Sorting the Living World

Teacher		**Class**	Year 6
Subject	Science	**Topic**	Classifying living things
Date		**Room**	
Lesson length	60 minutes	**Country**	United Kingdom

Students learn how scientists group living things by what can be observed. They sort picture cards into five kingdoms and explain their choices.

Curriculum links

- Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals [1]
- Give reasons for classifying plants and animals based on specific characteristics [2]

Learning objectives

- Students will sort living things into broad groups using observable characteristics.
- Students will give reasons for plant and animal groups using specific characteristics.
- Students will describe micro-organisms as tiny living things seen with a microscope.

Success criteria

- I can place living things into five kingdoms by similarities and differences.
- I can explain why an animal or plant belongs in its group.
- I can describe what micro-organisms are and where they are found.

What students already know

Ask: In Year 4 you grouped living things in different ways. What did you look at to decide? Listen for observable features and using keys to group and name living things [1].

Key words

classify	to put things into groups by what you can see [4]
characteristic	something you can notice about a living thing, like leaves or legs [3]
vertebrate	an animal with a backbone inside its body [4]
invertebrate	an animal without a backbone inside its body [4]
micro-organism	a very tiny living thing that can only be seen using a microscope [12]
fungi	living things like mushrooms and mould that cannot make their own food [9]

Materials

- Picture cards of everyday plants, animals, mushrooms, mould, pond water microbes
- Labels for five trays: animals, plants, fungi, Protoctista, Prokaryota/Monera

Before the lesson

- Print picture cards sets: trout, frog, blackbird, spider, daisy, fern, mushroom, bacteria plus spares of mould and pond microbes
- Print five tray labels and sub-labels for vertebrate and flowering plant

- Five sorting trays or boxes, plus one pre-sorted example tray
- Slides 1-5, 7, 9-12 projected, whiteboard and mini-whiteboards
- Make one pre-sorted example tray with mushroom labelled as fungi
- Test Slides 1-5, 7, 9-12 on the classroom screen

Lesson outline

0–8 min **Starter** 8 min · Whole class

To hook students and recall that living things can be grouped in different ways.

YOU DO

1. Show Slide 1 Sorting the Living World and read the title.
2. Say the hook and place one mixed pile of picture cards on each table but tell students not to touch yet.
3. Show Slide 2 Think, pair, share and give 2 minutes for pairs to discuss how they would sort 30 new living things.
4. Take three quick ideas and link them to sorting by similarities and differences [4].

STUDENTS DO

1. Look at the mixed pile and think alone for 30 seconds.
2. Share ideas with a partner about grouping by what can be observed.
3. Offer ideas to the class, such as leaves, legs, wings or size.

Say: I have dumped a whole museum box on your table. How would you tidy it so a scientist could find anything? Think with your partner. If you found 30 new living things, how would you sort them so anyone could find them again?

Ask: What did you look at in Year 4 to group living things? (Observable features, and we used keys to group and name them [1].) · Why would a scientist need one shared way to tidy the box? (So anyone can find and compare organisms because they are sorted by similarities and differences [4].)

Check understanding: Hands up for one feature you would use first. If ideas are only colours or size, remind the class we look for features that living things share as a group [3].

Support: Give word prompts on mini-whiteboard: leaves, legs, wings, backbone. **Stretch:** Ask students to suggest a first yes-or-no question that would split the pile into two big groups.

Use: Slides 1-2

8–20 min **Teaching** 12 min · Whole class

To teach the five kingdoms and how observable features place a living thing.

YOU DO

1. Show Slide 4 Key words and teach classify, characteristic, vertebrate and invertebrate.
2. Show Slide 3 mindmap with Living things, Animals, Plants, Fungi, Protoctista, Prokaryotes - bacteria and explain UK scientists use five kingdoms: Animals, Plants, Fungi, Protoctista, and Prokaryota/Monera [12].
3. Show Slide 5 Mushroom mystery vote and take a class vote for With plants, With animals or In its own fungi group.
4. Model the answer using green colour and food clues, then note that many living things in the last three kingdoms are micro-organisms (tiny, seen with a microscope), though fungi such as mushrooms are not [12].

STUDENTS DO

1. Repeat key words and point to backbone picture for vertebrate.
2. Vote for the mushroom group and give a reason.
3. Copy the five kingdom names into books.

Say: Scientists who sort living things look for special features each group shares [3]. Green plants make their own food through photosynthesis [11]. A fungus has no green pigment chlorophyll, so it cannot make food from sunlight and instead absorbs nutrients from plants or animals [11]. That is why a mushroom is not a plant.

Worked example: Mushroom mystery, step by step: 1. It has no green leaves. 2. Without the green pigment chlorophyll a fungus is unable to make food from sunlight [11]. 3. It feeds by absorbing nutrients. 4. Ruling: In its own fungi group, not With plants, because fungi cannot make their own food [9].

Ask: What do all green plants share that helps us spot them? (They contain chlorophyll that they use to make their own food [3], through photosynthesis [11].) · Why is the mushroom not a plant even though it grows in soil? (Because without chlorophyll it cannot make its own food from sunlight and absorbs nutrients instead [11].)

Check understanding: Mini-whiteboards: write P, A or F for daisy, blackbird, mould. Reteach any group where most answers are wrong using the food and green clues.

Support: Keep the five kingdom labels on the board with a picture beside each one. **Stretch:** Ask students to predict which kingdoms need a microscope to see, ready for micro-organisms.

Use: Slides 3-5

20–45 min **Main activity** 25 min · Groups

To sort eight living things into broad groups using observable characteristics.

YOU DO

1. Show Slide 9 Your task and read the list: trout, frog, blackbird, spider, daisy, fern, mushroom, bacteria.
2. Give each group trays labelled for the five kingdoms and a set of picture cards, with one pre-sorted example tray showing mushroom as fungi.
3. Model sorting trout: animal, has backbone so vertebrate, lives in water and breathes with gills so fish [7].
4. Time 15 minutes for sorting, then hear one card per tray from each group with the similarity that put it there.

STUDENTS DO

1. Discuss each card and place it in animals, plants, fungi, Protoctista or Prokaryota/Monera trays [12].
2. Write one observable clue per card, such as feathers, six legs, petals or spores.
3. Present one card per tray and name the shared similarity.

Say: Work in your group. Sort 8 living things into groups using what you can observe. Copy the list, then place each card in a tray. Be ready to explain one card per tray and name the similarity that put it there.

Worked example: Trout, step by step: 1. It moves and feeds, so Animals kingdom. 2. It has a backbone, so vertebrate because vertebrates have a backbone and invertebrates do not [4]. 3. It lives in water and breathes with gills [7], so fish group. 4. Place in animals tray with fish sub-label.

Ask: Where does bacteria go and why? (Prokaryota/Monera tray, because bacteria are made up of just one cell [4] and are very tiny living things only seen with a microscope [12].) · How did you decide between daisy and fern? (Daisy makes seeds in flowers like daisies, fern makes spores or cones like ferns, so flowering and non-flowering plants [12].) · What is the similarity for your animals tray? (They are all members of the animal kingdom, then split by backbone or no backbone [6].)

Check understanding: Walk round with checklist for all five trays used correctly. If groups mix fungi and plants, point back to the example tray and green-food test.

Support: Give a pre-sorted example tray with a mushroom labelled as fungi, not a plant, because fungi cannot make their own food [9]. **Stretch:** Students add a sub-label, such as vertebrate or flowering plant, to two cards they are sure about.

Use: Slide 9

45–53 min **Teaching** 8 min · Whole class

To give reasons for groups using characteristics, not where an animal lives.

YOU DO

1. Show Slide 11 What could this be? and read: I live in the sea and swim like a fish, but I breathe air and feed my baby milk. What am I?
2. Show Slide 7 Animals in groups cards and compare fish that breathe underwater with gills [7] with mammals.
3. Explain grouping by water, air and land would wrongly put birds, bees and bats in the same group [8].

STUDENTS DO

1. Answer the mystery and write the two-sentence ruling on whiteboards.
2. Name one feature for penguin as bird and bat as mammal despite swimming or flying.

Say: Living in the sea does not make it a fish. A whale breathes air with lungs and feeds its young milk, which are the features that define mammals even though it lives in the sea [6]. Classification is the process of organising living things into categories based on similarities and differences [4].

Worked example: Two-sentence ruling: Whale is a mammal because it breathes air with lungs and feeds its young milk [6]. Fish is a fish because it lives in water and breathes with gills [7].

Ask: Why is a whale not a fish even though it swims in the sea? (Because it breathes air with lungs and feeds its young milk, the mammal features [6].) · Why is sorting only by habitat a weak system? (Because it would put birds, bees and bats together by air although they belong apart [8].)

Check understanding: Read whiteboard rulings for the words lungs, milk and gills. Reteach with Slide 7 cards if milk or gills are missing.

Support: Give sentence starters: A whale is a mammal because... A fish is a fish because... **Stretch:** Ask students to explain why a penguin is a bird and a bat is a mammal despite where they swim or fly.

Use: Slides 7, 11

53–60 min **Plenary** 7 min · Whole class

To check what students can now describe and what is still unclear.

YOU DO

1. Return to the five trays and ask each table to state one similarity for one kingdom.
2. Show Slide 12 Exit ticket with One thing I learnt today, One group I can describe, One question I still have.
3. Collect answers and praise use of observable characteristics and similarities and differences [1].

STUDENTS DO

1. Say one similarity for their tray, for example spores for fungi or gills for fish.
2. Write the three exit lines on their own in books.

Say: Look back at our five kingdoms. Tell me one group you can describe and the feature that puts a living thing there. Then write your exit ticket on your own.

Ask: Which three kingdoms can be grouped as micro-organisms? (Fungi, Protoctista and Prokaryota/Monera, many of them micro-organisms, though fungi such as mushrooms are not [12].) · Why do scientists use one system called taxonomy? (Taxonomy is the science of naming, describing and grouping all living things [8].)

Check understanding: Read exit tickets as they leave. If many cannot name a kingdom feature, start next lesson with the example tray again.

Support: Allow students to copy one kingdom label and picture to support their description. **Stretch:** Ask students to add genus and species idea that each smaller level shares more features in common [3].

Use: Slide 12

Common mistakes

Mistake	How to spot it	How to fix it
Thinking a mushroom or mould is a plant because it grows in soil.	Plants tray contains mushroom card.	Test for green chlorophyll and food making: fungi cannot make their own food and reproduce from microscopic spores [9]. Move to fungi.
Thinking a whale is a fish because it lives in the sea.	Whale placed with fish or reason says lives in water.	Compare breathing and young: whale uses lungs and milk for mammals [6], fish use gills underwater [7].
Thinking spiders are insects because they are small with legs.	Spider sorted as insect without counting legs.	Count legs: insects have six legs, spiders have eight and are not insects [6]. Both are invertebrates [6].

Support

- Give a pre-sorted example tray with a mushroom labelled as fungi, not a plant, because fungi cannot make their own food [9].

Stretch

- Students add a sub-label, such as vertebrate or flowering plant, to two cards they are sure about.

For the LSE or teaching assistant

Stay with the sorting tables: prompt use of the example tray, read card clues aloud and ask for one observable feature before placing each card.

Check for understanding

Question	Answer
Name the five kingdoms and one example in each.	Animals, plants, fungi, Protoctista and Prokaryota/Monera [12]; e.g. blackbird, daisy, mushroom, pond microbe, bacteria.
A whale lives in the sea. Why is it a mammal not a fish?	Because it breathes air with lungs and feeds its young milk [6]; fish breathe with gills [7].
What is a micro-organism and how do we see one?	A very tiny living thing such as bacteria and yeast that can only be seen using a microscope [12].

Homework

Draw two living things seen at home and label the kingdom and one observable feature for each.

Sources

1. Living things and their habitats Year 6 National Curriculum Objectives ... · dinting.derbyshire.sch.uk · https://www.dinting.derbyshire.sch.uk/public/files/curriculum/science/Science_Expectations_Year_6.pdf
2. National curriculum in England: science programmes of study · gov.uk · https://www.gov.uk/government/publications/national-curriculum-in-england-science-programmes-of-study/national-curriculum-in-england-science-programmes-of-study
3. How do scientists classify living things? | The Learning Zone · learningzone.oumnh.ox.ac.uk · https://learningzone.oumnh.ox.ac.uk/how-scientists-classify-living-things
4. How to classify animals and plants - KS2 Science curriculum - BBC · bbc.co.uk · https://www.bbc.co.uk/bitesize/articles/zyt2jsg
5. Classifying Living Things: Yr 5/6—Cycle B · belmontprimarybolton.co.uk · https://www.belmontprimarybolton.co.uk/wp-content/uploads/2023/03/Classifying-Living-Things-Knowledge-Organiser.pdf
6. Classifying Living Things (KS2 Science) | MindBlaze · mindblaze.uk · https://mindblaze.uk/learning-centre/science/classifying-living-things/
7. How to classify animals and plants – KS2 Science curriculum ... · bbc.co.uk · https://www.bbc.co.uk/bitesize/topics/z6wwxnb/articles/zyt2jsg
8. Carl Linnaeus and classification - Oak National Academy · thenational.academy · https://www.thenational.academy/teachers/programmes/science-primary-ks2/units/why-we-group-and-classify-living-things/lessons/carl-linnaeus-and-classification
9. Classifying Living Things | Science Explained for Kids · kidsworldfun.com · https://www.kidsworldfun.com/learn-science/classifying-living-things.php
10. Classifying Living Things - NG Science · ngscience.com · https://ngscience.com/lesson-plans/classifying-living-things/
11. Lesson plan Classifying living things · cdn-media.tigtagworld.com · http://cdn-media.tigtagworld.com/learning-materials/life-processes/variation-and-classification/lesson-planners/Lesson_plan_Classifying_living_things.pdf
12. y6 science classify living things · primarysite-prod-sorted.s3.amazonaws.com · https://primarysite-prod-sorted.s3.amazonaws.com/newhall-community-junior-school/UploadedDocument/831b4153-c801-4392-b82f-3872b2536f28/y6-science-classify-living-things.pdf