



Characteristics of life and classification

Time needed for activity 30 mins for each activity

Location Indoors or outdoors

Context

This activity plan shares several activities that will encourage your learners to investigate the characteristics of different species that live amongst sand dunes and consider how they can be classified.

Natural Resources Wales' purpose is to pursue sustainable management of natural resources in all of its work. This means looking after air, land, water, wildlife, plants, and soil to improve Wales' well-being, and provide a better future for everyone.

Curriculum for Wales

Science and Technology

- **What matters** - Being curious and searching for answers is essential to understanding phenomena.
- **What matters** - The world around us is full of living things which depend on each other for survival.

Languages, Literacy and Communication

- **What matters** - Understanding languages is key to understanding the world around us.
- **What matters** - Expressing ourselves through languages is key to communication.

Objectives

- Learners will be aware of and understand the characteristics of life.
- Learners will consider and identify the similar and different characteristics between species.
- Learners will think up their own criteria to sub-classify animals.

What to do

Activity 1 - Characteristics of life

1. Divide your learners into small groups and ask them to consider what all living things have in common? What are the characteristics of life? Can they write a short definition for each characteristic? Alternatively, give each group one characteristic to consider and explain.
 - **Movement** - either all a creature's structure moves or there are moving parts which respond to stimuli, for example, light or a predator.
 - **Respiration** - is a chemical reaction that occurs in the parts of cells in which glucose and oxygen react to produce carbon dioxide and water, releasing energy. Plants respire all the time in both light and darkness.
 - **Sensitivity** - reacting to the environment, such as creatures closing their shell at low tide or plants bending and growing towards a source of light.



- **Growth** – all living organisms grow and develop. Growth can be defined as an irreversible change in mass with organisms gradually increasing in terms of size or number over time or, an organism developing to maturity e.g. a plant from a seed.
 - **Reproduction** – producing offspring. When reproduction occurs, genes containing DNA are passed to an organism's offspring. These genes ensure that the offspring will belong to the same species and will have similar characteristics, such as size and shape.
 - **Excretion** – all living things produce waste. The processes of obtaining energy all create by-products or waste. For example, when humans digest food, they eliminate waste – the liquid waste becomes urine, and the solid waste becomes faeces. Plants need to excrete excess carbon dioxide and oxygen. Carbon dioxide is a waste product of aerobic respiration in plant cells. Oxygen is a waste product of photosynthesis.
 - **Nutrition** – nutrients are compounds in foods essential to life and health. They provide us with energy, the building blocks for repair, growth, and the substances necessary to regulate the bodies chemical processes.
2. The characteristics of life can be remembered using the acronym MRS GREN. This acronym is often used to help remember all the necessary features of living organisms: **M**ovement, **R**espiration, **S**ensitivity, **G**rowth, **R**eproduction, **E**xcretion and **N**utrition. Can your learners come up with an action to help them remember each characteristic? Obviously this exercise may need to be tailored depending on your learners especially regarding excretion and reproduction!
 3. Give each group some of the **Resource cards (set B) – Sand dune super species** along with some items from within your setting such as a pot plant, a stone, cup, carton of juice or stapler and ask your learners to use the characteristics of life (MRS GREN) to ascertain whether the items are living or non-living. What observations can be made for each characteristic to decide whether it is living or non-living? For example, a flower in a plant pot on a window sill will grow towards the sun as it's sensitive to light. If a stapler was placed in a plant pot of water on a window sill it would not grow towards the sun. If there are any objects or species they are unsure of, ask them to carry out some research to find out more. Can your learners think of any experiments they could complete to test whether or not an object or species is living or non-living against the MRS GREN characteristics of life?
 4. Ask your learners if they can explain how we have come to know as much as we do about the species on our planet. Discuss how everything we currently know about living things is because people have observed them in their natural environments and have recorded their findings and communicated the information.

Activity 2 - What is classification?

While all living things have the characteristics of life, they often look different. These differences are used to group living things into species which provides a way of classifying and organising them.

1. Ask your learners to describe what classification means? Ask them what they might use to classify themselves, for example gender, age, height, ethnicity and/or language. Explain why we try to group and name plants and animals. Classification is a way of making sense of the incredible biodiversity we have on earth by grouping different organisms according to their similarities and differences. As there are millions of different species of organisms, by classifying them into groups according to their shared characteristics, it helps us to remember what they are like and makes identifying them easier and quicker.



- Ask your learners to think of a place where items are classified for our ease, for example books in a library, food in a supermarket, departments in a hospital or year groups in a school. Ask your learners to imagine what it would be like doing weekly food shopping if supermarkets didn't group similar things together and if they didn't have names! How would they ask for a certain branded packet of crisps or a Golden Delicious apple?

By grouping similar items together, they can be found much faster.

Watch the **BBC Teach Science KS2/KS3: Classification of organisms** video with your learners to find out more.

- Working in small groups, ask your learners to sort their **Resource cards (set B) - Sand dune super species** under the plant, animal or fungi heading cards. Once they have done this, ask your learners to put the plants and fungi resource cards to one side. Ask them to create their own heading cards and sub-classify the animals. For example, into mammals, birds, reptiles, or amphibians. Discuss their thoughts. Have all the groups sub-categorised the resource cards in the same way? Ask your learners to discuss their rationale.

Activity 3 - Make keys to identify some of the sand dune super species

Dichotomous keys are used to identify species using the classification criteria. Keys use questions to which there are only two answers, often 'Yes' or 'No'. They are presented as a table of questions or a branching of questions. Useful information on classification can be found on the BBC Bitesize [website](#).

Ask your learners to choose three species from the **Resource cards (set B) - Sand dune super species**. Can they list their characteristics as questions in a table either on paper or in a word processing document or spreadsheet?

Ask learners to sort the list of sand dune super species into broad categories of Kingdoms, for example, plant, animal and fungi. Then a further sorting of the animals into birds, mammals, reptiles, and amphibians. Learners can then make a dichotomous key to help someone else work out which species is which, from their questions which may have been based on the first activity.

An example is provided below.

| Characteristics | Super Species Name | | |
|-------------------------|--------------------|-----|--------|
| | Rabbit | Fox | Chough |
| Can it fly? | No | No | Yes |
| Does it have four legs? | Yes | Yes | No |
| Does it have two legs? | No | No | Yes |
| Does it have a snout? | Yes | Yes | No |



Activity 4 - Sand dune species fact file

Ask each learner to choose one species to research and create a fact file or presentation. Can they present their findings to the rest of the group?

Activity 5 - Classification using global status

Ask learners to look at the **Resource Cards (set B) - Sand dune super species** and identify the words used to describe how many of them there are and whether they are endangered or common. Words include: common, least concern, rare, endemic and declining. Ask them to define what each means. Which species should we be most concerned about? Why? What strategies can they identify to help protect the species?

Are any of these species on the 'Red List'?

[IUCN Red List of Threatened Species | IUCN](#)

Activity 6 - Design 'Sand dune super species' top species cards

Divide your learners into small groups and pick some species from the **Resource cards (set B) - Sand dune super species** for each group to work with. They are going to design a set of Top Species in the style of Top Trumps cards. Ask each group of learners to decide on five categories to score their sand dune super species against. For consistency in scoring, it might be best to give one group plants, another group mammals and so on. Ask your learners to think of a scoring category that will apply to all of their species. For example, plants that live closest to the beach get a higher 'salt tolerance' score. Mammals that have few predators get a high 'top survivor' score. They could also include information on average height, weight etc. Give your learners an opportunity to complete some research on their species before designing and populating their top species cards and challenging another group to a game of 'Sand dune super species' top trumps.

Activity 7 - Sand dune super species guess who

A fun take on the classic 'Guess Who?' game, learners ask each other questions to figure out which animal or plant has been chosen.

This activity can be played in one of two ways:

1. Using clothes pegs, peg one species card to the back of each learner. Ask your learners to work in pairs to question each other and work out which species has been pegged to their back. Encourage your learners to carefully consider and structure their questions so they can be answered with closed answers 'yes' or 'no'. For example, "Am I a bird?" "Can I swim?"
2. Working in pairs, give each pair a set of 20 **Resource cards (set B) - Sand dune super species**. These should be laid out on a flat surface face up. Ask Learner 1 to pick one resource card and keep the image of the card in their head. It is important not to touch the card or indicate to others which has been chosen. Learner 2 asks Learner 1 questions to eliminate resource cards. Once a species has been eliminated, Learner 2 should turn the eliminated species card face down until the correct species is the only one left face up. Encourage your learners to use open ended questions. Questions with who, what, where, when, how or why may lead to their partner giving some thought to their answer and providing much more information.

Can your learners identify the sand dune species using as few questions as possible? For each activity ask whichever learner is answering the question to keep note of how many questions their partner asks before identifying the sand dune species. At the end of the activity(ies) discuss how many questions the pair used. Ask your learners to reflect on whether they could have posed questions more effectively? If yes - how? Which method of questioning did they find the most effective to identify the sand dune species? Questions with closed answers or questions with open ended answers? What do their findings tell them?



Suggested key questions

- What can all living things do?
- Why do we need to classify living things?
- What is a classification key?

Adapting for different needs/abilities

More support

- Reduce the number of **Resource cards (set B) – Sand dune super species** you give out to your learners.
- Give out **Resource cards (set B) – Sand dune super species** that your learners will be familiar with.

More Challenge

- Can your learners to complete the **Resource cards (set B) – Sand dune super species** guess who activity using a maximum of ten questions. Or fifty words.
- Complete the activities individually or in pairs.

Follow up activity/extension

- Animals adapt to suit what they eat. Ask your learners to take a close look at three species and record two ways that their bodies or behaviours have adapted to suit their feeding style or type of food available.
- Investigate the relationship between respiration and photosynthesis, write an equation for both respiration and photosynthesis.
- Learn and investigate how Marram grass has adapted to living in a sand dune environment.
- Give your learners the opportunity to go out and survey, classify and identify organisms on a sand dune system, with our **Activity plan - Sand dune vegetation sampling**.
- Find out more about sand dune plants. Plants are the first colonisers of a new area of sand and they have to adapt to a combination of wind exposure, drought, salty conditions and sand lacking humus or nutrients. The process by which plant communities create conditions allowing new species to establish is called ecological succession and is incredibly important for invertebrates.
- Discuss the significance and importance of bare sand. Bare sand is incredibly important for invertebrates, which is one of the drivers for the Sands of LIFE project. Can your learners research more about why bare sand is necessary within the system and how projects like Sands of LIFE are trying to ensure there is bare sand within systems?

Looking for more learning resources, information and data?

Please contact: education@naturalresourceswales.gov.uk or go to <https://naturalresources.wales/learning>

Alternative format; large print or another language, please contact: enquiries@naturalresourceswales.gov.uk
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