

On the prowl...

Zac has recently joined the museum to investigate the types of animals found in Mountain Ash forests.

His sketch below shows the animals he observed on his recent field trip.



Zac's job is to try and sort the animals into groups based upon their physical structure, including the arrangement of their body parts. He thinks he might start by counting the number of limbs.

What 3 other features or body parts could Zac use to sort animals into groups?

1. Number of limbs
2. _____
3. _____
4. _____

Zac has decided that the first thing to do is to separate animals that have a backbone from those that don't.

Using his forest sketch, help him to complete the table below.

Animals with a backbone	Animals without a backbone
Possum	Butterfly

Zac thinks he has developed a system to further sort the animals which have a backbone based upon their body covering. Help him to fill out the table.

Fur/hair	Feathers	Moist skin	Scales
		Frog	

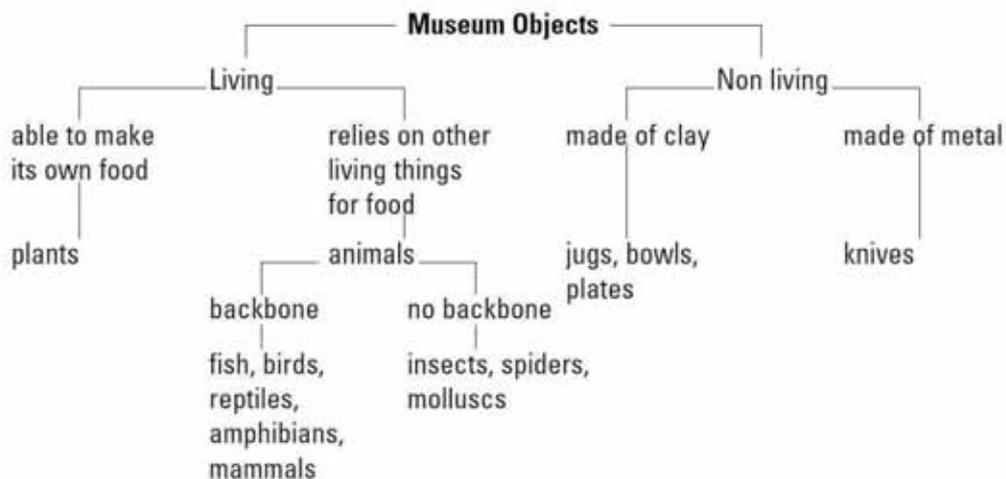
He really doesn't think that the Galaxias Fish and Copperhead Snakes should be in the same group. What are two characteristics he could use to separate them?

- _____
- _____

Zac would like to further sort out the group of animals that have fur. Help him to complete his table.

Lays eggs	Gives birth to live young

Scientists, including zoologists, often use keys to help them sort the objects they are studying into groups. Zac has already developed a key for objects in the museum.



On a separate piece of paper help Zac to design a key for animals in a Mountain Ash forest. Remember to only provide two choices at each step. Your key should allow you to sort the following animals: Brushtail Possum, Communal Huntsman (spider), Copperhead Snake, Tawny Frogmouth, Stick Insect, Mountain Galaxias (fish), Pobblebonk (frog) and Platypus.

Zac's friend Bianca Botanica was very impressed with Zac's work on forest animals. She has decided to use his forest sketch to sort forest plants.

What 3 features or parts of plants could she use?

1. _____
2. _____
3. _____

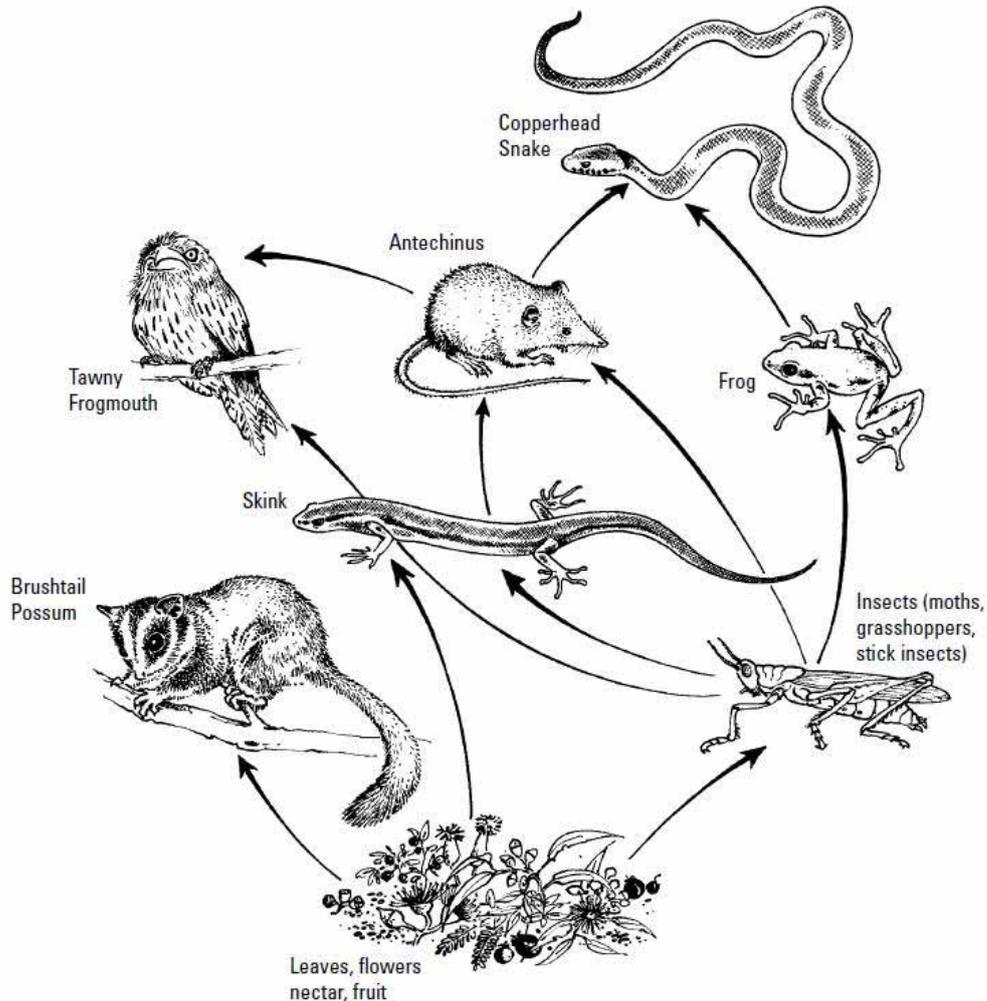
Are there any plant features or parts you would suggest she doesn't use? Explain

Forest Food

A forest is a community. It consists of many plants and animals living together and interacting in an area. The food web below illustrates the feeding relationships between forest plants and animals.

Using the food web, write a short story or series of sentences to explain how forest plants and animals are interconnected. You must include the following terms:

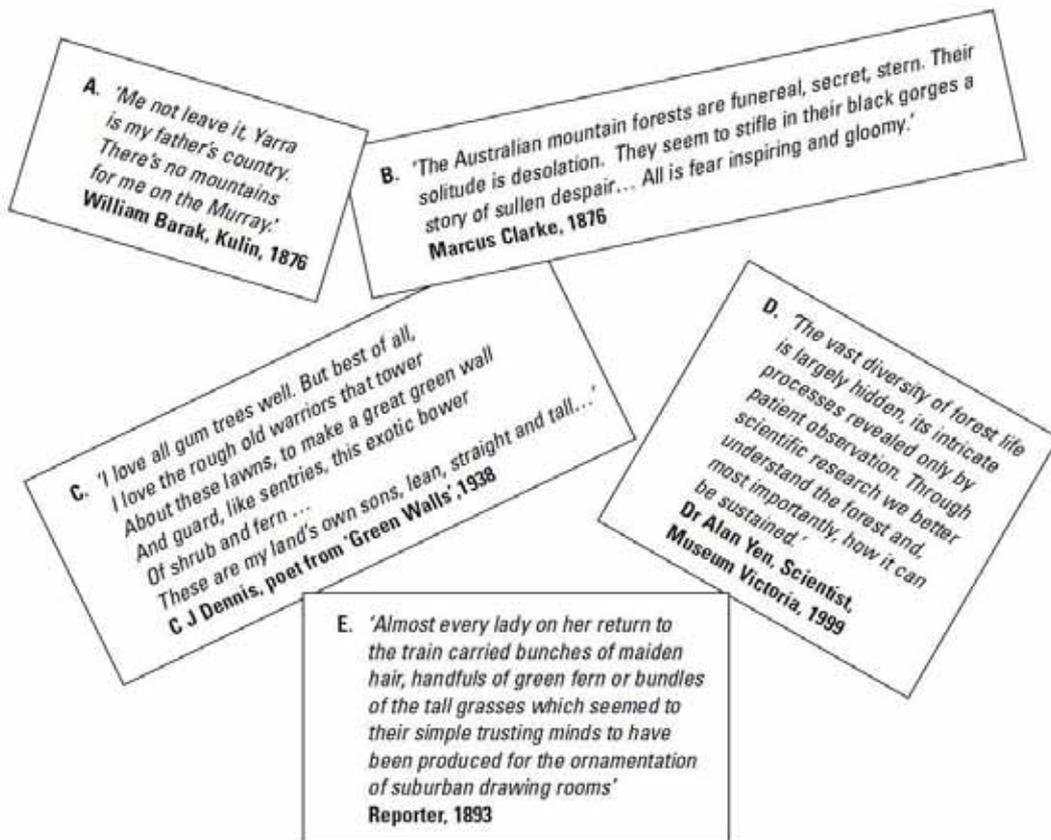
Competition	Producer	Predator	Habitat
Carnivore	Litter	Consumer	Canopy
Prey	Sunlight	Mammal	Invertebrate



Changing Perceptions

Our views on forests are diverse and continually changing. Below is a series of quotes from individuals from various organisations. Each gives a different perception on forests.

Draw a table like the one below into your workbook. Explain the forest view in each quote. State whether you agree or disagree with the view and justify your response. In the final space propose your own view of forests.



Quote/Sticker	Forest View	Do you agree or disagree?	Reasons
A			
B			
C			
D			
E			
My View			

Paper Trail

In the table below, list all the places in your school where paper is used. Some examples might include the office, the toilets, the art room and the science labs. Write what the paper is used for. Tick whether the paper is recycled or not. Also make an estimation of how much paper each location is using. For example, the amount of paper used for photocopying might be high, while the amount of paper towel used in the staff toilets might be low.

Paper use in my school:

Area of School	Use of Paper	Recycled? (Tick)			Rate of Use (Tick)		
		Yes	No	Unknown	High	Medium	Low

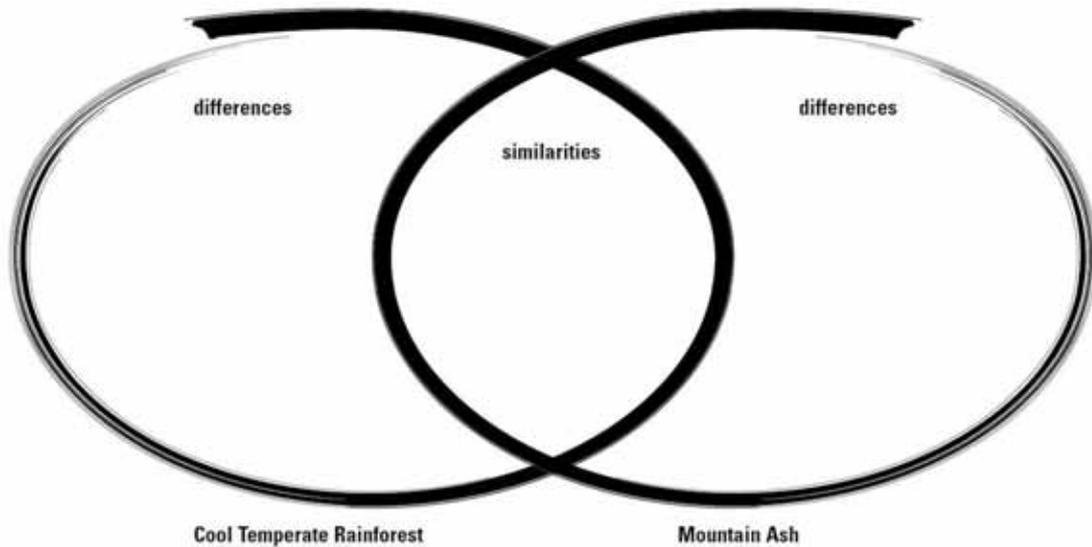
Identify ways in which your school can reduce its use of paper. As a class, write a proposal to present to your principal or school council on how these measures could be implemented and what the benefits would be.

Some things you might want to consider are-

- Who will teach people how to implement the new systems?
- Will it cost the school money? (For example, switching to recycled paper)
- Will it save the school money?
- Who will check to see if the systems are actually being used?

Forest Types

Use the Venn diagram below to identify the similarities and differences between Cool Temperate Rainforests and Mountain Ash forests.



Forests are always changing. Sometimes it is easy to observe the changes, while at other times the changes are so slow and gradual they are almost impossible to notice.

List four factors that cause changes in forests:

1. _____
2. _____
3. _____
4. _____

Identify the changes caused when a bushfire burns through an area of forest containing both Cool Temperate Rainforest and Mountain Ash forest:

Immediate Changes

Short Term Changes

Forest Gallery

You will need: native plants, reference material, cardboard, atlas, local maps, display boards.

- Collect, press and mount six leaves or flowers from native plants. Where possible select plants that are found in forests and that are endemic to your part of Victoria. Plants could be collected from private gardens or the school grounds. Contact the Department of Natural Resources and Environment for details regarding plant collection from public land.
- Label each plant: Scientific Name, Common Name, Aboriginal Name (where possible). You could also include information on how Aboriginal people used the plant, as well as how it is used today.
- Using a map of Victoria or of your local area, indicate the distribution of each plant. Remember to label fully and to use a key.
- Select an area for your class to exhibit their work. Invite people to visit your Forest Gallery. You might like to supply 'bushfood' from the supermarket or other suppliers for people to sample. A table could display forest products that are used in the home or at the work place.
- At the end of the exhibition all student work could be placed in a class folder or book and given to the library for other students to use.



What's it Worth?

Old growth forests are full of mature trees that have never been disturbed by activities like logging. Victorian old growth forests are logged to obtain resources like wood and paper.

In your opinion, is it worth cutting down a 200 year old tree to use its wood to build a house? What about to make paper? What about to make a fence?

Here are some materials that have been made from Victorian old growth trees:

- Woodchips for paper
- Structural timber for building houses
- Firesticks used traditionally by Indigenous Australians
- Furniture
- Floorboards
- Firewood
- Tomato stakes
- Wooden bowls and decorative woodwork
- Fence palings

In groups, decide which of these products should be obtained by cutting down old growth forests. If there are any that you decide are not worth it, decide how we could live without that product.

Present your decisions and alternatives to the class in a short speech.

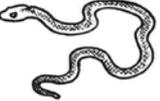
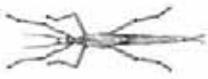


Survival in the Forest

For an animal to survive in a forest, its physical features and behaviour needs to be suited to that environment.

In the table below, a number of animals and their habitats have been identified. Complete the table by including the following:

- a physical feature that helps survival eg. long claws for digging worms
- an example of behaviour that aids survival eg. active at night
- two examples of interactions with other living things or the non-living environment that aid survival eg. trees provide nesting hollows
- a forest food chain that includes the animal eg. Mountain Ash → tree cricket → Leadbeater's Possum

Organism	Habitat	Physical Feature	Behaviour	Interactions	Food Chain
 Tawny Frogmouth					
 Alpine Copperhead					
 Dusky Antechinus					
 Stick Insect					
 Southern Brown Treefrog					

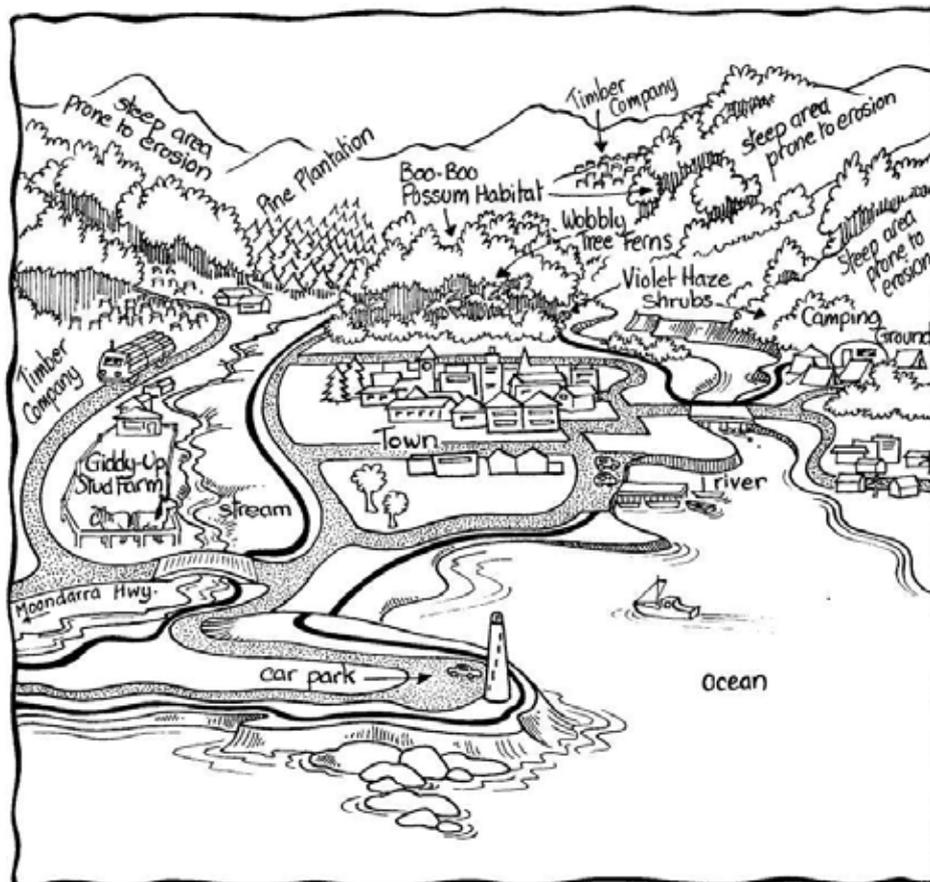
Fernwood Forest

Fernwood Forest lies 40 kilometres to the north of the major city, Moondarra. It covers an area of 3000 hectares and includes some of the most picturesque forests in the State. Whilst most areas are gently sloped, there are three areas which are quite steep and prone to erosion. Two small streams weave their way through the forest.

The main tree species are straight and tall, providing excellent timber for buildings and furniture. The understorey includes many different trees and shrubs. Violet Haze, with its bright purple flowers and berries, was once distributed throughout the state but is now only found in small pockets of this forest.

Many vertebrate and invertebrate species are found in the forest. The rare Boo-Boo Possum utilises tree hollows which only develop in century old trees. The Flute Bird builds its nest only in Wobbly Tree-ferns. These ferns were once quite common, however, many were removed by people wanting to add them to their own gardens.

Indigenous people have been using these once extensive forests for thousands of years. They possess an extraordinary insight into the ever-changing patterns of the forest. Their traditional lifestyle revolved around seasonal changes and their practices ensured the continued survival of the forest. With the arrival of Europeans 250 years ago the forest experienced enormous change. Trees were removed, areas were cleared for housing, and roads and tracks were constructed.



Today Fernwood Forest continues to be used for a diverse range of activities. The Vroom Club holds their annual trail bike and car rally along the extensive road network. Two timber companies operate in the forest providing important employment for locals. Giddy Up Stud Farm runs a horse riding school and takes participants for rides throughout the forest. Camping and bushwalking are also popular.

A major bushfire burnt over a third of the forest 10 years ago, killing many plant species and triggering a flush of regrowth.

Local conservation groups are concerned that the forest is being over-used and that areas are becoming degraded. In response to a number of letters and submissions, the local government authority is about to review their current management strategies.

Eco Solutions

Your company Eco Solutions has been employed to conduct an investigation into the condition of the forest and to make recommendations as to how it should be managed in the future. You have decided that you need two of your colleagues to assist with the work.

Part A: Dirty Business

In the past, trees have been removed from all areas of the forest including areas which are quite steep and prone to erosion. This has caused the streams to sometimes become blocked by mud and silt.

You have been asked to design an experiment which investigates the relationship between slope, vegetation cover and erosion levels. Your results will help determine the activities that will be undertaken in certain areas of the forest.

Before beginning your experiment you need to complete and submit the following form.

Dirty Business Experimental Form

Hypothesis: _____

Variables:

Manipulated	Responding	Controlled

Equipment required: _____

Method: Use either a series of dot points or labelled diagrams to show how you will go about completing the experiment

Designed by: _____

Submitted: ____ / ____ / ____

Complete your experiment and record your results. The local government authority wants you to write a paragraph based upon your results outlining your recommendation. You could use the following table as a checklist.

Forest Area	Erosion Concerns ✓ or ✗
Flat land	
Areas close to streams	
Slight slope	
Moderate slope	
Steep slope	

Part B: Impact Analysis Study

The local government wants to review the activities it will allow in the forest. They have provided you with a form they would like completed as soon as possible. In particular, they would like your recommendations based on an analysis of potential impacts.

Forest Activity	Potential Impact	Recommendations	Reasons
Horse riding			
Timber harvesting			
Trail bike riding			
Camping			
Bushwalking			
Other			

Part C: Eco Solutions

The local government authority would like you to produce a PowerPoint presentation or a series of overheads that covers the following points:

- results of your experiment,
- an overview of your recommendations for activities in the forest,
- a plan outlining how you would manage the forest especially Violet Haze, Boo- Boo Possum, Flute Bird, Wobbly Tree-fern and soil quality.

Your audience may include representatives from local industries, sporting clubs and conservation organisations who will also be interested in your conclusions and how they impact upon their activities.

Biodiversity Audit

What is biodiversity?

Biodiversity, which is short for biological diversity, is a measure of how many species of animals and plants live in a certain area, like your school grounds.

What is a biodiversity audit?

A biodiversity audit is a way of counting how many species are present. This can be very difficult, since some species, especially birds, can move in and out of the area being measured. Also, if you were to count every species of plant and animal it would take a very long time.

Because of this, scientists use shortcuts to get an approximate measure of biodiversity. This rough measure gives you a good idea of the health of an area being studied; the more species present, the healthier the area.

Performing your audit

There are three main groups that need to be measured for a biodiversity audit: plants, invertebrate animals and vertebrate animals.

Plants

Plants are grouped into three main categories. Grass and groundcover are any plants that don't have a woody trunk. Shrubs have a woody trunk, but are less than three metres tall when mature. Trees have a woody trunk, but are over three metres tall when mature. Count how many trees and shrubs are in your school grounds and record your findings in a table.

For grasses and groundcover you will need to estimate the number of square metres of ground covered, since counting every grass plant is impractical, if not impossible.

When you return to the classroom, use print or online resources to identify whether the plants present in your school grounds are native or introduced.



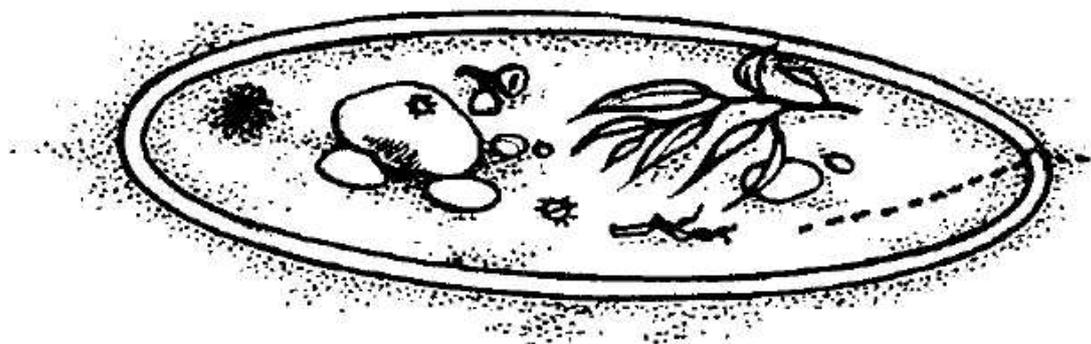
Invertebrate animals

Invertebrate animals are animals without a spinal cord, such as worms, insects and spiders. Invertebrates are an important food source for many larger animals, so the more bugs you have, the more birds and other animals you are likely to attract to your school. Again, it is impossible to count every invertebrate in your school yard, so a shortcut is used.

You will need a large hoop with an area of approximately one square metre. Choose some varying surfaces around your school, for example grass, leaf litter, bare dirt, woodchips or bark. Different groups might want to look at different surfaces. Lay the hoop on each surface. Within the area of the hoop, note what small creatures you can see. You may need to look under loose leaves of bark. Have one person in your group record each *species* you find, not each individual creature.

By looking in several places around the school, you will get a good idea of how many species are present.

You should also record any extra evidence of invertebrate animals you find, such as webs, cocoons or shells.

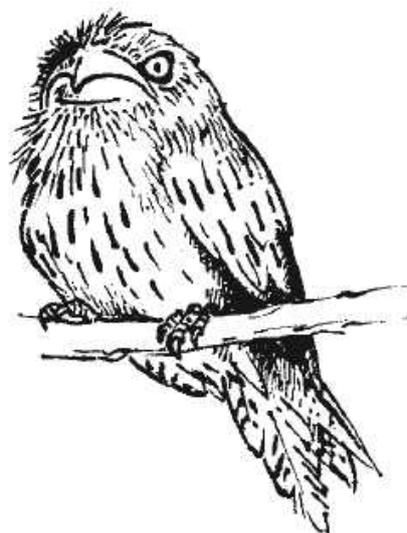


Vertebrate animals

Vertebrate animals have a spine, like mammals, reptiles and birds. You will need to observe and record the vertebrate animals in your school grounds at three different times of day – morning, midday and afternoon.

Be very patient for this. Find a quiet spot for your group to sit and observe. Record every bird and animal you see, as well as what it does in the yard. For example, you might see a Crimson Rosella feeding from a Grevillea bush.

When you return to the classroom, use print or online resources to identify unknown animals and research whether the species identified are native or introduced.



Increasing Biodiversity

Now you should have an idea of the number of plant and animal species in your school. To improve your school's biodiversity, you need to encourage more species of animals to come onto your school grounds.

You now need to develop an action plan for how you can increase biodiversity in your school.

Some possible ideas

- Building structures like bird feeders or nesting boxes
- Planting indigenous plants, including trees, shrubs and groundcover
- Removing threats to biodiversity, like litter or weeds
- Putting up signs to raise awareness among students and parents
- Restricting access to sensitive areas to avoid damage to plants etc.

Some things to consider

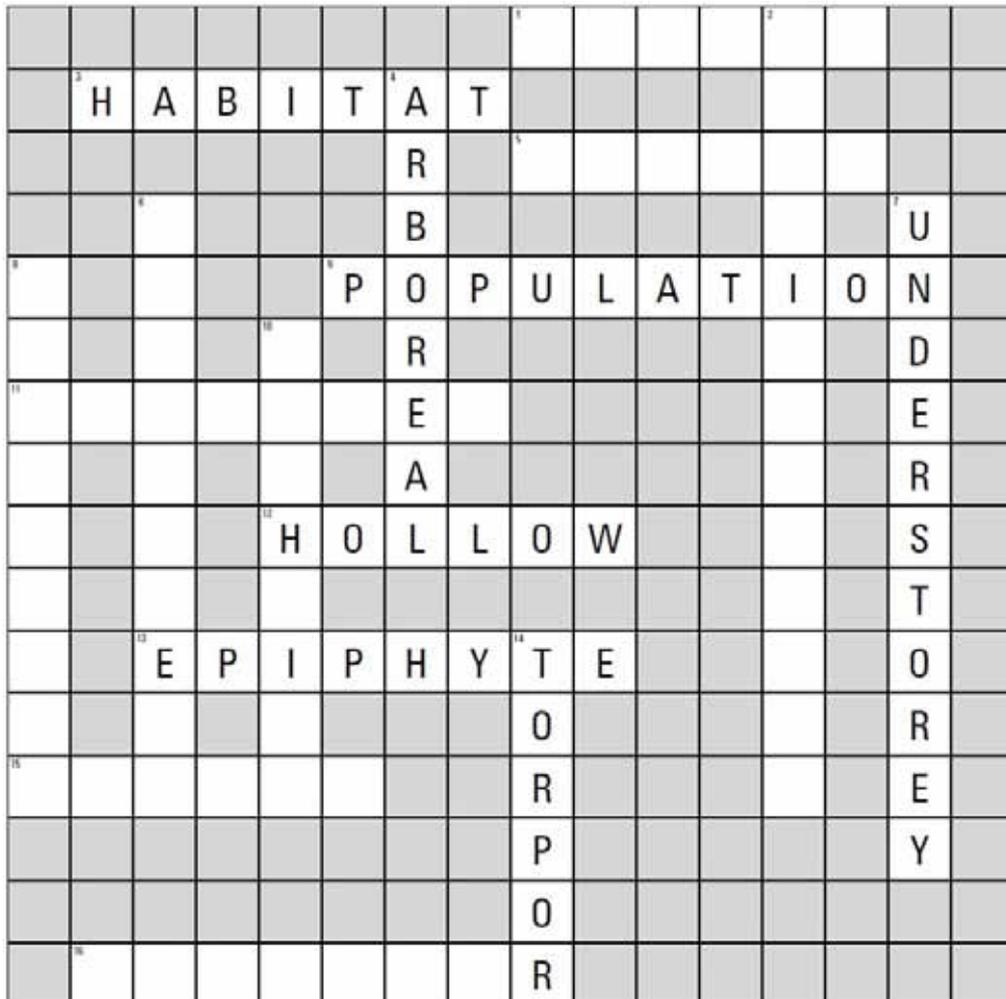
- Who do you have to get permission from to make these changes?
- Which changes are practical and achievable?
- Will it cost the school money? If so, where will this money come from? Could you hold a fundraising event?
- Could parents be involved? If so, how could we convince them to help?
- How are you going to publicise your action plan, especially if it is a success?

When your action plan has been completed you will need to perform another biodiversity audit to see if your actions have attracted new species to the environment.



Forest Puzzle

Solve the puzzle below by finding the correct term or writing appropriate clues in the spaces provided.



Across

- Cover produced by the highest level of branches
-
-
- Forest product
-
- Relies on plants and animals for food
-
-
- Leaf and other material found on the ground
- A living thing that is able to make its own food

Down

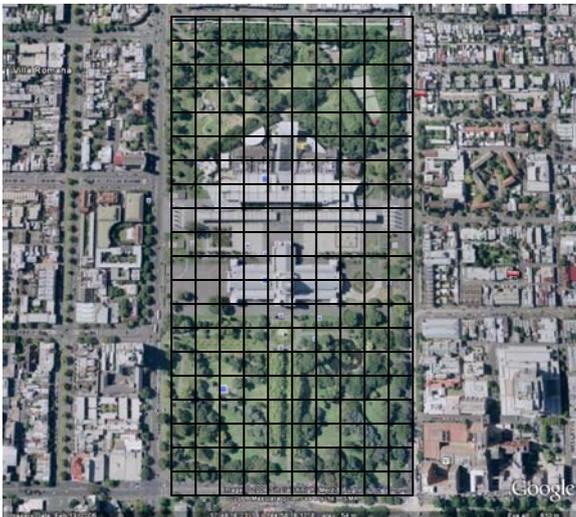
- Rain, snow, sleet
-
-
-
- A type of forest
-
-
- Animals that are active at night
- An unplanned fire
-

Our Grounds and Surrounds

To better understand the make-up of your school, it is useful to know the percentage of your school grounds that are covered in buildings, grass, exposed or covered dirt and artificial surfaces.

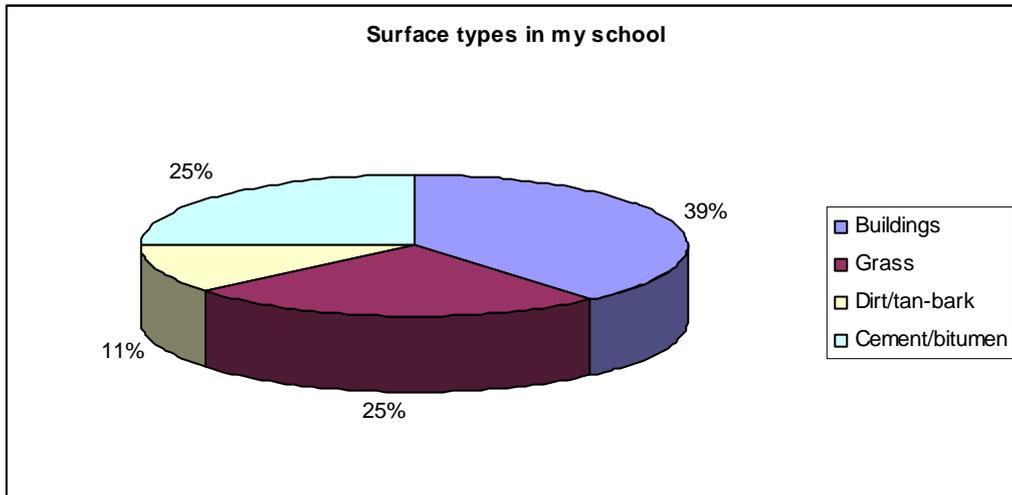
The Google Earth mapping tool can be very useful for this. It is found at <http://earth.google.com> and can be downloaded for free.

1. Enter your school name and suburb in the 'Fly to' search engine.
2. Zoom in on your school until it fills the frame of the screen using the + - slider on the right. Rotate the image so that the school boundaries are square with the frame using the  tool in the circle on the right.
3. Go to 'Tools, Ruler, Line' and change the unit of measurement to 'metres'. Use this 'ruler line' function to obtain the dimensions of your school ground. Calculate the area of your school by multiplying the length in metres by the width.
4. Later, you should check the accuracy of this method by taking accurate measurements of your school ground with a trundle wheel.
5. Click on 'Edit' then to 'copy image'.
6. Paste the image into a blank Word Document – drag the corners of the image to make them fit the size of the page. Draw a grid over the map of the school ground (as shown below) and count the number of squares covering the school ground.



7. Now count and record in a table how many squares of grass there are, how many squares are covered by buildings, how many are dirt or tan-bark and how many are covered by artificial surfaces like concrete and bitumen.
NB: A good rule to follow is to only count a square if it is more than half covered by that surface.

8. Enter these values into an Excel spreadsheet.
9. Click on 'Insert' then 'Chart'. Choose 'Pie' as your graph type. Enter a chart title. In 'Data labels' click 'percentages'. Now click finish. It should look like this-



10. Click on 'Edit' then 'Copy'.
11. Now paste the graph into your Word document with the picture of your school.
12. Now that you have the size of your school and the percentages of different surfaces, you can do things like calculate areas in your school grounds suitable for future tree plantings.

The surface types in your school can tell you a lot about what plants and animals you can expect in your school. Trees can't be grown in buildings or on cement, but could be planted on grass or tan-bark.

You probably won't find many bugs on cement either.

A map like this can give you a good idea of where to go when looking for interesting animals.

Blooming Forests

More forest learning activities based upon Gardner's multiple intelligences, Bloom's taxonomy and VELS learning outcomes that can be undertaken before or after a visit to Forest Secrets.

	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
Language	Identify six ways in which forest are used by people	Write a story to explain how one tree can be important for other plants, animals and people	Write a set of instructions for using a classification key that you have developed	Write a report explaining how plants make their own food and how this is important for other living things	Create a crossword using words that explore forest relationships and change	Write a newspaper article evaluating the impact of bushfires on people and forests
Logic and Maths	Make a chart showing one year in the life of a lyrebird	Design a classification system for plants in your school ground	Design an experiment to test which conditions are best for decomposition	Draw a Venn diagram to compare and contrast Aboriginal and European uses of forests	Develop a concept map to show how living and nonliving	Explore a natural environment near your school and write a strategic plan to improve it
Art and Space	Make a poster of a forest plant or animal and show where it lives in the forest	Using a map of Victoria show how forest cover has changed over the last 200 years	Design a worksheet for younger students to help them identify products we use from forests	Participate in a role play to explain what happened to forests as Australia separated from Gondwana	Using an image of a tree, identify all the parts of the tree we use	Make a forest mobile showing how Australia's global position has changed since the time of Gondwana
Music	Find a song about forests. Explain the lyrics to your class	Write and perform a rap that explains how an animal or plant survives.	Using the sounds of the forest, create your own piece of music	Discuss why 'natural sounds' have become popular on CD's	Develop a musical production about life in the forest	Investigate which instruments in an orchestra are made from wood. Suggest why instruments are made from different materials
Movement	Make a labelled model to show the role of forests in the water or carbon cycle.	Write and perform a play to show how plants and animals work together in a forest	Organise a bush food lunch for your class	Visit a local forest and identify all interactions between living and nonliving things	Design a mini-beast farm and record population changes and interactions	Evaluate the impact of recreational activities in forests
Naturalist	Undertake a bird survey for either your garden or school grounds	Select your favourite spot in your garden. Keep a diary of the changes that occur there	Participate in a field visit to a park or forest with a naturalist club	Visit an indigenous garden. Design a table to record the plants and how they can be used	Design and plant an indigenous plant trail for your school. Investigate how animals use this area	Take a group of students on an eco tour of a garden, park or forest. Point out important features
Understanding Others	Select a forest plant or animal and explain how it interacts with the plants or animals chosen by the rest of the class	In groups of 2-3 interview a 300 year old Myrtle Beech tree to discuss that changes it has witnessed	In a group, design a machine to extract eucalyptus oil from gum leaves	Invite a forest officer or conservationists to discuss forests with your class	In small groups, decide on the activities you would allow in forests. Also choose two things you wouldn't allow	Organise a debate on the topic 'People have been good for forests'
Understanding Yourself	In your home identify all the things that are made from forest materials	Pretend you are a forest animal. Write a journal of your life in the forest	Design a poster or cartoon that explains what you like about forests	Record all the forests you have visited in Victoria. Present this to the class	Interview a relative or friend to find out what forests were like when they were your age	Write a ten point plan outlining how you think people should go about protecting forests