



The Cedar School Science

Our hopes for a Cedar child

Communication

Pupils will develop their communication skills through being encouraged to ask and answer questions about the world around them. They will engage in scientific enquiry and reflect upon this to communicate their scientific findings. Pupils will express interest in a wide range of topics and communicate their preferences in their own way. They will develop their understanding and use of scientific vocabulary related to the four core areas. Interactions will encourage the use of or experience of this vocabulary and pupils will explain what they have observed.

Empowerment

Pupils' independence will be promoted through setting up and taking part in investigations. They will be empowered to work successfully as part of a team throughout. They will make their own contributions to planning and evaluation by making choices and interpreting what they have found. Pupils will be empowered to develop their core scientific skills and conceptual understanding in biology, chemistry and physics.

Discovery

Pupils will explore and begin to understand the world around them through real life experiences. They will be encouraged to develop their sense of excitement and curiosity about natural phenomena by taking part in enquiries that are relevant to them and their everyday life. They will explore objects, environments, and living things in a way which will foster their love of learning and discovering.

Aspiration

Pupils will be exposed to the uses of science in our everyday life and the impact it has upon us. They will be encouraged to understand how science can be used to explain what is occurring. Pupils will develop their skills relevant to their age and stage of development. Where appropriate pupils will have the necessary skills to embrace formal learning and accreditation in their future education.

Resilience

Pupils will be challenged to question what they see around them. They will begin to predict how things will behave, and analyse the causes. Pupils will be resilient if enquiries require another attempt and will understand that scientists spend many years working on their discoveries.

Principles

Our science curriculum encompasses biology, physics, chemistry and scientific core skills.

We teach these subjects during 12 immersive discovery days each year.

The discovery days will focus on a specific area of science (biology, chemistry or physics) and will have the scientific core skills embedded within this.

Our approach aims to increase pupil's skills throughout all 5 key stages.

| Approach within developmental stages | |
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| Pre formal stage | Pupils will work on developing targets from the pre-formal curriculum with inspirational and exciting experiences within the context of a strand of science. |
| Semi-formal stage | Pupils will work on developing early targets from the science curriculum through practical, real life and play based experiences. These will be in the context of inspirational and exciting experiences chosen from their level or Key Stage within the science curriculum. |
| Formal stage | Pupils will work on increasingly more subject specific targets from the science curriculum through practical, real life and more formal learning experiences. These will be in the context of inspirational and exciting experiences chosen from their level or Key Stage science curriculum. |
| Further Study | Pupils who complete the Cedar science curriculum could choose to study science at GCSE or other accredited courses. |

Biology



*Chemistry and physics skills and objectives can be taught through any suitable and motivating context for learners.

Guidance on implementing the Cedar Science Curriculum

The key skills within science will be taught through 12 Discovery days throughout the year. Each discovery day will focus on a particular strand of science (physics, chemistry or biology). Within this strand, key elements of working scientifically will be embedded throughout by focusing on the specific scientific core skills.

As an example, you might like to choose four discovery days relating to each strand of science throughout the year. However, if you find that your learner's targets are more heavily weighted in one particular area of science, this may mean that you will need to dedicate more Discovery days to this to suit the needs of the class.

The Discovery day may be chosen within the context of your current half-termly topic, or as a standalone day with a motivating context.

Example of a structure of a **physics** scientific discovery day on **movement**:

| Session one: | Session two: | Session three: | Session four: |
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| <p>Introduce the context of the science discovery day. (physics-movement). Pose a question/problem to the class. E.g. How could scientists make cars go faster?</p> <p>Work in groups and think about which variables we could change. Share any key vocabulary.</p> <p>Unpick this together and think about: <i>weight of vehicle, shape of vehicle and gradient of ramp.</i></p> | <p>Place class into groups each changing a different variable. (<i>weight of vehicle, shape of vehicle and gradient of ramp.</i>)</p> <p>Predict what we think will happen to our vehicle traveling down the ramp. e.g. <i>the heavier the car is the slower it will go.</i></p> <p>Plan and set up the group scientific investigation. What equipment will we need?</p> | <p>Carry out the investigation using simple equipment. Record the results in an appropriate way for individual learners.</p> <p>Learners observe some properties of movement. (e.g. speed, direction, position).</p> <p>Think about keeping it a fair test and only changing one variable at a time.</p> | <p>Evaluate how the science experiment went.</p> <p>What did we find out? Which car was the fastest?</p> <p>Link this to the scientific concept of forces as appropriate.</p> |

Guidance on implementing the Cedar Science curriculum for pre-formal learners

Pre-formal learners will be focusing on achieving targets from the pre-formal curriculum within a scientific context. Each discovery day will focus on a strand of science. The table below shows examples of different scientific contexts which the pre-formal curriculum can be delivered within.

| Biology | Chemistry | Physics |
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| See Key Stage target above for contexts | Exploring a range of materials | Movement (e.g. push and pull) |
| | Materials changing state | Light |
| | Properties of materials | Sound |
| | Materials of everyday objects | Electricity |
| | Changing materials (e.g. bending, stretching) | Electrical appliances |
| | Rocks and fossils | Magnets |
| | Solids, liquids and gasses | Light and dark |
| | The Water cycle | Shadows |
| | Reversible and irreversible changes | Reflection |
| | | The solar system |
| | | Mechanisms (levers and pulleys) |

An example of using a **chemistry** discovery day on **materials** to develop targets from the pre-formal curriculum (objectives taken from Cedar Stage 3A).

| Target | Activity ideas related to chemistry strand |
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| They will demonstrate greater control and perseverance when engaging in fine and gross motor skill development | Learners could explore and handle a range of materials to develop fine and gross motor skills e.g. tearing paper, mixing sand, squeezing playdough, scrunching tin foil. |
| They can choose between two objects through their preferred method. | Make a choice between two contrasting materials. e.g. hot and cold, solid or liquid, hard or soft. |
| Using whichever medium is most meaningful, students to explore making marks independently. | Mark making can be made using different textures such as shaving foam, jelly, flour, chalk |
| They will persevere and find new/ increasingly complex ways to cause an effect. | Explore changes of states by taking part in cause and effect activities. e.g. mixing dry and wet ingredients, melting an ice cube with a hair dryer, baking a cake in the oven. |
| They can begin to cross their midline whilst reaching for different objects. | Explore a variety of everyday materials used in objects. (wooden, glass, paper, metal). Reach for an object of interest. |

| | Scientific core skills | Biology | Chemistry | Physics |
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| C4 | Pupils explore objects and materials. | Imitates actions involving main body parts, e.g. copies clapping | Changes some materials and observes the outcome, e.g. tearing paper, stacking cubes, mixing sand. | Makes sounds using own body, e.g. tapping or singing. |
| | Interacts with objects and materials. | Shows interest in a wide range of living things, handling and observing them. | | Can imitate and copy sounds. |
| | Observes objects and materials. | | | Causes movement by pushing or pulling action |
| | Knows that certain actions produce predictable results e.g. sponges can be squeezed. | | | Communicates awareness of changes in light and sound, e.g. looks at light, smiles at sound |
| C5 | Answers simple questions, e.g. where is the flower, is the water hot or cold? | Joins in enquiries into specific environments, e.g. looking under stones for insects. | Can indicate the before and after of material changes, e.g. jelly: liquid and set, bread to toast. | Can indicate the causes of movement in objects e.g. when pushing toy cars. |
| | Engages in experimentation with a range of equipment in familiar and relevant situations, e.g. using a volume switch. | Groups objects in terms of simple features e.g. begins to sort animals. | Groups objects and materials in terms of simple properties, e.g. begins to sort paper and plastic. | Experiments making sounds with a variety of objects. |
| C6 | Begins to make generalisations, connections and predictions from regular experience, e.g. ice cream melts. | Closely observes the changes that occur, e.g. when growing seeds | Consistently sort materials according to given criteria when the contrast is obvious, e.g. stones and leaves, hot/cold. | Identifies some appliances that use electricity, e.g. PC, lamp |
| | | | Explores objects and materials provided in an appropriate way. | Can recall sources of sound and light, e.g. sun, TV, candle. |
| | | | Closely observes changes that occur, e.g. when materials are heated. | Explores objects and materials provided in an appropriate way, e.g. pushes car, squeezes a sponge. |
| C7 | Actively joins in scientific investigations in a range of contexts. | Understands some simple, scientific vocabulary related to nature e.g. can say that dogs have tails. | Understands some simple, scientific vocabulary related to materials e.g. it's melting. | Understands some simple, scientific vocab related to light, sound and movement e.g. wind it up and make it go. |
| | Begins to make suggestions for enquiries their work, e.g. suggest equipment. | Recognises features of objects knowing where they belong, e.g. fin on a fish, eyes on face. | Sorts materials reliably with given criteria, e.g. hard/soft. | Observes some of the simple properties of light, sound and movement. |
| C8 | Begins to make their own | Explores and observes similarities, | Sort materials using simple criteria and | |

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| | contributions to planning and evaluation, e.g. answers how questions, makes choices, interprets simple graphs, provides equipment. | differences, patterns and changes in features of objects, living things and events, e.g. survey of class height, shapes of leaves. | communicates their observations of materials in terms of these properties, e.g. hot and cold. | |
| | Begins to record their findings in different ways, e.g. symbols, photos. | | Identifies a range of common materials and some of the properties, e.g. can find wooden objects. | |
| | Can describe changes when questioned, e.g. "gone hard", | | | |
| C9 | Asking simple questions and answer in different ways. | Observe changes across the 4 seasons. | Distinguish between an object and the material from which it is made. | Know magnets attract or repel each other and attract some materials and not others. |
| | Observing closely, using simple equipment. | Observe and describe weather associated with the seasons and how day length varies | Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water. | Recognise that they need light in order to see things and that dark is the absence of light. |
| | Identifying and classifying. | Identify and name a variety of common wild and garden plants and evergreen trees. | Describe the simple physical properties of a variety of everyday materials. | |
| | | Know the structure of a variety of common animals e.g. fish, amphibians, reptiles, birds and mammals. | Compare and group together a variety of everyday materials on the basis of physical properties. | |
| | | Identify and describe the basic structure of a variety of common plants and trees. | | |
| | | Know the basic parts of the human body and say which part of the body associates with each sense. | | |
| C10 | Performing simple tests. | Identify and name a variety of plants and animals in their habitats, including microhabitats. | Identify and compare the suitability of a variety of everyday materials for particular uses. | Know that light from the sun can be dangerous and that there are ways to protect their eyes. |
| | Using their observations and ideas to suggest answers to questions. | Know animals obtain their food from plants and other animals, simple food chains, and different sources of food. | Find out how some materials can be changed by squashing, bending, twisting and stretching. | Notice that light is reflected from surfaces. |
| | Gathering and recording data to help in answering questions. | Observe and describe how seeds and bulbs grow into mature plants. | | Classify magnetic materials identify some magnetic materials. |
| | Using their observations and ideas to | Find out and describe how plants need water, light and | | Describe magnets as having 2 poles |

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| | suggest answers to questions. | temperature to grow and stay healthy. | | |
| | Gathering and recording data to help in answering questions | Explore and compare the differences between things that are living, dead, and that have never been alive. | | Know that magnetic forces can act at a distance. |
| | | Know things live in habitats to which they are suited and different habitats provide for the basic needs of animals and plants. | | |
| | | Know that animals, including humans, have offspring which grow into adults. | | |
| | | Describe the basic needs of animals, including humans, for survival (water, food and air). | | |
| | | Describe the importance for humans of exercise, types of food, and hygiene. | | |
| C11 | Asking relevant questions and using different types of scientific enquiries to answer them. | Know the functions of different parts of plants: roots, stem/trunk, leaves, flowers. | Classify different kinds of rocks on the basis of their appearance and simple properties. | Know that shadows are formed when the light from a light source is blocked by an opaque object. |
| | Gather, record, classify and present data in a variety of ways to help in answering questions. | Know the life cycle of plants- pollination, seed formation and seed dispersal. | Describe in simple terms how fossils are formed when things that have lived are trapped within rock. | Find patterns in the way that the size of shadows change. |
| | Record findings in simple scientific language, labelled diagrams, charts, and tables. | Know requirements of plants for growth (air, light, water) and how they vary from plant to plant. | Recognise that soils are made from rocks and organic matter. | Construct a simple series electrical circuit, naming its basic parts, including cells, wires, bulbs, switches and buzzers |
| | Report findings, including oral and written explanations, presentations. | Investigate the way in which water is transported within plants. | | Identify whether or not a lamp will light in a simple series circuit. |
| | | Know that some other animals have skeletons and muscles for support, protection and movement. | | |
| C12 | Use results to draw simple conclusions. | Know simple functions of the basic parts of the digestive system in humans | Classify materials together, according to whether they are solids, liquids or gases | Recognise that light appears to travel in straight lines. |
| | Use results to make predictions. | Know the different types of teeth in | Know that some materials change | Know that some forces need contact between 2 objects. |

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| | | humans and their functions. | state when they are heated or cooled, | |
| | Use results to suggest improvements. | Know a variety of food chains, producers, predators and prey. | Find out the temperature at which this happens °C | Compare how things move on different surfaces. |
| | Use results to raise further questions. | | | Explain that objects fall towards the Earth because of gravity. |
| | | | | Know sounds are something vibrating. |
| | | | | Know vibrations from sounds travel through a medium to the ear |
| | | | | Recognise that sounds get fainter as the distance from the sound source increases |
| C13 | Use straightforward scientific evidence to answer questions or to support findings. | Recognise that living things can be grouped in a variety of ways | Know the part played by evaporation and condensation in the water cycle. | Know the effects of air/ water resistance, that act between moving surfaces |
| | Identify differences, similarities or changes related to simple scientific ideas and processes. | Use classification keys to help classify a variety of living things in their local and wider environment. | Associate the rate of evaporation with temperature. | Find patterns between the pitch of a sound and features of the object that produced it |
| | | Recognise that environments can change and that this can sometimes pose dangers to living things. | | Find patterns between the volume of a sound and the strength of the vibrations that produced it |
| | | Describe the changes as humans develop to old age. | | Know that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect. |
| | | | | Recognise that a switch opens and closes a circuit. |
| | | | | Recognise some common conductors and insulators, and associate metals with being good conductors |
| C14 | Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary | Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird | Classify materials on the basis of their properties, including hardness, solubility, transparency, conductivity (electrical + thermal). | 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 |
| | Recording data and results of | Describe the life process of | Know that some materials will dissolve | Associate the brightness of a lamp |

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| | increasing complexity using scientific diagrams and labels. | reproduction in some plants and animals. | in liquid to form a solution. | or the volume of a buzzer with the number and voltage of cells used in the circuit. |
| | Recording data and results of increasing complexity using classification keys. | Give reasons for classifying plants and animals based on specific characteristics. | Describe how to recover a substance from a solution. | Describe the movement of the Earth, and other planets, relative to the Sun in the solar system. |
| | Recording data and results of increasing complexity using tables. | Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function. | Use knowledge of solids, liquids and gases to decide how mixtures might be separated. | Describe the movement of the Moon relative to the Earth. |
| | Recording data and results of increasing complexity using, scatter graphs, bar and line graphs. | | Understand filtering, sieving and evaporate. | |
| C15 | Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings. | Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood. | Give reasons, based on evidence from fair tests, for the particular uses of everyday materials, including metals, wood and plastic. | Describe the Sun, Earth and Moon as approximately spherical bodies |
| | Using test results to make predictions to set up further comparative and fair tests | Describe the ways in which nutrients and water are transported within animals, including humans. | Demonstrate that dissolving, mixing and changes of state are reversible changes | Understand the Earth's rotation to explain day + night and the apparent movement of the sun across the sky. |
| | Identifying scientific evidence that has been used to support or refute ideas or arguments. | Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents. | | Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them. |
| | | Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution. | | Use recognised symbols when representing a simple circuit in a diagram. |
| C16 | Using test results to make predictions to set up further comparative and fair tests | 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 | Explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda. | 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 |
| | Reporting findings from enquiries, including | Recognise that living things have changed over time and that fossils provide | . | Compare and give reasons for variations in how components function, including |

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| | conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations | information about living things that inhabited the Earth millions of years ago | | the brightness of bulbs, the loudness of buzzers and the on/off position of switches |
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