Autumn Block 1

Living things and their habitats

Small steps

Step 1	Conditions for life
Step 2	Group organisms
Step 3	Classify animals
Step 4	Classify plants
Step 5	Microorganisms
Step 6	Classify organisms
Step 7	Carl Linnaeus

Conditions for life

Notes and guidance

In this small step, children explore conditions for life and the differences between living and non-living things. Conditions for life depend on the organism. An animal needs food, water, shelter and space to survive. A plant needs similar conditions but makes its own food, takes in water from the roots and needs sunlight to survive.

Children need to understand the criteria for living and non-living things, so they are then able to group organisms or objects. An animal is living because it can breathe, move, eat, grow, excrete and reproduce. A plant is living because it can move towards sunlight, make its own food, grow and reproduce.

Things to look out for

- Children may think that animals move and plants do not. It is important to state to them that plants do move, they move towards sunlight.
- There is often confusion in differentiating between living and non-living things. To address this, use examples such as animals, plants and rocks to discuss with children why the examples are living or non-living.

Key questions

- What is an organism?
- What do animals and plants need to survive?
- How do animals and plants get their food?
- How do you know if something is living?
- How do you know if something is non-living?
- How can you group these organisms based on their conditions for life?
- How are the conditions for life similar or different in plants and animals?

National curriculum links

- Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals.
- **Working scientifically** – Identifying scientific evidence that has been used to support or refute ideas or arguments.

Conditions for life

Key vocabulary

- **Organism** - A living thing such as an animal or a plant.

- **Excretion** – The removal of waste products.

- **Reproduction** – The production of offspring, either sexually or asexually.

- **Living** – An organism that moves, reproduces and grows.

- **Non-living** – Things that do not breathe, move, eat, grow, excrete or reproduce.

Practical ideas

- Children can go into the school grounds and collect examples of living and non-living organisms or objects.

  They can then give reasons why they have grouped them as living or non-living.

Be aware of allergies when children are in the school grounds.

- Children can work in pairs to create a true or false quiz to check their understanding of the conditions for life. They should include a variety of living and non-living things.

Factual knowledge

- A living organism moves, reproduces, grows and excretes.
- The stem of a plant moves towards the strongest light source and the roots move away from light.
- Plants can reproduce sexually and asexually.

Group organisms

Notes and guidance

In this small step, children group animals and plants based on their characteristics. Children should recap different organisms including flowering and non-flowering plants, vertebrates (mammals, birds, fish, amphibians and reptiles) and invertebrates. By the end of this step, children should give examples of each type of organism and their characteristics.

This step introduces the enquiry question for this block. Children will be carrying out an identifying, grouping and classifying enquiry. They should think of ways that animals and plants can be grouped based on their features. It is important that children look at a range of animals and plants when grouping them.

Things to look out for

- Children may think that all animals in the sea are fish. Clarify to them that mammals, such as whales, are also found in the sea.
- They may think that all plants have flowers. Remind children that some plants are non-flowering, such as mosses and ferns.

Key questions

- What is an organism?
- What are vertebrates and invertebrates?
- What are the features of different vertebrate groups?
- How do scientists group invertebrates?
- Which of these plants are flowering or non-flowering?
- How can you group these organisms?

  How many ways can you think of?

Enquiry question

- How can we identify, group and classify plants, animals and microorganisms?

National curriculum links

- Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants, and animals.
- **Working scientifically** – Use and develop keys and other information records to identify, classify and describe living things (non-statutory).

Group organisms

Key vocabulary

- **Organism** – A living thing such as an animal or a plant.

- **Vertebrate** – An animal with a spine.

- **Invertebrate** – An animal without a spine.

- **Flowering plant** – A plant that can produce flowers and fruit.

- **Non-flowering plant** – A plant that does not produce flowers and fruit.

Practical ideas

- Ask children to sort and group images of flowering and non-flowering plants, vertebrates and invertebrates in different ways.

  Encourage children to provide explanations for their groupings.

- To emphasise grouping based on features, give children different types of coins or sweets. They should have different features such as colour and shape. Ask children to sort the coins or sweets into groups and ask them what they have in common.

Factual knowledge

- Vertebrates can be grouped as mammals, birds, fish, amphibians and reptiles.
- Plants can be grouped as flowering and non-flowering. Flowering plants produce flowers and fruits. Non-flowering plants do not.
- Scientists group organisms to organise animals and plants based on their features.
- Grouping organisms can help us understand how organisms are related to each other.

Classify animals

Notes and guidance

In this small step, children build on grouping organisms from the previous step to classifying animals. Children have been introduced to classification keys in Year 4. They look at classification systems in more detail and discuss reasons why animals are placed in one group and not the other.

Children will continue to explore the enquiry question in this step and they should be given opportunities to develop their thinking. This should be done by children classifying a range of animals based on their features. It is important to encourage children to discuss and explain their reasoning using scientific facts.

Things to look out for

- This can lead to some children incorrectly classifying animals. For example, they may believe that whales are fish.
- Children may classify animals based on whether they can move or where they live.
- Highlight to children that organisms are classified according to their features, such as number of legs or having scaly skin.

Key questions

- What are classification keys?
- Why are classification keys important?
- How are animals classified?
- What questions can be used to create classification keys for animals?
- What are open/closed questions?

Enquiry question

- How can we identify, group and classify animals, plants and microorganisms?

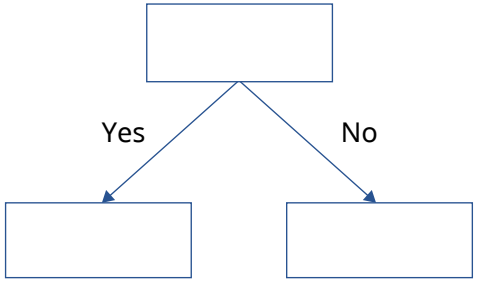
National curriculum links

- Give reasons for classifying plants and animals based on specific characteristics.
- **Working scientifically** – Use and develop keys and other information records to identify, classify and describe living things and materials, and identify patterns that might be found in the natural environment (non-statutory).

Classify animals

Key vocabulary

- **Classification** – Method of arranging organisms into groups.
- **Classification key –** A way of separating organisms into groups or types.



- **Molluscs** – A soft bodied invertebrate, including slugs and snails.

- **Arachnids** – An invertebrate with two body parts and eight legs, including spiders and scorpians.

Practical ideas

- To recap classification, give the children five craft buttons of different colours and shapes.

  Two square (one red and one blue)

  Three circular (two green and one yellow)

  Give the children several questions with "Yes" or "No" answers.

  For example, "Is the button circular?" or "Is the button green?"

  The children should then move the buttons under either "Yes" or "No" labels.

- Ask children to create their own classification keys. Children can create their own questions so they can separate the animals and classify them.

Factual knowledge

- Classification keys are used to classify animals.
- Classification keys can be used to identify different unknown animals based on their features, such as number of legs, having fur or scales.
- A classification key is made up of several questions with yes or no answers.
- These questions can then lead to further questions and answers until the identity of the animal is determined.

Classify plants

Notes and guidance

In this small step, children use their prior knowledge of classification keys to create their own questions and classify plants. Children have used classification keys to classify plants in Year 4. In this step, they classify flowering and non-flowering plants including deciduous, evergreen and coniferous trees. Although children have used the terms "deciduous" and "evergreen" in previous year groups, this is the first time they are introduced to coniferous trees.

Children will continue to explore the enquiry question in this step and they should be given a range of plants to create their own questions and classify plants based on their features.

It is important that children have opportunities to discuss and explain their reasoning when classifying plants.

Things to look out for

- Children may classify plants based on what they can clearly see, such as stem and flowers. For example, they may classify a mushroom as a plant by stating it has a stem.
- It is important to clarify to children what coniferous trees are and to provide examples such as pine trees.

Key questions

- What are the features of flowering and non-flowering plants?
- What are the differences between deciduous and evergreen trees?
- What are the features of coniferous trees?
- What are the different ways that scientists classify plants?
- What questions can be used to create classification keys for plants?

Enquiry question

- How can we identify, group and classify animals, plants and microorganisms?

National curriculum links

- Give reasons for classifying plants and animals based on specific characteristics.
- **Working scientifically** – Use and develop keys and other information records to identify, classify and describe living things and materials, and identify patterns that might be found in the natural environment (non-statutory).

Classify plants

Key vocabulary

- **Flowering plant** – A plant that produces flowers and fruit.


- **Non-flowering plant** – A plant that does not produce flowers and fruit.

- **Deciduous trees** – Trees that lose their leaves during winter.

- **Evergreen trees** – Trees that do not lose their leaves during winter.

- **Coniferous trees** – Trees that produce cones instead of flowers.

Practical ideas

- Ask children to create their own classification keys. Give them cut-out images of plants such as daffodils, mosses, ferns, cedar and oak. Ask the children to create questions on how they can separate the plants and classify them.


- Provide children with real plants that they can closely observe. Allow them to work in pairs or groups. They can then create a classification key to try to identify them. Children can compare their classification keys to another group.

Factual knowledge

- Classification keys can be used to classify plants.
- They can be used to identify different unknown plants based on their features.
- Plants can be classified in several ways.
- Trees can be classified as deciduous, evergreen and coniferous.

Microorganisms

Notes and guidance

In this small step, children explore microorganisms, including bacteria, viruses and fungi, for the first time. As a result, they may have limited understanding of what microorganisms are. Children should describe what bacteria, viruses and fungi look like and what diseases or infections they may cause.

Bacteria can be helpful and harmful. Friendly bacteria lives in the stomach and aids digestion and harmful bacteria may cause food poisoning and throat infections. Viruses may cause flu and the common cold. Fungi may cause infections in the mouth and throat. Some microorganisms are helpful and vital for humans to function properly.

Children continue to explore the enquiry question in this step, and they should be shown a variety of microorganisms so they can observe the different shapes and types that exist.

Things to look out for

- Children may think that all bacteria are harmful. State to them that humans have bacteria inside them which help to digest food.
- Children may believe that all microorganisms can be seen with the eye. Clarify to them that a powerful microscope is needed to view them.

Key questions

- What is a microorganism?
- Where can bacteria be found and what can they do?
- What diseases can viruses cause?
- What infections can fungi cause?
- How are some bacteria helpful for humans?

Enquiry question

- How can we identify, group and classify animals, plants and microorganisms?

National curriculum links

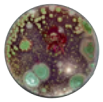
- Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals.
- **Working scientifically** – Identifying scientific evidence that has been used to support or refute ideas or arguments.

Microorganisms

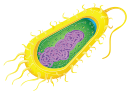
Key vocabulary

- **Organism** – A living thing such as a plant, animal, bacteria or fungi.

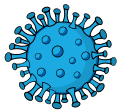
- **Microorganisms** – Tiny organisms such as bacteria, viruses and fungi.



- **Bacteria** – Simple, tiny, invisible (to the eye) microorganisms.



- **Viruses** – Tiny microorganisms that need a host.



- **Fungi** – A group of organisms including mushrooms, mould and yeast.

Practical ideas

- Children can explore the role of yeast in bread making. Ask them to place a teaspoon of active yeast, a teaspoon of sugar and three-quarters of a cup of warm water in a bowl. Children should then add enough flour to make a dough and place it in a warm environment. After 1 hour, the children should observe what happens to the dough and describe the role of yeast.
- Provide children with different types of mushroom from the supermarket.

They can use hand lenses to observe and describe the mushrooms. Ask children to carefully draw their observations and to describe their similarities and differences.

Factual knowledge

- A microorganism is tiny and can be seen using a powerful microscope.
- Bacteria are simple, invisible (to the eye) microorganisms. Some bacteria can cause diseases and infections. Humans have good bacteria in their bodies which help to digest food.
- Viruses are invisible (to the eye) microorganisms and need a host. They can cause diseases such as flu or a common cold.
- Some fungi are microorganisms which may cause infections. Some can be involved in bread making.

Classify microorganisms

Notes and guidance

In this small step, children provide answers to the enquiry question "How can we identify, group and classify animals, plants and microorganisms?" They should demonstrate their understanding through classification keys, grouping organisms in different ways or by creating written and verbal responses.

Classifying microorganisms should be based on features such as shape. It is important to note that children have not come across the names of the shapes of microorganisms.

The names of shapes of microorganisms should be limited to "has a tail" for bacteria, "complex and spherical-shaped" for viruses and "long, thin tubes" for fungi. This will make it easier for the children to classify microorganisms.

Things to look out for

- Clarify to children that microorganisms can be classified based on their features, just as animals and plants can.
- Children may struggle to create questions when classifying microorganisms. Create a whole-class question bank to help them to generate questions when constructing classification keys.

Key questions

- How can microorganisms be classified?
- What questions can be used to classify microorganisms?
- How are bacteria, viruses and fungi similar?
- How are bacteria, viruses and fungi different?

Enquiry question

- How can we identify, group and classify animals, plants and microorganisms?

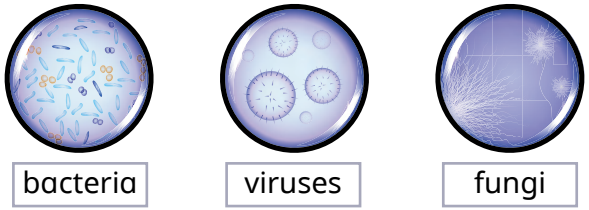
National curriculum links

- Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals.
- **Working scientifically** – Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and a degree of trust in results, in oral and written forms such as displays and other presentations.

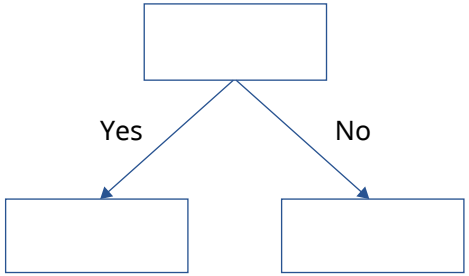
Classify microorganisms

Key vocabulary

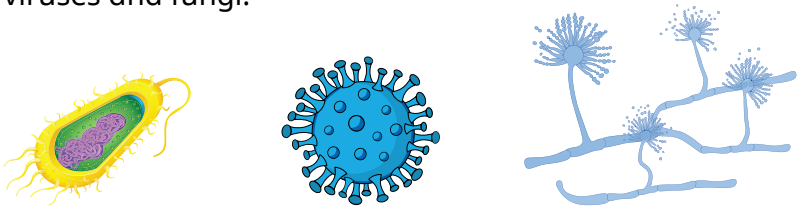
- **Classification** – Method of arranging organisms into groups.



- **Classification key** – A way of separating organisms into groups or types.



- **Microorganisms** – Tiny organisms such as bacteria, viruses and fungi.



Practical ideas

- Children could play "Which microorganism am I and can you classify me?"

  Place four labels face down on the table.

  Do not allow children to see the labels before playing the game.

bacteria	fungi	virus

  In pairs, one child picks up a label, without looking at the name, and shows their partner.

  The child can then ask questions such as "Am I spherical shaped?" or "Can I cause diseases such as food poisoning?" The partner answers only "Yes" or "No" until the child correctly identifies the name of the microorganism.

  They then switch roles and pick another label until all three types of microorganisms have been identified correctly.

Factual knowledge

- Microorganisms such as bacteria, viruses and fungi can be classified.
- The classification of microorganisms is based on their features or characteristics such as shape.
- Bacteria, viruses and fungi have different shapes.

Carl Linnaeus

Notes and guidance

In the final step of this block, children learn about the work of Carl Linnaeus and his system of classifying organisms. They will have opportunities to research what Linnaeus did and how he classified organisms based on their physical appearances. Children explore the impact of Linnaeus' work on how organisms are classified today.

Children do not need to be aware of "genus" and "species" as these are complex terms introduced in later curriculum. This step is an opportunity for children to collaborate, discuss and share ideas. They can present and compare their findings on the work of Carl Linnaeus.

Key questions

- Who was Carl Linnaeus?
- Why did Linnaeus create the classification system?
- How did Carl Linnaeus classify animals?
- What challenges did Linnaeus face?
- Why do you think Linnaeus did not classify microorganisms?
- How have advances in science allowed us to identify, group and classify microorganisms?

Things to look out for

- Children may think that Linnaeus created a classification system for microorganisms. Due to a lack of technology, Linnaeus was not aware of the existence of microorganisms.
- Children should be aware that Linnaeus did not classify reptiles as a separate vertebrate group.

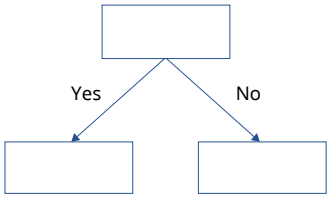
National curriculum links

- Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals.
- **Working scientifically** – Use relevant scientific language and illustrations to discuss, communicate and justify their ideas and should talk about how scientific ideas have developed over time (non-statutory).

Carl Linnaeus

Key vocabulary

- **Carl Linnaeus** – A Swedish botanist who first developed a system to classify animals based on physical characteristics.
- **Classification** – Method of arranging organisms into groups.



- **Characteristics** – Features of an organism.



- **Vertebrate** – Animal with a spine.


- **Invertebrate** – Animal without a spine.

Practical ideas

- In small groups, children can create a timeline of Carl Linnaeus' life and his contribution to classifying animals. They may present their ideas and timelines to the rest of the group. Children then compare their timelines.





- Children could work in pairs to become science journalists. They can create a newspaper article on Carl Linnaeus and his system of classifying animals.

Factual knowledge

- Carl Linnaeus was a Swedish botanist who wrote a book called *Systema Naturae* or *System of Nature*.
- Linnaeus was famous for developing the first system to classify animals. The classification was based on physical characteristics.
- Carl Linnaeus divided animals into six classes. These were mammals, birds, amphibians, fish, insects and worms.