



St Joseph's Catholic Primary School

Science Medium Term Plan Overview

YEAR 6 LIVING THINGS AND THEIR HABITATS

Knowledge & understanding statutory requirements:

6a1: describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals

6a2: give reasons for classifying plants and animals based on specific characteristics.

Pupils should build on their learning about grouping living things in year 4 by looking at the classification system in more detail. They should be introduced to the idea that broad groupings, such as micro-organisms, plants and animals can be subdivided. Through direct observations where possible, they should classify animals into commonly found invertebrates (such as insects, spiders, snails, worms) and vertebrates (fish, amphibians, reptiles, birds and mammals). They should discuss reasons why living things are placed in one group and not another.

Pupils might find out about the significance of the work of scientists such as Carl Linnaeus, a pioneer of classification.

Pupils might work scientifically by: using classification systems and keys to identify some animals and plants in the immediate environment. They could research unfamiliar animals and plants from a broad range of other habitats and decide where they belong in the classification system.

Upper KS2 - Working Scientifically

Statutory Requirements

ks2w1: planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary

uks2w2: taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate

uks2w3: recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs

uks2w4: using test results to make predictions to set up further comparative and fair tests

uks2w5: reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations

uks2w6: identifying scientific evidence that has been used to support or refute ideas or arguments.

Lessons:

1. To classify animals as vertebrates and invertebrates. Learn that animals can be classified as vertebrates and invertebrates. Vertebrates have a common ancestor



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and comprise the fish and tetrapods. Identify 18 organisms as vertebrates or invertebrates and place them in the correct sub-group (fish, birds, mammals, amphibians, reptiles, insects, arachnids, molluscs, worms).

2. To use taxonomy to explain how organisms are related to each other. Learn that evolutionary taxonomy is the most modern way of grouping organisms and is a development of Linnaeus' system but is superior as it shows how closely organisms are related to each other. Group 5 mammals (including homo sapiens) into an evolutionary diagram. Use this to explain how closely related the 4 mammals are to modern humans. Then begin to work out the binominal name (genus – species) name for each organism.
3. To explain the work of Carl Linnaeus and how he developed a classification system. Investigate the work of Carl Linnaeus, including his other contributions to science and how he developed a classification system which placed organisms in hierarchical groups. Learn about binominal nomenclature. Discuss what was kept and what was abandoned from this system and way.
4. To use taxonomy to explain how organisms are identified, named and classified anywhere in the world. Look at the taxonomy of 8 different organisms in terms of the eight main levels of : domain, kingdom, phylum, class, order, family, genus and species. Then use this information to work out their binominal scientific name using their genus and species.
5. To make a dichotomous key and use it to classify organisms. Learn that a dichotomous classification key has exactly two answers to each question. Use given 6 pictures of animals provided to create their own key. Discuss why some classification questions are better than others.
6. To identify familiar arthropods using a classification key. Learn these are a large and diverse phylum (group) comprising arachnids, crustaceans and myriapods. Learn about their characteristics. Discuss why arthropods have certain body features in common.
7. Identify some common British trees using a classification key. Do this by examining leaves. Learn terms to describe leaves such as: pinnate, palmate, simple, compound and lobed. Discuss which of these trees can be seen in the local area.
8. To identify invertebrates in the local environment. Investigate the River Gade habitat. Use a classification key to identify the creatures and a Pollution Tolerance chart to identify how clean the water is. Present results in frequency table and then transfer these to a bar chart. Look for patterns in the results.
9. Identify trees in the local environment. Use a classification key to identify the tree. Present results in frequency table and then transfer these to a bar chart. Look for patterns in the results.

Vocabulary



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Mammal, amphibian, reptile, fish, bird, vertebrate, invertebrate, insects, arachnids, molluscs, worms, tetrapod, taxonomy, organisms, taxonomy, binominal name (genus – species), domain, kingdom, phylum, class, order, family, genus, species, Carl Linnaeus, binominal nomenclature, Celsius, racial groups, dichotomous classification key, arthropods, arachnids, crustaceans, myriapods, pinnate, palmate, simple, compound, lobed.

YEAR 6 ANIMALS INCLUDING HUMANS

Knowledge & understanding statutory requirements:

6b1: identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood

6b2: recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function

6b3: describe the ways in which nutrients and water are transported within animals, including humans.

Upper KS2 - Working Scientifically

Statutory Requirements

ks2w1: planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary

uks2w2: taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate

uks2w3: recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs

uks2w4: using test results to make predictions to set up further comparative and fair tests

uks2w5: reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations

uks2w6: identifying scientific evidence that has been used to support or refute ideas or arguments.

Pupils should build on their learning from years 3 and 4 about the main body parts and internal organs (skeletal, muscular and digestive system) to explore and answer questions that help them to understand how the circulatory system enables the body to function. Pupils should learn how to keep their bodies healthy and how their bodies might be damaged, including how some drugs and other substances can be harmful to the human body.

Pupils might work scientifically by: exploring the work of scientists and scientific research about the relationship between diet, exercise, drugs, lifestyle and health.



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Lessons:

1. To describe the functions of the blood and blood vessels. To learn that red blood cells carry oxygen, white blood cells fight infection, platelets help to prevent bleeding, and plasma is the medium in which these components are suspended. Describe and explain the function of each of these.
2. Identify the main parts of the human circulatory system and explain their functions. E.g Learn that this system is composed of 2 parts – the systemic circulation and pulmonary circulation and the role of the heart, components of red and white blood cells, platelets and plasma.
3. To explain how the human heart works. Learn how the human heart is a vital organ, how blood flows through its double pump system to the lungs and all round the body, supplying oxygen and removing all waste products . create a diagram with explanations. Dissect a pig heart.
4. Investigate the effect of exercise on heart rate. Learn to measure their heart rate in beats per minute (bpm) by taking their radial pulse, then perform vigorous exercise and measure their heart rate afterwards at an interval of 1 minute for 8 minutes. Record results in a table and transfer these to a line graph. Interpret results and discuss how their heart rate has changed over the time and why.
5. To calculate how much alcohol is in different alcoholic beverages. Learn about the active ingredient in alcoholic drinks (alcohol and ethanol) and that the strength of a beverage can be measured as a percentage of alcohol by volume (%ABV). Learn about the short and long-term effects of alcohol consumption. Look at 16 different servings of different alcoholic drinks. Using serving size and %ABV , calculate how much alcohol (in ml) and how many units of alcohol are in each beverage. Place the beverages in order of strength. Discuss why people drink alcohol if it has negative health effects.
6. To describe the effects of smoking. To learn that smoking involves inhaling tobacco which contains the active ingredient, nicotine. Learn about the many health issues associated with smoking such as cancer, heart damage , lung damage and reproduction damage. Learn about other negative effects such as unpleasant smell, high cost and effects on the skin. Use a tally chart to find out the worst side effects of smoking. Transfer results to a bar chart and place the negative effects in order of concern. Use to make Public Health warning leaflet.
7. To explain how diet and exercise affect body weight. To learn that our bodies are constantly using energy and that we all get our energy from food. Learn that we store excess food energy in our bodies in the form of fat deposits to help us in times of starvation. Look at the profile of 6 different people. Calculate whether each person is eating the right amount of food and suggest ways in which they can improve their lifestyles.



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8. To research preferred forms of exercise in the class. Learn about the many benefits of exercise and identify some aerobic exercises. Carry out a survey, identifying the most popular forms of exercise in the class or school. Display results in a tally chart and transfer these to a bar chart. Identify the most popular forms of exercise and suggest ways in which these can be promoted in school.

Vocabulary

Blood, blood vessels , red blood cells, white blood cells, oxygen, infection, platelets, bleeding, plasma, circulatory system, heart, pump, vital, organ, oxygen, carbon dioxide, cells, waste products, nutrients, left atrium, right atrium, right ventricle, valve, aorta, arteries, veins, pulmonary artery, pulmonary vein, lungs, gas exchange , heart rate, beats per minute (bpm), alcohol, ethanol, (%ABV), inhale, exhale , tobacco, nicotine, energy, diet, lifestyle,

YEAR 6 EVOLUTION AND INHERITANCE

Knowledge & understanding statutory requirements:

6c1: recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago

6c2: recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents

6c3: identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.

Building on what they learned about fossils in the topic on rocks in year 3, pupils should find out more about how living things on earth have changed over time. They should be introduced to the idea that characteristics are passed from parents to their offspring, for instance by considering different breeds of dogs, and what happens when, for example, Labradors are crossed with poodles. They should also appreciate that variation in offspring over time can make animals more or less able to survive in particular environments, for example, by exploring how giraffes necks got longer, or the development of insulating fur on the arctic fox. Pupils might find out about the work of palaeontologists such as Mary Anning and about how Charles Darwin and Alfred Wallace developed their ideas on evolution. At this stage, pupils are not expected to understand how genes and chromosomes work. Pupils might work scientifically by: observing and raising questions about local animals and how they are adapted to their environment; comparing how some living things are adapted to survive in extreme conditions, for example, cactuses, penguins and camels. They might analyse the advantages and disadvantages of specific adaptations, such as being on two feet rather than four, having a long or a short beak, having gills or lungs, tendrils on climbing plants, brightly coloured and scented flowers.

Upper KS2 - Working Scientifically



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Statutory Requirements

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uks2w4: using test results to make predictions to set up further comparative and fair tests

uks2w5: reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations

uks2w6: identifying scientific evidence that has been used to support or refute ideas or arguments.

Lessons:

1. To model the process of evolution by natural selection. Use a die to model the effects of predation and mutation. Observe how a population can change over time due to natural processes. Then try to explain how these processes are modelled in a game.
2. To explain how Mary Anning contributed to our understanding of fossils. Learn about the life and work of Mary Anning: how she found her fossil, considering what can be learned from her fossil finds, whether or not she received the recognition she deserved and how she nearly died in the process.
3. To explain what the fossil record tells us about the past. To learn what fossils are and how they are formed. Learn how palaeontologists build up a picture using incomplete evidence and most organisms die without leaving fossil trace. Learn about stratigraphy, and that organisms found in lower layers of rock tend to have died earlier. Use a diagram showing a simplified cross-section of rock to date 3 different organisms, working out when they appeared, when they died out and how long they lived for. Compare the organisms to each other and discuss which lived most recently. Using fossil evidence, guess at how an animal may have looked when alive and show this in a diagram.
4. To explain how Darwin developed the theory of natural selection. Learn about his early life, his role in the voyage of HMS Beagle, his relationship with Alfred Russel Wallace, and how he developed and published his theory of natural selection. Write this up in the form of an autobiographical account.
5. To explain the process of evolution by natural selection. Learn that offspring inherit traits of their parents, and that they might occasionally carry a random mutation which gives them a survival advantage which they pass on to their own offspring. Learn that this process can change a population over time. Share learning in information text with diagrams to explain.



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6. To identify features that individuals have inherited from their parents. Learn that offspring inherit traits from their parents and that organisms that reproduce sexually combine traits from two parents. Learn about hybrids eg. different breeds of dogs such as the labradoodle. Create a simple family tree for a range of organisms- the mule, labradoodle, zonkey and loganberry and discuss the traits inherited from the different species' parents.
7. To explain how some animals are adapted to their environment. To learn that over time the process of natural selection can cause a range of beneficial traits (adaptations) to build up a population. Look at animals and identify 3 useful adaptations and explain the survival advantage they provide.
8. To explain how some plants are adapted to their environment. Look at the dandelion, cactus and Venus fly trap and identify and explain survival adaptations for each.

Vocabulary

Evolution, predation, mutation, population, Mary Anning, fossil, palaeontologist, natural selection, Darwin, inherit, traits, offspring, environment, adaptation, survival.

YEAR 6 ELECTRICITY

Knowledge & understanding statutory requirements:

6e1: associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit

6e2: 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

6e3: use recognised symbols when representing a simple circuit in a diagram.

Building on their work in year 4, pupils should construct simple series circuits, to help them to answer questions about what happens when they try different components, for example, switches, bulbs, buzzers and motors. They should learn how to represent a simple circuit in a diagram using recognised symbols.

Pupils are expected to learn only about series circuits, not parallel circuits. Pupils should be taught to take the necessary precautions for working safely with electricity.

Pupils might work scientifically by: systematically identifying the effect of changing one component at a time in a circuit; designing and making a set of traffic lights, a burglar alarm or some other useful circuit.

Upper KS2 - Working Scientifically

Statutory Requirements



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uks2w6: identifying scientific evidence that has been used to support or refute ideas or arguments.

Lessons:

1. To describe the function of electrical components – learn about the appearance and function of different electrical components, including switches, bulbs, buzzers, motors, cells and wires. Draw symbol and explain their function.
2. To use symbols to create circuits diagrams to represent electrical circuits. Draw accurate circuit diagrams for given illustrations and create these circuits using simple apparatus.
3. To use symbols to create circuits diagrams to represent electrical circuits. Draw accurate circuit diagrams for given illustrations and create these circuits using simple apparatus.
4. To investigate the effect of changing the voltage of cells in an electrical current. Learn that electrical cells produce a flow of electrons (current) through the reactions of 2 chemicals inside them; that one measure of the power of the cell is voltage (V) and that the connecting cells in series adds their voltages together. Investigate how changing the number of cells in a circuit changes the brightness of a bulb. Order circuits in order brightness. Could measure brightness bulb using a light monitor.
5. To investigate the effect of changing the number of bulbs and the voltage of cells in an electrical circuit. E.g 1 cell to light 1 bulb, compared with 2 cells to light 1 bulb; then 1 cell to light 2 bulb and 2 cells to light 2 bulbs. Discuss how the brightness of the bulb varies (and how 1 cell could light 3 bulbs equally by putting the circuit in parallel and why that might work).
6. To create a wire loop game and explain how it works. Use a buzzer. Draw a circuit diagram to help explain how it works.
7. To create an electrical burglar alarm and explain how it works. Construct their own switch using peg and a card insulator which is attached to the area under surveillance. Draw a circuit diagram to help explain how it works.



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8. To create a set of electrical traffic lights and explain how the function. To learn about how traffic lights are central to road safety. Use simple apparatus to construct a set of traffic lights with a single switch (which they construct themselves) turning two lights on and off in turn. Create a suitable casing for their traffic lights. Consider how they could construct a 3-way traffic light.
9. To predict whether an electrical circuit will function and suggest ways of improving it. Loo at 5 defective circuits and explain why each will not work. Make changes to make them work . test these improvements with simple apparatus.

Vocabulary

electrical components, switches, bulbs, buzzers, motors, cells, wires, symbol, voltage (V), electrons, series circuit, parallel circuit,

YEAR 6 LIGHT

Knowledge & understanding statutory requirements:

6d1: recognise that light appears to travel in straight lines

6d2: 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

6d3: 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

6d4: use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.

Pupils should build on the work on light in year 3, exploring the way that light behaves, including light sources, reflection and shadows. They should talk about what happens and make predictions.

Pupils might work scientifically by: deciding where to place rear-view mirrors on cars; designing and making a periscope and using the idea that light appears to travel in straight lines to explain how it works. They might investigate the relationship between light sources, objects and shadows by using shadow puppets. They could extend their experience of light by looking a range of phenomena including rainbows, colours on soap bubbles, objects looking bent in water and coloured filters (they do not need to explain why these phenomena occur).

Upper KS2 - Working Scientifically

Statutory Requirements

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uks2w3: recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs

uks2w4: using test results to make predictions to set up further comparative and fair tests

uks2w5: reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations

uks2w6: identifying scientific evidence that has been used to support or refute ideas or arguments.

Lessons:

1. To recognise that light appears to travel in a straight line. Learn that this is why shadows are the same shape as the opaque object blocking the light. Investigate this using pieces of card with a hole in them and a light source. Use the investigation and a diagram to explain the process.
2. To explain how moving an object changes the size of the shadow. Learn that a shadow is formed when light is blocked by an opaque object, creating an area of no light (shadow) and a pattern of light on a surface. Investigate what happens to a shadow when an opaque object is moved farther away from a light source. Plan a fair test, predict and measure the width of the shadows, take 2 measurements and find the average width of the shadow at 50cm, 100cm, 150cm and 200 cm away from the light source. Record the results in a table and then transfer to a line graph. Use these results to answer the question explaining the relationship between the distance and the shadow width.
3. Explain how we see light sources and non-light sources. Learn that we see light sources because they create light which travels straight into our eyes. Then learn that we can see non-light sources because light reflects off them into our eyes.
4. To make a periscope and explain how it works. Learn that a periscope is a device made from 2 angled mirrors that enables the user to see round obstacles. Explain how it works and when it might be used.
5. to calculate the best position for a rear-view mirror. Recap the information that light travels in a straight line and learn that mirrors can reflect light at precise angles, depending on their position and angles, then look at 4 simple diagram and predict , and then calculate (using a mirror and protractor) the best position for a mirror so that the viewer (car driver) can see an object (eg. motorcycle headlamp). Look for patterns between the different distances and angles in their diagrams.
6. To label the main parts of the eye and label and explain their functions. We see because light reflects off of objects and goes into our eyes etc.
7. To use their knowledge about reflection to place mirrors to make light follow a path. Learn that light travels in a straight line and can ne made to follow a path by placing mirrors in its path. Use a simple grid and position mirrors at 45° angles to make light travel through a maze. Solve increasingly difficult problems and create their own.



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8. To explain how white light is made up of a spectrum of colours. To learn that white light is a combination of different colours, and that these colours exist on the visible light spectrum. Learn how white light can be split into component colours. Use a prism and light source to create a rainbow effect and discuss how it is made. Learn that a range of colours can be combined into white light. Create a spinner to show this and help to explain this.

Vocabulary

Straight line, light source, non-light source, opaque, transparent, translucent, blocking, shadow, angles, mirror, reflect, cornea, iris, pupil, lens, retina, optic nerve, white light, spectrum, prism