Unit – Group and classify living things – Y4

How can living things be grouped and classified?

Knowledge Progression

-Recognise that living things can be grouped in a variety of ways.
-Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment.
-Recognise that environments can change and that this can sometimes pose dangers to living things.

Skill Progression

-Using and making simple guides or keys [sorting, grouping, comparing, classifying] to explore and identify local plants and animals.
-Making a guide [sorting, grouping, comparing, classifying] to local living things.
-Raising and answering questions based on their observations of animals.
-What they have found out about other animals that they have researched.

Key Learning

1. **Living things can be grouped and classified based on their characteristics.**
- Scientists classify living things by identifying similarities and differences in their features.
- Classification helps scientists identify, name and organise living things.
2. **Animals can be classified into groups based on their physical features.**
- Animals with a spine are called **vertebrates** and include mammals, birds, fish, amphibians and reptiles.
- Animals without a spine are called **invertebrates** and can be grouped further by their characteristics (e.g. insects, spiders and soft-bodied invertebrates).
3. **Different animal groups have shared characteristics that help scientists identify them.**
- Mammals, birds, fish, amphibians and reptiles have specific features that distinguish them from one another.
- Invertebrates can also be identified by features such as body structure, number of legs and presence of an exoskeleton.
4. **Classification keys help scientists identify and group living things.**
- Classification keys use questions with **yes/no answers** based on observable features.
- Good classification questions are factual rather than based on opinions.
5. **Plants can also be classified based on their characteristics.**
- Flowering plants produce flowers and fruit, while non-flowering plants do not.
- Plants can be grouped using features such as leaves, flowers and stems.

Vocabulary

Classify, classification, characteristics, vertebrate, invertebrate, exoskeleton, soft-bodied invertebrate, classification key, flowering plant, non-flowering plant, deciduous, evergreen, fern, moss, pollination

Misconceptions

A whale is a fish because it lives in water.

All animals have a skeleton made of bones.

All invertebrates are insects.

Spiders are insects.

All plants have flowers.

Fruit means only foods humans eat, such as apples and oranges.

Classification is based on what something looks like or what we think it is.

Questions in classification keys can be opinions (e.g. "Is it a nice animal?").

Prior Knowledge / Connected Learning

-Living things can be grouped based on similarities and differences.
(Year 1 – Plants; Year 2 – Living Things and their Habitats)
-**Animals can be grouped into mammals, birds, fish, amphibians and reptiles based on their features.**
(Year 2 – Living Things and their Habitats)
- **Animals have basic needs for survival and produce offspring.**
(Year 2 – Animals Including Humans; Year 2 – Living Things and their Habitats)
- **Plants are living things and can be grouped into common types, including flowering plants and trees.**
(EYFS/Year 1 – Plants; Year 2 – Living Things and their Habitats)
- **Some trees are deciduous and some are evergreen.**
(Year 1 – Plants)
- **Plants have different parts with different functions (roots, stem, leaves and flowers).**
(Year 3 – Plants)
- **Plants have reproductive parts and produce seeds through pollination.**
(Year 3 – Plants)

Future Learning

-More complex classification systems based on **evolutionary relationships** (Year 6/KS3).
-That living things can be classified into groups based on shared characteristics and **common ancestors**.
-That microorganisms can be classified separately from plants and animals (KS3).
-How adaptations help organisms survive in their environments (Year 6 Evolution and Inheritance).
-How scientists use evidence to explain relationships between living things.

Possible Activities/Evidence

- Animal classification sorting
    - Sort animal images into groups based on physical features.
    - Explain and justify classification choices.
    - Explore unusual examples such as whales and platypuses.
- Animal characteristics investigation
    - Create comparison charts showing features of mammals, birds, fish, amphibians and reptiles.
    - Play classification games such as animal snap.
- Vertebrate and invertebrate exploration
    - Group animals based on whether they have a spine.
    - Investigate local invertebrates and record observations.
- Creating and using classification keys Use existing classification keys to identify animals.
    - Design yes/no classification keys using observable features.
    - Create large-scale classification keys using hoops/string.
- Plant classification investigation
    - Observe and sort plants based on characteristics.
    - Compare flowering and non-flowering plants.
    - Classify leaves from deciduous and evergreen trees.
- Plant classification keys
    - Create and use classification keys to identify plants.
    - Present findings through explanations, displays or presentations.

○ Sort invertebrates into insects, spiders and soft-bodied groups.	
MCQs	
MCQ 1: What does it mean to classify living things? A) To put living things into groups based on their features B) To put living things into groups based on whether we like them C) To give every living thing the same name D) To decide which living things are the most important **Correct answer:** ☑ A) To put living things into groups based on their features **Follow-up discussion questions:** • Why would scientists need to classify living things? • Why would someone's opinion not be useful when classifying?	**MCQ 4: Which question would be most useful in a classification key?** A) Is it a scary animal? B) Is it your favourite animal? C) Does it have feathers? D) Is it a large animal? **Correct answer:** ☑ C) Does it have feathers? **Follow-up discussion questions:** • Why are yes/no questions useful in classification keys? • Why are some questions better than others for identifying living things?
MCQ 2: A whale lives in the sea. Which statement is correct? A) A whale is a fish because it lives in water. B) A whale is a mammal because it gives birth to live young and feeds them milk. C) A whale is an amphibian because it lives in water. D) A whale cannot be classified because it lives in the sea. **Correct answer:** ☑ B **Follow-up discussion questions:** • Why might someone classify a whale as a fish? • What features tell us that a whale is a mammal?	**MCQ 5: Which statements about plants are correct?** *(Select all that apply)* ☐ Flowering plants can produce flowers and fruit. ☐ All plants produce flowers. ☐ Ferns and mosses are examples of non-flowering plants. ☐ Plants cannot be classified because they are all different. **Correct answers:** ☑ Flowering plants can produce flowers and fruit. ☑ Ferns and mosses are examples of non-flowering plants. **Follow-up discussion questions:** • Why might someone think all plants have flowers? • What features could scientists use to classify plants?
MCQ 3: Which statements about invertebrates are correct? *(Select all that apply)* ☐ Invertebrates do not have a spine. ☐ Spiders are insects. ☐ Some invertebrates have an exoskeleton. ☐ All invertebrates have six legs. **Correct answers:** ☑ Invertebrates do not have a spine. ☑ Some invertebrates have an exoskeleton. **Follow-up discussion questions:** • What features make an insect different from a spider? • Why might someone think all invertebrates are the same?	

Digging Deepers	

Digging Deeper Question 1 (Early in the unit – linking prior learning)
 	
Question:
A whale lives in the sea. Some people think it should be classified as a fish. Do you agree? Explain your answer.
Prompts:
Think about:
• What features do fish have?
• What features do mammals have?
• Does where an animal lives tell us its group?
• Use:
  ○ mammal
  ○ vertebrate
  ○ features
  ○ classify
Model answer:
I disagree because whales are mammals, not fish. Although whales live in water, they have features of mammals. They breathe air, give birth to live young and feed their young milk. Scientists classify animals by their characteristics, not where they live.
	Digging Deeper Question 2 (Later in the unit – linking the whole unit)
	
	Question:
	Scientists discover a new animal. Explain how they could find out which group it belongs to.
	Prompts:
	Think about:
	• What features would scientists observe?
	• Would they look for a spine?
	• How could a classification key help?
	• What type of questions would they ask?
	• Use:
	  ○ classification
	  ○ characteristics
	  ○ vertebrate/invertebrate
	  ○ classification key
	Model answer:
	Scientists would observe the animal's characteristics and record its features. They would check whether it has a spine to decide if it is a vertebrate or invertebrate. They could then use a classification key with yes/no questions to identify the group it belongs to. The questions should focus on scientific features, such as whether it has fur, feathers, scales or legs.

Unit – States of Matter (Y4)

Solids, liquids, gases, heating, cooling, evaporation, condensation

Knowledge Progression

-Compare and group materials together, according to whether they are solids, liquids or gases.
-Observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C).
-Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.

Skill Progression

-asking relevant questions and using different types of scientific enquiries to answer them
-setting up simple practical enquiries, comparative and fair tests
-making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers
-gathering, recording, classifying and presenting data in a variety of ways to help in answering questions
-recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables
-reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions
-using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions
-identifying differences, similarities or changes related to simple scientific ideas and processes using straightforward scientific evidence to answer questions or to support their findings.

Key Learning

A solid keeps its shape and has a fixed volume. A liquid has a fixed volume but changes in shape to fit the container. A liquid can be poured and keeps a level, horizontal surface. A gas fills all available space; it has no fixed shape or volume. Granular and powdery solids like sand can be confused with liquids because they can be poured, but when poured they form a heap and they do not keep a level surface when tipped. Each individual grain demonstrates the properties of a solid.

Melting is a state change from solid to liquid. Freezing is a state change from liquid to solid. The freezing point of water is 0oC. Boiling is a change of state from liquid to gas that happens when a liquid is heated to a specific temperature and bubbles of the gas can be seen in the liquid. Water boils when it is heated to 100oC. Evaporation is the same state change as boiling (liquid to gas), but it happens slowly at lower temperatures and only at the surface of the liquid. Evaporation happens more quickly if the temperature is higher, the liquid is spread out or it is windy. Condensation is the change back from a gas to a liquid caused by cooling.

Water at the surface of seas, rivers etc. evaporates into water vapour (a gas). This rises, cools and condenses back into a liquid forming clouds. When too much water has condensed, the water droplets in the cloud get too heavy and fall back down as rain, snow, sleet etc. and drain back into rivers etc. This is known as precipitation. This is the water cycle.

Vocabulary

Solid, liquid, gas, state change, melting, freezing, melting point, boiling point, evaporation, temperature, water cycle

Misconceptions

Some children may think:
-‘solid’ is another word for hard or opaque
-solids are hard and cannot break or change shape easily and are often in one piece
-substances made of very small particles like sugar or sand cannot be solids

-particles in liquids are further apart than in solids and they take up more space
-when air is pumped into balloons, they become lighter
-water in different forms – steam, water, ice – are all different substances
-all liquids boil at the same temperature as water (100 degrees)
-melting, as a change of state, is the same as dissolving
-steam is visible water vapour (only the condensing water droplets can be seen)
-clouds are made of water vapour or steam

Prior Knowledge

-Distinguish between an object and the material from which it is made. (Y1 - Everyday materials)
-Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock. (Y1 - Everyday materials)
-Describe the simple physical properties of a variety of everyday materials. (Y1 - Everyday materials)
-Compare and group together a variety of everyday materials on the basis of their simple physical properties. (Y1 - Everyday materials)
-Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses. (Y2 - Uses of everyday materials)
-Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. (Y2 - Uses of everyday materials)

Future Learning

-Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets. (Y5 - Properties and changes of materials)
-Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution. (Y5 - Properties and changes of materials)
-Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating. (Y5 - Properties and changes of materials)
-Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic. (Y5 - Properties and changes of materials)
-Demonstrate that dissolving, mixing and changes of state are reversible changes. (Y5 - Properties and changes of materials)
-Explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda. (Y5 - Properties and changes of materials)

Possible Activities/Evidence

-Can create a concept map, including arrows linking the key vocabulary
-Can name properties of solids, liquids and gases
-Can give everyday examples of melting and freezing
-Can give everyday examples of evaporation and condensation
-Can describe the water cycle

-Can give reasons to justify why something is a solid liquid or gas
-Can give examples of things that melt/freeze and how their melting points vary
-From their observations, can give the melting points of some materials
-Using their data, can explain what affects how quickly a solid melts

-Can measure temperatures using a thermometer
-Can explain why there is condensation on the inside the hot water cup but on the outside of the icy water cup
-From their data, can explain how to speed up or slow down evaporation
-Can present their learning about the water cycle in a range of ways e.g. diagrams, explanation text, story of a water droplet

-Observe closely and classify a range of solids. Observe closely and classify a range of liquids.
-Explore making gases visible e.g. squeezing sponges under water to see bubbles, and showing their effect e.g. using straws to blow objects, trees moving in the wind.
-Classify materials according to whether they are solids, liquids and gases.
-Observe a range of materials melting e.g. ice, chocolate, butter.
-Investigate how to melt ice more quickly.
-Observe the changes when making rocky road cakes or ice-cream.
-Investigate the melting point of different materials e.g. ice, margarine, butter and chocolate.
-Explore freezing different liquids e.g. tomato ketchup, oil, shampoo.
-Use a thermometer to measure temperatures e.g. icy water (melting), tap water, hot water, boiling water (demonstration).
-Observe water evaporating and condensing e.g. on cups of icy water and hot water.
-Set up investigations to explore changing the rate of evaporation e.g. washing, puddles, handprints on paper towels, liquids in containers.
-Use secondary sources to find out about the water cycle.