Classification at Sydney Zoo

Teacher Toolkit
Stage 4

OUTCOMES CONTRIBUTED TO:

SC4-CLS-01

SC4-WS-01

Welcome to the Sydney Zoo Teacher Toolkit

Our vision is to secure a sustainable future for wildlife through making connections between your students and our animals.

'Bringing Nature into a classroom can kindle a fascination and passion for the diversity of life on earth and can motivate a sense of responsibility to safeguard it'.

Sir David Attenborough

What is in this toolkit:

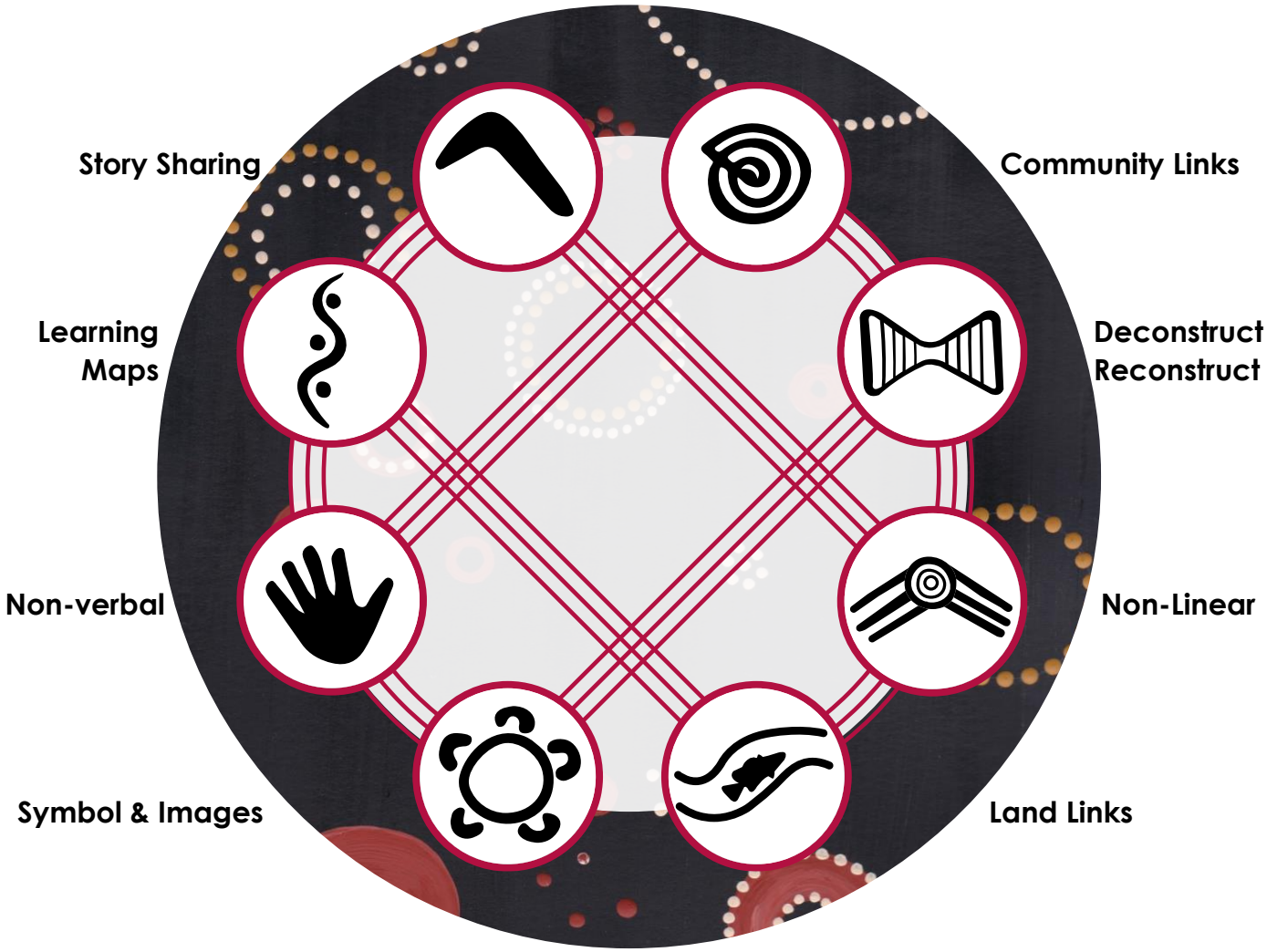
- Syllabus-linked pre-visit activities
- Resources for guided and self-guided visits to the Zoo to ensure your students get the most out of their visit
- Post-visit, syllabus-linked class project
- Links to provide further information

Resources required to best use this toolkit:

- Computer and screen or smartboard
- Internet access
- Access to playground/outdoors area where possible if not visiting the zoo

Sydney Zoo acknowledges the Darug nation, their people, past, present and their future generations.

Aboriginal Pedagogy
8Ways of Learning



TELL A STORY. MAKE A PLAN.
THINK AND DO. DRAW IT. TAKE IT OUTSIDE.
TRY A NEW WAY. WATCH FIRST, THEN DO.
SHARE IT WITH OTHERS

From the 8Ways website https://www.8ways.online/

Sydney Zoo has developed this lesson package with a focus on Aboriginal Pedagogy for delivery of all content. Context for each lesson is provided in the lesson plans.

Recommended pre-visit lesson outline

Location & Duration	Outcomes & 8Ways	Learning Activity	Resources
Classroom Can be broken up into multiple sessions or one longer session of 90min.	SC4-CLS-01 SC4-WS-01	8Ways context for this package includes deconstructing and reconstructing a concept. The process of classification is broken down and modelled throughout and then built back up by students as then create their own keys and tell a story. When visiting the zoo students will be learning on the land and using non verbal cues (watching animals, observing the environments).	
  	8Ways **Story Sharing** 8Ways **Deconstruct/ Reconstruct** 8Ways **Non-verbal**	**Activity 1:** **Hand out activity booklets** Ask students to read and fill in the first page of the activity sheets. - students can classify the contents of their own pencil case, and/or - whole class classification of equipment in the room. Break the tasks down for students and ask students to: • define how they will group the items (use, colour, or other ways) • move items into groupings or write them on a board/paper to group them together • discuss choices – there may be disagreements on what goes where - tell students this also happens frequently in the scientific community	**Activity sheets** 'Classification' 6 pages

Classification

2 of the animals on this page are more similar than the others – which two are they?

_____ **and** _____

How do we know?

Classification looks at the similarities and differences between things or groups as well as among members of the same group. We go from more general down to very specific until we get to the species name.

At Sydney Zoo we specialise in animal classification, but you can classify anything you can think of. Try it with the contents of your pencil case first, decide on how you will classify for example, by colour, function or shape.

Activity: group items with like items

- some items might not fit with any other and be on their own
- you might create subgroupings, for example, all blue pens together, then separating them into different branded blue pens, then different sized points.
- This is the essence of classification, making finer differentiations until you get to a single 'species'.

The scientific name of an animal is generally written in Latin (sometimes people call this a Latin name) and is used around the world so everybody knows exactly what species is being discussed and there is no confusion. There are over 6000 languages spoken around the world so there needed to be a standard way of communicating.

Carl Linnaeus set up this system of classification and it is now called Linnaean Classification, providing a universal language for people to use (this was in the 1700's).

Classification

Let's use the lion as an example. It has something in common with all living things – it is alive! To differentiate between living and non-living things is the first step.

MRS GREN	Does the lion do all these things? How do we know? Write some notes to show evidence of this.
M – Movement	
R – Respiration	
S – Sensitivity	
G – Growth	
R – Reproduction	
E – Excretion	
N – Nutrition	

Classification

All living things are split into groups with similarities, these groups (or as scientists we will call them clades) then get split further until they reach their species and cannot be split any further. We're looking for similarities and differences throughout. Here are the clades we use, going from the more general to the most specific.

Kingdom Phylum Class Order Family Genus Species

You can use an acronym to help you remember the order of groupings, here is an example:

Keep Ponds Clean Or Frog Gets Sick

Continuing with our lion:

There are currently 5 Kingdoms that all living things can be put into. They are different based on how they obtain food, the types of cells and number of cells in their body. Do some research –what are their basic characteristics? (we've done the first 2 for you).

Kingdom name	Basic characteristics
Monera	Single-celled and tiny, may or may not move, no nucleus or other organelles, absorb nutrients through their cell wall or can do photosynthesis. Example: Bacteria and cyanobacteria (blue-green algae)
Protista	Single-celled mostly, some multicellular and move by cilia, flagella or amoeboid mechanisms. Usually no cell wall. Some organelles. Nutrients gained by photosynthesis or ingestion of other organisms. Example: algae
Plantae	
Fungi	
Animalia	

Classification: Phylum

Lions are part of the _____ Kingdom. This Kingdom includes all the organisms on the first page.

Classifying into a Phylum is the next step. We look at physical similarities between organisms within the Kingdom. There are over 30 different Phyla but there are 9 main Phyla (below) that contain the majority of organisms in this Kingdom. Do some research into the top 3 Phyla and highlight which one of these 9 our lion belongs to.

Kingdom name	Basic characteristics
Arthropoda	
Chordata	
Mollusca	
Cnidaria	Corals, sea anemones and jellyfish. All have tentacles with stinging cells with only one opening into their digestive tract.
Echinodermata	Radial symmetry with several arms usually radiating from a central body. Includes sea urchins, starfish. Known to regenerate body parts.
Nematoda	Roundworms. Can be parasitic or free living in soil and aquatic environments. Can be microscopic.
Porifera	Pore-bearing organisms called sponges. 300,000 species. They live in aquatic environments, water and oxygen enter through their pores.
Annelida	Segmented worms that have hard bristles on each segment for locomotion. An earthworm.
Platyhelminths	Flatworms. They live in aquatic environments, some can be parasitic like tapeworms. Have sensory organs at one end ‘the head’.

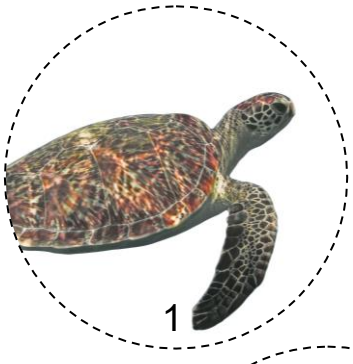
Classification: Class

Lions are part of the _____ Phylum. Now we need to divide further into 5 Classes - which organisms have more in common? Look closely at the animals below and have a think- scientists have divided these classes by:

- body covering (wet scales, moist skin, dry scales, fur/hair or feathers)
- reproductive method (jelly-like eggs in water, soft shelled, hard shelled, live birth)
- thermoregulation in primary school we would have said cold blooded or warm blooded, here we will say Ectothermic (externally regulates temperature using their environment) and Endothermic (own body regulates temperature)

What are the 5 Classes?
1.
2.
3.
4.
5.

Match the 2 examples of each of the 5 classes so each one has a pair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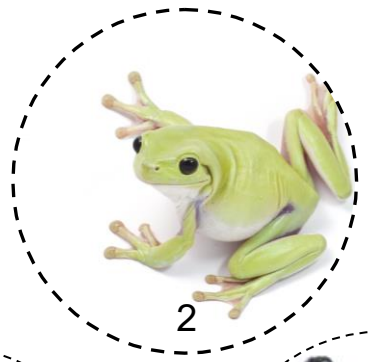
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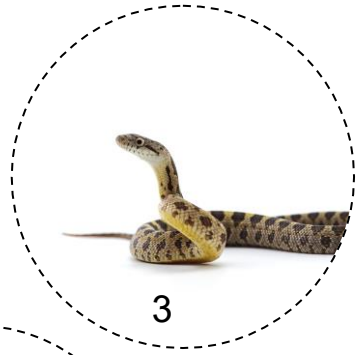
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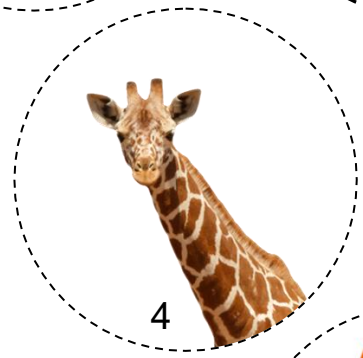
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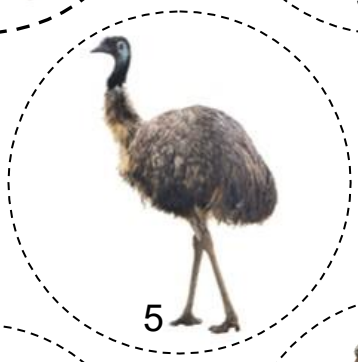
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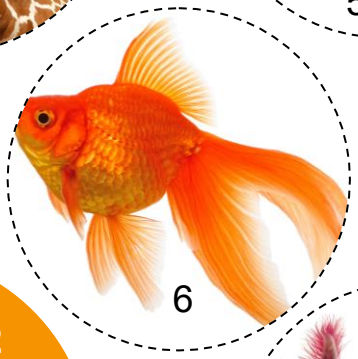
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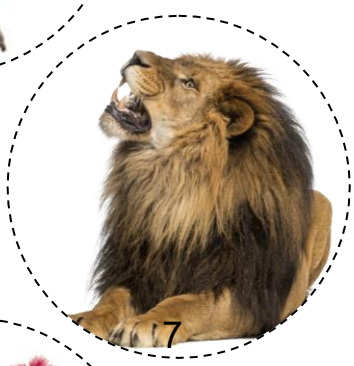
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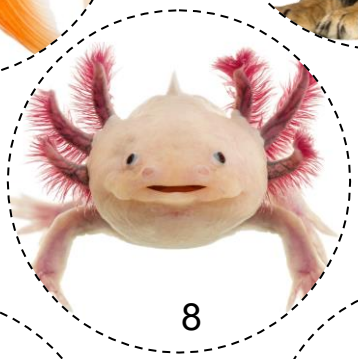
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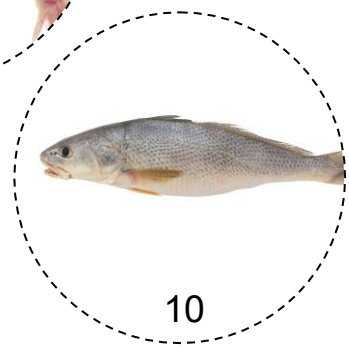
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Classification:
Order, Family, Genus, Species

Lions are part of the _____ Class. Within this class there are 3 sub-classes due to big differences in reproduction **what are these 3 subclasses?**

_____ **Example:** Meerkat and Lion

_____ **Example:** Platypus and Echidna

_____ **Example:** Kangaroo and Wombat

The next level of classifying is into Orders. At this level we are looking at more focussed similarities. There are over 20 Orders in this Class.

The lion is in the **Order Carnivora.** It shares characteristics with others in the order including:

- (mostly) meat eating
- Carnassial teeth (big bone crushing teeth that act like scissors)
- Shortened digestive tract

Can you guess which **Family** the lion belongs to?

Organisms in this Order are then split further into 15 **Families.**
The Families include:

- Canidae (dogs and wolves)
- Ursidae (bears)
- Felidae (cats)
- Phocidae (earless seals)

Families then get split into their **Genus**, this is the last split before species, so the animals that share a Genus are all very similar. There are 14 Genera in the lion's Family including:

- Panthera (the largest organisms in this Family)
- Neofelis (clouded leopard)
- Acinonyx (cheetah)

You have just classified a lion! Well done!

Finally we have the **species** name. This is always written: *Genus species* (note the italics and the capital letter for Genus which the species does not have). We all know lions are large organisms so they sit in the Genus *Panthera.* Now we just need to know the species. Can you guess which one of those listed below?
If not, look up the scientific name and highlight it below.

Panthera tigris
Panthera uncia
Panthera onca
Panthera pardus
Panthera leo

Visiting Sydney Zoo

Take your students on a self-guided adventure or book a workshop at Sydney Zoo! Download and print the Stage 4 Activity Sheet 'Classification and Adaptations' to support student learning about classification while visiting Sydney Zoo.

Pre-visit checklist:

- Pre-visit activities
- Behaviour expectations of students while visiting Sydney Zoo
  - Students must always be accompanied by a teacher
  - Follow instructions of your teacher and zoo staff
  - Take only photographs and memories, leave only footprints
  - If you get lost, find a staff member in uniform and tell them you need help
  - Have a lot of fun and ask lots of questions!
- Ask students to prepare low waste/waste free lunches if possible. We love seeing the students' being low waste/waste free – please brag about this to us
- Ask students to be prepared for wet-weather if the forecast is not favourable (some of our animals love wet days so don't worry about them hiding away)

Upon arrival:

- You will be met off the bus by one of our friendly staff. Please have your student and staff numbers ready to check – in.
- Enjoy your visit with us and please ask any staff for assistance if required
- Students must always be accompanied by a teacher

We recommend allocating small groups to adult supervisors. **Download** our '**survival guide for teachers**'

What is a low or no waste lunch?

- Sourcing foods that have **minimal or no packaging** and using **reusable containers** to carry food.
- Bringing your own **reusable drink bottle** and refill it.
- Carrying your own **reusable cutlery set**.

EXAMPLES

- **Sandwiches** - without clingwrap, they can stay fresh in a suitable reusable container or beeswax reusable wrap.
- **Fruit** - apples, bananas and mandarins are easy to eat and/or peel at school or the Zoo, the core and skin can go in the organic bins.
- **Nuts, dried fruit, biscuits, popcorn etc.** in a small reusable container, buy them in bulk to reduce packaging and put servings into small containers for snacks.

Optional dichotomous key project

A student:

- describes the unique features of cells in living things and how structural features can be used to classify organisms SC4-CLS-01
- uses scientific tools and instruments for observations SC4-WS-01

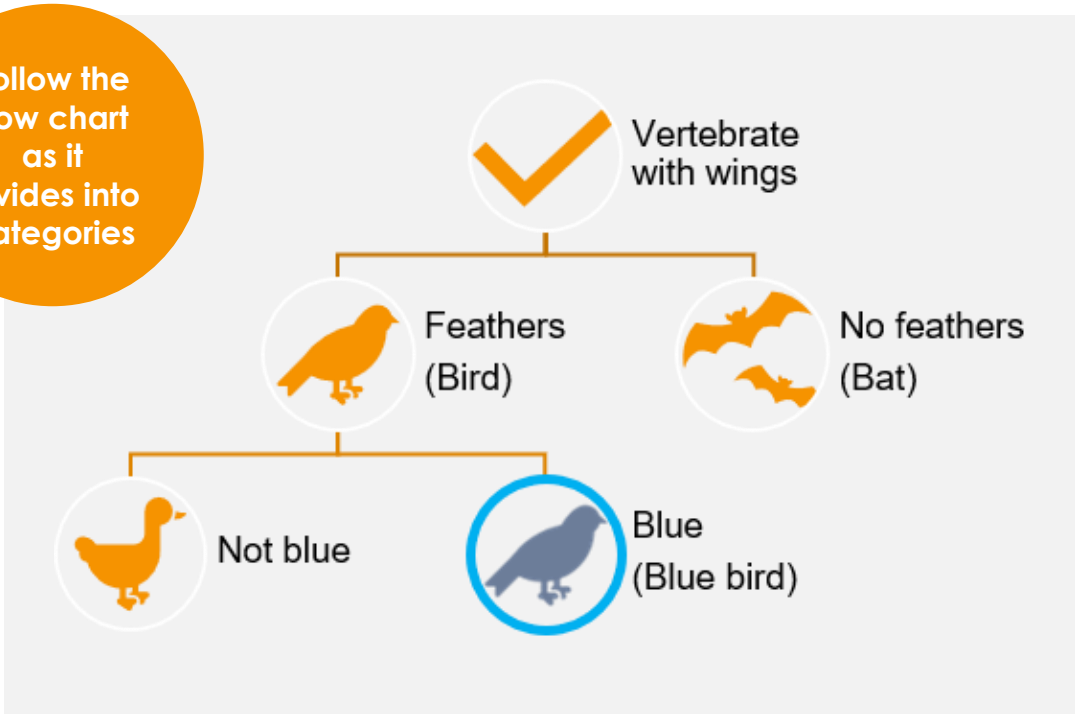
Students:
Interpret dichotomous keys to identify organisms surveyed in an Australian habitat

Location & Duration	Outcomes & 8Ways	Learning Activity	Resources
This project may extend over several lessons		8Ways context: deconstructing and reconstructing the dichotomous key as students learn the connections and differences between species.	
	8Ways **Deconstruct/ Reconstruct** 	**Activity 1:** **Dichotomy – Two Choices** Build on prior knowledge of classification. How to build a key to find out species identification. **Game** Choose an animal/plant/school item (without telling the class) Have the class listen to you or a class member describe the item and everyone else draw what they think it looks like. Does everyone's drawing look the same? Could someone not currently present know from that drawing what they're looking at? Keys help us define, beyond too much doubt, what species we are looking at. It helps scientists ensure they are identifying species correctly. Most field guides to animals will have keys to help people to identify what they're looking at. If there are field guides in the library, you can look at various types of keys. **Dichotomous keys** Each stage in the process of the key needs to have two clearly defined choices e.g. Backbone vs. No backbone. So it is easy to choose the correct path. Each of these choices gets us closer to identifying the species. Keys can be set up in a flow chart form or a table form as seen in the activity sheet. Students complete the activity sheet 'Build your own dichotomous key' as a project on their zoo visit.	**Activity sheet** 'Build your own dichotomous key' **Project:** Create dichotomous key based on animals at Sydney Zoo

Dichotomy? Two choices

What is a dichotomous key? It is essentially a checklist of characteristics. At each level there are two options, as you classify the species you are looking at, you make a choice and follow that path until you find your answer. Below are two ways to represent a dichotomous key, - imagine you are in the bush and have seen a bird that is blue – you can follow a key to find out what it is.

Follow the flow chart as it divides into categories



1A	Backbone present	Go to number 2
1B	Backbone absent	Invertebrate species
2A	Wings with feathers present	(Bird) Go to number 3
2B	Wings present without feathers	Bat
3A	Blue feathers	Blue bird
3B	Other colour feathers	Use other bird key

Follow the table as it divides into 2 categories at each step

Build your own Dichotomous Key




Practice creating a simple dichotomous key below for the animals you see above.

Each step must have two options that are opposite e.g. scales and no scales, allowing anyone who reads this key to make the same choice each time. We have done the first one for you.

Step	Split/Feature	Instruction/species
1	**1a Vertebrate**	Go to step 2
	1b Invertebrate	Bee
2	**2a**	
	2b	
3	**3a**	
	3b	

During your visit to Sydney Zoo you will choose 6 species to study. You will need to:

1. Take a photograph that shows each animal clearly
2. Complete the notes on the next page so you have enough data to construct your own dichotomous key
3. Create your dichotomous key
4. Share with classmates and your teacher to check your work
5. Apply any suggestions to perfect your key

Build your own Dichotomous Key

Choose 6 different species at Sydney Zoo. Spend at least 10 minutes watching each animal – note down important features of the animal you can see, but also any interesting behaviours.

Species	Photo taken	Important structural features
1		
2		
3		
4		
5		
6		

Build your own Dichotomous Key

Create a simple dichotomous key below for the animals you chose at Sydney Zoo.

Step	Split/ Feature	Instruction/species
1	1a	
	1b	
2	2a	
	2b	
3	3a	
	3b	
4	4a	
	4b	
5	5a	
	5b	

Evaluate your dichotomous key, ask multiple classmates to complete your key using the photos you have taken at Sydney Zoo. They must be able to follow the key and make the same choices every single time.

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