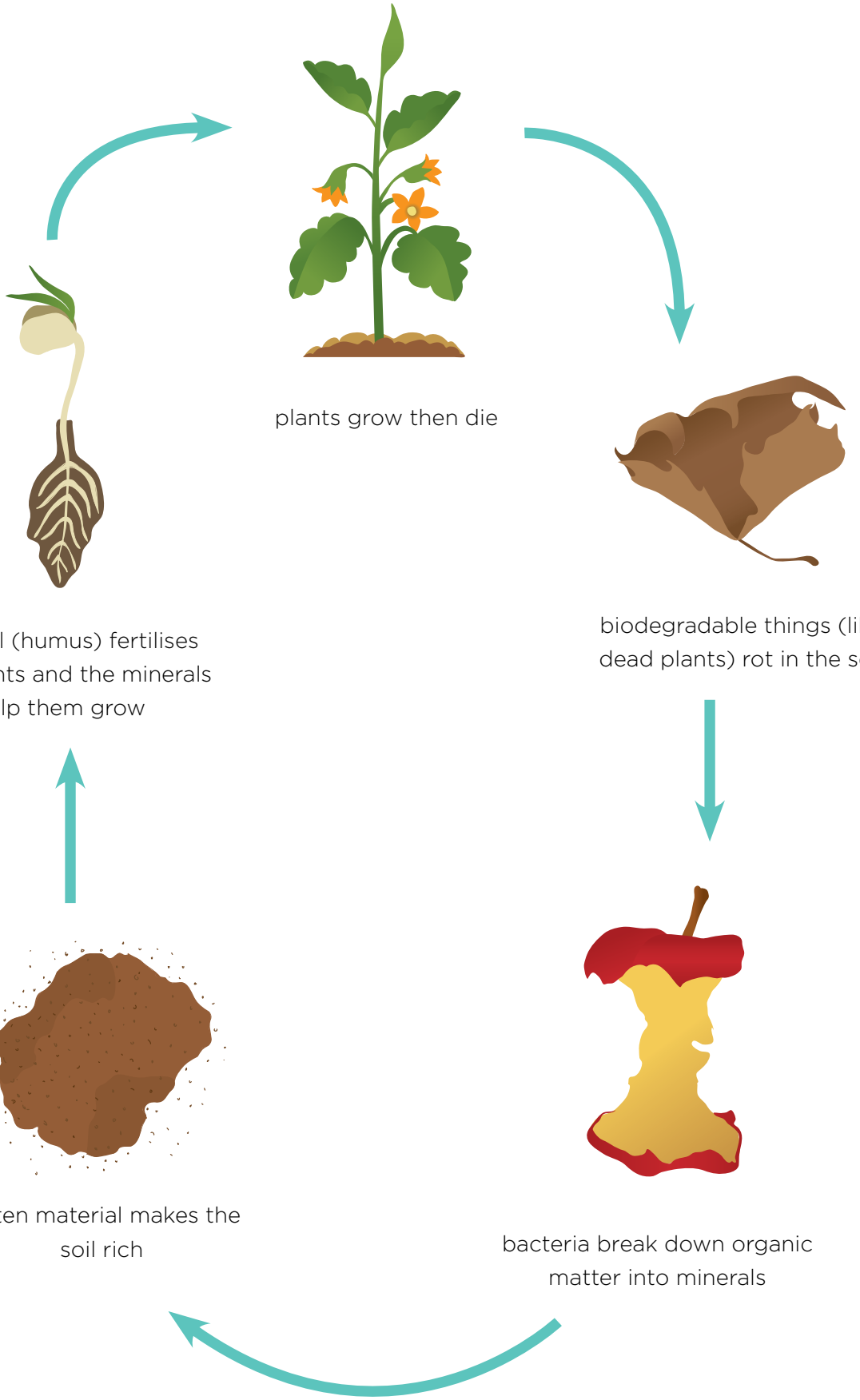
Read the diagram on the next page.

Which things that you buried did not biodegrade (rot)?

Which things that you buried biodegraded (rotted) the most?

Your teacher will look at your work.

Follow the cycle in this diagram



Write a sentence that explains how soil can help plants.

Write a sentence that explains how plants can help soil.

Your teacher will look at your work.

Activity 11

Finishing off

Read through your work or read it to someone else. Make any changes you think are necessary.

Check that you have recorded all your observations.

Check that your SCL233A chart and SCL233B blocklet are named.

Complete the Checkpoint.

Checkpoint

- ☐ I gathered information from pictures, diagrams, observations and tests.
- ☐ I recorded observations and results accurately.
- ☐ I can explain what soil is.
- ☐ I can describe some ways in which people affect soil.

Complete the checklist above.

Complete the self assessment on page 38 and the top boxes on page 39.

Write your name on the certificate on the next page, and cut it out to keep.

Pack up and send in:

- **this booklet**
- **your chart**
- **the magnifying glass that came with this booklet**
- **SCL233B Our Rocks Rocks booklet.**

Scanning your work

If you are scanning and sending your work back, check that you have included the pages with this symbol.

Cut out this certificate. **Well done!**

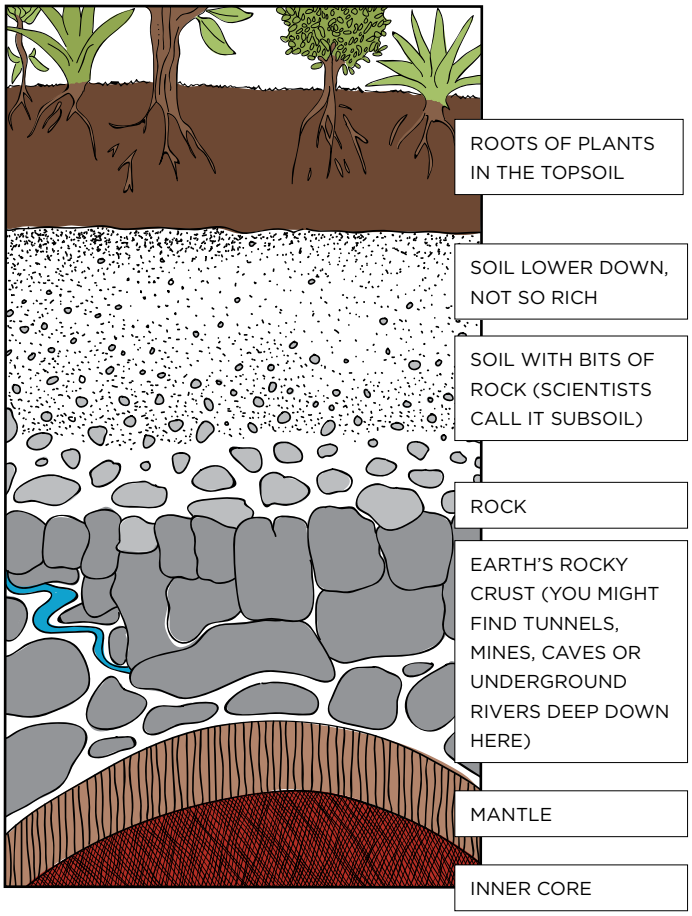
Answer guide

Activity 1 Under your feet

What we see (ocean, river, stream, forests, dunes, roads or bush) is just a covering over the Earth's crust. Underneath everything we see is rock. If you dig deep enough, you will find rock. Wherever you are standing or floating on Earth there is rock under you.

These layers are what you might see if you dig deep down under the ground:

- roots of plants in the topsoil
- soil lower down, not so rich
- soil with bits of rock (scientists call it subsoil)
- rock
- Earth's rocky crust (you might find tunnels, mines, caves or underground rivers deep down here)
- mantle
- inner core.



Activity 2 What is in soil?

Match label with the correct picture.

You may have thought there'd be things like worms, leafy bits, insects, spiders, stones, dust, roots and rubbish. These are all things you might find in soil.
Plants and animals live in soil. Plants put down roots to keep them in place. They absorb water and minerals through the roots up to the leaves to make food.

Animals like earthworms, grubs, and beetles spend most of their lives underground. Other animals, like rabbits, shelter in burrows. More animals live in the soil than in any other habitat.

Activity 6 Soil + water

You may have different soil types to test or similar types.

After mixing and shaking your soils you may have seen:

- Bits floating.
  They were probably decayed remains of plants and animals. They are lighter than water so they float.
- Bits sinking to the bottom.
  The larger stones sink because they're heavier than water.
- Cloudy or coloured water.
  Very fine bits like clay soil stay suspended (mixed) with the water.

Activity 8 Is it rock?

Look at the photographs.

Coal is rock. It is a mineral, not a plant or an animal. It is formed from the remains of trees and other plants that lived about 300 million years ago. Plants died, fell into swamps, partly rotted, and turned into peat. More and more plants grew and dropped material onto the ground. The weight of all that material pressed down on the peat and squeezed all the moisture out. Coal was left behind. It started off as organic material but it's usually called a mineral when it becomes hard coal.

Clay is rock. It is soft when it's wet and hard and smooth when it's dry. It is made of tiny bits of rock.

Sandstone is rock. It seems to be soft but the grains of sand in it are very hard.

Bricks are not rock. They look like rock but they are made by people from clay.

Concrete is not rock because it is made by people. Rock, like sand, clay and limestone, is used to make bricks and concrete.

Limestone is rock. It consists mainly of the bones and shells of tiny marine fossils made of lime.

Scientists say rock is formed by natural forces.

Activity 10 Dig it up

Dig up the things you buried in soil.

You may have found that any fruit or vegetable you buried is soft and starting to rot. Soil may stick to the rotten bits.

Peel takes longer to rot because it often has a coating of wax that stops bacteria from getting in.

Some things like tin or aluminium foil don't rot. They are not food for bacteria.

You may have tested other things that didn't rot. Paper rots but it usually takes longer than three weeks.

SCL223 Soil Self Assessment

Highlight the box that best applies to your learning.

LEARNING INTENTION	NOT ATTEMPTED	HAD A GO	SUCCEEDED	DID VERY WELL	DID AN EXCELLENT JOB
I am learning to gather information about different soils.		I gathered a small amount of information about different soils.	I gathered some information about different soils.	I gathered all the information I needed about different soils.	I confidently gathered information about different soils.
I am learning to carry out experiments and record and compare my observations of the soils.		I carried out one experiment and recorded and compared one observation.	I carried out experiments and recorded and compared some of my observations.	I carried out experiments and recorded and compared all of my observations.	I confidently carried out experiments and recorded and compared all of my observations.

Your teacher will look at this.

SOMETHING NEW I LEARNED

SOMETHING I WOULD LIKE MY TEACHER TO COMMENT ON

SUPERVISOR'S COMMENT

TEACHER'S COMMENT

Your teacher will look at this.

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Te Aho o Te Kura Pounamu apologises for any omissions and welcomes more accurate information.

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2013/1

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