

Field Guide: Teacher Notes



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Activity 2

Classification

Objectives

After completing this activity, students will be able to:

- Investigate how living things are classified.
- Group, or classify organisms according to a variety of common features.
- Understand how scientists group organisms.

Target audience

Level 7

Activity

This lesson builds upon what students have understood in Activity 1. In this activity students learnt that plants and animals are alike in some ways and different in others, and that they have features that help them survive in their environment. In Activity 2 students will learn to understand the established classification system used by scientists. Students will learn about scientific groupings including phylum, class, order, family, genus, species, invertebrates, vertebrates, mammals, birds, amphibians and reptiles.

Duration

50 minute session

Materials

iPad, iPhone or computer with internet connection
Flora and Fauna Field Guide App. or Field Guide from the Ecolinc website
Data projector linked to a computer with an internet connection and PowerPoint
Computers with internet connection
Student workbook
Pencil

The website used in this lesson acts as an introduction for students, which allows them to pair different vertebrate animals and learn more about their common traits. By doing this, students will begin to classify organisms. After the introductory activity, students will explore classification using the Flora and Fauna Field Guide.

Begin the session with an introduction to illustrate groupings of plants, animals and non-living objects. Ask students to volunteer objects from around them in the classroom (such as a pen, a book, a jumper) for scientific observation. Then add living objects such as plants and animals to the collection. Now ask the students to observe the group. Ask students questions such as:

1. How many different ways can you find to group or pair these objects?
2. What objects are non-living?
3. Which are living organisms?
4. What features determine whether something is alive or not?

Then, explain to students that scientists believe that there are over 10 million different species on Earth. Ask students to imagine trying to study and understand so many different types of organisms. Tell students that in order to make their task easier, scientists classify living things into groups based on their similarities and differences.

Scientists have grouped these organisms into six large groups, called kingdoms. These are:

Animals

Plants– flowering plants, mosses and ferns

Fungi – mushrooms, mould and mildew

Protists – algae and slime moulds

Archaeobacteria – unicellular (one cell) organisms found in extreme environments (such as hot springs)

Eubacteria – unicellular (one cell) and complex

Explain that the organisms in each kingdom may be divided into smaller and smaller groups depending on their characteristics. Organisms may be divided into phylum > class > order > family > genus > species. This is called taxonomy. Ask students to complete the introductory questions in their workbook.

Following this you may like to get students to complete an interactive activity on the web [Classifying Critters](http://www.hhmi.org/coolscience/forkids/critters/critters.html) (www.hhmi.org/coolscience/forkids/critters/critters.html). This activity will help students understand how animals are grouped according to their specific characteristics. After students complete the challenges you may like to pose the following questions; Why do scientists find this way of grouping animals useful? Why do you think scientists would be more interested in details of internal and external structures rather than the behaviour of an animal?

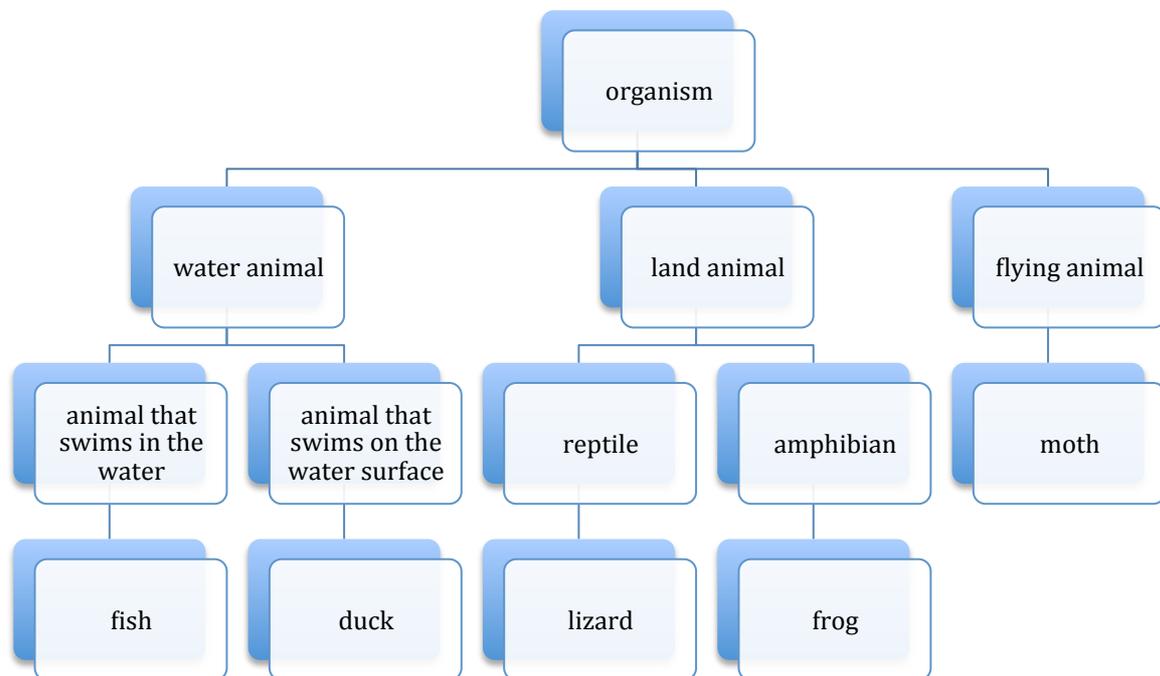
In the second part of the activity, students investigate classification using the Flora and Fauna Field Guide. Students explore how plants and animals have been grouped based on their similarities and differences. For these activities, students will need access to the Field Guide as an application on an iPad or iPhone, or on a computer via the Ecolinc website.

The following five activities engage students in exploring classification from phylum to species, and investigate how organisms have been grouped based on characteristics. You may like to introduce all of the activities at the start and then ask students to undertake them, or alternatively you may like to introduce each activity separately and allow students to complete each of them in turn.

1. Plant classification

Firstly, you will need to introduce students to dichotomous keys. Use the accompanying PowerPoint to explain a simple dichotomous key. Then, as a class, construct a dichotomous key on the board using the following organisms; fish, duck, lizard, frog and moth.

There are varying answers, one of which is shown below:



Finally, ask students to look up the following six plants; Hoary Sunray, Duckweed, Tufted Bluebell, Water Ribbon, Yellow Gum and Pacific Azolla, and complete the table to identify their characteristics. Then, students will use the characteristics of each plant to construct their own dichotomous key and answer the set questions.

2. Animal classification

Ask students to look up and compare the taxonomy of the Bougainville's Skink and the Centralian Ranges Rock-skink. Students will complete the table for both Skinks in their workbook and answer the set questions. The questions ask students to explain how closely related these Skinks are, and to then compare the taxonomy to an amphibian.

3. Animal characteristics

Students will explore the animals in the five groups; bird, mammal, amphibian, invertebrate and reptile. The task for students involves defining characteristics of each group. Ask students to examine the animals carefully and using the list provided, define the animal groups.

4. Mammal classification

Students will explore mammals further. Ask students to select a mammal group (monotreme, marsupial or placental) and explore why mammals in each category are grouped together. Have students look at the animals in each of the three groups and investigate what they have in common. Students will select the most appropriate definition for each group; monotreme, marsupial and placental, and answer the questions in their workbook.

5. Marsupial classification

Finally, students will classify the marsupial group. There are eight animals in this group. Ask students to classify them further. Ask them to group the marsupials based on their characteristics and answer the questions.

Conclude the session by engaging students in a brainstorming session about plants and animals and how they are classified. Ask students to tell you why scientists classify living things in this manner. Students will complete the conclusion questions in their workbook.

Student worksheet
Activity 2: Level 7 Classification

Introduction

1. What is classification?

Biologists group living things according to their characteristics.

2. Scientists have divided living things into six kingdoms. The plant and animal kingdom are two of these. How are kingdoms further grouped?

Phylum > class > order > family > genus > species.

Plant classification

3. Go to the Plants section, on the Flora and Fauna Field Guide. Look up the following six plants and write down identifying characteristics in the table:

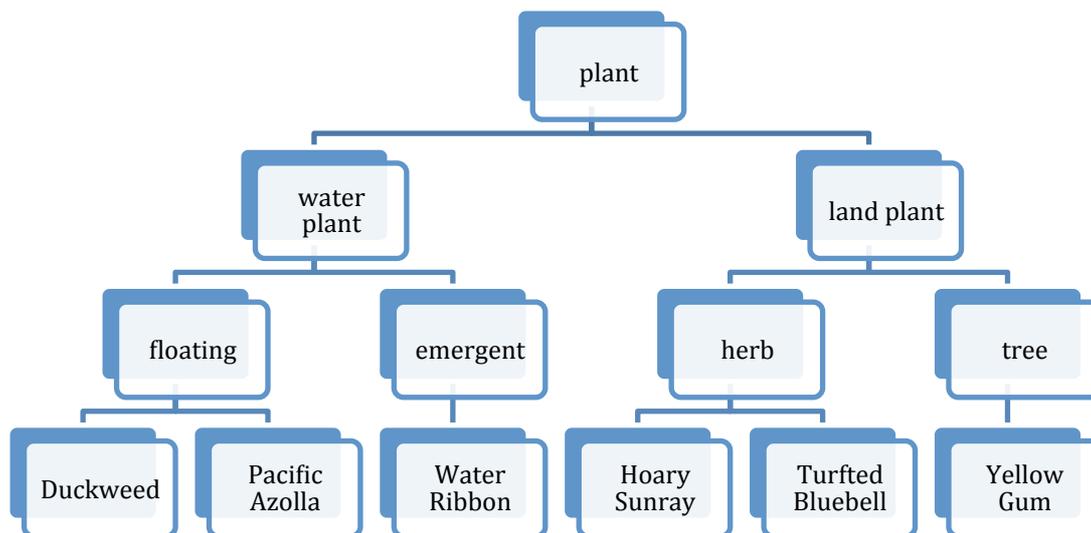
Plant common name	Plant group	Identifying characteristics
Hoary Sunray	Daisy	Tufted herb to 40 cm high, leaves are grass-like, silvery and stalkless. Large papery flowers are 4 cm wide.
Duckweed	Duckweed	Tiny floating plant with 2-3 leaves that form a dense mat on the water surface. Leaves, 2-3 mm, are shiny, bright green, flattened and disc-like.
Tufted Bluebell	Bluebell	Small herb with many stems to 40 cm tall. Leaves are bright green, narrow and almost hairless. Flowers are pale blue, and held in loose clusters at the end of stems.
Water ribbon	Arrowgrass	Robust plant with thick rhizomes ending in numerous tubers. Green, fleshy ribbon-like, erect or floating leaves. Sixty to two hundred small greenish flowers held in a dense flower spike, which is held above the water.
Yellow Gum	Eucalypt	Small to medium sized tree, 5-30 m tall. Leaves are deep olive to grey-green in colour. Flowers are cream or pink-red.
Pacific Azolla	Fern	Common floating fern 1-2.5 cm in diameter. Plants are ovate and branch irregularly. Roots are simple. Bright red or green in colour.

4. What is a dichotomous key?

A dichotomous key is a sequence of steps that allows living or non-living objects to be classified and identified. Objects are classified according to whether a particular characteristic is present or absent. Dichotomous keys may be designed in written or graphical form.

5. Develop a dichotomous key to classify each of these plants by looking closely at their characteristics; Hoary Sunray, Duckweed, Tufted Bluebell, Water Ribbon, Yellow Gum and Pacific Azolla.

Here is one example.



6. How did you classify the plants in the dichotomous key?

Students should mention the categories used to classify the plants.

7. Look at someone else's dichotomous key. How does this compare to yours?

Answers will vary.

Animal classification

8. Go to the Reptile section, on the Flora and Fauna Field Guide. Look up lizards. Compare and write down the taxonomy of the following two Skinks:

Taxonomy	Bougainville's Skink	Centralian Ranges Rock-Skink
Phylum	Chordata	Chordata
Class	Reptilia	Reptilia
Order	Squamata	Squamata
Family	Scincidae	Scincidae
Genus	<i>Lerista</i>	<i>Egernia</i>
Species	<i>bougainvillii</i>	<i>whitii</i>

9. How closely related are the two Skinks?

The two Skinks are closely related as they share the same phylum, class, order and family.

10. Compare the taxonomy of the Skinks to Bibron's Toadlet (an amphibian). How related are they to one another?

The Skinks and the Toadlet are in the same phylum but in a different class. Therefore they are not closely related.

Animal characteristics

11. Explore the classification of animals further. Examine the animals in these groups and define the characteristics. The following list of animal characteristics may be useful.

produce milk	backbone	thin skin	no backbone	lay eggs	breathe under water
feathers	hair or fur	beak	teeth	scaly skin	wings

Animal group	Definition
Bird	<p>These animals are endotherms, which means they can generate their own body heat.</p> <p>These animals are the only type of animal that has feathers. They have a beak with no teeth and lay hard-shelled eggs. All of these animals have wings, but not all of them can fly.</p>
Mammal	<p>These animals are endotherms, which means they can generate their own body heat.</p> <p>The females possess mammary glands, which produce milk to feed their young. Their body is covered in hair or fur during all or some stage of their life.</p>
Amphibian	<p>These animals are ectotherms, which means that their body temperature varies with the temperature of their environment.</p> <p>These animals have a thin skin covering their bodies which they can use to breathe when under water. They need to live in moist places so that their skin remains damp. Most of these animals lay their eggs in water or damp places.</p>
Invertebrate	<p>These animals are ectotherms, which means that their body temperature varies with the temperature of their environment. These animals do not have a backbone or spine. This group makes up more than 98% of the animal kingdom and consists of a wide variety of animals with different characteristics.</p>
Reptile	<p>These animals are ectotherms, which means that their body temperature varies with the temperature of their environment. These animals have a scaly skin. These scales may be different sizes, colours and textures but they all protect the body.</p>

12. Birds, mammals, amphibians and reptiles are vertebrates. How do they differ from invertebrates?

Vertebrates have a backbone, however invertebrates have no backbone.

13. Which animals are ectotherms? What does this mean for the animal?

Reptiles, invertebrates and amphibians are ectotherms. The body temperature of ectotherms varies with the temperature of the environment. They require the sun to warm up their bodies.

14. Which animals are endotherms? What does this mean for the animal?

Birds and mammals are endotherms. This means that these animals can generate their own body heat.

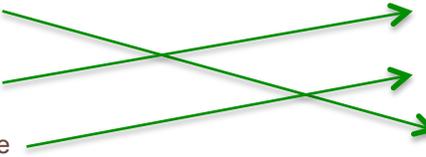
15. Which of these animal groupings are similar to one another? Why?

Reptiles, invertebrates and amphibians are similar as they are ectotherms. Mammals and birds are similar as they are both endotherms. Reptiles, amphibians, mammals and birds are similar as they are vertebrates, which means that they have backbones.

Mammal classification

Explore the classification of mammals further. Examine the animals in this group carefully. Look at the characteristics of these animals and use the definitions provided to link them to the appropriate mammal group.

Mammal group	Definition
Placental	Females have pouches, containing teats where the young are fed and carried.
Marsupial	Females lay eggs.
Monotreme	Females give birth to live young.



16. Identify an example for each group.

Marsupial	Common Brushtail Possum, Common Dunnart, Eastern Barred Bandicoot, etc.
Monotreme	Short-beaked Echidna
Placental	Australian Swamp Rat, Black Rat, Chocolate Wattled Bat, etc.

17. Which group of mammal do humans fit into?

Placental

Marsupial classification

18. Explore the classification of marsupials further. Examine the animals in this group carefully. Look at the characteristics of these animals. You need to group these animals into smaller groups based on their characteristics.

Group 1 – Common brushtail-possum (tree dwelling)

Group 2 – Common Dunnart and Fat-tailed Dunnart (Dunnarts)

Group 3 – Eastern Barred Bandicoot and Southern Brown Bandicoot (Bandicoots)

Group 4 – Spot-tailed Quoll (ground dwelling)

Group 5 – Eastern Grey Kangaroo and Swamp Wallaby (large animals)

Group 6 –

19. How many groups did you end up with?

Five

20. Explain why you organised each group of animals together?

Conclusion

21. How do scientists classify organisms?

Organisms have been classified into a hierarchy of groups based on similarities and differences in their appearance and structure. Biologists have created groups within groups to show relationships among the many living things.

22. Which level of classification indicates that group members have the least in common?

Phylum

23. Which level of classification indicates that group members have the most in common?

Species