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**Wibsey Primary School**

**Science Cumulative Curriculum**

This is pupils’ curriculum entitlement in Science:

**By the end of Year 6, our pupils will:**

* Have developed a secure scientific knowledge and conceptual understanding through the specific disciplines of Biology, Chemistry and Physics.
* Through undertaking different types of science enquiries that help them answer questions about the world around them, they will have developed understanding of the nature, processes and methods of science.
* Be equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future.
* Be familiar with, and use, technical terminology accurately and precisely. They will have built up an extended specialist vocabulary.
* Confidently apply their mathematical knowledge to their understanding of Science, including collecting, presenting and analysing data.

**Pupils at Wibsey will be taught:**

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| *Specific Discipline:* ***Biology*** |
|  | **EYFS** | **Year 1** | **Year 2** | **Year 3** | **Year 4** | **Year 5** | **Year 6** |
| **Living Things and their Habitats** | **Knowledge of the World** **Animals and where they live** |  | **Living Things and their Habitats** |  | **Living Things and their Habitats** | **Living Things and their Habitats** | **Living Things and their Habitats** |
| **Knowledge**Vocabulary(New year group vocabulary underlined. Pupils to be taught the meaning of the word; its spelling and use in context) | **Pupils will be taught:****Nursery*** Animals are living things and grow and change.
* Animals need food and water to live
* The names of a variety common animals and birds
* The animals that are found in the local area
* How to care for the environment and living things

**Reception*** Some environments are different to the one in which we live and different animals live there
* The names of a wider variety of animals
* All animals, need to eat and drink to keep healthy.
* All animals have a life cycle
* How to care for the environment and living things
 |  | **Pupils will be taught:*** The differences and similarities between things that are living, dead and things that have never been alive.
* Most living things live in habitats to which they are suited.
* Identify and name a variety of plants and animals in their habitats, including micro-habitats.
* Different habitats provide for the basic needs (shelter, food and water) of different kinds of plants and animals and know how they depend on each other.
* Animals obtain their food from plants and other animals.
* Identify and name different sources of food.
* Food chains are used to describe how animals obtain their food from plants and other animals.
 |  | **Pupils will be taught:*** Living things can be grouped in different ways based on their characteristics (flowering and non-flowering plants vertebrates / non-vertebrates)
* A habitat will change throughout the year, including the plants and animals in them.
* Humans can have an impact on an environment which can be positive or negative
* Environments can change and this can pose a danger to living things
 | **Pupils will be taught:*** The differences in the life cycles of a mammal, an amphibian, an insect and a bird.
* Life cycle of some plants, including sexual and asexual reproduction
* Know which parts of the plant are used to try and grow new plants
 | **Pupils will be taught:*** All living things can be grouped according to common observable characteristics (including micro-organisms, plants and animals)
* Broad groupings can be subdivided into smaller groups based on their similarities and differences.
* The Linnean system of classification
 |
| **Skills** | * Make observations.
* Talk about what they can see.
* Identify and name the main parts of an animal.
* Draw an animal and include the different parts.
* Talk about different animals and the similarities and differences between them
* Identify where different animals live
 |  | * How to set up a fair test, including posing an appropriate question.
* Close observation with some accuracy, including measurements.
* Recording and comparing results to answer their questions.
* Identify how plants and animals survive in different environments with reference to how they are suited for living there.
* Sort living, dead and things that have never been alive correctly, recording on simple charts / tables
* Identify similarities and differences between things that are living, dead and have never been alive.
* Construct simple food chains, which include humans and identify animals and food sources.
 |  | * Raise and answer scientific questions.
* Make careful, accurate observations and over time.
* Gather and record data.
* Group and classify data.
* Use keys including classification keys or simple guides to identify and name unknown living things, group living things and present information in different ways.
 | * Develop timelines to indicate stages of growth and development in animals
* Compare and group collections of animals based on similarities and differences in their lifecycle and suggest reasons for similarities and differences
* Carry out a practical enquiry and take systematic observations and recordings – How does a bean change as it germinates?
* Research the work of naturalists – David Attenborough and Jane Goodall
 | * Can identify similarities and differences and justify them.
* Can create own classification systems and keys using own observations in the local environment or information from own research.
* Research different types of micro-organisms (are they always harmful) and draw conclusions
 |
| **CLE** | * Nature walk in local area
* Hatching eggs and observing changes
* Visit to a contrasting area
* Sensory walk
* Farm visit
 |  | * Investigate the creatures found in a micro-environment in the garden
 |  | * Park visit to classify leaves found
 | * Dissect a flower head
 |  |
| **Concepts** | Variation* There are many different types of animals.
* Animals may look different but have some features and needs in common.

Enquiry* We can ask scientific questions about the world in which we live.
 |  | Dependency* Living things can have specific habitats and all living things have basic needs, which they need to survive.
 |  | Dependency* Recognise that living things live in certain habitats because these meet their needs.
* Habitats can change over time and this may endanger the things that live there.

Variation* Living things can be grouped in different categories.
 | Change* All animals have a life cycle
* All things have to have a means of reproducing itself in order to continue the species.

Enquiry* The most appropriate type of scientific enquiry needs to be selected and planned to explore specific questions.
 | Variation* All living things can be grouped and ordered according to their characteristics, including their similarities and differences.
* Larger groups can be subdivided on the basis of their similarities and differences.
* There is an underlying order in the natural world
 |
| **End Points** | **At the end of EYFS pupils will:****Nursery*** Identify how animals change over time
* Identify what animals need to stay alive
* Begin to show care for the environment and living things

**Reception*** Know that different animals live in different places
* Know that all animals have a life cycle – they are born and die, they change and grow over time
* Understand that an animal is a living thing, identifying its main parts and basic requirements for growth.
* Show care for the environment and living things

**Early Learning Goal**Explore the natural world around them, making observations and drawing pictures of animals |  | **By the end of year 2 pupils will:*** Use knowledge of the differences and similarities between things that are living, dead and things that have never been alive to sort things
* Name a variety of plants and animals in the habitat, and micro habitat, in which they live, and explain how they are suited to living there.
* Explain how different habitats provide for the basic needs of the plants and animals that live there and explain how they depend on each other.
* Know that animals obtain their food from plants and other animals
* Create a simple food chain that explains a feeding relationship, identifying and naming the animal and food sources.

**Greater Depth**Children independently explain how they know that the person sitting next to them is alive |  | **By the end of Year 4 pupils will:*** Group living things in a variety of ways, and use classification keys to present information clearly.
* Describe the ways in which humans impact an environment and the impact on the plants and animals that are found there. eg. deforestation.
* Raise and answer scientific questions by making observations and gathering, recording, grouping and classifying data

**Greater Depth**Using their knowledge of the local area, children plan where a nature reserve should be built. Is the proposed location adequate and what positive or negative reasons can be given. **Greater Depth**Children sort a variety of animals into a Carroll and Venn diagram using own headings to group them correctly.  | **By the end of Year 5 pupils will:*** Explain differences in the life cycles of a mammal, an amphibian, an insect and a bird.
* Identify and explain the process of sexual and asexual reproduction in plants when describing the lifecycles of some plants.
* Devise questions and carry out fair tests which involve: making predictions, making systematic observations and recording and comparing outcomes to predictions to draw conclusions.
* Use scientific knowledge acquired through observation and research to support own findings.

**Greater Depth**Children independently explain how they know that an animal is an amphibian, mammal, insect or bird from information about their life cycle | **By the end of Year 6 pupils will:*** Identify the similarities and differences between living things, giving reasons for observations and grouping them according to common features.
* Create and use own classification systems and keys accurately.

**Greater Depth**Create a creature that would fit in a specific section of the Linnean classification system |
| **Vocabulary** | * Names of animals and their young
* Egg, chick, bird, frog spawn, tadpole, frog
* Names of animals that live in different places
 |  | Living, dead, habitat, micro-habitat, food chain, environment, adaptation, shelter |  | Vertebrates, non-vertebrates, habitat, environment, key, classify, classification, category  | Anther, Asexual, Bulb, Dispersed, Dissect, Fertilisation, Germination, Life Cycle, Metamorphosis, Ovary, Ovule, Pollen, Pollination, Reproduction, Seed, Sexual, Stigma, Stamen, carpel, fertilize | Bacteria, Characteristic, Classification, Classification Key, Criteria, Fungi, Invertebrate, Linnean System, Micro Organism, Mini beast, Order, Organism, Species, Vertebrate, Virus |
| **Plants** | **Knowledge of the World Plants** | **Plants** | **Plants** | **Plants** |  |  |  |
| **Knowledge** | **Pupils will be taught:*** Plants are living things and grow and change.
* The main parts of a plant – seed; flower; leaf.
* Plants need water to grow.
* Pants and trees change over time - from a seed to a mature plant, over the course of the year
 | **Pupils will be taught:*** The structure of a plant and the names of its main parts – leaves, flowers, blossoms; petals, fruit, roots, bulb, seed, trunk, branches, stem.
* There are different type of plants – trees (deciduous; evergreen); flowers; vegetables.
 | **Pupils will be taught:*** Plants need water, light and a suitable temperature to stay healthy.
* The sun acts as a natural light source and influences the temperature of the environment.
* How seeds and bulbs grow into mature plants and stay healthy.
* Seeds and bulbs need water to grow.
 | **Pupils will be taught:*** The functions of the different parts of a plant: roots and stem/trunk in nutrition and support; leaves for nutrition and flowers for reproduction.
* How plants need specific things (air, light, water, nutrients from soil and room to grow) to live and grow and these vary from plant to plant.
* How water is transported in plants.
* The role of flowers in the life cycle of flowering plants including pollination; seed formation and seed dispersal.
 |  |  |  |
| **Skills** | * Make observations.
* Talk about what they can see.
* Identify and name the main parts of a plant.
* Draw a plant and include the different parts.
 | * Close observation over time.
* Recording findings
* How to draw a diagram accurately and neatly and labelled correctly.
* Use simple charts to identify plants and trees
* Compare, sort and group plants / leaves according to stated criteria.
 | * Understand how to set up a fair test, including posing an appropriate question and being able to recognise when a test is not ‘fair. Eg Do cress seeds grow quicker in the hot or the cold, with or without water?
* Close observation with some accuracy, including measurements of plants as they grow.
* Recording and comparing results to answer own questions.
 | * Set up a range of practical enquiries and fair tests to compare the impact of different factors on plants eg

Which conditions help seeds germinate faster?* Observation to check factual knowledge e.g. movement of water through plant; patterns in the structure of fruits and methods of seed dispersal.
* Making simple conclusions
* Research methods of seed dispersal
* Sort and group seeds based on their features, record and draw conclusions about each groups method of dispersal.
 |  |  |  |
| **CLE** | * Plant seeds and bulbs and care for growing things
* Role Play: Garden Centre
* Seasonal walks
* Visit to the Garden Centre
* Observe plants across the seasons, understanding their basic needs
 | * Walk in the woods in different seasons to observe the trees. Talk about how plants change over time and group leaves collected.
* Growing flowers and vegetables
 | * Grow a variety of plants
* Planting to observe growth – what happens to my bean after I have planted it?
 | * Carnation enquiry – what happens when left in a glass of coloured water? How does the length of its stem affect how long it takes for food colouring to dye the petals?
 |  |  |  |
| **Concepts** | * Living things grow and change over time.

Enquiry* We can ask scientific questions about the world in which we live.
 | * Plants may take different forms but all have the same key components.
 | * Plants have a life cycle which includes reproduction and growth.
* Light keeps plants growing and healthy.
 | * Different parts of the plant have different functions.
* Plants have needs which must be satisfied for them to survive.

Enquiry* Different types of scientific enquiry are most appropriate to answer specific questions.
 |  |  |  |
| **End Points** | **At the end of EYFS pupils will:*** Understand that a plant is a living thing, identifying its main parts and basic requirements for growth.
* Begin to show care for the environment and living things
* Know that all plants have a life cycle – seed, seedling, flower, tree
* Talk about the changes that are seen in plants at different times over the year
* Show care for the environment and living things

**Early Learning Goal**Explore the natural world around them, making observations and drawing pictures of plants | **At the end of Year 1 pupils will:*** Name the main parts of a plant.
* Describe, name, compare and sort and group some common locally occurring plants and parts of plants using similarities and differences.
* Take close observations and record findings by including drawings and labelling diagrams.

**Greater Depth*** Explain different ways in which a collection of different plants can be sorted
 | **At the end of Year 2 pupils will:*** Describe the conditions bulbs and seeds need to grow into mature plants, stay healthy and reproduce
* Identify the sun as a natural light source and explain how it influences the temperature of the environment.
* Undertake close observation with some accuracy including taking measurements of plants as they grow.
* Demonstrate how to set up a fair test and be able to recognise when a test is not “fair”.
* Record and compare results to answer own questions.

**Greater Depth**Explain why trees and plants change over the course of the year | **At the end of Year 3 pupils will:*** Identify and describe the functions of different parts of flowering plants.
* Describe the life cycle of a flowering plant, including pollination, seed formation, seed dispersal and germination.
* Design and carry out a range of practical enquiries, making observations and drawing conclusions about what plants need to live and grow and how water is transported in plants

**Greater Depth**Evaluate the advantages and disadvantages of different tpes of seed disp |  |  |  |
| **Vocabulary** | Plant, seed, tree, flower, water, leafStem, branch, life cycle | leaf, flower, blossom, petals, fruit, roots, bulbs, seed, trunk, branch, stem, treetrees (deciduous / evergreen), flowers  vegetables  | Light,  Sun, warm, cool, temperature, water, space, grow, healthy, bulb, seed, shoot, bud, flowering, non-floweringlife cycle, germinate, soil fair test, variable  | Function, nutrition, support, transported, life cycle, pollination, seed formation, seed dispersal, absorb, nutrients, life cycle, pollen, pollinator, reproduce |  |  |  |
| **Animals, including humans** | **Knowledge and Understanding of the world****Humans**  | **Animals, including humans** | **Animals, including humans** | **Animals, including humans** | **Animals, including humans** | **Animals, including humans**Taught alongside RSE | **Animals, including humans** |
| **Knowledge**NurseryReception | **Pupils will be taught:*** How to take care of themselves
* Humans grow and change
* How to take care of themselves
* Humans have a life cycle – they grow and .change
 | **Pupils will be taught:*** The names and structure of a variety of common animals including fish, amphibians, reptiles, birds and mammals.
* Which animals are carnivores, herbivores and omnivores.
* Basic parts of a human body including head, neck, arms, elbows, legs, knees, face, eyes, ears, hair, mouth, teeth.
* The five senses
 | **Pupils will be taught:*** Animals, including humans, have offspring, which grow into adults e.g. egg, chick, chicken; egg, caterpillar, pupa, butterfly; spawn, tadpole, frog; baby, toddler, child, teenager, adult.
* The basic needs of animals, including humans, to survive (water, food, air).
* The importance of exercise, hygiene and a balanced diet for humans.
 | **Pupils will be taught:*** Animals, including humans, need the right types and amounts of nutrition.
* Different types of food contribute to a healthy diet for different animals, including humans.
* Humans and some other animals have skeletons and muscles for support, protection and movement.

.  | **Pupils will be taught:*** The basic parts of the digestive system in humans including mouth, tongue, teeth, oesophagus, stomach, small/large intestine.
* Different types of teeth in humans and their functions
* Food chains include producers, predators and prey.

  | **Pupils will be taught:*** The changes which occur as humans develop to old age.
* Changes experienced in puberty.
* Gestation periods of different animals including humans.
 | **Pupils will be taught:*** Main parts of the human circulatory system including the functions of the heart, blood vessels and blood.
* Impact of diet, exercise, drugs and lifestyle on the way the body functions.
* How to keep their bodies healthy.
* How nutrients and water are transported within animals, including humans.
 |
| **Skills** | * Talk about the care that a baby needs providing
* Identify how to take care of themselves
* Talk about the similarities and differences between themselves and a baby
* Identify how they have changed since they were a baby
 | * Close observation of features of animals and humans at first hand and through videos and photographs.
* Compare and contrast different animals.
* Group animals on the basis of appearance and what they eat.
* Describe their basis for grouping animals.
* Use senses to compare textures, sounds and smells.
* Record findings scientifically.
 | * Close observation (with some accuracy) on growth of different animals eg how does frogspawn change over time
* Able to use first- and second-hand observation and measurement. Ask questions related to their investigations.
* Suggest ways to find answers to their questions.
* Record and compare findings to answer their questions.
* Research healthy and unhealthy foods
 | * Group animals according to similarities and differences in terms of their skeletons and diets.
* Pose appropriate questions that explore ideas e.g. what would happen if humans didn’t have a skeleton?
* Carry out research using first and second-hand evidence.
* Record and present findings in different ways.
* Can use food labels to answer enquiry questions eg how much sugar is in soft drinks?
 | * Raise and answer questions that explore parts of digestive system.
* Construct and interpret variety of food chains.
* Draw and label diagrams of the digestive system using their scientific knowledge.
* Gather and classify data to compare and contrast and explain the reasons for the differences.
 | * Develop timelines to indicate stages of growth and development in animals, including humans.
* Research gestation period of other animals and compare them with humans, working scientifically and identifying possible reasons for these differences.
 | * Use what they have learnt about the human body in Y3 and Y4 to deepen their understanding of how the circulatory system functions.
* Raise questions about and explore the relationship between diet, exercise, drugs, lifestyle and health eg Which type of exercise has the greatest effect on our heart rate?
* Plan and carry out a fair test
* Provide clear, scientific explanations, using scientific knowledge and evidence.
 |
| **Core Learning Experiences** | **Nursery*** Looking at photographs of themselves as a baby
* Visit of baby and mum

**Reception*** Visit of expectant mum and adult
 | * Visit to Yorkshire Wildlife Park.
 | * Observe frogspawn changing into tadpoles
 |  | * Investigate how different liquids affect teeth
 |  | * VR headsets: human circulatory system.
 |
| **Concepts** | Variation* Living things grow and change over time.

Enquiry* We can pose scientific questions about the world in which we live
 | Variation* Groups of living things may take different forms, but all members of the group have the same key components.
 | Change* All animals, including humans have offspring who grow and mature.
 | Variation* Different parts of the body have different functions
 | Variation* Different parts of the body have different functions which contribute to a healthy well-functioning body.
 | Change* All animals have a life cycle.
* All living things have a means of reproducing themselves in order to continue the species.
 | Dependency* The choices people make can affect their bodies and health as well as other living things.

Enquiry* The outcomes from scientific tests can be used to support or refute scientific ideas or arguments.
 |
| **End Points** | **At the end of EYFS pupils will:****Nursery*** **Identify how they have changed since they were babies**
* **Demonstrate ho to take care of their basic needs**

**Reception*** Know that all humans have a life cycle – they are born, they grow and change over time

  | **At the end of Year 1 pupils will:*** Identify and name a variety of common animals, giving examples of herbivores, omnivores and carnivores, and fish, amphibians, reptiles, birds and mammals.
* Identify the basic parts of the human body (head, neck, arms, legs, face, eyes, ears, mouth)
* Make close observations, comparing and contrasting features of humans and animals and group according to appearance and diet, with reasoning.

**Greater Depth**Sort a group of animals as amphibian, reptile, bird or mammal. | **At the end of Year 2 pupils will:*** Describe the stages in the lifecycles of animals, including humans, observing the growth of animals, with some accuracy through observation.
* Identify the basic requirements for animals and humans to survive and the requirements for human health.

**Greater Depth**Children independently explain how their environment provides for them | **At the end of Year 3 pupils will:*** Identify the function of their skeleton, giving examples of specific bones.
* Explain how muscle and joints work together to help them move
* Design a healthy meal, identifying the nutrients found in it.
* Sort and group animals according to the similarities and differences in their skeletons and diets.
* Use observations to investigate questions relating to animals, (inc humans), recording and presenting findings in different ways.

**Greater Depth**Make a working model of a joint and muscle to show how it moves | **At the end of Year 4 pupils will:*** Identify the different types of teeth in humans and explain their simple functions.
* Draw and label diagrams of the human digestive system, naming and explaining the functions of each part.
* Carry out an enquiry, gathering and classifying data to compare and contrast and explain the reasons for the differences.
* Construct and interpret a variety of food chains, identifying producers, predators and prey.

**Greater Depth**Children hypothesise what an animal could be based on its skull. They apply their learning of the function of teeth and justify why or how they have come to their conclusion | **At the end of Year 5 pupils will:*** Identify, name and explain the different stages in animal, including human development, drawing timelines to represent these stages.
* Research the different gestation periods of a variety of animals, compare with humans and explain these differences.

**Greater Depth**Suggest the gestation periods of a number of animals giving explanations for their thinking. | **At the end of Year 6 pupils will:*** Name and locate the parts of the human circulatory system and describe the transportation of nutrients within animals, including humans.
* Identify the factors that impact health and explain how to keep healthy.
* Investigate questions involving the factors that can impact health, providing clear scientific explanations.

**Greater Depth**Produce an information leaflet  |
| **Vocabulary**  | * Baby, child, adult
* Hair, eyes, skin, shorter, taller, bigger, smaller, parent, mother, father, brother, sister, grandparent
 | tail, wing, claw, fin, scales, feathers, fur, beak, paws   animal, birds, fish, reptiles, amphibians,  mammals herbivore, carnivore, omnivore Senses, sight, touch, taste, hearing, smell | Offspring, adult, basic needs, survive, food, water, air, exercise, hygiene, balanced diet. Healthy, unhealthyBasic needs | Healthy diet, nutrition, skeleton, muscle, support, protection, movement, spine, ribcage, pelvis, skull, contract | Digestive system, mouth, tongue, stomach, large / small intestine, digestion, incisor, canine, molar, oesophagusFood chain, producer, predator, prey | Adolescent, Adult, Adulthood, Baby, Child, Development, Foetus, Gestation Period, Life Cycle, Life Expectancy, Newborn, Puberty, Reproduction | Circulatory system, organ, heart, atrium, ventricle, lungs, blood vessels, blood, arteries, veins, oxygenated, deoxygenated, oxygen, pulse, nutrients, drug, disease, obesity |
| **Evolution and Inheritance** |  |  |  |  |  |  | **Evolution and Inheritance** |
| **Knowledge** |  |  |  |  |  |  | * Living things change over time and fossils provide information about things that inhabited the Earth millions of years ago.
* Living things produce offspring of the same kind which vary and are not identical to their parents.
* Animals and plants are adapted to their environment and this may lead to evolution.
* The work of palaeontologists (e.g. Mary Anning) and evolution theorists (e.g. Charles Darwin)
 |
| **Skills** |  |  |  |  |  |  | * Carry out research from a range of sources to find out how living things have changed over time.
* Critically compare how some living things are adapted to survive extreme conditions e.g. cactus, penguins, camels.
* Analyse and make links between the advantages and disadvantages of specific adaptations e.g. 2 feet;/4 feet; gills/lungs.
* Report and present clear findings from enquiries, offering well-evidenced explanations to support their reports.
 |
| **Concepts** |  |  |  |  |  |  | Evolution* Characteristics are passed from parents to their offspring.
* All living things change and adapt over time.
* Variation in offspring can make animals more able to survive in particular environments.
 |
| **End Points** |  |  |  |  |  |  | **At the end of Year 6 pupils will:*** Identify through research (using a range of sources) how living things change over time and explain how fossils provide evidence of these changes.
* Know that living things produce offspring of the same kind, which vary and are not identical to their parents.
* Describe and critically compare how animals and plants are adapted to their environment (including extreme conditions), recognising this may lead to evolution and analyse and make links between the advantages and disadvantages of specific adaptations.

**Greater Depth**Suggest how an animal that lives in the polar region could adapt to global warming |
| **Vocabulary** |  |  |  |  |  |  | Adapt, adaptation, characteristic, environment, evolution, extinct, fossil, inheritance, natural selection, offspring, palaeontologist, species, survive, theory, variation  |
| *Specific Discipline:* ***Chemistry*** |
|  | **EYFS** | **Year 1** | **Year 2** | **Year 3** | **Year 4** | **Year 5** | **Year 6** |
| **Materials** | **Knowledge of the World** **Materials including changing materials** | **Everyday Materials** | **Uses of Everyday Materials** | **Rocks** | **States of Matter** | **Properties and Changes of Materials** |  |
| **Knowledge** | **Pupils will be taught:*** The names of aa variety of everyday materials
* Objects can be made of different materials.
* Different materials have different properties.
* Materials can have different uses according to their properties.
* Vocabulary to describe different materials accurately and precisely -solid, liquid, stretchy, hard, soft
 | * Materials that everyday objects are made from including wood, plastic, glass, metal, water and rock.
* Simple physical properties of a variety of everyday materials.
 | * Different materials have different everyday uses.
* Some materials can be used to make different objects and the same object can be made of different materials e.g. wood, metal, plastic, glass, rock, brick, paper, cardboard.
* The shape of solid objects made from some materials can be changed by squashing, bending, twisting, stretching.
 | * Different rocks look different and have different physical properties.
* Know what a fossil is.
* How fossils are formed in sedimentary rocks.
* Soils are made from rocks and organic matter.
 | * Materials can be solids, liquids or gases.
* These materials have different states of matter: solids hold their shape; liquids form a pool not a pile; gases escape from an unsealed container.
* Some materials change state when they are heated or cooled.
* Water freezes at 0 degrees Celsius and boils at 100 degrees Celsius
* The part played by evaporation or condensation in the water cycle.
* The relationship between evaporation and temperature
 | * Materials have different properties (hardness, solubility, transparency, conductivity) and respond differently to magnets.
* Some changes in materials are reversible and some are irreversible.
* Some changes result in the formation of new materials and this kind of change is usually not reversible.
 |  |
|  **Skills** | * Make simple observations and talk about the objects they look at.
* Begin to sort materials and explain the reasons for their grouping.
* Manipulate materials to achieve a planned effect.
 | * Distinguish between object and the material it is made from.
* Describe the properties of a variety of materials e.g. hard/soft; stretchy/ stiff; shiny/ dull; rough/smooth; bendy/not bendy; waterproof/not waterproof; absorbent/not absorbent.
* Begin to compare and group materials based on their physical properties
* Raise and answer simple questions.
* Explore questions by performing simple tests e.g. best material for an umbrella?
* Use observations to suggest answers.
* Record findings scientifically.
 | * Work scientifically to compare the use of everyday materials around the school with materials found in other places.
* Raise and answer questions that consider which materials/properties make an object suitable/ unsuitable for a purpose.
* Can carry out a fair test.
* Make close observations with some accuracy.
* Record data and use to answer their questions.
* Evaluate the suitability of materials for different purposes.
 | * Observe, sort and group rocks using a hand lens.
* Record findings: draw and label a diagram accurately and neatly.
* Use findings to identify and classify rocks according to their properties (grains or crystals) and whether they have fossils in them.
* Pose questions to explore the properties of rocks and how and why rocks may have changed over time.
* Report on findings from enquiry including oral and written explanations.
* Draw simple conclusions and raise further questions.
 | * Compare, group and classify materials according to whether they are solids, liquids or gases.
* Make well-reasoned predictions and provide evidence to support ideas eg Does the mass of a block of ice affect how long it takes to melt?
* Design fair test to investigate the relationship between evaporation and temperature and carry it out.
* Observe and record outcomes carefully.
* Take accurate measurements, choosing and using the most appropriate instruments.
* Gather, record and present data, including use of charts.
* Report findings and conclusions in different ways and communicate using scientific language.
* Evaluate tests and begin to suggest improvements to chosen method.
 | * Compare, group and classify materials based on their properties.
* Design and carry out appropriate fair tests.
* Make well-reasoned predictions and offer evidence to support their views. Observe changes to materials over a period of time.
* Take accurate measurements using appropriately selected equipment.
* Gather, record and present data in a suitable way creating accurate charts.
* Report findings and conclusions in different ways and communicate using scientific vocabulary.
* Provide explanations for findings using scientific evidence.
 |  |
| **CLE** | * Opportunities to observe changes in materials – cooking, melting, making ice lollies
* Hands on exploration of natural materials
 | * Investigations to discover if materials are fit for purpose.
 | * Materials investigation.
 | * Explore the properties of rocks (durability, permeability, density, hardness), record findings and use the data to rank rocks.
 | * Evaporation – observe evaporation of puddles over time
 |  |  |
| **Concepts** | * Objects are made from different materials.
* Different materials have different properties and can be used for different purposes.
 | * Materials can be compared and grouped according to their properties.
* Objects are made from particular materials in order to be more effective.

Enquiry* Different types of scientific enquiries can be undertaken to answer scientific questions.
 | * Different materials have different properties which determine their use.
* Some materials can be used for more than one thing: the same object can be made from different materials.

Enquiry* Tests can be carried out and the findings from these tests used to answer scientific questions.
 | * Different rocks have different physical properties and can change over time
* Different rocks are formed in different ways and we can classify them.
 | * Different everyday materials have different states of matter.
* Some states of matter can be changed as they are heated or cooled, but others cannot.

Enquiry* The outcomes from scientific tests need to be analysed so that conclusions can be made
 | * Materials can be changed using different processes, some of which are reversible and others are not.
* Sometimes new materials can be made because an existing material has been changed and this is not usually reversible.

Enquiry* The most appropriate type of scientific enquiry needs to be selected and planned to explore specific questions
 |  |
| **End Points** | **By the end of EYFS pupils will:*** Name and identify the properties and uses of a range of materials.
* Begin to sort different materials, giving reasons for their choices.
* Make observations to describe the similarities and differences in different materials.
* Make observations to describe the changes they notice in different materials.

**Early Learning Goal**Understand some important processes and changes in the natural world around them, including changing states of matter | **By the end of Year 1 pupils will:*** Name and describe the physical properties of a variety of everyday materials.
* Compare and group a variety of everyday materials on the basis of their physical properties, giving reasons.
* Raise and answer simple questions by performing simple tests, using observations to suggest answers and record findings scientifically.

**Greater Depth**Explain different ways in which a collection of different materials can be sorted | **By the end of Year 2 pupils will:*** Identify and compare the uses of everyday materials in different locations, evaluating the suitability of materials for different purposes.
* Describe how the shape of solid objects made from some materials can be changed.
* Raise and answer questions that involve the suitability of materials for a purpose, making close observations with some accuracy and recording and using data to answer their questions.

**Greater Depth**Explain why different objects are made of particular materials and suggest why other materials are not used | **By the end of Year 3 pupils will:*** Know that soils are made from rocks and organic matter and can explain how fossils are formed in sedimentary rocks.
* Classify, sort and group a variety of rocks in a range of ways according to their physical properties and appearance.
* Pose questions to explore how and why rocks may have changed over time, record findings by drawing diagrams accurately and neatly, providing explanations, drawing simple conclusions and raising further questions.

**Greater Depth**Using correct vocabulary, children explain how they know rocks are formed  | **By the end of Year 4 pupils will:*** Name and define the three states of matterand classify materials accordingly, giving a justification for their reasoning
* Describe the effect of heating and cooling on materials and apply this knowledge when explaining the water cycle.
* Design and conduct a fair test to investigate the rate of evaporation with temperature.
* Gather, record and present data in a line graph and explain findings using scientific language.
* Evaluate tests and begin to suggest improvements to chosen method.

**Greater Depth**Use correct vocabulary to tell the story of a water droplet as it travels through the water cycle. | **By the end of Year 5 pupils will:*** Describe the properties of materials and use these properties to compare, group and classify a range of different materials.
* Demonstrate that some changes in materials are reversible and some are irreversible,

and explain that some of these changes can result in the formation of new materials, which are usually not reversible.* Design and conduct appropriate fair tests by: making well-reasoned predictions, gathering data by taking accurate measurements, recording data in a suitable way and reporting findings and conclusions in different ways, giving explanations for findings, using scientific evidence.

**Greater Depth**Use correct vocabulary to identify and explain everyday changes in materials as reversible / irreversible |  |
| **Vocabulary** | * Names of different materials – plastic, paper, card, wood, fabric

Solid, liquid, freeze, melt | Object, material Wood, plastic, glass, metal, water, rock, metalHard, soft, stretchy, stiff, shiny, dull, rough, smooth, bendywaterproof, absorbent  | See-through, opaque, transparent and translucent, reflective, flexible, rigid Shape; push / pushing; twist/twisting; squash / squashing Suitable, unsuitable | Rock, magma, lava, crust Igneous, Sedimentary,Metamorphic Sandstone, Limestone, Chalk, Granite, Slate, MarbleGeologist, Fossil Permeable, Impermeable – Soil, grains, crystals  | Solid, liquid, gas, states of matterChange, freezes, boilsEvaporation, condensation, water cycleEvaporate, temperature, solidify | Conductivity, solubility, transparency Conductivity / conductor/ insulator  Electrical, Thermal Dissolve – Solvent, solution, solute, soluble, insoluble, solid, liquid, particles, suspensions, substance, sediment Separating materials – Sieve, filter, evaporate, condense, mixture Change, reversible, irreversible Burning, rusting   |  |
| *Specific Discipline:* ***Physics*** |
|  | **EYFS** | **Year 1** | **Year 2** | **Year 3** | **Year 4** | **Year 5** | **Year 6** |
| **Light,Sound, Earth and Space** | **Understanding the World – Seasonal Changes** | **Seasonal Changes** |  | **Light** | **Sound** | **Earth and Space** | **Light** |
| **Knowledge** | **Pupils will be taught:*** The names of the days of the week and months of the year.
* Weather can change day to day, but weather patterns are related to the seasons.
* Vocabulary to describe the weather.
 | **Pupils will be taught:*** There are four seasons (Spring, Summer, Autumn, Winter).
* The weather changes during the year and is related to the seasons.
* Day length varies with the seasons.
 |  | **Pupils will be taught:*** Light can come from natural and artificial sources.
* Light from the Sun can be dangerous and how to protect our eyes
* Light is needed to see things in the dark, and that dark is the absence of light
* Some surfaces reflect light which makes them easier to see if there is less light
* Shadows are formed when light is blocked by a solid object.
 | **Pupils will be taught:*** Sound is caused by vibrations which travel through a medium to the ear.
* Pitch and volume of sounds can be changed.
* Sounds get fainter as the distance from the sound source increases.
 | **Pupils will be taught:*** Sun, Earth and Moon are approximately spherical bodies.
* Ideas about the solar system have changed from a geocentric model to a heliocentric model e.g. Copernicus.
* The Sun is a star at the centre of our solar system, with Earth as one of its eight planets which orbit the Sun.
* The Moon is a celestial body that orbits Earth.
* The Earth’s rotation causes day and night and the apparent movement of the Sun
 | **Pupils will be taught:*** Light appears to travel in straight lines.
* Objects are seen because they give out or reflect light into the eye.
* We see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes.
* Shadows have the same shape as the object that cast them because light travels in straight lines.
 |
| **Skills** | * Name the days of the week, months of the year.
* Use appropriate vocabulary to describe the weather.
* Observe the weather carefully and record in own way.
* Make simple predictions about the weather.
* Draw simple conclusions e.g. The sky has gone dark; it might rain.
 | * Observe changes in the weather daily and seasonally.
* Ask simple questions relating to the weather.
* Record findings scientifically, making tables and charts showing changes e.g. day length, with seasonal change.
* Make displays about the weather and seasonal changes.
* Note similarities and differences between seasons.
* Use information collected to answer questions.
 |  | * Explore, using mirrors and other reflective surfaces, how light is reflected from the surface.
* Set up practical enquiries and fair tests to investigate how shadows are made and how they vary as the distance between a light source and an object or surface is changed.
* Make careful observations and use appropriate equipment to measure accurately.
* Record findings in different ways.
* Identify patterns in the way shadows change
* Report findings in different ways.
 | * Raise and answer questions relating to the pitch and volume produced by an object.
* Explore how sound can be blocked by an object and draw a conclusion from this.
* Carry out careful and accurate observations.
* Gather and record data.
* Use data to find patterns/ relationships between volume of a sound and the strength of the vibrations that produced it
* Use data to find patterns/ relationships between pitch of a sound and the object that produced it
* Gather, record and present data in a line graph and explain findings using scientific language.
 | * Pose pertinent questions to explore and answer questions about the movement of the Earth and the Moon.
* Create models of the solar system.
* Observe and record the phases of the Moon over a lunar month, identify patterns and change over time.
* Investigate the time of day at different places on the Earth, record and identify patterns.
* Use scientific knowledge and evidence to explain their findings.
 | * Make predictions about how light will behave in specific situations e.g. (light sources, reflection, shadows) and create investigations to test their theory e.g. placing rear-view mirrors on cars; objects looking bent in water.
* Plan and carry out an investigation to see which material is most reflective. Take measurements and record. Use the data to draw conclusions.
* Explain how light travelling in straight lines enables us to see objects and why shadows have the same shape as the objects that cast them.
* Carry out an investigation to see how a shadow changes over the course of the day, take measurements and record. Use the data to draw conclusions.
* Report and present clear findings from enquiries, offering well-evidenced explanations to support their findings
 |
| **CLE** | * Outdoor provision in different weather
* Observe the changes in plants with changing seasons
 | * Seasonal visit to the park and weather recording
 |  | * Design and make a shadow puppet to form a shadow
 | * Investigate the best materials to insulate sound.
 | * National Science and Media Museum visit
 | * Design and make a periscope.
 |
| **Concepts** | * Time passes in a seasonal pattern.
* Weather changes day to day, but there are seasonal patterns of change in the weather over a longer period of time.
 | * Plants respond to seasonal change
 |  | * Light cannot bend or go around an object, so blockages from objects cause shadows.
* Without light objects cannot be seen and darkness is the absence of light.

Enquiry* Different types of scientific enquiry are most appropriate to answer specific questions.
 | * Vibrations need to travel through a medium to the ear to be heard as a sound.
* Volume and pitch can be manipulated.

Enquiry* The outcomes from scientific tests need to be analysed so that conclusions can be made.
 | * The sun is a star at the centre of a solar system which has eight planets.
* The Moon orbits the Earth and the Earth orbits the Sun, causing day and night and the phases of the Moon.
* The Earth rotates on an axis which affects climate and creates biomes.
 | * Shadows have the same shape as the objects that cast them because light travels in straight lines.
* Objects are seen because they give out or reflect light into the eye.

Enquiry* The outcomes from scientific tests can be used to support or refute scientific ideas or arguments.
 |
| **End Points** | **At the end of EYFS pupils will:*** Make observations about the weather.
* Make simple predictions about the weather and use cause and effect to draw simple conclusions.
* Talk about the changes that occur in Autumn, Winter, Spring and Summer

**Early Learning Goal**Understand some important processes and changes in the natural world around them, including the seasons  | **At the end of Year 1 pupils will:*** Observe and describe weather daily and compare and contrast weather and day length associated with the seasons.
* Ask questions and record findings relating to weather and seasonal changes scientifically, making displays, tables and charts.
* Use information collected to answer questions.

**Greater Depth**Describe the changes associated with the seasons and link these to changes in human behaviours |  | **At the end of Year 3 pupils will:*** Explain that dark is the absence of light and that light can come from natural and artificial sources, giving some examples.
* Describe how shadows are formed using their knowledge
* Explores how light is reflected using mirrors and other reflective surfaces.
* Set up practical activities and fair tests to investigate: how shadows are made, what causes them to change and identifying patterns in the way they change.
* Make careful observations and use appropriate equipment to measure accurately how shadows change throughout the day.

**Greater Depth**Children create shadow puppets that will create specific shadows | **At the end of Year 4 pupils will:*** Identify how sounds are formed, and use a diagram to demonstrate how sounds are heard from the vibrating object to the ear.
* Compare and contrast sounds with increasing distance from the source, drawing conclusions that sounds get fainter with distance from the source.
* Demonstrate how to increase / decrease pitch and volume using a musical instrument and identify patterns.
* Design and conduct a fair test to predict and explain what happens to sounds when the distance from the sound source increases.

**Greater Depth**Children explain, using a labelled diagram and written explanation, how sounds can be heard in different scenarios  | **At the end of Year 5 pupils will:*** Use a diagram to

demonstrate that the Sun is a star at the centre of our solar system, with Earth as one of its eight planets which orbit the Sun.* Using a diagram describe the movement of the Moon relative to the Earth.
* Use knowledge of the Earth’s rotation to explain day and night and the differences in time at different places on Earth at a given time.
* Pose pertinent questions to explore and answer about the movement of the Earth and Moon, using scientific knowledge and evidence to explain their findings.

**Greater Depth**Children present the pros and cons of living on the Moon.  | **At the end of Year 6 pupils will:*** Explain how light travelling in straight lines enables us to see things and use this knowledge to explain why shadows have the same shape as the object that cast them.
* Create a diagram to explain howwe see things by light travelling from light sources to our eyes or from light sources to objects and then to our eyes.
* Predict and explain, using a diagram, how the path of light rays can be reflected to be seen in a periscope.

**Greater Depth**Children explain, using a labelled diagram and written explanation, how a periscope works |
| **Vocabulary** | Days of the weekSunny, rain/y, wind/y, snow/yHot, cold, warmIce, Thunder, LightningSpring, Summer, Autumn, Winter  | Weather, seasons, sunrise, sunsetSpring, summer, autumn, winterNight, day, temperature , day length |  | Light, light source, dark Natural, artificial  Reflect, reflective, non-reflective Opaque, translucent, transparent Distance, surfaceShadow  | Vibrate, vibration, travelMedium – air, water, solidPitch, volumeFaint / fainterLoud / louderSilent, distance, sound source, insulationSound wave, particle, ear drum | Axis, tilt, orbit, rotate, rotation, spherical, planet, solar system, reflectSun, Earth, Moon, star Solar system, celestial body Geocentric model, heliocentric model | Straight lines, periscope, ray, absorb |
| **Forces and Electricity** | **EYFS** | **Year 1** | **Year 2** | **Year 3** | **Year 4** | **Year 5** | **Year 6** |
| **Forces**  |  |  | **Forces and Magnetism** | **Electricity** | **Forces** | **Electricity** |
| **Knowledge** | Forces can be felt |  |  | **Pupils will be taught:*** Magnets have two poles
* Magnets attract or repel each other and attract some materials and not others.
* Magnets exert a force and can act at a distance
 | **Pupils will be taught:*** Some appliances need electricity to work.
* The basic parts of a simple series electrical circuit (cells, wires, bulbs, switches and buzzers).
* A complete circuit is needed for a bulb to light up or a buzzer to work
* A switch opens / closes a circuit
* Materials can be conductors or insulators and some materials are better conductors than others.
* Precautions needed for working safely with electricity
 | **Pupils will be taught:*** Gravity is a force acting between the Earth and the object.
* Air resistance and water resistance slow things down
* Friction is a force that acts between different surfaces and slow things down.
* Some mechanisms (e.g levers and pulleys) allow a smaller forces to have a greater effect (e.g. levers, pulleys, gears).
 | **Pupils will be taught:*** Simple series circuits can be constructed in different ways to produce different outcomes e.g. brightness.
* Voltage is used to measure the electrical output from a cell.
* Conventional symbols used when representing a simple circuit in a diagram.
* Precautions needed for working safely with electricity
 |
| **Skills** | * Talk about what they can feel when they push objects under the water or when they explore magnets
 |  |  | * Sort materials based on their magnetic properties.
* Set up practical enquiries and fair tests to investigate the strength of different magnets.
* Set up a fair test to investigate how a toy car moves on different surfaces e.g. carpet, bubble wrap, sandpaper, fabric. Measure, record and draw conclusions about how objects move on different surfaces.
* Make careful observations and use appropriate equipment to measure accurately.
* Identify patterns in the way magnets behave to each other depending on which poles are facing and use this knowledge to make predictions
* Record and report findings in different ways.
 | * Ask relevant questions to explore features of electrical circuits.
* Construct a simple series circuit using cells, / wires/ bulbs/ switches and buzzers
* Set up simple practical enquiries and fair tests to understand how a circuit works
* Observe patterns in findings and draw simple conclusions.
* Record findings in different ways including pictorial representations.
 | * Pose pertinent questions that can be explored to find out about gravity and why objects fall to the floor.
* Investigate through practical enquiries and fair tests the effect of forces on objects:

a. air resistance with seeds from trees / parachutes; b. water resistance with boats of different shapes and sizes.* Make predictions and carry out practical enquiries including systematic observations / recording and compare outcomes to draw a conclusion.
* Investigate the effect of friction on movement eg the use of a brake on a bike, how does the surface area of a parachute affect the time it takes to fall?
* Explore the effects of levers and pulleys on movement.
* Present findings in appropriate ways.
* Explain what they have found out using scientific evidence to support their conclusions e.g. Galileo and Newton.
 | * Raise and answer questions about the impact of different components in a series circuit.
* Make predictions about the impact of changing different components and test these.
* Explain reasons for their findings using scientific knowledge.
* Apply scientific knowledge to solve a practical problem e.g. design a burglar alarm.
* Make own decisions about how to record and present findings using evidence to support their findings and using appropriate conventional symbols.
 |
| **CLE** | * Exploring magnets
* Exploring pushing and pulling – toys / provision
* Water play – sinking and floating
 |  |  | * Make a magnetic game
 | * Create and make an electrical item.
 |  | * Design and make an electronic game
 |
| **Concepts** | * Forces can be felt
 |  |  | * Unlike some other forces, magnets can act at a distance.
* The strength of a magnet can vary.

Enquiry* Different types of scientific enquiry are most appropriate to answer specific questions.
 | * An electrical circuit must make a complete loop to work.
* The more electrical energy in a circuit, the more power it is supplying
* Some materials are good conductors of electricity, whilst others are poor conductors.

Enquiry* Outcomes from scientific tests need to be analysed to draw conclusions
 | * Different materials create different amounts of friction which low down or stop moving objects.

Enquiry* The most appropriate type of scientific enquiry needs to be selected and planned to explore specific questions.
 | * Altering the different elements of an electrical circuit will affect the electrical output and how things function e.g. brighter light.
* The number and voltage of cells in a circuit have an effect.

Enquiry* The outcomes from scientific tests can be used to support or refute scientific ideas or arguments.
 |
| **End Points** | **At the end of EYFS pupils will:*** Talk about what they can feel when they push things under the water
* Talk about what happens when they put two magnets together
 |  |  | **At the end of Year 3 pupils will:*** Compare and contrast the behaviour of magnets and demonstrate how to use a marked magnet to find the unmarked poles on other magnets
* Compare how things move on different surfaces, and explain their findings
* Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials.
* Set up a fair test to investigate if bigger magnets are the strongest.
* Set up practical enquiries and fair tests to investigate magnets and forces, making careful observations, using appropriate equipment to measure accurately and record and report findings in different ways.

**Greater Depth**Children explain how magnetism is used in everyday life | **At the end of Year 4 pupils will:*** Construct and draw a simple electrical circuit, identifying and naming its basic components including cells, wires, bulbs, switches and buzzers.
* Create a working switch using knowledge that metals are good electrical conductors
* Design and carry out a fair test to investigate whether or not a lamp will light in a simple series circuit, predict how they can change the brightness of a bulb and test their prediction.

**Greater Depth**Children justify why household appliances are either mains or battery powered | **At the end of Year 5 pupils will:*** Define gravity, air resistance, water resistance and friction, give examples of each and know that they slow things down.
* Describe how some smaller forces can have a greater effect (e.g. levers, pulleys, gears).
* Explain what they have found out using scientific evidence to support their conclusions after conducting own practical investigations and fair tests concerning the effects of forces on objects.

**Greater Depth**Explain how forces are used in everyday life | **At the end of Year 6 pupils will:*** Define voltage, identify symbols used in diagrams when representing a simple circuit and identify ways in which simple series circuits can be constructed in different ways to produce different outcomes.
* Identify and describe the precautions needed for working safely with electricity.
* Investigate own questions about the impact of different components in a series circuit by: making predictions, recording findings appropriately and explaining their findings using scientific knowledge.
* Apply scientific knowledge to solve a practical problem.

**Greater Depth**Children produce an electrical safety leaflet |
| **Vocabulary** | Object, float, sink, push, pull, magnet, up, downForce, gravity, faster, slower  |  |  | Magnet, attract, repel, force, properties, strengthMagnetic, non-magneticPole | Electricity, appliance, circuit, series, cell, wire, bulb, switch, buzzerConductor, insulator, precautions | Gravity, force, air resistance, water resistance, frictionUpthrust, streamlinedLever, pulley, gear, mechanism | circuit diagram, circuit symbol, voltage, resistance  |

N.B. “Working scientifically” will be planned through the curriculum for teaching the programmes of study content