get growing!

National Tree Day®

ENVIRONMENTAL EDUCATION KIT

National Tree Day is organised by Planet Ark in partnership with Toyota Prius

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The 'Get Growing!': Environmental Education Kit has been produced by Planet Ark in partnership with the Australian Association for Environmental Education as an education and learning resource for teachers and students participating in Schools Tree Day and National Tree Day. *

This resource has been designed to increase the environmental, educational and community development outcomes of mass plantings of locally indigenous plant species and bush regeneration in benefiting Australian ecosystems, thereby satisfying the Aim of the National Tree Day project.**

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'Get Growing!' Environmental Education Kit

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* National Tree Day 2008 is organised by Planet Ark in partnership with Toyota and the AMP Foundation.

** For more information on the Vision, Aim and Objectives of National Tree Day, please go to: treeday.planetark.org.

*** The Australian Association for Environmental Education (AAEE) is the premier, national, professional association for those who identify themselves as working in the fields of environment or sustainability education.

**** The National Tree Day Environmental Advisory Committee was set up to provide technical and specialist advice to enhance the environmental and social outcomes of the National Tree Day project. Member organisations include: Trees For Life, the Australian Association of Bush Regenerators, Greening Australia, Landcare Australia, the Australian Local Government Association and Education for Sustainability.
For more information on the NTDEAC, please go to treeday.planetark.org.

TEACHER NOTES

UNIT OBJECTIVES

After completing this unit students will be able to:

Understand how plant communities came to be a part of our world

Articulate how trees are different to other plants

Understand the role and significance of native trees in helping and protecting the natural environment

Appreciate that trees have evolved over time and continue to change as natural and social conditions change

HELPFUL TERMS AND DESCRIPTORS (SEE GLOSSARY FOR DEFINITIONS)

- Biodiversity
- Ecological Community
- Ecosystem
- Ecosystem Services
- Habitat
- Native plants
- Plant Communities
- Riparian Zones
- Sustainability

FOCUS QUESTIONS

1. How did plants become part of our world?
2. How are trees different to other plants?
3. How do native plants help our environment?
4. How long do trees live and how can you tell their age?

OTHER RESOURCES AND WEBSITES SUPPORTING THIS UNIT

EVOLUTION OF PLANTS

http://www.siu.edu/~perspect/03_sp/plants.html

http://www.bomengids.nl/uk/tree-evolution.html

http://scienceandevolution.blogspot.com/2007/12/how-trees-changed-world.html

PLANTS AND HABITATS

http://www.nps.gov/plants/pubs/nativesMD/info.htm

http://www.australian-backyard-wildlife.com

BIODIVERSITY

http://environment.gov.au/biodiversity

http://www.austmus.gov.au/biodiversity/what

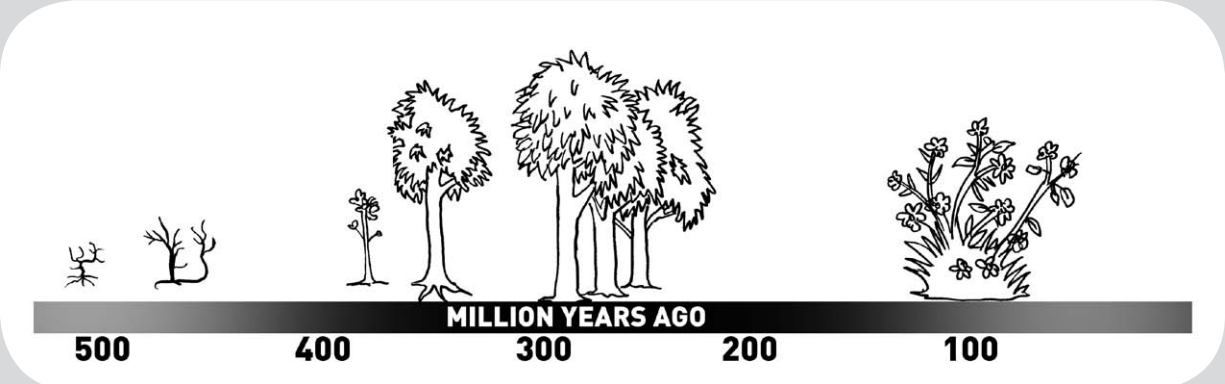
A visit to your local Botanic Gardens or National Park can also be an effective revision of this unit. Most state Botanic Gardens have resources and learning activities available too.

BACKGROUND INFORMATION

Trees and other plants developed slowly over millions of years after our planet was formed. The work of scientists and biologists has given us an understanding of how plants have developed during this time. Some of the very early plants have long gone, others are still with us and many have changed over time. Here is a simple history of how plants came to be the way they are today.

430 million years ago: Plants developed in the oceans but began to spread to land. These early plants had no roots, seeds or woody stems and needed damp conditions to propagate and survive. Algae, for example, began in the ocean, was washed onto the land, dried out and slowly developed waxy leaves containing pores and seed coats. Lichens and mosses also spread onto the land at this time. During this period there were no animals with backbones.

360 million years ago: The first larger plants which had roots and woody stems developed during the Carboniferous period. Giant tree ferns were plentiful during these times - the same trees which died and rotted away to become the coal and oil we use today. Seeds first appeared in plants at this time as well. Plants began to grow in drier places, arrange themselves into large clumps to form forests, scatter their seeds further afield and help to make and protect soils. It was about this time that reptiles (but not dinosaurs) began to appear on Earth. Trees at this time were mainly conifers and cycads.



270 million years ago: There was a big extinction of many plants.

100 million years ago: In the time of the dinosaurs (the Mesozoic Era) conifers, cycads and ginkos were dominant, and around this time flowering plants began to appear.

60 million years ago flowering plants began to take over and replace many of the conifers. Today, there are over 200,000 species of flowering plants on the planet. Grasses became more common also giving us the 10,000 species of today.

37 million years ago There were only half the number of species of plants on the planet as there are today.

20 to 25 million years ago there was an explosion of herbal plants because of a drier climate in many parts of the world.

Australia has been separated from the rest of the world for around 80 million years. In this time it has developed its own unique plants, like the many species of eucalypts and acacias we see today. Some have changed slightly over thousands of years, and have adapted to the different climatic conditions that we now experience.

This is one reason the existing native plants are the most appropriate plants for their respective locations, even though many have been replaced in large numbers by other plants. It also explains the reasons for so many different plants on the planet today and why biodiversity is so important. Eucalypts, for example, are prolific in terms of their number in Australia with over 700 different species identified. In the past it was not always like this.

STAGE 1

FOCUS QUESTION 1: HOW DID PLANT COMMUNITIES COME TO BE PART OF OUR WORLD?

How are plants different from each other?

Materials

5 small plant pots or milk cartons with the tops cut off and small holes in their base for drainage

5 large yoghurt lids or old plates to go under the pots and catch the water runoff

5 different native seeds (e.g. hakea, wattle, bottlebrush, eucalypt. See http://asgap.org.au/seed.html for more information.)

Popsticks for planting and labelling

Activity Sheet 1.1

Potting mix

ACTIVITY

In simple terms with simple illustrations, show how plants were different in the past (as outlined in the Background Information). Explain that plants grow differently (e.g. some grow roots from a seed, some have an underground travelling system, i.e. a fern, some just get moisture and air from the atmosphere i.e. moss).

Separate class into 5 groups and distribute a seed and potting materials to each.

Help each group to fill their plant holder with damp soil, bury their seed about 1 cm deep, and water it in.

Place the popstick in the soil and label it with the groups' name and the name of the plant.

Each group should care for its seed by keeping the soil damp and in a sunny spot.

Keep a record of their growth (Activity Sheet 1.1)

Groups should report back to the class about the size, colour and shape of their plant, and compare it with the growth and changes of other groups.

When seedlings are established, the class could plant them on site, donate them to the local community nursery or take them home for their family.

FOCUS QUESTION 2: HOW ARE TREES DIFFERENT TO OTHER PLANTS?

What do all trees look like?

Materials

Pictures of different types of trees

(e.g. pine tree, eucalypt, silky oak, bottle brush)

Paper and pencils

ACTIVITY

Look at pictures of different types of trees and plants.

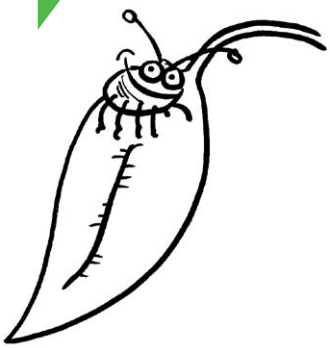
Discuss what trees have in common (e.g. all need sun, soil, water, air) and what makes them different to each other (e.g. different bark, different heights, different types of leaves, different sorts of roots and seeds, flowering/non flowering, different habitats).

Ask students to draw two trees (preferably real ones they can see in the playground) that are different. Get them to label the branches, leaves, trunk, and roots.

You could also make a collage showing all the different sorts of trees around the school. This can be done using students' sketches or taking photos. Discuss why it is important to have many different sorts of plants (importance of biodiversity).

FOCUS QUESTION 3: HOW DO NATIVE PLANTS HELP OUR ENVIRONMENT?

Who lives in our native plants?



Materials

Bug catchers or clear takeaway containers with holes in the lid (1 between 2)

paper and pencils

magnifying glasses for later study

clipboard

ACTIVITY

While supervised outside, students find an insect that lives in the school grounds. It may be in a tree, shrub, amongst fallen leaves, sticks or bark. Ensure students use a stick or wear gloves if turning over material.

Help students identify, and ask them to draw a picture of the habitat f, their specimen – for example. on a tree, in the leaves of a small shrub, under some bark or in the leaf litter/grass. Once the habitat drawing is complete, carefully collect the insect.

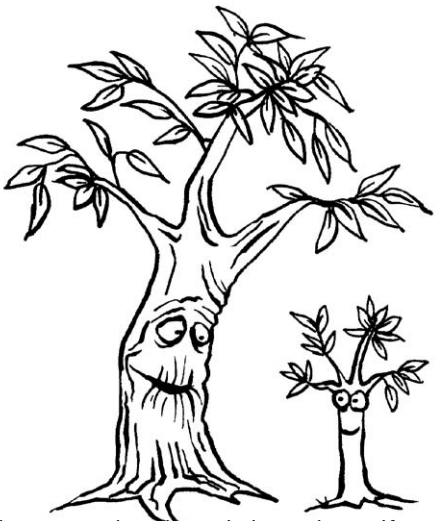
Students bring the collected specimen and their drawing back to the classroom.

In the classroom, students carefully study their specimen with a magnifying glass, without harming it. They can then add a detailed drawing of it to their earlier sketch of its playground habitat. Return bugs to their home as quickly as possible.

Students should then discuss with a partner or with the class, why they think each creature chose its particular site for a home. Why was that home so good for them?

Discuss with students why it is good that there are so many different insects and animals living in so many different places (biodiveristy benefits and the web of life).

FOCUS QUESTION 4: HOW LONG DO TREES LIVE & HOW CAN YOU TELL THEIR AGE?



Young and Old

Materials

Photos or sketches of a young face, old face;

baby possum, mature possum; seedling, mature tree

Activity Sheet 1.2

ACTIVITY

Discuss with students the concept of age and growth by showing your photos or sketches. Ask students if they think the biggest plants are always the oldest and the smallest plants are always the youngest. Consider that some plants grow more slowly or have smaller forms than others, so the biggest actually isn't always the oldest.

Discuss why some plants live longer than others (each tree has its role in the ecosystem - the shorter living, quicker growing plants often prepare the ground for older plants).

Visit the playground and look at a number of plants. What are some ways you could tell the age of each plant? (By their size, height, the number of branches, seeds or flowers, length of root system, gnarled trunk or branches, existence of hollows). Explain it is sometimes hard to tell because plants grow at different rates. Ask students to consider which plants might be the oldest and youngest in the playground.

Complete Activity Sheet 1.2

STAGE 2

FOCUS QUESTION 1: HOW DID PLANT COMMUNITIES COME TO BE PART OF OUR WORLD?

Seed Collecting

Materials

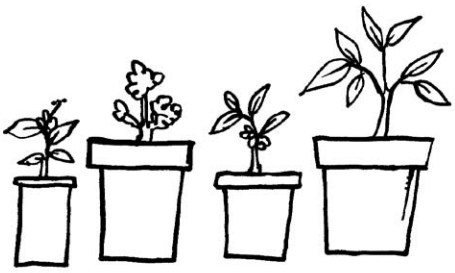
6 small plant pots (or milk cartons with the tops cut off and holes in its base)

6 large yoghurt lids to go under pots

6 small containers to collect seeds

Popsticks for planting and labelling

Potting mix



ACTIVITY

In simple terms with simple illustrations, discuss the progression of plants over time (as outlined in the Background Information). Explain that plants grow in different ways and might have grown differently when the climate was different to today.

Separate class into 6 groups and give each group a seed collection container.

Go into the schoolyard and ask each group to carefully collect a (preferably native) seed. Try to get a range of plants (e.g. a grass seed, a seed from a native shrub, a seed from a tree, etc). If you can't get these from the school site, students could bring some from home, or with permission and assistance you could use a local bush site or even speak to your local council, Landcare or Bushcare officer for help. Remember to make a note of which plant each seed came from.

Identify your seed and research how it will grow best. Some seeds need heat, smoke or fire to germinate. If any of these processes are required, help groups to prepare their seed for planting.

When seeds are ready, help each group fill its plant pot with damp soil, cover the collected seed with soil about 1 cm deep, and water it in.

Place the popstick in the soil with the group's name on it.

Each group should care for its seed by keeping the soil damp and in a sunny spot.

Record growth progress and discuss after several months which plants grew the fastest: trees, grasses or shrubs? Which ones did not grow? Why?

Groups report back to the class about the size, colour and shape of their plant, and compare it with the growth and changes of other groups' plants.

Once the seedlings are established, plant them at the school, donate them to a local community nursery or students could plant them at home.

FOCUS QUESTION 2: HOW ARE TREES DIFFERENT TO OTHER PLANTS?

What do all trees need to stay alive?

Materials

Picture of a tree (to be projeted and labels added to)

Labels (brances, leaves, trunk, roots, canopy, bark, flowers/seeds) to be placed on Smartboard/cardboard sheet/OHP image of unlabelled tree diagram

Activity Sheet 1.3

ACTIVITY

Discuss with students the different parts of a typical tree and what function(s) each part plays. Slowly add labels to the tree image as you discuss each one.

Help students to complete Activity Sheet 1.3

FOCUS QUESTION 3: HOW DO NATIVE PLANTS HELP OUR ENVIRONMENT?

How do plants help other living things?

Materials

Activity Sheet 1.4

Information Sheet A

ACTIVITY

An OHP can be used to project a large outline of a tree and its immediate surrounds onto a large piece of paper taped to the wall. See Information Sheet A or you may wish to create your own version with the students' help.

Brainstorm with the class the many insects, reptiles (lizards, skinks, geckos), birds, frogs, mammals (possums, gliders, bats) that make their homes and find their food in trees. Some creatures will live in fallen logs or in the bark or leaf litter around trees too.

Allocate each of the different creatures suggested to different students and get them to draw, colour and cut out their creature to be glued to the wall drawing.

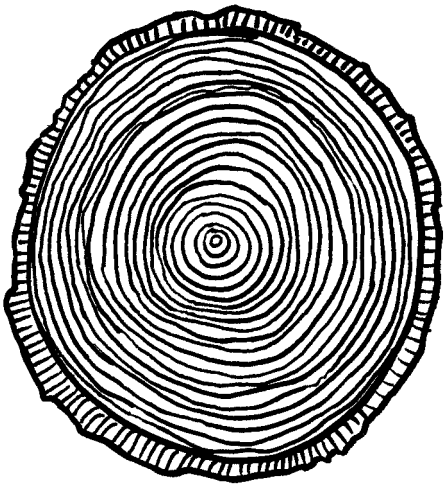
As they glue their drawing up, ask students to tell the class why their animal likes to live in that particular part of the tree or its surrounds. Remember to consider how the animal or insect might help the tree too! Very often, it is a symbiotic relationship.

Visit the playground and see if there are any animals or insects in the plants growing there. Placing a light coloured cotton sheet on the ground and gently moving the branches above can release many living things that will fall onto the blanket. Record the insects you see on the blanket and then carefully move the blanket to make sure they can move back onto the plant.

Discuss with students the idea of biodiversity (which tells us how healthy our environment is) and why it is important to have a variety of animals and plants in their area.

Complete Activity Sheet 1.4 to summarise students' learnings.

FOCUS QUESTION 4: HOW LONG DO TREES LIVE AND HOW CAN YOU TELL THEIR AGE?



Measuring age and growth of plants

Materials

Information Sheet B

Activity Sheet 1.5

ACTIVITY

Using Information Sheet B (on a screen or OHP), discuss with students the rings on a cross section of a tree (If you can get an actual tree cross section then use that).

Consider each of the layers and discuss why some rings are thicker than others. It could indicate wetter years (i.e. the thicker rings) and drier or drought years (the thinner rings).

Discuss how the age of some trees can be determined by counting how many rings there are from the centre of the cross section to the outer bark (approximately 1 ring = 1 year).

Help students complete Activity Sheet 1.5

Discuss how else you could guess the age of a plant or tree (height, width, root development, number of branches or seeds, past photos of the same area to show change, old council records). See http://www.wikihow.com/Measure-the-Height-of-a-Tree for other methods.

STAGE 3

FOCUS QUESTION 1: HOW DID PLANTS BECOME PART OF OUR WORLD?

How have plants evolved?

Materials

Information from 'Background Information' page and the timeline.

ACTIVITY

Discuss with students the changes in plants over time (as outlined in the Background Information). Ascertain that different plants grow in different ways over different time periods and explain the variety of plants that exist on our planet today. This variety and number of plants is called biodiversity and measures how healthy our environment is.

Ask students to draw up a timeline (with pictures) representing the information located in the 'Background Information' section on the evolution of plant communities.

Students could also research one era or type of plant mentioned and do a more detailed presentation on that step in the evolution of plants.

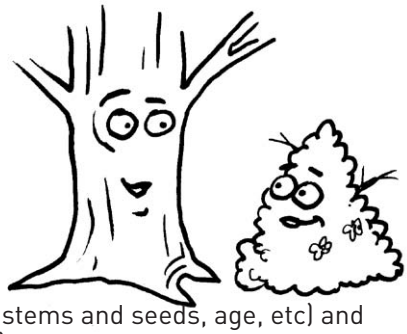
FOCUS QUESTION 2: HOW ARE TREES DIFFERENT TO OTHER PLANTS?

What makes trees different to each other and to other plants?

Materials

Activity sheet 1.6

Clipboard and pencils



ACTIVITY

Refresh students memories about the way plants have evolved over time.

Ask students to suggest how plants differ (colour, size and shape of leaves, stems and seeds, age, etc) and how they reproduce in different ways (seeds, rhizomes, cuttings, spores, etc).

Take students to the playground and ask them to find 3 different plants (one of which is a tree) and fill in Activity Sheet 1.6.

Based on their discoveries from the playground, discuss how plants have adapted in different ways (e.g. shade/sun, soil type, availability of water, seed dispersal or method of propagation, sheltered or exposed position, age, etc).

FOCUS QUESTION 3: HOW DO NATIVE PLANTS HELP OUR ENVIRONMENT?

What role do native plants play in our environment?

Materials

Information from school library books or the Internet.

Interviews with National Park and Bushcare or Landcare officers, native nursery employees, officers from the Royal Botanic Gardens or Greening Australia.

ACTIVITY

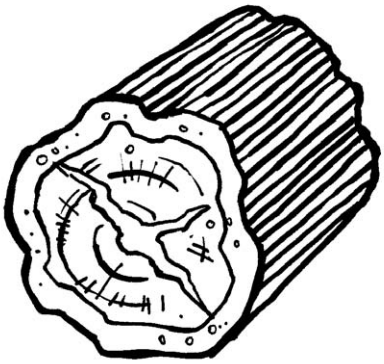
Discuss the importance of having healthy native vegetation in your local area, and the world (corridor, habitat and food source for native wildlife; carbon cycle role; erosion control; aesthetics; shade; soil enrichment; wind breaks etc). Discuss the concept of biodiversity (the more naturally occuring species we have, the better they can play their special part in the environment by helping the soil keep its moisture, giving shade/ protection to other plants, fertilising soil etc).

Explain that as most native plants have adapted to their environment over millions of years (remind them of the timeline), they are the most appropriate plant for the location in which they naturally occur. If they are replaced by other plants or removed then the ecosystem may become disturbed and damaged. Biodiversity may also suffer.

Students are then asked to select a native plant and to research its location, the site it occupies, the type of soil it grows in, how it has adapted to that site, the amount of water it needs, what other plants species are near it, whether it is associated with other plants (e.g. Is it part of the understorey? Does it provide protection for other plants?), the animals or insects that live with it, and to propose what might happen if the plant was cleared from the area.

Students make a presentation to the class summarising their research and stating the role their plant plays in the local ecosystem (e.g. Is it dependent on another plant or animal, is it part of a chain or connected to others by providing food or shelter?).

FOCUS QUESTION 4: HOW LONG DO TREES LIVE AND HOW CAN YOU TELL THEIR AGE?



How can plants tell us about the past?

Materials

Information Sheet B

Camera or pencils and paper

ACTIVITY

Using Information Sheet B (on a screen or OHP), discuss with students the rings on a cross section of a tree (if you can get an actual tree cross section, use that).

Consider each of the different layers and discuss why some rings are thicker than others. It could indicate wetter years (i.e. the thicker rings) and drier or drought years (the thinner rings). Discuss how the age of a tree can be determined by counting the number of rings (approximately, 1 ring = 1 year).

Take students into the playground and photograph or draw a variety of young and old plants. Comment on their age in terms of height, hollows, roots or any other signs. Ask students how old the trees might be and determine some guidelines on how you can tell the age of trees. Ask older people in the school (custodian etc) if they remember when certain trees and shrubs were planted to see if the students' estimates of tree ages were accurate.

Activity Sheet 1.1 – Stage 1:
How are plants different from each other?

My group name is _____

Our native seed is a _____

We planted our seed on the _____

The date we first saw a little seedling appear was _____

It looked like this:

After 2 weeks, our plant was _____ mm tall

After 4 weeks, our plant was _____ mm tall

At the end of the term, our plant was _____ mm tall

It looked like this

Our plant is different to the other plants in the class because _____

_____

Activity Sheet 1.2 – Stage 1:
Young and Old

Name: _____ Date: _____

The oldest person I know is _____

The youngest person I know is _____

The oldest plant at our school is a _____

Draw a picture of this plant. What does it look like? Where in the school does it grow?

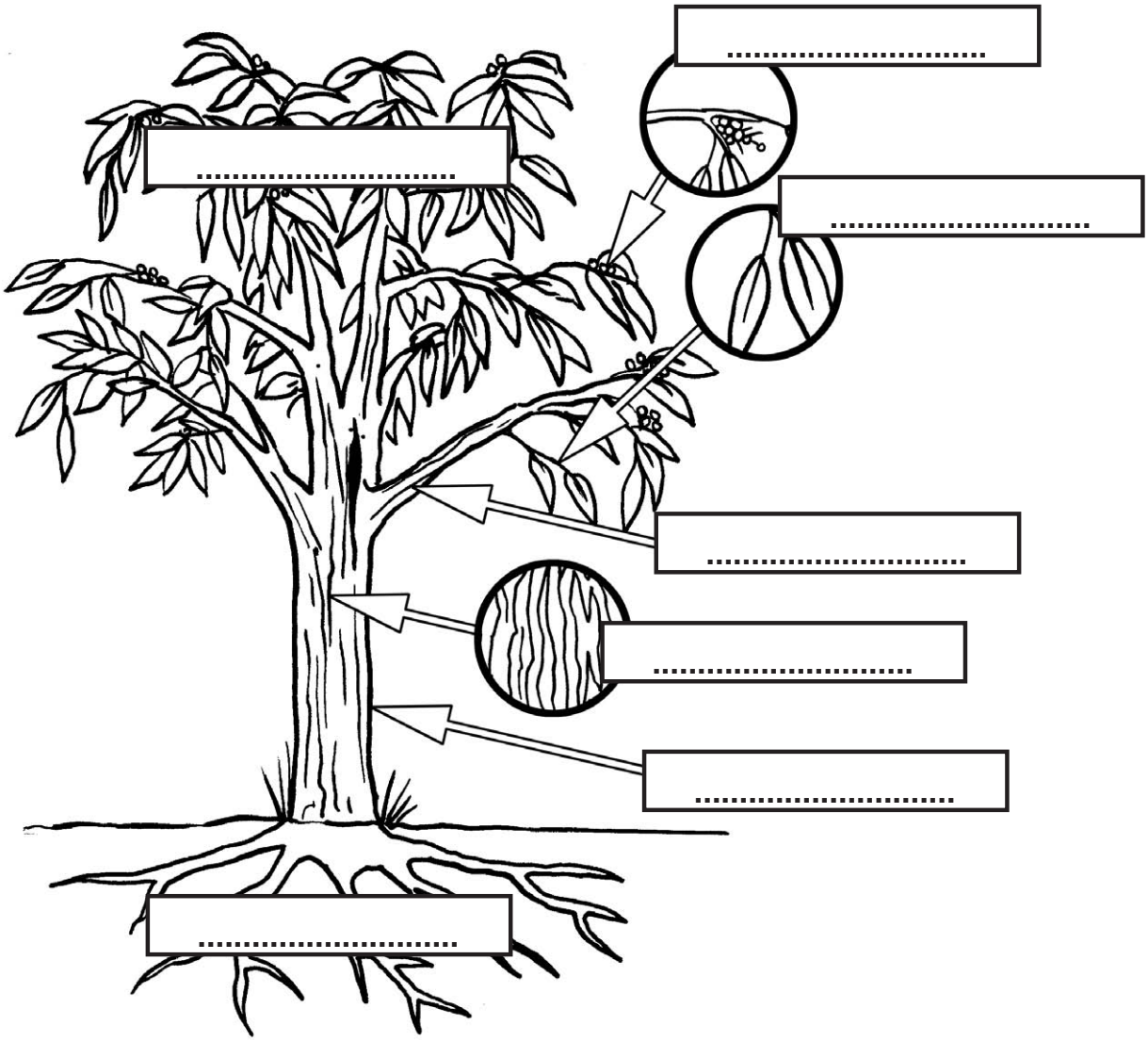
The youngest plant at our school is a _____

Draw a picture of this plant. What does it look like? Where in the school does it grow?

Activity Sheet 1.3 – Stage 2:
What do all trees need to stay alive?

Name: _____ Date: _____

Label the different parts of the tree on the picture below



Now write a sentence about why each part is important. The first one has been done for you.

The roots supply food and water from the soil to the tree

The branches _____

The leaves _____

The canopy _____

The bark _____

The trunk _____

The flowers or seeds _____

Information Sheet A – Stage 2:

How do plants help other living things?

Activity Sheet 1.4 – Stage 2:
How do plants help other living things?

Name: _____ Date: _____

My animal is a _____

It lives _____

It has_____

_____

Trees are important to it because _____

_____

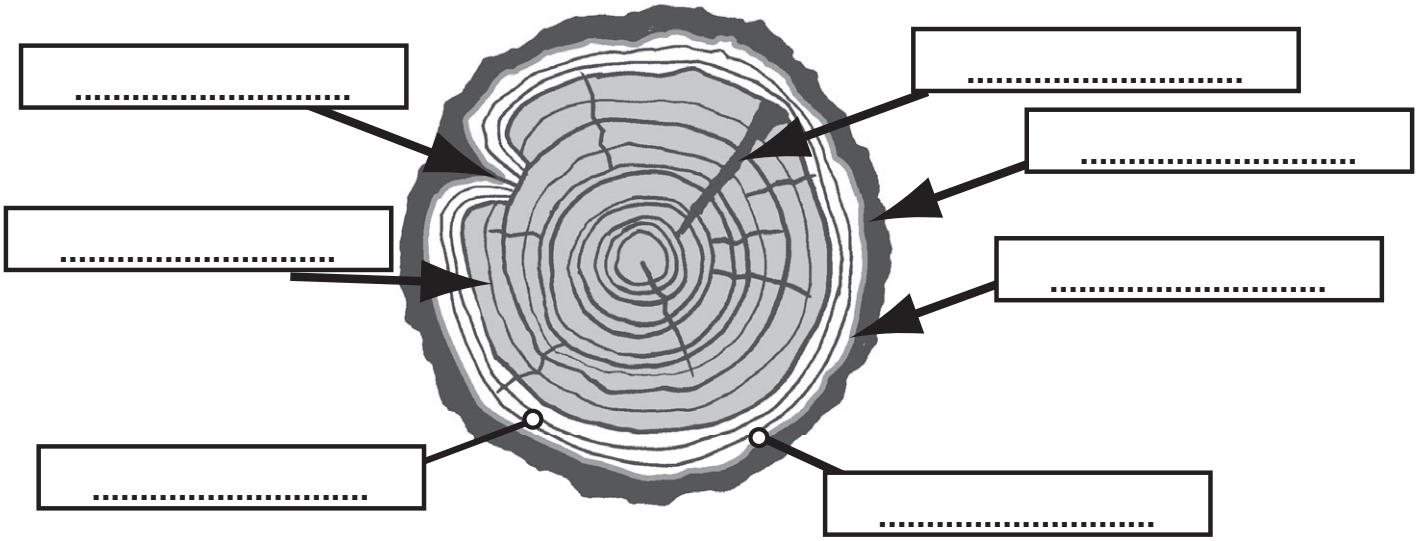
_____

_____

Draw a picture of your animal in its habitat here

Activity Sheet 1.5 – Stage 2:
Measuring age and growth of plants

Label the tree section with the appropriate parts then write a description of each part. The first one has been done for vou



The outer bark is the protective layer of the trunk

The inner bark _____

The cambium _____

The sapwood _____

The heartwood _____

Match the tree cross section with the correct description

5 YEAR OLD TWINS

4 YEARS OLD

10 YEARS OLD

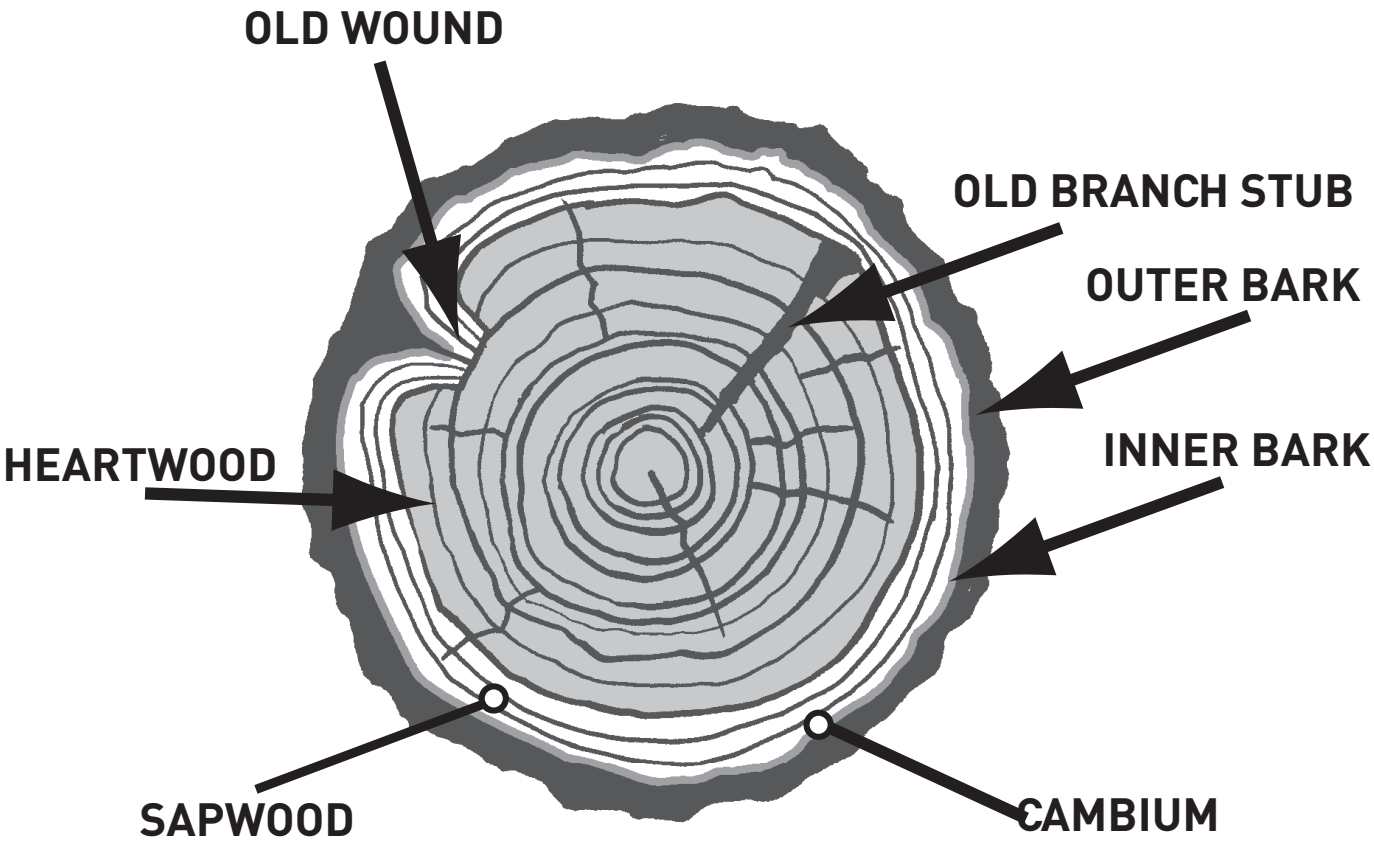
7 YEARS OLD
IN THE 4TH YEAR THERE WAS A FIRE NEARBY

6 YEARS OLD
THIS TREE HAD INSECT PROBLEMS

6 YEARS OLD
THIS TREE HAS A DENT

Information Sheet B – Stage 2:

Measuring age and growth of plants and Stage 3: How can plants tell us about the past?



Outer bark- The protective outer layer of the trunk

Inner bark – Where the trees food flows

Cambium – Layer of living cells in the trunk located between the inner bark and the sapwood

Sapwood – Layer of wood outside the heartwood

Heartwood – Core of the trunk

Thicker rings indicate a wetter and healthier season while thinner rings can indicate drought or drier periods.

Dents, cracks, colouring or trails can indicate the impact of fire, insects, loss of branches, and inhibited or stunted growth.

Activity Sheet 1.6 – Stage 3:
What makes trees different to each other and other plants?

Name: _____ Date: _____

Write summary notes on the 3 plants you investigated here

Plant 1:	Plant 2:	Plant 3:
Draw a sketch of the plant:	Draw a sketch of the plant:	Draw a sketch of the plant:
Sunny position? Yes ❐ No ❐	Sunny position? Yes ❐ No ❐	Sunny position? Yes ❐ No ❐
Soil Type Sand ❐ Clay ❐ Rock ❐ Other ❐	Soil Type Sand ❐ Clay ❐ Rock ❐ Other ❐	Soil Type Sand ❐ Clay ❐ Rock ❐ Other ❐
Seed Dispersal Wind ❐ Bird ❐ Animal ❐	Seed Dispersal Wind ❐ Bird ❐ Animal ❐	Seed Dispersal Wind ❐ Bird ❐ Animal ❐
Water in Soil Dry ❐ Moist ❐ Wet ❐	Water in Soil Dry ❐ Moist ❐ Wet ❐	Water in Soil Dry ❐ Moist ❐ Wet ❐
Sheltered Position? Yes ❐ No ❐	Sheltered Position? Yes ❐ No ❐	Sheltered Position? Yes ❐ No ❐
Approximate Age Less than 1 year ❐ 1-2 years ❐ 2-10 years ❐ 10-20 years ❐ 20+ years ❐	Approximate Age Less than 1 year ❐ 1-2 years ❐ 2-10 years ❐ 10-20 years ❐ 20+ years ❐	Approximate Age Less than 1 year ❐ 1-2 years ❐ 2-10 years ❐ 10-20 years ❐ 20+ years ❐

What were the main differences you noticed between these three different plants?

_____

_____

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National TreeDay

Unit 1 - Feedback and Evaluation Form

This resource has been developed to help students get the most out of their National Tree Day and/or Schools Tree Day event, and to provide learning experiences that enable them to grow into environmental custodians.

In order to improve this resource in the future, we would greatly appreciate your feedback.

Once completed, please fax this form to **02 4757 8980** or post to

Planet Ark Environmental Foundation, PO Box 4, Wentworth Falls, NSW 2782

Please answer the following questions:

Teacher Name: _____

School Name: _____

Grade/Class: _____

Which state do you teach in? _____

In which Local Government Area is your school? _____

Which stage of lessons did you implement? _____

Which focus questions did you implement? _____

Did your class participate in Schools Tree Day? Yes No

If so, on what date? _____

How did you hear about this resource? _____

Please remark on the following statements on the scale provided:

Statement	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I feel the lessons were effective in teaching their stated aims	1	2	3	4	5
I feel the class was engaged by the unit content	1	2	3	4	5
I feel the lessons were appropriate for their age and level of understanding	1	2	3	4	5
I found this unit useful for incorporating environmental education into my lesson planning	1	2	3	4	5
I feel this unit helped to increase my class' knowledge about the benefits of creating healthy native plant communities	1	2	3	4	5
I feel my class is now better equipped to be environmental custodians as a result of this unit	1	2	3	4	5
(If applicable) I feel this unit gave good educational support to our Schools Tree Day event	1	2	3	4	5

Which lesson(s) did you find were the most effective?

Which lesson(s) did you think were ineffective or inappropriate?

Was there anything about the document layout that you found frustrating?

How would you like to see this unit changed or improved for the future?

Are there any other comments, feedback or suggestions you would like to make?

Are you happy for us to contact you for further feedback? If so, please provide a contact number:

Thank you for taking the time to fill in this evaluation form.

Your feedback will ensure that we can produce the best possible resources to support the valuable work you are doing in educating our children, the future leaders of our world.