Principles for Science

“Science Education fosters a respect for the evidence of scientific enquiry, while the collaborative nature of its activities can also help children to acquire social and co-operative skills. Investigations and problem-solving tasks nurture the inventive and creative capacities of children. Science education plays a key role in promoting a sensitivity to, and a personal sense of responsibility for, local and wider environments. ” p.6 Science Curriculum.

In our school, the aim of science is to enable the children to explore, describe and understand the world in which they live by exploring the local environment in a hands-on and active way. This ensures the children develop their scientific skills in a realistic and meaningful manner. We also find wholeness in science in our classes by showing science’s own development, and by telling stories of its discoveries and discoverers.

We aim:

* To cultivate the appreciation and respect for the diversity of living and non-living things, their interdependence and interactions
* To encourage the child to explore, develop and apply scientific ideas and concepts through designing and making activities
* To foster the child’s natural curiosity, so encouraging independent enquiry and creative action
* To encourage the child to behave responsibly, to protect, improve and cherish the environment and to become involved in the identification, discussion, resolution and avoidance of environmental problems and so promote sustainable development
* To enable the child to communicate ideas, present work and report findings in a variety of ways
* Understand the application of some basic scientific ideas and concepts in everyday situations
* Understand the interdependence of a wide variety of living things and their environments, recognise the importance of conserving habitats and environments and begin to understand that all life now and in the future depends on the sustainable development of the planet.

Skills, Strands and Strand Units

In our school we will present the Science curriculum to all classes under two headings: *Skills*and *Strands.*

Skills

* The children will be taught to **work scientifically**.
* The children will be afforded the opportunity to carry out **Design and** **Make activities**.
* The children will be afforded the opportunity to carry out **scientific investigations**.

Strands

* Living things
* Energy and Forces
* Materials
* Environmental Awareness and Care

Skills

The children in our school will learn to work scientifically. Scientific activity differs from other forms of enquiry in the process through which ideas are developed. A scientific approach is a process by which;

* Observations are made
* Hypotheses are constructed
* Predictions are formed
* Investigations are planned and carried out with an emphasis on fair testing
* Results are recorded and analysed
* Findings and conclusions are shared and discussed
* Previous knowledge and conceptual understanding accommodate new findings.

Children learn by doing. They bring different ideas and experiences to the learning process. By interacting with objects and materials, they “create” new knowledge and concepts that in turn become part of their base for future learning. This constructivist approach will be used in our school as the children explore scientific topics.

Design and Make

In our school the Design and Make section of the Science Curriculum will invite the children to provide a practical solution to everyday problems. This will involve children in exploring and assessing everyday objects in terms of their functionality, their component materials and their design, and using this information in the design, production and evaluation of their own artefacts or models. Such activities harness and nurture the creative and imaginative capacities of children as they engage in a four-stage process that involves a range of scientific skills.

* Exploring
* Planning
* Making
* Evaluating.

Scientific Investigation

As part of working scientifically the children in our school will be encouraged to carry out scientific investigations. These investigations will involve changing something and measuring the effect of that change on something else.

The children will be exposed to the concept of a fair test. They will learn that it is important to change just one thing and then to measure the effect of that change while keeping everything else the same.

Children are encouraged to pose their own questions. During scientific activities children are encouraged to discuss, question, listen and problem solve through activities that ‘try out’, challenge, change or replace ideas.

Junior, Senior Infants and First class

“For the young child, the distinctions between subjects are not relevant: what is more important is that he or she experiences a coherent learning process that accommodates a variety of elements”. –p. 16 Primary Curriculum

In our school, the subject of science is integrated wholly with other subjects and aspects of the school day in these classes.

***Strands and strand units as per the Primary School curriculum***

***Activities***

**Living Things**

|  |  |
| --- | --- |
| Myself | Through Circle Time (Singing, Poetry & Games), lunches, arts and crafts, baking and daily walks;  -Recognise and measure similarities and differences between people.  -Changes that occur as children grow and mature; height, foot size etc.  -What people need in order to grow; exercise, food, clothing and shelter.  -Awareness of human birth; baby in womb until born.  -Senses; using them to increase awareness. |
| Plants and animals | -Observe, discuss and identify plants and animals in different habitats at a local level.  -Sorting and grouping living things into sets; flowers, leaves, trees, birds, fruit and vegetables.  -Recognise and identify external parts of living things.  -Observe growth and change in some living things.  -Explore conditions for growth of bulbs and seeds.  -Awareness of seasonal change for plants and animals.  Daily walk  Stories of the World Assembly stories  Circle Time (Singing, Poetry & Games)  Story Time  Lunch  Gardening |

**Energy and Forces**

|  |  |
| --- | --- |
| Light | Sun, moon, stars, day and night  Observations  Lighting candles and observation on seasonal changes  Painting and drawing; difference between light and dark  Discussions around festivals e.g. Halloween, Christmas, lantern festival, spiral of light  Rhymes and poems  Shadows  Identify and name colours.  Sort according to colour.  Observe colours in local environment. |
| Sound | Recognising and identifying sounds in the environment.  Singing and music; High and low, loud and soft sounds.  Ways of making different sounds using tins, bottles, metal, paper and other things found in the classroom and environment |
| Heat | Hot and cold; weather, food, cooking, water and the body.  Ways of keeping objects and substances warm and cold  Dressing for walks  Weather observations  Cooking  Gardening |
| Magnetism and Electricity | Awareness of electricity in school and home  Awareness of household appliances using electricity  Awareness of dangers of electricity |
| Forces | Pushing and pulling- informal activity with toys and blocks  How shapes can be altered by pulling, squeezing and other forces e.g. bee’s wax  Playing with water at the river; objects that sink or float (throwing different things into the water), Pushing objects into water off the bridge  Playing with sand  Tidying the yard |

**Materials**

|  |  |
| --- | --- |
| Properties and characteristics of materials | Art and crafts, handwork  Clothing for different types of weather |
| Materials and change | Art and crafts, handwork  Cooking and baking  Clothing for different types of weather |

**Environmental awareness and care**

|  |  |
| --- | --- |
| Caring for my locality | Leave no trace on walks  Tidying up and keeping the school grounds; they keep the school environment clean and tidy  Green Schools; Recycling, energy, water conservation  Feeding birds  Taking care of and respecting school equipment  Classroom practise and awareness for Green school flag  Planting  Compost  Clean up day; The national Spring clean  Learning to be responsible for themselves and belongings |

First Class

More formal discussion of topics and recording in main SESE lesson book

Second Class

It is in second class that formal SESE lessons begin to be taught in our school. Up until now, SESE has been integrated into the school day of the younger pupil. In second and third class (first class if together with 2nd class) children do gardening throughout the two years, weekly. A lot of science is done as part of this gardening throughout the year.

***Strands and strand units as per the Primary School curriculum***

***Activities***

**Living Things**

|  |  |
| --- | --- |
| Myself | Main Lesson  -Gardening  Walks  SPHE  Exercise programme  PE, art & music  Using the senses; on walks (what we see, hear, smell, what things feel like), eating, during arts and crafts and music  Comparing our differences (appearance)  My body (integrated with SPHE)  Growth (height chart, looking at old photos)  Changes since birth (discussion, baby photos) |
| Plants and animals  (link – Geo; The local natural environment) | Main Lessons  -Farming  -Gardening  -Building (e.g. chicken run and hen house)  Going to the sea shore  Harvesting crops  Stories of the World  Assembly stories |

**Energy and Forces**

|  |  |
| --- | --- |
| Light | Main Lesson  -Gardening (looking at importance of sunlight)  Sun, moon, stars, day and night  Observations  Lighting candles and observation on seasonal changes  Painting and drawing; difference between light and dark  Discussions around festivals e.g. Halloween, Christmas, lantern festival, spiral of light  Rhymes and poems  Shadow |
| Sound | Environmental sounds  Music and singing  Sound travelling through materials e.g. construction, scratching, tapping, hammering |
| Heat | Main Lesson  -Gardening (plants need heat to grow), effects of heat on water and impact on plants  Cooking  Weather |
| Magnetism and Electricity | Awareness of north, south, east and west  Electrical awareness and safety  Green Schools- conserving energy |
| Forces | Main Lesson  -Building (moving materials)  Pushing and pulling- informal activity with toys and blocks  How shapes can be altered by pulling, squeezing and other forces e.g. bee’s wax  Playing with water at the river; objects that sink or float (throwing different things into the water), Pushing objects into water off the bridge  Playing with sand  Tidying the yard  Practical working in the garden |

**Materials**

|  |  |
| --- | --- |
| Properties and characteristics of materials | Art and crafts and handwork  Costumes  Building materials  Different types of clothing for different weather |
| Materials and change | Cooking, baking – effects of heat  Painting – mixing colours  Gardening – wet and dry |

**Environmental awareness and care**

|  |  |
| --- | --- |
| Caring for my locality | Leave no trace on walks  Tidying up and keeping the school grounds; they keep the school environment clean and tidy  Green Schools; Recycling, energy, water conservation  Feeding birds  Taking care of and respecting school equipment  Classroom practise and awareness for Green school flag  Planting  Composting  Clean up day; The national Spring clean  Learning to be responsible for themselves and belongings |

Third and Fourth Class

In keeping with the integrated approach to teaching SESE in our school teachers use opportunities and questions that arise during lessons as a basis for teaching science.

Gardening continues into 3rd class (unless begun in 1st class).

***Strands and strand units as per the Primary School curriculum***

***Activities***

**Living Things**

|  |  |
| --- | --- |
| Human Life | Main Lessons  -Man and Animal  -Ancient Civilisations  SPHE  PE – how we move  Cooking; using fresh ingredients vs commercial  Healthy eating policy  Breathing (why do we see our breath when it is cold?)  Exercise programme and circle time |
| Plants and animals | Main Lessons  -Gardening (what plants need to grow)  -Man and Animal (life cycles and food chains)  -Local geography (exploring some local habitats and how changes have influenced plants and animals)  Stories of the World  Experiments with light and other factors for plant growth  Assembly stories |

**Energy and Forces**

|  |  |
| --- | --- |
| Light | Main Lesson  -Gardening  -History of Man (maths; could also be covered in 2nd class)  Sun, moon, stars, day and night  Observations and experiments with light and the growth of plants  Lighting candles and observation on seasonal changes  Painting and drawing; difference between light and dark  Discussions around festivals e.g. Halloween, Christmas, lantern festival, spiral of light  Rhymes and poems  Shadows (Sun dial)  Making lanterns |
| Sound | Environmental sounds  Music and singing  Sound travelling through materials e.g. construction, scratching, tapping, hammering  Making instruments  Class play – sound effects |
| Heat | Main Lesson  -Gardening (plants need heat to grow), effects of heat on water and impact on plants  Cooking  Weather  Making candles |
| Magnetism and Electricity | Main lesson  Local geography  Awareness of north, south, east and west and poles  Static electricity (biro picking up paper, shock off car, strip hanging down from back of car)  Batteries vs. electricity  Electric fences  Electrical awareness and safety  Green Schools- conserving energy  Tie in when it comes up in relation to Green Schools, art and crafts, festivals, safety |
| Forces | Main Lesson  -Building (moving materials)  -Ancient civilisations  *Good opportunity for design and make; construction of dolmens, pyramids, marble run, clay work.*  Pushing and pulling  Inertia  Friction (using sand paper, grips on shoes etc.)  How shapes can be altered by pulling, squeezing and other forces e.g. bee’s wax  Uses of water, boats (floating and boat making –Vikings)  How objects were moved e.g. Ancient Egypt (pulleys), Poulnabrone, New Grange  Resistance – cycle training, maths (area which can be linked to gravity and dropping paper, parachutes) |

**Materials**

|  |  |
| --- | --- |
| Properties and characteristics of materials | Main Lesson  -Local Geography  Investigate common rocks/soil in the immediate environment  Cooking/baking (solids, liquids and gases)  Compare materials  Raw vs. manufactured (linked to history)  Materials in construction of local buildings past and present  Art  Graphs |
| Materials and change | Heating and cooling – weather, frost, ice, melting etc.  Appropriate clothing; explore materials for different purposes/temperatures  Conductors and insulators in cooking  Mixing and changing – water colour painting, wet and dry (soil)  Cooking/baking |

**Environmental awareness and care**

|  |  |
| --- | --- |
| Environmental awareness | Leave no trace  Tidying up and keeping the school grounds  Gardening  Green Schools; Recycling, energy, water conservation  Feeding birds  Taking care of and respecting school equipment  Classroom practise and awareness for Green school flag  Planting  Composting  Leave no trace on walks |
| Science and the Environment | Main Lesson  Local geography  -effects of human activities on the environment |
| Caring for the environment | Mainly done through Green Schools  Responsibility for particular tidying on the school grounds -Walk way into the school and the school yard  Gardening |

Fifth and Sixth Class

**Main Lessons;** Geology, botany, air and water (science but links to weather)

***Strands and strand units as per the Primary School curriculum***

***Activities***

**Living Things**

|  |  |
| --- | --- |
| Human Life | Main Lessons  -Ancient Civilisations (Greece, Rome)  SPHE & RSE  Green Schools and air pollution; lungs  Make demonstrative lungs  PE – how we move  Cooking; using fresh ingredients vs commercial  Healthy eating policy  Breathing (why do we see our breath when it is cold?)  Exercise programme and circle time |
| Plants and animals | Main Lessons  -Botany  -Geology  Lifecycle of a flower  Dissecting flower  Photosynthesis  Tree Project  Planting trees  Sketching  Exploring habitats  Bees and pollination  Experiments with light and other factors for plant growth  Fossil formation  Sediment and sedimentary rocks  Assembly stories  Stories of the World |

**Energy and Forces**

|  |  |
| --- | --- |
| Light | Main Lessons  -Geometry (sun and earth’s orbit’s influence on degrees)  -Botany  Photosynthesis  Sun, moon, stars, day and night  Observations  Lighting candles and observation on seasonal changes (experiments with fire and what is need to create a flame)  Painting and drawing; difference between light and dark (perspective drawing with charcoal)  Explore prism and composition of light  Discussions around festivals e.g. Halloween, Christmas, lantern festival, spiral of light  Rhymes and poems  Shadows  Making lanterns and decorations |
| Sound | Main Lesson  -Acoustics  Creating instruments  Experimenting with water to make scales (different notes)  Explore sounds in nature and human sounds  Body percussion  Hearing and balance  Integrate with music and families of instruments  Sound moving through solids  Cymatics (Dr Emoto’s rice experiment)  Golden Ratio |
| Heat | Main lessons  -Botany  -Geology  Experiments with light and heat for plant growth  Sources of heat  Volcanos, magma and rock formations  Weather (measuring temperature, graphs)  Cooking/Baking to teach convection, conduction and radiation |
| Magnetism and Electricity | Main Lessons  Electromagnetics/Magnetism/Electronics  History of electricity  Magnetism and compasses (experiments)  Simple circuits  Make and do (using electronics)  Dangers of Electricity |
| Forces  (opportunity for design and make) | Pushing and pulling  Inertia  Friction (using sand paper, grips on shoes etc.)  How shapes can be altered by pulling, squeezing and other forces e.g. bee’s wax  Uses of water, boats (floating and boat making)  How objects were moved e.g. building medieval castles, Roman temples, ships of explorers  Resistance – cycle training, maths (area which can be linked to gravity and dropping paper)  Using levers |

**Materials**

|  |  |
| --- | --- |
| Properties and characteristics of materials | Main lesson  -Air and water  Practical applications of air and water  Solids, liquids and gases using water as an example  Explore the fact that air occupies a space  Moving air vs stagnant air and its implications  Composition of air and water  Local materials |
| Materials and change | Main lesson  Geology  Air and water  Effects of heating and cooling on solids, liquids and gases  Conductors and insulators (food and cooking)  Explore home heating  Mixing materials (painting)  Oxygen for burning  Separating materials using a magnet  Force changes materials e.g. compressing air in relation the cartesian diver |

**Environmental awareness and care**

|  |  |
| --- | --- |
| Environmental awareness | Green School campaign (doing the paper work etc.)  Gardening  Leave no trace  Tidying up and keeping the school grounds  Gardening  Green Schools; Recycling, energy, water conservation  Feeding birds  Taking care of and respecting school equipment  Classroom practise and awareness for Green school flag  Planting  Compost |
| Science and the Environment | Effects of human activities on the environment |
| Caring for the environment | Gardening  Mainly done through Green Schools  Responsibility for particular tidying on the school grounds -Walk way into the school and the school yard |