



EMPIRIBOX

Biology

Living Things & Evolution

Year 4

Working scientifically: Data

Welcome!

Welcome to Empiribox: Living Things & Evolution

Here you will find all you need for delivering this Programme of Study in your Year 4 class.

This Programme of Study consists of an initial assessment lesson, followed by 8 practical science lessons, and a final assessment lesson.

The lesson plans provide you with National Curriculum coverage, suggested classroom organisation, key questions and vocabulary and a list of the resources you need for every lesson.

Make sure you download the PowerPoint at www.empiribox.org to support your lesson, where you will find further information such as common misconceptions, examples of how the children can record their learning and the subject knowledge you will need.

If you find you need any help with any of the investigations, or if you just want to have a chat about Science, please get in touch at

support@empiribox.org

We hope you and the children thoroughly enjoy Living Things & Evolution

National Curriculum

National Curriculum in Living Things & Evolution

In the National Curriculum, the objectives relating to Living Things & Evolution can be found within Year 4 under Living Things & Their Habitats and Animals, Including Humans, and in year 6 under Evolution & Inheritance. The Working Scientifically objectives are taken from the Lower Key Stage 2 Programme of Study.

This table details the complete coverage of the National Curriculum provided by Living Things & Evolution:

National Curriculum Objective:	Science Subject Knowledge	Working Scientifically
Lesson 2	recognise that environments can change and that this can sometimes pose dangers to living things	making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers
Lesson 3	recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago	making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers
Lesson 4	identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.	making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers
Lesson 5	recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents	recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables

Lesson 6	identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution	gathering, recording, classifying and presenting data in a variety of ways to help in answering questions
Lesson 7	recognise that living things can be grouped in a variety of ways, and explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment	gathering, recording, classifying and presenting data in a variety of ways to help in answering questions
Lesson 8	Construct and interpret a variety of food chains, identifying producers, predators and prey	reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions
Lesson 9	Construct and interpret a variety of food chains, identifying producers, predators and prey	reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions

Living Things & Evolution Lesson 4: Adaptation

Health and Safety

You must adhere to the following regarding Health and Safety requirements of this lesson:

Read, sign and date Assessment

If any equipment or chemicals you receive is incorrect, please contact Empiribox at support@empiribox.org immediately

Knowledge Learning Objective

National Curriculum Year 6 Evolution & Inheritance:

identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.

‘I can explain why living things need to adapt to survive’

Working Scientifically Learning Objective

National Curriculum LKS2:

making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers

‘I can fill in the results table with the independent variable and each record of the dependent variables’

Resources		Key vocabulary/questions
Moth Template x 15	Coloured Pencils x 15	Adapt Survive Living Camouflage Environment Independent/Dependent Variables Give an example of how a living thing has adapted to survive. Can you think of a living thing which didn't adapt to survive? How could an adaptation happen?
Plastic bags x 15	Tweezers x 15	
Blue Tack	Why Zebras are Striped kit	
Liquorice	Haribo	
*Not Included: Pencils; iPad/tablets; Scissors		

Main Lesson

Science Lab A: Darwin's Peppered Moths

You will need: Moth templates, scissors, pencils, blue tack, small plastic bag, tweezers

The children should work in pairs to shade in a peppered moth from white to dark grey. Cut them out and follow the steps below. They should take note of how many moths they have got before they start the activity.

1. Partner A should hide the moths around the playground in secret
2. Partner B has one minute to find as many of the moths as they can, using the tweezers to collect them in their plastic bag
3. Count how many were found, swap roles and repeat the activity.

If you have time, you could repeat this but this time, colour the moths. The children should notice that the better camouflaged the moth, the harder it is to find them. Brightly coloured moths are easy to spot—what's the danger of this?

Working Scientifically: Independent Variables

Colour of moths; amount of moths; location of moths

Working Scientifically: Dependent variables:

Time taken to collect the moths; number of moths collected in the various colours

Science Lab B: How the Zebra got its stripes

You will need: Why Zebras are Striped kit, tablets/iPad, black and white craft paper

The children will need to find out about what kind of predator will try to eat a zebra. They should realise that big cats like to eat zebras. Find out why it is a good advantage for Zebras to be black and white (they should discover that cats can't see in colour!). Using the craft paper, the children should make a camouflage picture of a zebra. They can draw a zebra, cut it out, and stick it on a black and white background. They can use the iPad to take a black and white photograph of their camouflage picture, to see it as a big cat would.

Whole class activity: Haribo vs liquorice

You will need: Haribo, Liquorice and a bowl

Mix the two bags of sweets together. Count the number of Haribo and the number of liquorice and make sure there are the same amount. Pass the bowl of mixed up sweets around the class, asking every child to take one. Once this is complete, count how many Haribo's are left, and how many liquorice sweets are left. Usually, you will find that children do not like the taste of liquorice and so will only pick the Haribo. It's just the same in nature—some insects and plants are really smart and are designed to taste awful to anything that might want to eat them. This way, they survive!

Mastery opportunity

You are visited by a time traveller, who comes from the year 3018. He looks very different to the people walking around today.

How have humans adapted for survival in the future? Draw a picture and label any adaptations.

Common Misconceptions

- Survival of the fittest means the strongest organisms are the most likely to survive – the dinosaurs were some of the strongest creatures ever to live, but they couldn't survive a radical change in their environment
- Humans are not adapted to their environments – people with darker skin are adapted to deal with strong sunshine, Inuit people have thicker fat layers in their skin.

Cross-Curricular Links

History: Research why the Industrial Revolution made some moths change colour

Art: Design a camouflage picture

English: Write a fact file on Charles Darwin

Living Things & Evolution Lesson 8: Producers, Predators & Prey

Health and Safety

You must adhere to the following regarding Health and Safety requirements of this lesson:

Read, sign and date the Risk Assessment

If any equipment or chemicals you receive is incorrect, please contact Empiribox at support@empiribox.org immediately

Knowledge Learning Objective

National Curriculum Year 4 Animals Including Humans:

Construct and interpret a variety of food chains, identifying producers, predators and prey

'I can explain the differences between producers, predators and prey and say why each of them are important'

Working Scientifically Learning Objective

National Curriculum LKS2:

reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions

'I can reorder my table to show a pattern more clearly'

Resources		Key vocabulary/questions
Golf Tees x 60	Food Colour: Red, Green, Yellow & Blue	Producer Predator Prey
Twine	Spaghetti	Why do we need to have producers, predators and prey?
Safety Gloves	Craft Paper Flags	How are producers, predators and prey different from each other? Find their key characteristics.
Producers, Predators and Prey Classification Kit		What would happen if we didn't have any predators? Explain your answer

Main Lesson

Science Lab A: Classifying Producers, Predators and Prey

You will need: Producers, Predators and Prey Classification Kit

Through this activity, the children should find some examples of producers, predators and prey and learn about their key characteristics

Science Lab B: Spaghetti Worms

You will need: Spaghetti, red, blue, yellow and green food colour, Safety gloves, Craft paper Flags, microwave, microwave-proof bowl, golf tees and twine.

The children should die a strands of spaghetti different colours. They can do this by placing a strand of spaghetti in a bowl with some food colour mixed with water and heating it in the microwave for 5 minutes. You can experiment with the amount of food colour you use for different intensities of colour.

Drain the spaghetti and allow it to dry. When handling the spaghetti, make sure you wear the safety gloves so that no food colour gets on to your hands. The children should take the spaghetti strands outside and place them in a designated area, marked out with the golf tees and twine. Mark where they place them with a craft flag—they can put the colour of the worm on the flag and/or their name. Leave them out overnight. The next day, see if they are still there. If they have gone—where have they gone?!

Working Scientifically: Reordering a table to show a pattern

The children could start by writing the colour of worm they think will be the best camouflaged in their table first. They could then order the colours from what they predict will be the best camouflaged to the worst and write them in order in their table. Alternatively, they could start with their predicted worst camouflaged worm colour.

Science Lab C: Design your own adapted Producer/Predator/Prey

You will need: Paper and pencils/pens

Now that you have learned about some important features of predators/prey/producers, can you design your own? What kind of features would a successful predator have? What kind of characteristics would prey need to get away from predators? What should a producer look/taste like to avoid being eaten? Some children might want to start with a real living thing and then 'adapt' it to make it better suited for survival.

Mastery opportunity

All producers start life as light from the sun. Is this true or false? Explain your answer and list some producers.

Common Misconceptions

- Predators cannot be prey too
- Prey are always larger than their prey

Cross-Curricular Links

English: Write a newspaper report about all predators in England being wiped out by a disease, and the consequences

Maths: Problem solving. EG, if a fox needs to eat 3 rabbits a day to survive, how many rabbits would 5 foxes need to eat in a week?

History: Find out what happened to the Red Squirrels