# Science

## Nature Detectives - connecting with our place

Written by: Janet Price

**Number of lessons: 6**

**Year Level(s): Year 1 & 2**

**Australian Curriculum content descriptions:**

**Science**

Living things have a variety of external features ACSSU017

Living things live in different places where their needs are met ACSSU211

Living things grow, change and have offspring similar to themselves ACSSU030

Science involves observing, asking questions about, and describing changes in, objects and events ACSHE021, ACSHE034

People use science in their daily lives, including when caring for their environment and living things ACSHE022, ACSHE035
Pose and respond to questions, and make predictions about familiar objects and events ACSIS024, ACSIS037

Use informal measurements to collect and record observations, using digital technologies as appropriate ACSIS026 ACSIS039

Use a range of methods to sort information, including drawings and provided tables and through discussion, compare observations with predictions ACSIS027, ACSIS040

Compare observations with those of others ACSIS213, ACSIS041

Represent and communicate observations and ideas in a variety of ways ACSIS029, ACSIS042

**Math**
Represent data with objects and drawings where one object or drawing represents one data value. Describe the displays ACMSP263

Collect, check and classify data ACMSP049

Create displays of data using lists, table and picture graphs and interpret them ACMSP050

**Achievement standard:**

By the end of Year 1, students describe objects and events that they encounter in their everyday lives, and the effects of interacting with materials and objects. They describe changes in their local environment and how different places meet the needs of living things.

Students respond to questions, make predictions, and participate in guided investigations of everyday phenomena. They follow instructions to record and sort their observations and share them with others.

By the end of Year 2, students describe changes to objects, materials and living things. They identify that certain materials and resources have different uses and describe examples of where science is used in people's daily lives.

Students pose and respond to questions about their experiences and predict outcomes of investigations. They use informal measurements to make and compare observations. They record and represent observations and communicate ideas in a variety of ways.

**Math**
By the end of Year 1, students describe data displays. Students collect data by asking questions, draw simple data displays and make simple inferences.

By the end of Year 2, students interpret simple maps of familiar locations. Students make sense of collected information.

Students use a calendar to identify the date and the months included in seasons. Students collect, organise and represent data to make simple inferences.

# Lesson 1 - Nature Spots

**Context**
Students need practice at sitting quietly and using their senses to look around them. Once they have attuned to their surroundings they are more likely to be able to make detailed observations. It is important to get to know the country you are part of and spend time in quiet contemplation.

## Materials and equipment

Nature spot Student Booklet
small carpet tile, rubber spot to sit on

## Safety Advice

Hats worn
Check for ant nests

## Objectives

This lesson is to get students used to sitting quietly by themselves and using their senses to take in what is happening around them.

## Introduction

Discuss who has spent time outdoors with their family, camping, bush walks, playing in a creek.
Explain that the class is going to build up their stamina at sitting quietly in the same spot, using all senses.
Time students sitting at their desks without talking or looking at each other as a baseline measurement before heading outside. Some may find this challenging and your first time may be very short. Record the time to show students later the improvement they have made.

## Core

Find a place in your school grounds where each child can sit within sight but away from each other. Let students decide on their own spot. Put down the spot or mat and ask students to make themselves comfortable in a sitting position.

Establish rules for the Nature Spot – look around you at your natural environment, listen to what is happening, breathe deeply to see what smells you can identify, feel the weight of your body on the ground beneath you. Remind students that this is their time to spend in nature, ignore sounds or movements from other students.

Time for one minute and see if students are able to remain quietly using their senses for the whole time.
Repeat each day/week with students in exactly the same spot, lengthening the time each visit.

### Conclusion

In the classroom, get feedback from students about the process.
How did it make you feel?
What did you see?
What did you hear?
Were there any smells?
How did breathing deeply have an effect on you?
How did your body feel sitting without moving?

### Resources

**Digital:**
**Worksheet:**
**Useful links:**

# Lesson 2 - Nature Spot mapping

### Context

When students are able to sit using their senses for at least 1 – 2 minutes introduce the next step.

### Materials and equipment

Nature Spot Student Booklet
Clipboards
small carpet tile, rubber spot to sit on

### Safety Advice

Hats worn

### Objectives

To record each Nature Spot as a bird's eye map, including important features.

### Introduction

This week, when visiting the student's Nature Spot, they will be drawing a map of their Spot.
Hand out the Nature Detective booklets. Explain that for each activity they complete, they will be able to colour the badge associated with that activity. If possible, make the badges to hand out to students.
Discuss bird's eye view – show pictures of the school grounds via Google maps to help illustrate.

### Core

Students visit their Nature Spot.
Spend time in quiet contemplation using all senses to take in their surroundings.
Using the clipboard and booklet students draw a map of their site as it might appear to a bird flying overhead. Name things around them and put an x in the middle of a sheet of paper to represent where they are sitting.

### Conclusion

Share maps when back in the classroom. Note the items that were included that the students felt were important. Discuss and defend what they chose to include.

### Resources

**Digital:**
Google maps

**Worksheet:**
Nature Detective Student Booklet, Nature Detective Teacher Notes

# Lesson 4 – Nature Spot sound map

### Context

This lesson focusses on using the student's sense of hearing to map what can be heard around them. This can be completed in multiple lessons over time and a "compare and contrast" can be done about different times of the day, seasons, weekdays etc.

## Materials and equipment

Nature spot Student Booklet
Clipboards
small carpet tile, rubber spot to sit on

## Safety Advice

Hats worn

## Objectives

To record a sound map of each Nature Spot.

## Introduction

This week, when visiting the student's Nature Spot, they will be drawing a sound map of their Nature Spot.
Hand out the Nature Detective booklets. Discuss sitting without sound and tuning in to what can be heard around them.

## Core

Students visit their Nature Spot.
Challenge them to sit quietly for at least 10 minutes at their Nature Spot. On the map created in the last session (or a new map), put an x in the middle of a sheet of paper to represent where they are sitting. The challenge now is to listen carefully to the sounds around them and plot each sound on the map in relation to where they are sitting. They can either write out sound words of what is heard or if they know what is making the sound they can write the name. Write the sounds in relation to you (the x) on the paper.

## Conclusion

Share maps when back in the classroom.
Infer the source of any unidentified sounds. Compare sounds heard according to where the Nature Spot is located.
How many sounds were from nature and how many sounds were man made? Graph the types of sounds – decide on categories to graph (natural/man-made, birds, cars, people other etc)

## Resources

**Worksheet:**
Nature Detective Student Booklet, Nature Detective Teacher Notes
**Useful links:**
https://www.birdsinbackyards.net/birds/featured/Top-40-Bird-Songs
https://www.birdsinbackyards.net/finder

# Lesson 4 - Nature Spot noticing - journal writing

## Context

This lesson focusses on students using their senses to closely observe their surroundings and write about what they find.

## Materials and equipment

Nature spot Student Booklet
Clipboards
small carpet tile, rubber spot to sit on

## Safety Advice

Hats worn

## Objectives

To write about observations made at student's Nature Spot.

## Introduction

This week, when visiting the student's Nature Spot, students will be spending time "noticing" what is around them. This will be recorded as a Journal entry.
Hand out the Nature Detective booklets. Discuss sitting without sound and tuning in to what can be heard around them.

## Core

Discuss the word "notice". Think, pair, share ideas. Record student ideas. Define "notice" as a noun meaning "the fact of observing or paying attention to something."
Explain that each student will be observing what is around them at their Nature Spot and writing their "noticings" in the Nature Detective Journals.
Discuss a "detailed statement". It gives specific observations about what you notice.Instead of, "There is a beautiful tree on my right" try "The beautiful tree to my right has bumpy grey bark and slender, yellow flowers. Here's a drawing I made of the flowers. I think it's a silky oak."

Students visit their Nature Spot.
Spend 5 minutes noticing.
In their Nature detective booklet, students then write at least one detailed statement or paragraph for each of the four noticings.

**I notice . . .**
**I think . . .**
**Connection: This reminds me of . . .**
**I wonder . . .**

### Conclusion

Share journal entries when back in the classroom.
Discuss the variety of noticings, perhaps dependent on where the student was or what caught their attention. Dig deeper to find out what made each student notice what they did.
Share connections made.
Write wonderings on a Wonder Board for future investigation.

### Resources

**Worksheet:**
Nature Detective Student Booklet, Nature Detective Teacher Notes

## Lesson 5 - Invertebrates I Spy

### Context

Finding invertebrates is a great way to get kids connected to the nature around them because they can be found almost everywhere. Creating a map of invertebrates within the school grounds will make students more familiar with their own "place".

### Materials and equipment

Nature Spot Student Booklet
Clipboards
magnifying glasses
bug catchers

## Safety Advice

Hats worn
Establish rules about not touching insects or spiders, only observing them.

## Objectives

To connect with the natural environment through finding invertebrates in the local area.

## Introduction

Explain that there are two main types of animals; invertebrates and vertebrates.
Vertebrates: These animals have a backbone and a skeleton on the inside. A skeleton inside means you can grow.
Invertebrates: Invertebrates are animals that don't have a backbone or a bony skeleton. Some invertebrates are soft like a jellyfish. Others have a shell to give their bodies protection. Others have a skeleton on the outsides of their bodies; called an exoskeleton. This helps to protect their insides, like armour. These animals have to shed the old exoskeleton and grow a new one. Ask students if they have ever seen an exoskeleton that may have been shed by an invertebrate. (spider, cicada)
Share the Vertebrate Or Invertebrate? Images with students.
Work as a class to classify each animal as either a vertebrate or an invertebrate. Ask students to provide justifications for their suggestions (e.g. I see… I know…). Discuss misconceptions as they arise.

Discuss that many invertebrates are the bugs we find in the garden, such as insects, spiders, and slugs and snails.

## Core

Explain to students that they will be going on an invertebrate hunt in the school grounds. Students will not be touching anything they find, but for any invertebrate that is not dangerous, they can get down close and examine it.
Each student will need their Nature Detective booklet. Students will be drawing what they see.
Use the Scientific Drawing Guidelines (taken from Cool ustralia.org) to show students what a good drawing looks like. The drawing don't need to be as detailed as the example in the guidelines document, but it is useful to record things like the number of legs, the shape of the head and body, whether you can see any wings, the colours, and anything else interesting or important. Explain that it doesn't matter what their drawings look like; what is important is how much information about the invertebrate they include in the drawing. The guidelines are something to aim for.

Head outside to the student's Nature Spot or find an area that can be defined easily to find invertebrates. Allow time for students to find and draw a few samples.
As students observe and draw have these questions for them to work from.
What do you think this invertebrate is? (E.g. ant, beetle, snail ).

- What do you think it is doing?
- If it is travelling, where do you think it is going?
- Imagine this invertebrate could speak, what would it say?
- How does it move? Can you copy its movements?

### Conclusion

Share scientific drawings when back in the classroom. Point out features of student drawings that made clear what they observed. Copy and display student examples.
Collate types of invertebrates found. Identify if possible (iNaturalist, handbooks)
Graph different types of invertebrates to gain a snapshot of the date and time.
Talk through the prompt questions and share responses.

### Resources

**Digital:**
Vertebrate or Invertebrate chart

**Worksheet:**
Nature Detective Student Booklet, Nature Detective Teacher Notes, Scientific Drawing Guidelines, Vertebrate or Invertebrate chart

**Useful links:**
Nature Detective Student Booklet, Nature Detective Teacher Notes, Scientific Drawing Guidelines, Vertebrate or Invertebrate chart

# Lesson 6 - Animal School Ground Blitz

### Context

To begin a map of animals found on the school grounds.

### Materials and equipment

Nature Spot Student Booklet
Clipboards

## Safety Advice

Hats worn

## Objectives

To find out what kinds of bigger animals inhabit the school grounds and begin a map of these. This can be used to compare with future groups doing the same activity or with the same group of students in a different season.

## Introduction

Discuss the idea of a school ground Blitz to find as many animals as possible. Go though the sheet in the Nature Detective Booklet and start with the idea of looking to find these things.
Next students will be walking around the school grounds with the class recording animals seen and what they were doing.

## Core

Walk slowly as a class, ticking off when animals on the sheet are found. Discuss ground rules(behaviour, locations, how students are moving) for working with a partner to find other animals. With a partner spend 20 minutes looking for animals in the defined area. Fill in the sheets in the Nature Detective booklet as they go.

## Conclusion

Collate the information when back in the room. Create a graph based on the class information. Allow students to make inferences about the data – what is it showing us? Students can then create their own graph based on class information.
Write some inquiry questions about the data for follow up.

## Resources

**Digital:**
Vertebrate or Invertebrate chart

**Worksheet:**
Nature Detective Student Booklet, Nature Detective Teacher Notes, Vertebrate or Invertebrate chart

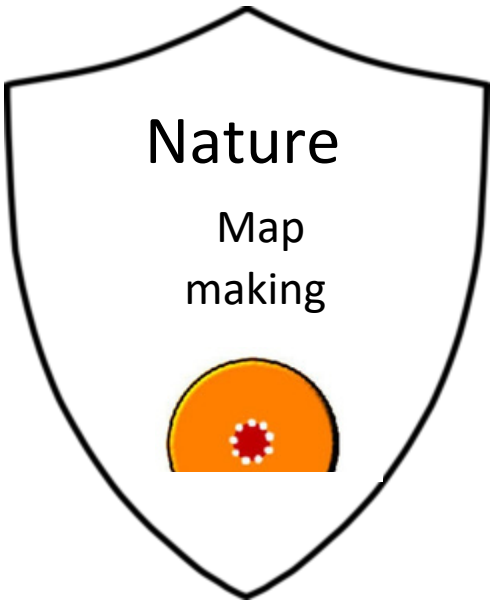
**The Nature Detective badges can be earned any way you see fit. If students have completed an activity to your satisfaction, they can be "awarded" the badge. This could mean colouring the badge in their booklet or receiving an actual badge.**

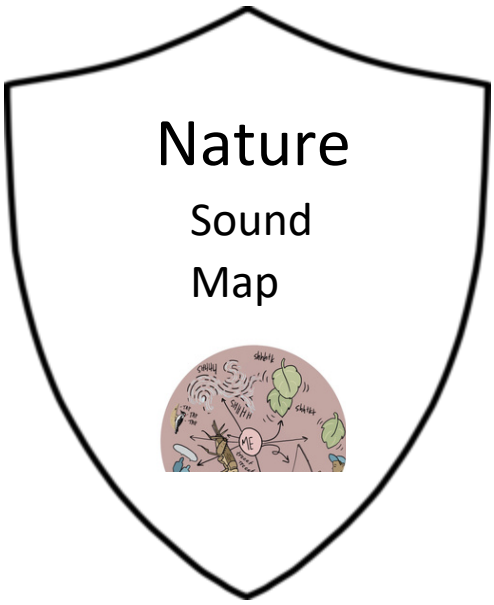
Nature Detectives Student Booklet

# Nature Detectives Nature Passport

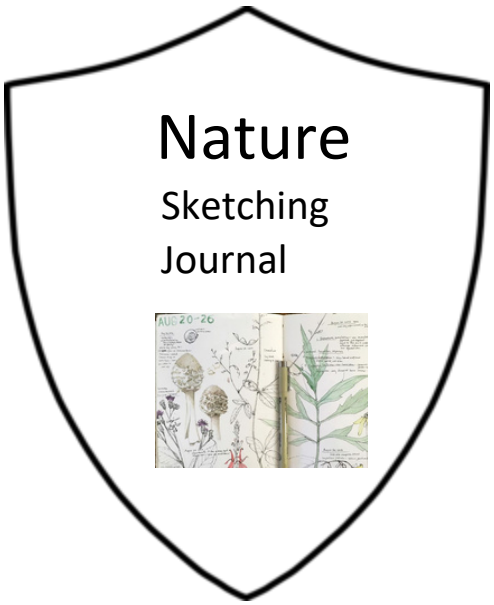
Nature Detectives Student Booklet

# Nature Detective Badge collection







**Nature Detectives Student Booklet**

## Invertebrates

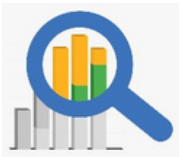
I Spy


## School Yard

Identify

## Maths

Data
Collecting



Nature Detectives Student Booklet

# Nature Spot

A nature spot is a special natural place that you explore, and get to know well.

Once a week, you will be visiting your spot and observing plants and animals, seasonal changes, and doing some nature writing and mapping from your nature spot.

Find your Nature Spot!

Nature Detectives Student Booklet

Draw a map of your site as it might appear to a bird flying overhead.

Name things around you and put an x in the middle of a sheet of paper to represent where you are sitting.

Nature Detectives Student Booklet

# Sound Map

Challenge yourself to sit quietly for at least ___ minutes at your Nature Spot.

Your challenge now is to listen carefully to the sounds around you and plot them on your map in relation to where you are sitting.

You can either write out sound words of what you hear or if you know what is making the sound you can write the name.

Write the sounds in relation to you (the x) on your paper.

# Noticing Journal Writing

Go to your Nature Spot

Sit and notice what is around you.

In your Nature Detective booklet, write at least one detailed statement or paragraph for each of the noticings.

I notice . . .

I think . . .

Connection: This reminds me of . . .

I wonder . . .

Nature Detectives Student Booklet

A "detailed statement" gives specific observations about what you notice. Instead of, "There is a beautiful tree on my right" try "The beautiful tree to my right has bumpy grey bark and slender, red flowers. Here's a drawing I made of the buds. I think it's a Bottlebrush."

I notice _____

I think _____

Connection: This reminds me of _____

_____

I wonder _____

Nature Detectives Student Booklet

I notice _____

I think _____

Connection: This reminds me of _____

_____

I wonder _____

Nature Detectives Student Booklet

I notice _____

I think _____

Connection: This reminds me of _____

_____

I wonder _____

Nature Detectives Student Booklet

I notice _____

I think _____

Connection: This reminds me of _____

_____

I wonder _____

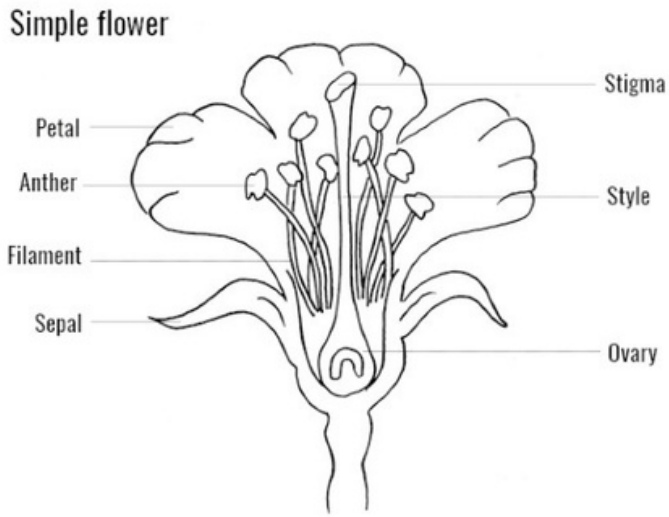
Nature Detectives Student Booklet

# Invertebrates I Spy

You will be finding invertebrates and sketching them.

For a scientific drawing;

1. Use a very sharp lead pencil.
2. Print a heading at the top of the page and underline it.
3. Draw a simple, side-on view of what you're drawing. Include only the essential details.
4. Print all labels (no running writing). Write them horizontally to the diagram and close to the relevant feature. Arrange them neatly around the drawing. Rule a straight line between the label and the feature.



**Nature Detectives Student Booklet**

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**Nature Detectives Student Booklet**

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Nature Detectives Student Booklet

# Find as many as you can.

A bird on the ground

An ant trail

A bird flying overhead

Two birds together

A flowering shrub

Something a bird could eat

Something birds might use to build a nest

A bird in a tree

Hear a bird call and imitate it

A flying insect

A lizard

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Nature Detectives Student Booklet

# Species count

Find as many living things as you can. Record your finds in the table below. Name as many as you can correctly.

| Animal | Species | Tally | What was it doing? | Picture – if needed |
|---|---|---|---|---|
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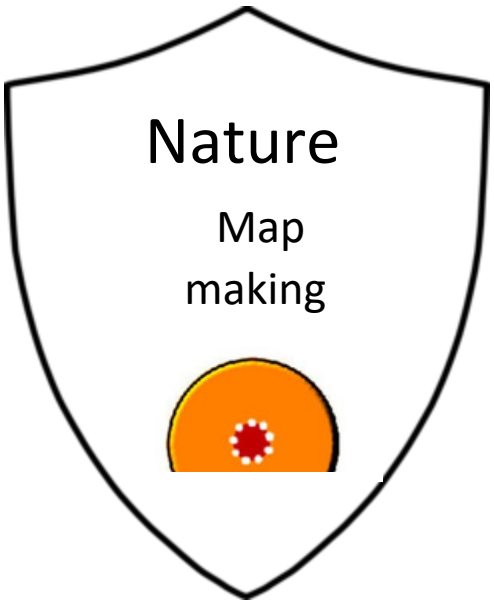
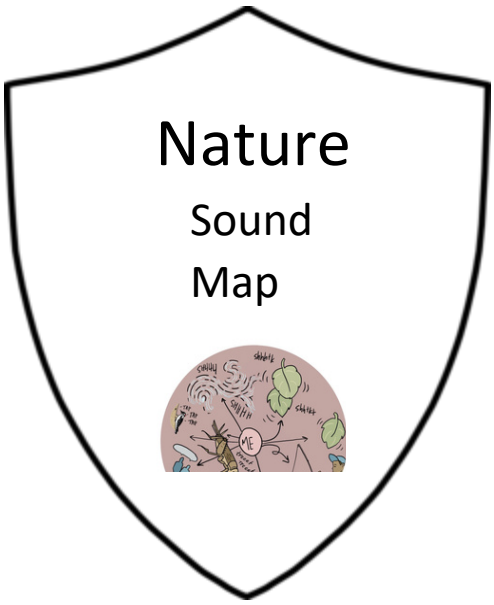
Nature Detectives Teacher Booklet

# Nature Detectives Nature Passport

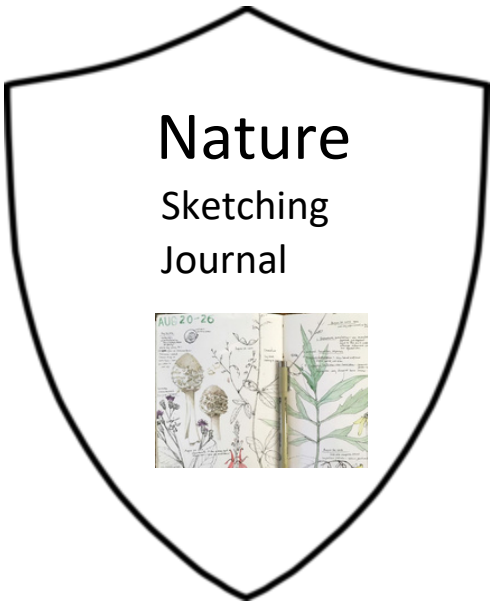
Nature Detectives Teacher Booklet

# Nature Detective Badge collection







**Nature Detectives Teacher Booklet**

## Invertebrates

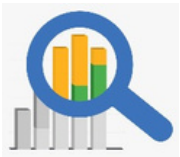
I Spy


## School Yard

Identify

## Maths

Data
Collecting



# Nature Spot

A Nature Spot is a special natural place that you explore, and get to know well. Once a week, you will be visiting your spot and observing plants and animals, seasonal changes, and doing some nature writing and mapping from your Nature Spot.

## Find your Nature Spot

Draw a map of your site as it might appear to a bird flying overhead. Name things around you and put an x in the middle of a sheet of paper to represent where you are sitting.

## Sound Map

Challenge yourself to sit quietly for at least 10 minutes at your Nature Spot. On the map you just created, put an x in the middle of a sheet of paper to represent where you are sitting.
Your challenge now is to listen carefully to the sounds around you and plot them on your map in relation to where you are sitting. You can either write out sound words of what you hear or if you know what is making the sound you can write the name. Write the sounds in relation to you (the x) on your paper.

## Noticing Journal Writing

In your Nature Detective booklet, write at least one detailed statement or paragraph for each of the four noticings.

I notice . . .

I think . . .

Connection: This reminds me of . . .

I wonder . . .

NOTE: A “detailed statement” gives specific observations about what you notice. Instead of, “There is a beautiful tree on my right” try “The beautiful tree to my right has bumpy grey bark and slender, layered, red flowers. Here’s a drawing I made of the buds. I think it’s a grevilia.”

## Nature Spot Sketches (optional)

Make a detailed sketch of your Nature Spot from different perspectives. You may want to photograph or sketch “macro” (close up) to show a small, intricate detail in your spot.

# Invertebrates I Spy

Teacher Notes

As a group, insects (one group of invertebrates) are the most populous animals on Earth. It is estimated that there are 200 million insects for every human on the planet.

Invertebrates are animals without a spine (humans and other mammals have a spine and belong to the category 'vertebrates'.). Invertebrates that you may find in your schoolyard or home garden could include:

• Insects - Insects are defined as having a body made up of three parts; a head, an abdomen, and a thorax (the bit that lies between the abdomen and the head, in humans, this would be the chest). They have two antennae, three pairs of legs and a hard exoskeleton. Some examples of insects are bees, ants, beetles, mosquitoes, crickets and butterflies

• Spiders - Spiders are arachnids, not insects. They are defined by having eight legs and don't have antennae

• Worms - Worms tend to be tube-shaped, slimy and live underground or undercover (such as rocks or logs)

• Snails - Snails and slugs belong to the phylum Mollusca which they share with squids, cuttlefish and octopus.

Teaching sequence

Explain that there are two main types of animals; invertebrates and vertebrates.

Vertebrates: Humans have a backbone and a skeleton on the inside. A skeleton is useful because it means we can grow.

Invertebrates: Invertebrates are animals that don't have a backbone or a bony skeleton. Some invertebrates are soft, like a jellyfish. Some have a shell to give their bodies protection. Others have a skeleton on the outsides of their bodies; this is called an exoskeleton. This helps to protect their insides, a bit like armour. They have to shed the old exoskeleton and grow a new one.

Share the Vertebrate Or Invertebrate? images with students. Work as a class to classify each animal as either a vertebrate or an invertebrate. Ask students to provide justifications for their suggestions (e.g. I see... I know...).

Explain to students that many invertebrates are the bugs we find in the garden, such as insects, spiders, and slugs and snails. These are great invertebrates to focus on because you can find them everywhere.

Explain to students that they will now be going on an invertebrate hunt in their schoolyard. Explain to students that they will not be touching them but for any invertebrate that is not dangerous, they can get down close and examine it.

Each student will need some paper and a pencil. Explain to students that they will be drawing what they see.

Use the Scientific Drawing Guidelines (taken from Cool ustralia.org) to show students what a good drawing looks like. The drawing don't need to be as detailed as the example in the guidelines document, but it is useful to record things like the number of legs, the shape of the head and body, whether you can see any wings, the colours, and anything else interesting or important. Explain that it doesn't matter what their drawings look like; what is important is how much information about the invertebrate they include in the drawing. The guidelines are something to aim for.

Head outside to the student's Nature Spot or find an area that can be defined easily to find invertebrates.

Model an observation by finding an invertebrate, gather students around and before drawing, invite students to closely observe the invertebrate you have found and think about the following:

What do you think this invertebrate is? (E.g. ant, beetle, snail ).

• What do you think it is doing?

• If it is travelling, where do you think it is going?

• Imagine this invertebrate could speak, what would it say?

• How does it move? Can you copy its movements?

Allow time for students to find and draw a few samples. Encourage students to think about the features of the invertebrate they observed (i.e. does it have a shell? How many legs does it have? What colour is it?) and to record these features in their drawings.

Nature Detectives Teacher Booklet

# Find as many as you can.

A bird on the ground

An ant trail

A bird flying overhead

Two birds together

A flowering shrub

Something a bird could eat

Something birds might use to build a nest

A bird in a tree

Hear a bird call and imitate it

A flying insect

A lizard

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Nature Detectives Teacher Booklet

# Species count

Find as many living things as you can. Record your finds in the table below. Name as many as you can correctly.

| Animal | Species | Tally | What was it doing? | Picture – if needed |
|---|---|---|---|---|
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## Nature Detectives Teacher Booklet

Class Species Count

Use the pages below to collate the species found from the whole class.

**Nature Detectives Teacher Booklet**

## Graphing the DataExplain to students that they will now be working on presenting their data.

Model bar graph on paper as a class. Go through the conventions needed as you model.

Provide students with grid paper and explain that they will be creating a graph of the data they recorded.

Discuss the maximum number they recorded for a population and how they will ensure that they will be able to be shown it on their graph - what scale will be used?
Model how to create the graph, drawing and labelling the axis, writing a title for the graph and displaying the data for one category.
Provide time for students to create their own column graphs.

Once students have completed their graphs, reconvene the class.

Share observations about the data.

There might be observations about most common animal on the school grounds, types of species found (more birds than insects?), animals they thought they might see but did not (and why), any unusual sightings.

Write some inquiry questions for follow up – would we see different animals at a different time of the day/year?
Keep the data for future classes to use.

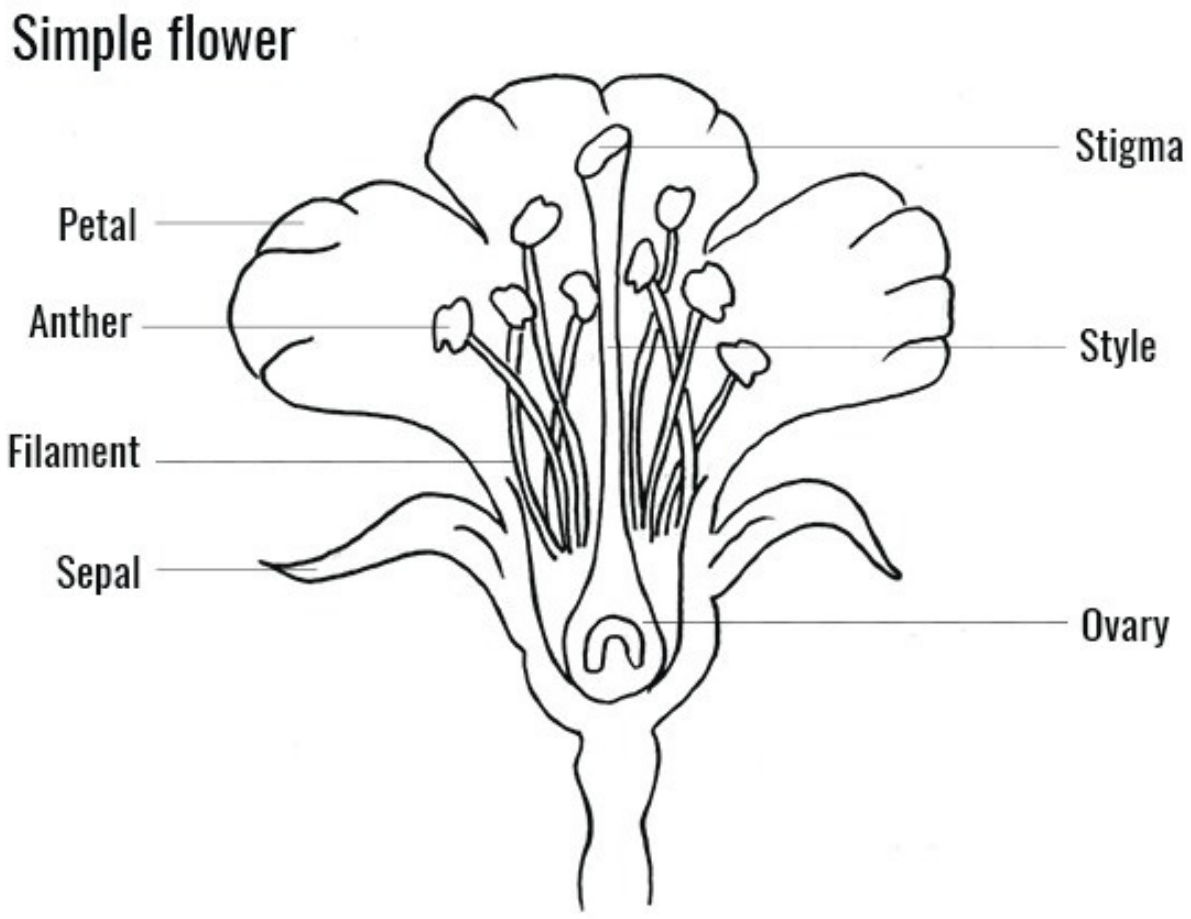
# Scientific Drawing Guidelines

Scientific drawing is about more than just quickly sketching what you see: it is about precision and facts - and the rules about diagrams reflect this. Correct diagrams show exactly what is needed, no more, no less. They need to be clear and accurate with as few lines as possible.

How to draw a correct scientific diagram:

1. Use a very sharp lead pencil, preferably 2B.
2. Print a heading at the top of the page and underline it.
3. Draw a simple, side-on view of what you're drawing (e.g. experiment/animal/plant). Include only the essential details (e.g. if you're drawing a beaker, just draw the sides and base. If you're drawing a bird, just draw the bird but leave out the forest and sky in the background).
4. Print all labels (no running writing). Write them horizontally to the diagram and close to the relevant feature. Arrange them neatly around the drawing. Rule a straight line (no arrowheads) between the label and the feature. Labels can include the purpose of the feature (e.g. pouch: where immature young develop).
5. Rule all straight lines - including underlining headings and titles - with a ruler (don't free-draw these lines). And don't underline labels!

For example:



# Vertebrate or Invertebrate?




# Vertebrate or Invertebrate?

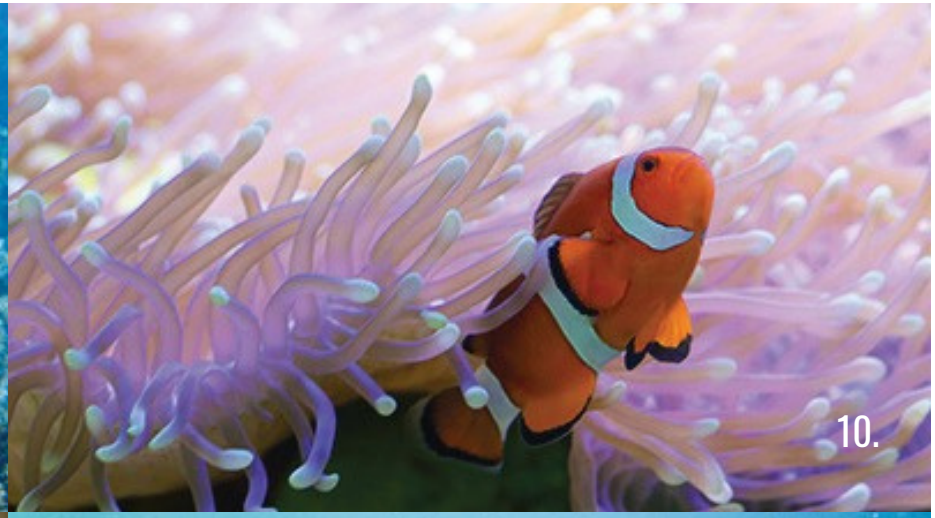

5.


6.


7.

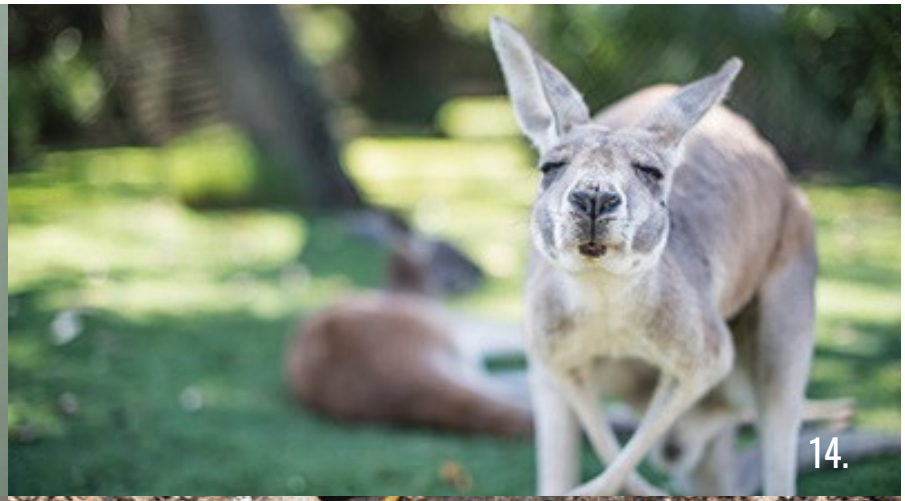

8.

# Vertebrate or Invertebrate?



# Vertebrate or Invertebrate?

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# Vertebrate or Invertebrate?

1. Snake - vertebrate
2. Earthworm - invertebrate
3. Snail - invertebrate
4. Caterpillar - invertebrate
5. Mosquito - invertebrate
6. Butterfly - invertebrate
7. Bee - invertebrate
8. Bird (Magpie) - vertebrate
9. Turtle - vertebrate
10. Fish - vertebrate (the anemone that the fish is hiding in is an invertebrate)
11. Octopus - invertebrate
12. Jellyfish - invertebrate
13. Spider - invertebrate
14. Kangaroo - vertebrate
15. Cat - vertebrate
16. Centipede - invertebrate