Science MTP - Living things and their habitats - Year 6

National Curriculum Objectives

- 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.
- Give reasons for classifying plants and animals based on specific characteristics.

Sticky Knowledge

- Variation exists within a population (and between offspring of some plants) – *NB: this Key Idea is duplicated in Year 6 Evolution and Inheritance.*
- Organisms best suited to their environment are more likely to survive long enough to reproduce.
- Organisms reproduce and offspring have similar characteristic patterns.
- Competition exists for resources and mates.
- Scientists, called Taxonomists, sort and group living things according to their similarities and differences.

Vocabulary

amphibians, animals, bacteria, birds, characteristics, classification system, classified, differences, fish, groups, habitats, insects, invertebrates, key, living things, mammals, micro-organisms, organisms, plants, reptiles, similarities, snails, spiders, subdivided, variation, vertebrates, worms

Key Scientists

Carl Linnaeus
(Botanist & Zoologist)

Marjory Stoneman Douglas
(Writer & Conservationist)

Prior Learning

In Year 4 children should:

- 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 danger to living things.

Future Learning

In KS3 children will learn:

- The dependence of almost all life on Earth on the ability of photosynthetic organisms, such as plants and algae, to use sunlight in photosynthesis to build organic molecules and to maintain levels of oxygen and carbon dioxide in the atmosphere.
- The adaptations of leaves for photosynthesis.
- The interdependence of organisms in an ecosystem, including food webs and insect pollinated crops.
- The importance of plant reproduction through insect pollination in human food security.
- How organisms affect, and are affected by, their environment, including the accumulation of toxic materials.

Key Questions

- Why do we need to classify living things?
- How do we classify?
- What are the difficulties with classification? (penguins, whales, platypus)
- How do animals change over time?
- Why does variation exist?
- What happens if animals of different species breed? (hybrids)
- What happens to house plants outside?
- What are microorganisms?
- How can we prevent the spread of disease?
- Why do animals and plants compete – and what for?

How does the temperature affect how much gas is produced by yeast?

How would you make a classification key for vertebrates/ invertebrates or microorganisms?

Do all fruits grow mould in the same way over time?

Are all exoskeletons the same?

What do different types of microorganisms do? Are they always harmful?

BIG Question
(assessment opportunity)

In what ways can we sort living things?

5 types of enquiry symbols from: https://seerih-innovations.org/enquiringscience4all/

Science MTP - Animals, including humans - Year 6

National Curriculum Objectives

- Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood.
- Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function.
- Describe the ways in which nutrients and water are transported within animals, including humans.

Sticky Knowledge

- The heart pumps blood around the body.
- Oxygen is breathed into the lungs where it is absorbed by the blood.
- Muscles need oxygen to release energy from food to do work. (Oxygen is taken into the blood in the lungs; the heart pumps the blood through blood vessels to the muscles; the muscles take oxygen and nutrients from the blood.)
- Drugs, alcohol and smoking have negative effects on the body.

Vocabulary

animals, artery, blood, blood vessels, circulatory system, damaged, deoxygenated, diet, digestive system, drugs, exercise, functions, harm, health, heart, human, impact, internal organs, lifestyle, muscular system, nutrients, oxygenated, respiration, skeletal system, substances, transported, valve, veins, water

Key Scientists

Marie Curie
(Physicist & Chemist)

Alexander Fleming
(Physician & Microbiologist)

Prior Learning

In Year 5 children should:

- Describe the changes as humans develop to old age.

In Year 4 children should:

- Describe the simple functions of the basic parts of the digestive system in humans.
- Identify the different types of teeth in humans and their simple functions.
- Construct and interpret a variety of food chains, identifying producers, predators and prey.

Future Learning

In KS3 children will learn:

- The hierarchical organisation of multicellular organisms: from cells to tissues to organs to systems to organisms.
- The tissues and organs of the human digestive system, including adaptations to function and how the digestive system digests food (enzymes).
- Calculations of energy requirements in a healthy daily diet.
- The consequences of imbalances in the diet, including obesity, starvation and deficiency diseases.
- The structure and functions of the gas exchange system in humans, including adaptations to function.
- The effects of recreational drugs (including substance misuse) on behaviour, health and life processes.

Key Questions

- Why do we need oxygen?
- How do we breathe?
- Do fish and plants breathe?
- Do all living things need oxygen?
- How does the size of a person's lungs affect their lung capacity?
- Are there ways to increase/decrease our lung capacity? Is lung capacity fixed?
- Why do we have blood?
- How does our heart work?
- How does exercise affect our pulse rate?
- How might the circulatory system of an elephant, a hummingbird, or a polar bear differ?
- Is the air you breathe out, the same as that you breathe in?

How does the length of time we exercise for affect our heart rate?

Which type of exercise has the greatest effect on our heart rate?

Which organs of the body make up the circulation system, and where are they found?

How does my heart rate change over the day?

How much exercise do I do in a week?

Is there a pattern between what we eat for breakfast and how fast we can run?

How have our ideas about disease and medicine changed over time?

BIG Question
(assessment opportunity)

How do our choices affect how our bodies work?

Why does my heart beat?

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Science MTP - Evolution and inheritance - Year 6

National Curriculum Objectives

- Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago.
- Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents.
- Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.

Sticky Knowledge

- Life cycles have evolved to help organisms survive to adulthood.
- Over time the characteristics that are most suited to the environment become increasingly common.

NB: The following could be duplicated in Year 6 Living things and their habitats.

- Organisms best suited to their environment are more likely to survive long enough to reproduce. Organisms best adapted to reproduce are more likely to do so.
- Organisms reproduce and offspring have similar characteristic patterns.
- Variation exists within a population (and between offspring of some plants).
- Competition exists for resources and mates.

Vocabulary

adapted, adaption, breed, changed, characteristics, competitions, environment, evolution, fossils, identical, inhabited, inherited, living things, mutation, offspring, parents, produce, reproduction, suit, survive, survival of the fittest, variation, vary

Key Scientists

Charles Darwin
(Naturalist)

Gregor Mendel
(Botanist & Biologist)

Prior Learning

In KS1 and KS2 children should:

- Understand there is a variety of life on Earth.
- Know that some animals' differences are important to their survival.
- Know how animals and plants reproduce.
- Know how fossils form over time.

NB: This unit builds on understanding from a variety of year groups and units of learning.

Future Learning

In KS3 children will learn:

- Heredity as the process by which genetic information is transmitted from one generation to the next.
- The variation between individuals within a species being continuous or discontinuous, to include measurement and graphical representation.
- The variation between species and between individuals of the same species means some organisms compete more successfully, which can drive natural selection.
- Changes in the environment may leave individuals, and some entire species, less well adapted to compete and reproduce, which may lead to extinction.
- The importance of maintaining biodiversity and the use of gene banks to preserve hereditary material.

Key Questions

- Why are we all different?
- What is variation, and why is it important?
- How did life begin on Earth?
- How do we change?
- What is evolution?
- What evidence is there for evolution?
- How does evolution happen?
- What reasons do animals become extinct?
- The habitat for [animal name] is rapidly changing, what possible futures do they face and can we predict which is most likely?
- How did Darwin come up with the theory?
- Why was his theory not initially accepted?

What is the most common eye colour in our class?

Can you identify the characteristics you have inherited from your parents? (or use the Molliebird story).

How has the skeleton of the horse changed over time?

Is there a pattern between the size and shape of a bird's beak and the food it will eat?

What happened when Charles Darwin visited the Galapagos islands?

BIG Question
(assessment opportunity)

What is evolution, how does it happen and how do scientists know?

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Science MTP - Light - Year 6

National Curriculum Objectives

- Recognise that light appears to travel in straight lines.
- Use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye.
- Explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes.
- Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.

Sticky Knowledge

- Animals see light sources when light travels from the source into their eyes.
- Animals see objects when light is reflected off that object and enters their eyes.
- Light reflects off all objects (unless they are black). Non shiny surfaces scatter the light so we don't see the beam.
- Light travels in straight lines, called rays or beams of light.

Vocabulary

beam, cast, coloured filters, emitted , eye, glare, light, light source, periscope, rainbows, reflect, reflection, shadows, straight lines, Sun, travel, visible

Key Scientists

Thomas Edison
(Inventor)

Edith Clarke
(Electrical Engineer)

Prior Learning

In Year 3 children should:

- Recognise that they need light in order to see things and that dark is the absence of light.
- Notice that light is reflected from surfaces.
- Recognise that light from the sun can be dangerous and that there are ways to protect their eyes.
- Recognise that shadows are formed when the light from a light source is blocked by a solid object.
- Find patterns in the way that the sizes of shadows change.

Future Learning

In KS3 children will learn:

- The similarities and differences between light waves and waves in matter.
- Light waves travelling through a vacuum; speed of light.
- The transmission of light through materials: absorption, diffuse scattering and specular reflection at a surface.
- Use of a ray model to explain imaging in mirrors, the pinhole camera, the refraction of light and action of convex lens in focusing (qualitative); the human eye.
- Light transferring energy from source to absorber leading to chemical and electrical effects; photo-sensitive material in the retina and in cameras.
- Colours and the different frequencies of light, white light and prisms (qualitative only); differential colour effects in absorption and diffuse reflection.

Key Questions

- How does the size of an object affect the size of a shadow?
- How does the distance between the light and the object change the size of a shadow?
- How does the distance between the object and the size of the screen affect the size of a shadow?
- How does the amount of aluminium foil scrunched affect how much light is scattered?
- How does the amount of polishing affect how well a piece of metal scatters light?
- How perfect are our mirrors? Do some scatter light more than others?
- What happens to light when it is shone through water? How is this affected by putting glitter, salt or talc in the water?
- How does a periscope/microscope/telescope work?

How does the angle that a light ray hits a plane mirror affect the angle at which it reflects off the surface?

Which material is most reflective?

Can you identify all the colours of light that make white light when mixed together?

What colours do you get if you mix different colours of light together?

How do my pupils change throughout the day?

Is there a pattern to how bright it is in school over the day? If there is a pattern, is it the same in every classroom?

Why do some people need to wear glasses to see clearly?

How do our eyes adapt to different conditions?

BIG Question
(assessment opportunity)

How can we keep ourselves visible when walking/cycling in the dark?

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Science MTP - Electricity - Year 6

National Curriculum Objectives

- Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit.
- Compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches.
- Use recognised symbols when representing a simple circuit in a diagram.

Sticky Knowledge

- Batteries are a store of energy. This energy pushes electricity around the circuit.
- When the battery's energy is gone it stops pushing. Voltage measures the 'push.'
- Symbols for: lamp, wire, buzzer, cell, battery, motor, switch (open), switch (closed).
- A series circuit will not work if a lamp is broken or a wire is disconnected.

Vocabulary

brightness, bulb, buzzer, cells, circuits, components, diagram, function, insulator, lamp, loudness, motor, series circuit, switches, symbols, variations, voltage, volume

Key Scientists

Michael Faraday
(Physicist & Chemist)

William Kamkwamba
(Inventor)

Prior Learning

In Year 4 children should:

- Identify common appliances that run on electricity.
- Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers.
- Identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery.
- Recognise that a switch opens and closes the circuit and associate this with whether or not a lamp lights in a simple series circuit. Recognise some common conductors and insulators, and associate metals with being good conductors.
- Recognise some common conductors and insulators, and associate metals with being good conductors.

Future Learning

In KS3 children will learn:

- Electric current: measured in amperes, in circuits (series and parallel), currents add where branches meet and current as flow of charge.
- Potential difference, measured in volts, battery and bulb ratings; resistance, measured in ohms, as the ratio of potential difference (p.d.) to current.
- Differences in resistance between conducting and insulating components (quantitative).
- Separation of positive or negative charges when objects are rubbed together: transfer of electrons, forces between charged objects.
- The idea of electric field forces acting across the space between objects not in contact.

Key Questions

- Do all batteries push as hard as each other?
- How does the voltage of a battery affect how much current is pushed?
- How does the number of bulbs affect the brightness of a bulb?
- Are all types of wires as good at conducting electricity?
- Why are wires insulated in plastic? Does the type of material make a difference?
- Does the length of wire make a difference?
- Does the type of circuit affect how the components work/long the battery lasts?
- What renewable ways can we generate electricity?
- What are the dangers of a short circuit?

Which make of battery lasts the longest?

Which type of fruit makes the best fruit battery?

How would you group electrical components and appliances based on what electricity makes them do?

How does the brightness of the bulb change as the battery runs out?
How can we measure how quickly a battery is used up?

Does the temperature of a light bulb change the longer it is on?

How has our understanding of electricity changed over time?

BIG Question
(assessment opportunity)

Can we vary the effects of electricity?

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