

Autumn
Scheme of learning

Year 2

The White Rose Science schemes of learning

Schemes of learning

Our research-based schemes of learning are designed to teach the aims and objectives of the National Curriculum.

Content over time

Our schemes are written for content rather than time. This ensures that children are developing a solid understanding of scientific processes and concepts.

Substantive knowledge

Our schemes of learning ensure full coverage of the scientific content as stated within the National Curriculum.

Disciplinary knowledge (Working scientifically)

Each step has a working scientifically skill focus. Working scientifically skills are developed across years and year groups.

Year 2 | Autumn term | Block 1 – Animal needs for survival | Step 1

Mammals

Notes and guidance

In Year 1, children identified familiar mammals and described their basic structure. In this small step, children build on this as they explore mammals needs for survival. It is important that children are confident with the definition of a mammal before they think about their needs for survival.

Children should know that all mammals need air, water, food and shelter to survive. In Year 2, children should use the term 'air' instead of oxygen, as they have not yet been introduced to gases. They will need to recap the terms 'carnivore', 'omnivore' and 'herbivore' so they can differentiate between different dietary requirements.

There is an opportunity for children to think about sustainability within this step. Children can explore how they can help to protect and care for mammals in their local area.

Key questions

- What mammals are shown?
- Do all mammals live on land?
- How do you know?
- What do all mammals need to survive?
- What does a carnivore, a herbivore or an omnivore eat?
- How do mammals that live in water breathe air?
- Is a human a mammal? Explain your thinking.

Sustainability link

- What can we do to help care for mammals?

Things to look out for

- Children may think that all mammals live on land. Discuss whales and dolphins to help address this misconception.
- Children may need support when thinking about dietary needs for different mammals.

National curriculum links

- Find out about and describe the basic needs of animals, including humans, for survival (water, food and air).
- **Working scientifically** – Asking simple questions and recognising that they can be answered in different ways.

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Working practically

Research shows that children learn best from a 'hands on and heads on' approach whereby practical activities are engaging and relevant. This features throughout our schemes of learning.

Experiments

Children carry out experiments following a plan, investigate and evaluate (KS2) model. Children plan their investigations, carry out their experiments and conclude and provide evaluations.



Modelling

Modelling is used wherever possible to explain abstract scientific ideas and concepts. This makes it easier for children to apply their knowledge and improve their understanding. In Upper KS2, children are introduced to the limitations of models.

Outdoor learning

Children are encouraged to work outside the classroom wherever possible to help provide relevancy to scientific concepts.



Scientific enquiry

There is one enquiry question per block covering the five enquiry types. This allows children to develop answers to a range of relevant scientific questions.



Teacher guidance

Every block in our schemes of learning is broken down into manageable small steps, and we provide comprehensive teacher guidance for each one. Here are the features included in each step.

Notes and guidance that provide an overview of the content of the step and ideas for teaching, along with advice on progression and where a topic fits within the curriculum.

Things to look out for, which highlights common mistakes, misconceptions and areas that may require additional support.

Year 3 | Autumn term | Block 1 – Skeletons | Step 1

Name and identify bones in the human body

Notes and guidance

In this small step, children explore the human skeleton for the first time by naming and identifying bones. There are lots of bones in the human skeleton, many of which have complex names. The focus of this small step is on the skull, femur, pelvis, spine and ribcage. By the end of this step, children should be able to name, identify and locate these bones in the human body.

The enquiry question for this block is “How can we sort and group animals based on their skeletons?” This is an identifying, grouping and classifying enquiry. Within this step, children can create relevant questions to begin the enquiry process.

Key questions

- How many bones are there in the human skeleton?
- Where is the skull found in the skeleton?
- Where is the femur found?
- Where is the pelvis found in the skeleton?
- Where is the ribcage found?
- Where is the spine found in the skeleton?

Enquiry question

- How can we sort and group animals based on their skeletons?

Things to look out for

- Children may think that the skeleton is one large bone, rather than a collection of bones.
- They may believe that bones in the body do not have specific names, for example, they may think all bones in the leg are called “leg bones”.
- Children may think that the arms and legs are one long bone, rather than made up of multiple bones.

National curriculum links

- Identify that humans and some other animals have skeletons and muscles for support, protection and movement.
- **Working scientifically** – Asking relevant questions and using different types of scientific enquiries to answer them.

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Key questions that can be posed to children to develop their scientific understanding and reasoning skills.

Enquiry questions are highlighted when children are undertaking the scientific enquiry process. Each block has one enquiry question and there is coverage of the five enquiry types across a year.

National Curriculum links to indicate the objective(s) being addressed by the step.

Teacher guidance

During **experiment steps**, experiment variables and **equipment** are clearly identified.



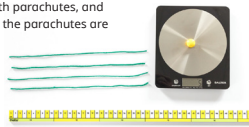
The **key vocabulary** section highlights essential vocabulary and definitions.

Relevant and purposeful **practical ideas** to encourage a 'hands on and heads on' approach.

Year 5 | Autumn term | Block 1 - Forces | Step 3

Plan - parachute experiment

Experiment variables

- Independent variable** (what will change) - the surface area of the parachute.
 
- Dependent variable** (what will be measured) - the time taken for the parachute to fall to the ground.
 
- Controlled variables** (what is kept the same) - the material that the three parachutes are made from, the object that is attached to both parachutes, and the height that the parachutes are dropped from.
 

Experiment information

Equipment needed

- Plastic bags
- Scissors
- 12 pieces of string 30 cm each
- Ruler
- 12 paper clips
- Stopwatch
- Scales
- Modelling clay to attach to the strings

Practical activity

- Put children in small groups. Give each group the equipment needed for the experiment. Children should identify what the equipment is and why it is used within the experiment.

Planning sentence stems

- I predict that ...
- I think this will happen because ...
- The independent variable will be ...
- The controlled variables will be ...

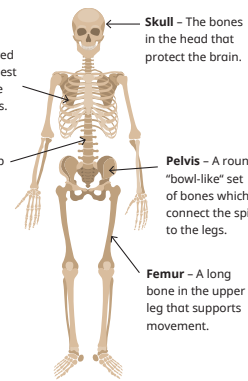
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Sentence stems to help promote the use of scientific talk in the classroom.

Year 3 | Autumn term | Block 1 - Skeletons | Step 2

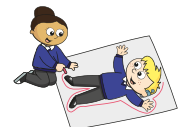
Functions of the skeleton

Key vocabulary



- Skull** - The bones in the head that protect the brain.
- Ribcage** - Curved bones in the chest that protect the heart and lungs.
- Spine** - A group of small bones stacked on top of each other in the back that support movement.
- Pelvis** - A rounded "bowl-like" set of bones which connect the spine to the legs.
- Femur** - A long bone in the upper leg that supports movement.

Practical ideas

- Children could work in pairs to draw around the outline of their partner's body on large sheets of paper. Children can then correctly identify and label the locations of the bones learnt in Step 1.
 

They should then describe the functions of each of the bones. (Note: If drawing round a partner's body is not appropriate, a printed outline could be used.)

Factual knowledge

- Bones have specific functions.
- The skull protects the brain.
- The femur helps humans to stand and move.
- The pelvis helps to support the spine.
- The spine helps humans to twist and be held upright.
- The ribcage protects the heart and lungs.

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Factual knowledge written in clear, child-friendly language.

Symbols

Key Stage 1 and 2 symbols

The following symbols are used to indicate:



Children are answering an enquiry question.



Highlights when and how health and safety measures need adhering to.



An outside activity or one that uses resources from nature.



Children talk about and compare their answers and reasoning.



A question that should really make children think. The question may be structured differently or require a different approach from others and/or tease out common misconceptions.

Sustainability

Sustainability blocks are highlighted with a leaf symbol.



Yearly overview

The yearly overview provides suggested timings for each block of learning, which can be adapted to suit different term dates or other requirements.

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Autumn term	Animal needs for survival			Humans			Materials			Project		
Spring term	Plants (light and dark)			Living things and their habitats						Light and dark Consolidation		
Summer term	Plants (bulbs and seeds)		Growing up		Bulbs and seeds Growing up		Wildlife		Consolidation			

Each year group has two blocks dedicated to sustainability. We want to help children to:


- Understand the current issues around sustainability and climate change.
- Identify that they have a role to play in creating a more sustainable future for themselves and others.
- Think of ways to make a positive impact on their local and wider environments.
- Have a positive and proactive mindset when it comes to making sustainable changes.

Premium supporting materials

Worksheets to accompany every small step, providing relevant practice questions for each topic that will reinforce learning at every stage.

Name and identify bones in the human body

1 Here is Mo.

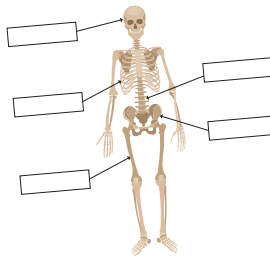


Draw an arrow to show the position of these parts on Mo's body.
Label your arrows.

head leg arm shoulder hand

2 Use the words to complete the labels on the skeleton.

ribcage skull femur spine pelvis




3 Diddy has been looking at the human skeleton.

The ribcage is part of the leg.

Do you agree with Diddy? _____
Explain your answer.

4 Match the images to the names.



femur
skull
spine
ribcage
pelvis

5 Use the words to complete the sentences. You can only use each word once.

skull skeleton femur

a) The collection of bones that make up a human body is called a _____.

b) The long bone in the upper leg is called the _____.

c) The bones in the head are called the _____.

6 Is the statement "always", "sometimes" or "never" true?
Any two human skeletons are the same.

Circle your answer.
Always Sometimes Never

Explain your answer.

7 Annie and Kim are talking about human skeletons.

A skeleton is 1 large bone.

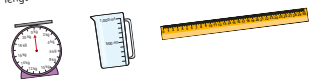
There are 206 bones in a typical skeleton!

Who do you agree with? _____
Talk about it with a partner.


Investigate - parachute experiment

1 Max is setting up the equipment for his experiment.


a) Which piece of equipment should Max use to measure the length of the sides of the parachute? Tick your answer.



b) Which piece of equipment should Max use to measure the time taken for the parachute to drop? Tick your answer.




c) Which piece of equipment should Max use to measure the mass of the modelling clay? Tick your answer.



Evaluate - parachute experiment


1 The parachute is falling to the ground.



Air resistance is an invisible force acting on the parachute.

Which letter shows air resistance acting on the parachute? _____

2 Circle the parachute that hit the ground first in your experiment.



3 Write your experiment prediction below.

4 Was your prediction correct? _____
How do you know? _____

5 Annie and Amir completed a parachute experiment.

Parachute length (cm)	Time taken in seconds (Attempt 1)
10	0.46
20	18.23
30	0.98

a) Circle the anomalous result in Annie and Amir's data.
b) In your own words explain what is meant by an anomalous result.

Meet the characters

Our class of characters brings the schemes to life and will be sure to engage learners of all ages and prior attainments. Follow the children and their class pet, Diddy the duck, as they explore new scientific concepts and ideas.



Yearly overview

The yearly overview provides suggested timings for each block of learning, which can be adapted to suit different term dates or other requirements.

	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Autumn term	Animal needs for survival				Humans		Materials					Plastic
Spring term	Plants (light and dark)			Living things and their habitats							Light and dark	Consolidation
Summer term	Plants (bulbs and seeds)		Growing up			Bulbs and seeds	Growing up	Wildlife		Consolidation		

Autumn Block 1

Animal needs for survival

Small steps

Step 1

Mammals

Step 2

Birds

Step 3

Fish

Step 4

Amphibians

Step 5

Reptiles

Step 6

Humans

Key resources

Step 1 - Mammals

- Images or small figures of mammals
- Food for mammals – (vegetables, seeds, nuts)
- Water container



Step 2 - Birds

- Binoculars (optional)
- Plastic bottles
- Seeds
- Sticks



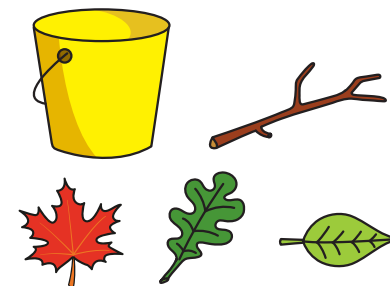
Step 3 - Fish

- Whole fish
- Disposable gloves
- Hand lenses or magnifying glasses
- Large hoops
- Images or small figures of mammals, birds and fish



Step 4 - Amphibians

- Large container
- Rocks
- Leaves
- Pebbles
- Water



Step 5 - Reptiles

- Large hoops



Step 6 - Humans

- Large hoops
- Images or small figures of animals
- Vet/doctor area in the classroom

Mammals

Notes and guidance

In Year 1, children identified familiar mammals and described their basic structure. In this small step, children build on this as they explore mammals' needs for survival. It is important that children are confident with the definition of a mammal before they think about their needs for survival.

Children should know that all mammals need air, water, food and shelter to survive. In Year 2, children should use the term “air” instead of oxygen, as they have not yet been introduced to gases. They will need to recap the terms “carnivore”, “omnivore” and “herbivore” so they can differentiate between different dietary requirements.

There is an opportunity for children to think about sustainability within this step. Children can explore how they can help to protect and care for mammals in their local area.

Things to look out for

- Children may think that all mammals live on land. Discuss whales and dolphins to help address this misconception.
- Children may need support when thinking about dietary needs for different mammals.

Key questions

- What mammals are shown?
- Do all mammals live on land?
How do you know?
- What do all mammals need to survive?
- What does a carnivore eat?
- What does a herbivore eat?
- What does an omnivore eat?
- How do mammals that live in water breathe air?

Sustainability link

- What can we do to help care for mammals?

National curriculum links

- Find out about and describe the basic needs of animals, including humans, for survival (water, food and air).
- **Working scientifically** – Asking simple questions and recognising that they can be answered in different ways.

Mammals

Key vocabulary

- **Mammal** – An animal with hair or fur on its body.



- **Fur** – The fine, soft hair found on different animals.



- **Carnivore** – An animal that eats other animals.



- **Herbivore** – An animal that eats plants.



- **Omnivore** – An animal that eats plants and other animals.



Practical ideas

- Group images, or small figures of mammals, based on different categories such as: dietary requirements, whether they inhabit land or sea, or where they would find shelter.
- Create an area within the school grounds to provide food and water for a range of mammals. Whilst creating this area, children should explain why and how this area helps local mammals meet their needs for survival.
- Invite a local vet into class, or arrange an online meeting, to discuss what a range of mammals need for survival and identify whether their needs are similar or different.



Factual knowledge

- Mammals have fur or hair on their bodies.
- All mammals need air, water, food and shelter to survive.
- Mammals are carnivores, herbivores or omnivores.

Birds

Notes and guidance

In this small step, children look at birds and explore their needs for survival. Children should understand that birds have the same needs as mammals. It is important that they are shown a wide range of examples, including flightless and swimming birds. Children will be introduced to the term “insectivore” within this step. This can be linked to the use of the terms carnivore, herbivore and omnivore in the previous step.

Within this step, children could gather and record data by completing a bird watch in the local area. This could be repeated later in the year to compare data in different seasons. Children have not yet used tally charts so should record the data in numerals.

Things to look out for

- When talking about the dietary requirements of birds, children may use the word “insect” to describe all minibeasts. Worms, slugs and spiders are not classified as insects. Children do not need to know this factual knowledge until Year 4, but “insect” should not be used as a general term to describe all minibeasts.

Key questions

- What birds are shown?
- What features do all birds have?
- What are the differences between these two birds?
- What does an insectivore eat?
- Is a _____ a carnivore or a herbivore?
- What do birds need to survive?
- How are the needs of birds similar to the needs of mammals?

Sustainability link

- What can we do to help care for birds?

National curriculum links

- Find out about and describe the basic needs of animals, including humans, for survival (water, food and air).
- **Working scientifically** – Gathering and recording data to help in answering questions.

Birds

Key vocabulary

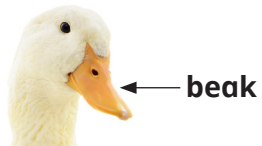
- **Bird** – An animal with feathers, wings and a beak.



- **Feathers** – The soft covering on the outside of birds.



- **Beak** – The hard, pointed part of a bird's mouth and nose.



- **Insect** – A small animal that has three body sections and six legs.



- **Insectivore** – An animal that eats insects, worms and spiders.



Practical ideas

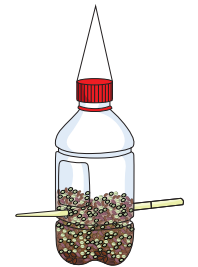
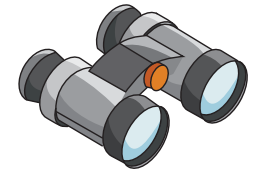
- Carry out a bird spotting survey in the local area.

Children can identify and count the number of species they spot.

This could be repeated in different seasons to see if there are any patterns or trends in data.

- Create bird feeders to hang in the school grounds to help birds to survive in colder months.

Encourage children to discuss why this bird feeder will help birds meet their needs for survival.



Factual knowledge

- Birds have feathers, wings and beaks.
- Some birds can fly.
- Some birds cannot fly.
- Birds need air, water, food and shelter to survive.

Fish

Notes and guidance

In this small step, children look at fish and their needs for survival. They will recap the basic features of fish before understanding that fish need air, water, food and shelter to survive. By the end of this step, children should identify that fish have the same needs for survival as birds and mammals.

This step introduces the enquiry question for this block. Children will be carrying out an identifying, grouping and classifying enquiry.

Children should record their initial ideas and think of ways they can group animals based on their needs for survival. It is important that children are using examples of mammals, birds and fish to identify any similarities and differences.

Things to look out for

- Children may use the term “fish” to describe all animals that live in water.
- They may think that fish do not breathe as they are underwater.
- When grouping, children may sort animals into mammals, fish and birds rather than on their needs for survival.

Key questions

- Is a _____ a fish?
How do you know?
- What features do fish have?
- What do fish need to survive?
- What do other animal groups need to survive?
- How are these animals’ needs similar?
How are they different?

Enquiry question

- How can we group these animals based on their needs for survival?

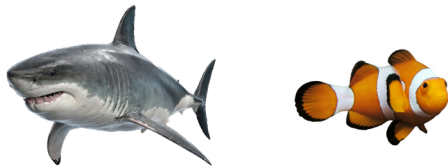
National curriculum links

- Find out about and describe the basic needs of animals, including humans, for survival (water, food and air).
- **Working scientifically** – Identifying and classifying.

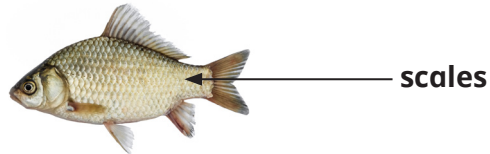
Fish

Key vocabulary

- **Fish** – Animals that live in water and have fins and gills. Most fish have scales.



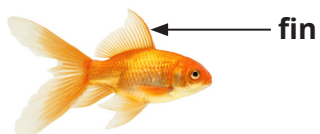
- **Scales** – Small, hard layers that grow from the skin.



- **Gills** – The part of the body that fish use to breathe.



- **Fin** – A thin part of a fish that sticks out from its body to allow it to balance and swim in the water.



Practical ideas

- Provide a whole fish for children to explore up close. Children can find and identify its fins, scales and gills. They could use hand lenses to observe the fish closely, then draw and label any findings.



- Use large hoops to sort and group images, or small figures, of fish, birds and mammals based on their needs for survival. Children should be encouraged to group the animals in more than one way.

Factual knowledge

- Fish are animals that live in water.
- Fish need air, water, food and shelter to survive.
- Fish have gills that they use to breathe.

Amphibians

Notes and guidance

In this small step, children should name and identify common examples of amphibians before looking at their needs for survival. Children may think that amphibians are fish as they spend part of their life in water. It is important to explore the differences between these two animal groups. Children should identify amphibians' needs for survival and compare these to other animal groups.

Children continue to explore the enquiry question in this step and should be given opportunities to develop their ideas throughout. This can be done through sorting and grouping activities. Encourage children to sort the animals based on their needs for survival rather than their physical features.

Things to look out for

- Children may think that amphibians have scales or gills like fish.
- They may need support to group animals based on their needs for survival. Provide structure to help them sort correctly. For example, "All animals need air. Sort these animals based on whether they breathe underwater or not."

Key questions

- Is a _____ an amphibian?
How do you know?
- What features do amphibians have?
- What do amphibians eat?
- What do amphibians need to survive?
- What do other animal groups need to survive?
- How are these animals' needs similar?
How are they different?

Enquiry question

- How can we group these animals based on their needs for survival?

National curriculum links

- Find out about and describe the basic needs of animals, including humans, for survival (water, food and air).
- **Working scientifically** – Identifying and classifying.

Amphibians

Key vocabulary

- **Amphibian** – An animal that lives on land and in water.



- **Webbed feet** – Toes that are joined together to help with swimming.



- **Frog** – A small amphibian with moist, smooth skin.



- **Toad** – A small amphibian with dry, bumpy skin.



- **Newt** – A small amphibian with a long tail.



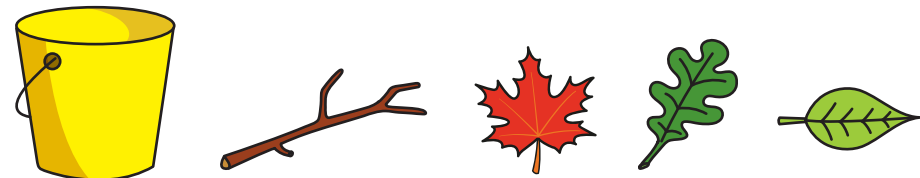
Practical ideas

- Create a mini-pond to help children further understand amphibians' needs for survival.

Use a container and add rocks, pebbles and sticks.

Fill the container with water and observe the mini-pond over time to see if it attracts any amphibians to the school grounds.

Ensure children are discussing why the mini-pond will meet the needs of amphibians in the local area.



- Continue to sort and group images, or small figures, of amphibians, fish, birds and mammals based on their needs for survival.

Factual knowledge

- Amphibians live on land and in water.
- Amphibians do not have scales on their bodies.
- Some amphibians have webbed feet.
- Amphibians need air, water, food and shelter to survive.

Reptiles

Notes and guidance

In this small step, children continue to look at the needs for survival of different animal groups. This step is focused on the needs of reptiles. Children recap knowledge from Year 1 where they named and identified some familiar reptiles and labelled some common features.

By the end of this step, children should understand that reptiles need air, water, food and shelter to survive. Reptiles also need external heat to survive as they cannot generate their own body heat. This could be used as a key difference when sorting animals based on their needs for survival. Children need to discuss their answers to the enquiry question as their knowledge of animals develops.

Things to look out for

- Children may think that all reptiles are small.
- They may think that reptiles do not inhabit the United Kingdom.
- Continue to provide structure to support children to group animals based on their needs for survival and not physical features.

Key questions

- Is a _____ a reptile?
How do you know?
- What features do reptiles have?
- What is similar about these two reptiles?
What is different?
- What do reptiles need to survive?
- What do other animal groups need to survive?

Enquiry question

- How can we group these animals based on their needs for survival?

National curriculum links

- Find out about and describe the basic needs of animals, including humans, for survival (water, food and air).
- **Working scientifically** – Gather and record data to help in answering questions.

Reptiles

Key vocabulary

- **Reptile** – An animal with dry scales on its body.



- **Scales** – Small, hard layers that grow from the skin.



- **Carnivore** – An animal that eats other animals.

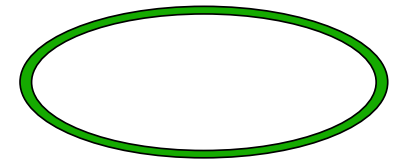
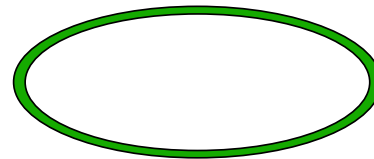


- **Herbivore** – An animal that eats plants.



Practical ideas

- Children should continue to sort and group images, or small figures, of amphibians, fish, birds, mammals and reptiles based on their needs for survival.



- Play games with children to help them identify animals and their needs for survival.

One child thinks of an animal but keeps it secret from others playing.

The other children must guess the animal they are thinking of by asking yes/no questions about the animal's characteristics and needs for survival.

Factual knowledge

- Reptiles have dry scales on their bodies.
- They need air, water, food and shelter to survive.
- Reptiles need direct heat to survive.

Humans

Notes and guidance

In this small step, children look at the basic needs for survival in humans. In Year 2, children should understand that humans are mammals. They should recap the features of mammals from Step 1 before applying this knowledge to categorise humans as mammals.

By the end of this step, children should identify the needs for survival in humans. They should explore the similarities and differences between humans and other animal groups. Children should present their findings and provide an answer to the enquiry question for this block. This can be verbally, through simple written statements, or by creating drawings and diagrams.

Things to look out for

- Children may sort and group animals based on physical features rather than their needs for survival. As a class, recap the similarities and differences between each animal group. They can then use this information to help them sort and group correctly.
- Although they are noticing differences in how animals meet their basic needs for survival, children should identify that all animals need air, water, food and shelter to survive.

Key questions

- What is a mammal?
- Is a human a mammal?
How do you know?
- What do babies need to survive?
- What do adults need to survive?
- How are the needs of humans similar or different from those of other animals?

Enquiry question

- How can we group these animals based on their needs for survival?

National curriculum links

- Find out about and describe the basic needs of animals, including humans, for survival (water, food and air).
- **Working scientifically** – Using their observations and ideas to suggest answers to questions.

Humans

Key vocabulary

- **Mammal** – An animal with fur or hair on its body.
- **Adult** – A human is a type of mammal. A fully grown human is called an **adult**.



- **Baby** – A newborn human.

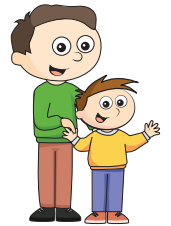


- **Shelter** – A place that gives protection from weather or danger.



Practical ideas

- Invite a parent into class and allow children to create and ask questions to help them further understand the needs for survival in babies and children.
- Children could present their answers to the enquiry question. Suggestions are given below.
 - Create a pop-up museum in the classroom to teach other children about animals' needs for survival.
 - Create a vet's area within the classroom where children can help to take care of animals. Children could identify the animal, the animal group, its needs for survival and what need is not being met. A doctor's area could also be created for humans.
 - Sort and group figures of animals in large hoops based on their needs for survival.



Factual knowledge

- A mammal has fur or hair on its body.
- Humans are mammals.
- Humans need air, water, food and shelter to survive.
- All animals need air, water, food and shelter to survive.