



KILGARVAN CENTRAL SCHOOL

Science Policy

Broad Objectives:

The purpose of this Science policy is to compile a user friendly document outlining the approach, methodologies, timetable, content and resources necessary to implement the subject as per *The Primary Curriculum 1999*. It is hoped that this plan will ensure that children will experience a broad and balanced curriculum in which undue repetition and significant gaps are avoided. It is intended that over a two-year period, all strand units from each strand should be covered. There should also be a balance between the development of scientific knowledge and understanding and the processes of working scientifically. This draft should ensure continuity and progression in the development of scientific ideas and in the application of investigative skills.

Aims:

The aims of science education are:

- To develop knowledge and understanding of scientific and technological concepts through the exploration of human, natural and physical aspects of the environment
- To develop a scientific approach to problem-solving
- To encourage the child to explore, develop and apply scientific ideas and concepts
- To foster the child's natural curiosity
- To aid the child to appreciate the contribution of science and technology to the wider world
- To appreciate and respect diverse living and non-living things
- To encourage the child to become environmentally responsible and aware
- To enable the child to communicate ideas, present ideas and report findings using a variety of media

Approaches and Methodologies:

It is essential no matter what our collective experience in teaching the subject, that we use a range of teaching methods and approaches when teaching Science. Lessons "should not be work card or textbook based". Our main aim is to get the children "thinking scientifically" and not memorising facts to be regurgitated at a later stage. The approaches adopted should create a learning environment where;

- Practical activity is encouraged (Hands on discovery)
- Links with the environment are fostered

- Children have an opportunity to work together, share ideas and communicate their findings
- Children's ideas are the starting point for science activities (concept mapping)
- Children should be allowed the excitement of finding out for themselves
- Children are encouraged to pose their own questions

The use of a variety of approaches and methods will facilitate the efficient implementation of the science curriculum. The nature of the strands and strand units themselves necessitates the use of a variety of teaching methods. The approaches chosen should enable the children to work scientifically in a variety of contexts, to undertake practical activities and to tackle open-ended investigations. Different methods are outlined as follows;

Whole Class Work:

This is effective in introducing a topic and concept-mapping. It is also useful in providing background information that may be required for an activity.

Small groups:

This can be in many forms;

- Several groups working on the same activity
- Small groups rotating around different activities (circus of experiments)
- Small groups working on independent activities

Individual work:

This is where children pursue their own studies and carry out investigations that allow them to pursue their own interests and ideas.

Safety

During practical work, teachers should be aware of the safety implications of any exploratory or investigative work to be undertaken. Children should be encouraged to observe safety procedures during **all** tasks. There are many safety issues to consider including:

Plants and Animals:

Disposable gloves to be used when investigating hedgerows. Children should never handle unknown or unfamiliar plants, especially fungi. Gloves to be worn also when handling birds or animals. Hand washing should be encouraged after handling plants and animals.

Electricity:

Children should only use low-voltage battery powered devices. Mains electricity should **never** be used for electricity and magnetism experiments. If mains-powered equipment is used then it should be connected and operated by the teacher only. Children should be repeatedly warned about the danger of mains electricity.

Equipment:

The use of glass apparatus and sharp-edged tools should be avoided except under the direct supervision of the class teacher. Use plastic where possible. Thermometers should be handled carefully. If a thermometer breaks and mercury is spilt it should be carefully gathered up by the teacher and buried in a place where the ground will not be disturbed. Spirit thermometers should be used where possible.

Eyes:

Children should never use lenses, binoculars or other lens devices to look directly at the sun or other intense sources of light. This includes dark glass and plastic.

Chemicals:

Household chemicals should be purchased to meet the requirements of the experiment and any surplus disposed of on completion of experiment. Try to avoid any chemical containing bleach. Use safety goggles where possible. These chemicals will **not** be stored in the science resource boxes.

Polythene Bags:

Children should be warned of the dangers of using these bags as they may cause suffocation.

Heat:

Under no circumstances should the children themselves handle matches or lighters. If using candles during an experiment please ensure that they are securely fastened. Lit candles should never be moved. Care should be taken to avoid situations where children may be tempted to lean across a lit candle. Long hair should be tied back and loose sleeves secured. Any heating can be done with hot water from a tap or from a kettle held by an adult. Flammable liquids should never be used. Small portable gas burners are relatively safe provided that they can be securely mounted to prevent them from toppling over. If they are used, they should be sited clear of curtains, notice boards and busy areas.

Cleanliness and Hygiene:

Random sniffing and tasting should be discouraged. The teacher should explain that anything the children are asked to smell or taste has been carefully chosen for that activity. The sharing of spoons or other utensils should not be permitted. Hand washing should be encouraged before food activities.

Skills Development

Working Scientifically:

Working scientifically will involve children;

- Observing
- Questioning
- Predicting
- Hypothesising
- Investigating and experimenting
- Interpreting results
- Recording and communicating results

An important aspect of the scientific activity is '**Designing and Making**'. Children are to be encouraged to design and make artefacts and models that will provide solutions to practical problems. The skills to be developed for this facet are;

- Exploring
- Planning
- Making
- Evaluating

As children learn to apply these skills they will learn to deal with more complex concepts in a scientific way. (See Teacher Guidelines pp17-21)

Notes on Timetable:

The words odd/even refer to the year in which the school year begins, For example, the school year begins in September 2017. The year number is odd, therefore the programme followed for the **whole** school year until June 2018 is the odd programme. This timetable will allow all classes to follow similar themes simultaneously.

Our science plan is based on a spiral approach as per the curriculum. For this reason, it is not intended that all strand units will be taught in each class. The units may be supplemented by extension work at the discretion of the class teacher.

Resources

Textbooks and work cards can be used during science lessons to support active investigative work. However, "Science lessons **should not be work card or textbook based**" cf Curriculum Guidelines

To this end, it has been decided to create a resource box for each class level to support the teaching of each strand. These boxes are to include

- Photocopiable Masters
- Laminated Work cards
- Relevant equipment (excluding consumables)

The use of these science boxes should prevent any significant overlap and repetition of strand units.

We shall also keep a library of resource books, videos and cd-roms in the resource area. It is hoped that all resource material will be included in the evaluation of the science plan.

Resources Required for the Science Programme

Living Things - Myself/Human Life:

- Mirrors – plastic
- Metre sticks
- Height chart
- Thermometer
- Measuring tape
- Bathroom scales

Living Things - Animals and Plants:

- Flower pot
- Rain gauge
- Aquarium tank
- Old spoons

- Sheets of Perspex or plastic
- Watering can
- Plastic tubing
- Hand lenses
- Nature viewers
- Magnispectors
- Bird table
- Petri dishes

Energy and Forces - Magnetism and Electricity:

- Magnets – including bar, button, horseshoe
- Screw in light bulb holders
- Bulbs and batteries
- Iron filings
- Crocodile clips
- Wires
- Compasses
- Electric buzzers
- A range of magnetic materials
- Electric bells
- Electric motor
- A selection of metals
- Wire stripping pliers
- Steel wool
- Screwdrivers

Energy and Forces – Light:

- Torches
- Curved mirrors and Plane mirrors
- Glass blocks and triangular prism
- Shiny objects that will act as mirrors; spoons, biscuit tin lid, sheet metal
- Transparent, translucent and opaque materials
- Colour filters
- Projector
- Kaleidoscope
- periscope

Energy and Forces – Heat:

- Thermometers

Energy and Forces - Sound:

- Rubber bands – Different sizes and thickness

Energy and Forces – Forces:

- Wheeled toys
- Sandpaper
- Springs
- Weights
- Balls
- Construction sets such as Meccano, wheels, pulley, axle rod, gears
- Timers
- Stop clock and watches
- Balloons

- Plastic syringes
- Pulleys
- Gears

Materials:

- Polystyrene sheets, blocks, balls and beads
- Samples of fabrics and fibres
- Food colouring
- Materials from the kitchen or bathroom such as sugar, salt, soda, chalk, oil, soda water, lime water, tea, coffee, bath salts, flour
- Samples of different metals
- Pebbles, stones, bricks and rocks

Equipment and Materials Required for Designing and Making:

Due to health and safety considerations these items will be supplied by the class teacher as need arises

Consumable Materials:

- Plasticine
- Plaster of Paris
- Clay
- A range of fabrics and fibres
- Fasteners – bulldog clips, paper clips, hair clips, clothes pegs
- Soft woods
- Foil
- Metals
- Acetate
- Plastic
- Rubber
- Dowels of various lengths and thickness
- Thin wire
- String and threads
- Adhesives
- Paints

Domestic Reclaimable Waste: (to be gathered as needed)

- Plastic bottles of various sizes
- Plastic straws
- Aluminium foil
- Thread spools
- Tins
- Range of empty boxes, lids, containers and tubes
- Coat hangers
- Polystyrene block and beads
- Scrap cord and board
- Corks of varying sizes

Assessment

Assessment in Science is concerned with the children's mastery of knowledge and understanding of the strands of the science programme and the development of skills and attitudes. Consequently a broad range of assessment tools and approaches will be necessary. The following are among the assessment tools found useful in schools;

Teacher Observation:

Observations made by the teacher during practical science tasks will help to determine the development of process skills and attitudes. They will also help to establish the extent to which the children have mastered the knowledge aspect. The teacher will need to take an active role in science tasks and ask open-ended questions to gain insight into a child's understanding.

Teacher-Designed Tasks and Tests:

Some representational record - whether written, drawn, sculpted or modelled, is necessary to build up a picture of the child's achievements. A wide variety of tasks should be provided for the children, including;

- Observing
- Analysing objects, processes and hypothesising about how systems work or are made
- Predicting outcomes of an investigation
- Collecting information from books and materials
- Asking questions
- Providing oral, written and pictorial accounts of investigations
- Displaying projects
- Using work cards or activity sheets
- Designing, making and evaluating models and structures
- Using interactive multimedia programs to explore themes and complete a range of tasks and problems
- Exploring and engaging in practical investigations in the environment
- Completing teacher-designed tests on a unit(s)
- Displaying and reporting project work
- Drawing with labels (teacher can discuss drawing with child and annotate it as a result of asking questions)

Concept Mapping:

The child's initial ideas must be explored if they are to form a starting point for learning. Concept mapping helps a child to record and discuss their ideas (in other words, brainstorming). This will help enormously to see what pre-conceived ideas the child may have. It is also useful as an assessment tool at the end of a unit to see if there has been any progression.

Work Samples, Portfolios and Projects:

A wide range of samples of a child's work is compiled to form a science portfolio. This should document and assess progress over a term or longer. The portfolios should contain samples of work in progress or what the child considers to be "best samples" of finished pieces together with teacher's comments. The samples chosen should demonstrate achievement in a range of areas. Samples of work in one area may be included to show progression of ideas and skills.

Written accounts or drawings, photographs of stages of an investigation, graphs, samples of worksheets or audio tapes of children's reports of investigations may be enclosed.

Curriculum Profiles:

These profiles consist of descriptions of the range of knowledge, skills and attitude that might be expected of children at different stages of development. These descriptions may be written in the form of a short paragraph. As teachers observe their pupils, they should seek to highlight or mark the relevant paragraphs as work is in progress or completed.

The indicators relating to scientific skills should be assessed separately. As the science plan is reviewed, it is hoped to compile a user-friendly curriculum profile which would provide us with a worthwhile assessment tool.

This plan will be reviewed in 2020.

This plan was ratified by the Board of Management on June 6th, 2017

Signed : _____
(Chairperson, Board of Management)

Infants – Odd Years

Term	Strand Unit	Content	Curriculum	Teacher Guidelines
Autumn	Myself Caring for my Locality	Body – similarities/differences Body – changes as we grow Observe and appreciate attributes of our locality Develop a sense of responsibility for its care Implement simple strategies for its improvement and care	Page 24	Page 118 121
Winter/Spring	Magnetism and Electricity Forces	Purposeful play with magnets to observe effect Use of electricity at home/school Dangers of electricity Investigate the effects of pushing and pulling of various objects	Page 26 26	Page 38, 108, 109, 136, 138
Summer	Properties and Characteristics of materials	Investigate and compare a variety of materials, e.g. water, metal..... Identify uses for these materials Grouping of these materials according to different criteria Observe floating and sinking of objects	Page 27	Page 124

Infants – Even Years

Term	Strand Unit	Content	Curriculum	Teacher Guidelines
Autumn	Plants and animals	Investigate living things in various habitats, e.g. trees, ponds..... Investigate parts of living things e.g. flower, stem, leaf.... Observe growth and change of living things Explore conditions of change – need for growth etc Explore seasonal change	Page 24	Pages 26, 62, 64, 66, 68, 70, 78, 82, 84
Winter/Spring	Light	Identify and name items in relation to colour Explore various colours and group objects accordingly Explore shadow and colour in our natural environment	Page 25	Page 90
	Sound	Explore sound and difference of sound, high/low etc Explore making sound - percussion	Page 25	
Summer	Heat	Investigate hot/cold through our weather/bodies Explore how to maintain heat/cold	Page 25	Page 124
	Materials and Change	Observe the effects of water on objects/materials Observe the effects of heating/cooling objects/materials	Page 27	

Rang 1 & 2 – Odd Years

Term	Strand Unit	Content	Curriculum	Teacher Guidelines
Autumn	Myself	Body – identify external parts Locate sense and link to body parts Measure body changes and identify requirements needed for growth	Page 41	Page 121
	Caring for my Locality	Identify and discuss the basic elements – air, soil, water etc Introduce co-dependence, e.g. food chain Pollution – causes and prevention	Page 48	
Winter/Spring	Magnetism and Electricity	Purposeful play with magnets – observe effects Observe attraction <u>to</u> different materials Observe attraction <u>through</u> different materials, water, card etc Static electricity Uses/ dangers of electricity at home/school	Page 44-45	Page 106 99
	Forces	Investigate pushing and pulling of various objects Pushing power of air/water – current, wind Floating/sinking of objects in various substances Friction of surfaces – observe rolling distances		Page 136, 138
Summer	Properties and characteristics of materials	Investigate materials and their uses in our surroundings Grouping materials under different criteria – include magnetism, absorbency, etc Investigate the uses of these materials in construction	Page 46	Page 126

Rang 1 & 2 – Even Years

Term	Strand Unit	Content	Curriculum	Teacher Guidelines
Autumn	Plants and Animals	Investigate living things in various habitats Investigate parts of living things Grouping living things by characteristics, e.g. migration Explore the conditions needed for growth and change, e.g. heat, light.. Explore life cycles of plants and animals	Page 42	Page 48, 62, 64, 68, 70, 73, 78, 80, 82
Winter/Spring	Light Sound	Explore sources and importance of light Observe transparency of materials to light Importance of the sun for light, heat Learn dangers of the sun, eyes, skin etc Investigate various sounds and how to make these sounds Develop percussion instruments	Page 43	Page 38, 108, 109, 136, 138
Summer	Heat Materials and change	Explore various sources of heat: sun, fire, radiator Investigate how to measure heat Measure and compare temperatures Observe effects of heating/cooling solids and liquids Explore how to maintain temperature Mixing materials and the effects, eg paint	Page 44	Page 125, 126

Rang 3 & 4 – Odd Years

Term	Strand Unit	Content	Curriculum	Teacher Guidelines
Autumn	Human Life	Body – name external and internal organs Discuss need for balanced diet Examine the breathing system, lungs, smoking Examine the skeletal system, muscles, bones, joints	Page 61	Page 119, 122
	Environmental Awareness	Observe, discuss and record elements of our local environment Renewable/non-renewable resources Conservation of our environment	Page 68	
	Caring for the environment	Implementing anti-pollution schemes Identify issues and responsibilities through debate/action	Page 68, 70	
Winter/Spring	Magnetism and Electricity	Push/pull effects-terms attract/repel are introduced Classification into magnetic/non-magnetic Link magnets to the compass Static electricity Uses/dangers of electricity at home/school Construction of simple circuits Identify conductors/insulators	Page 64	Page 102-103
	Forces	Movement of objects – push, pull/stretch, pulley, roll... Slowing moving objects due to friction, e.g. ball on carpet Investigate gravity Levers- designing levers, see-saw Floating/sinking of objects	Page 65	
	Properties and	Investigate properties	Page 66	Page 127

Summer	Characteristics of materials	of various materials Discuss solids, liquids, and gases Raw v. manufactured materials Grouping of materials under specific criteria, include insulators/conductor, magnetic, absorbency Discuss uses of these materials in construction		
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Rang 3 & 4 – Even Years

Term	Strand Unit	Content	Curriculum	Teacher Guidelines
Autumn	Plants and Animals	Investigate living things in various habitats Explore conditions of growth and how animals adapt to environments Uses of keys in the identification of species Explore food chains and life cycles	Page 62	Page 48, 62, 64, 68, 70, 73, 78, 80, 82, 85
	Science and the Environment	Explore technology in the everyday context Identify the positive/negative effects of technology on our environment	Page 69	
Winter/Spring	Light	Light as a form of energy, explore transparency of materials Explore natural and artificial light Observe the light spectrum Observe refraction of light Identify the importance /dangers of the sun	Page 63	Page 94
	Sound	Sound as a form of energy Creation of sound through vibration How sound travels through materials	Page 63	
Summer	Heat	Use of thermometer Explore heat transfer Uses of heat in the home – energy saving.... Significance/dangers of the sun's heat	Page 64	Page 127
	Materials and change	Effects of heating/cooling on solids, liquids and gases Conductors and insulators of change Mixing and separating of materials	Page 66	

		Testing of materials under different criteria, e.g. use of water, forces		
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Rang 5 & 6 – Odd Years

Term	Strand Unit	Content	Curriculum	Teacher Guidelines
Autumn	Human Life	Body Identify structure of internal and external organs Discuss need for a balanced diet – food pyramid The breathing system effects of smoking Immune system – protecting our bodies	Page 83	Page 119, 122
	Environmental Awareness	Observe, discuss and record elements of our local environment Renewable/non-renewable resources Conservation of our environment	Page 90	
	Caring for the environment	Implementing anti-pollution schemes Individual/community/national and global responsibility	Page 92	
Winter/Spring	Magnetism and Electricity	Push/pull, attract/repel, lift/hold effect of magnets Investigate making magnets – the electromagnet Construct a variety of simple circuits Uses/dangers of electricity	Page 86	Page 102,103, 104
	Forces	Movement of objects – push, pull, pulley, wind, water.. Effects of friction – slowing objects and generating heat Introduce gravity as a force Use of levers to lift, turn Design	Page 87	Pages 40-41 114, 116, 136, 138
Summer	Properties and Characteristics of materials	Solids, liquids, gases, their properties Investigated and group different materials, including oxygen The decay of various materials Composition of our air – its properties Different gases in our environment and everyday uses	Page 88	Page 127

Rang 5 & 6 – Even Years

Term	Strand Unit	Content	Curriculum	Teacher Guidelines
Autumn	Plants and Animals	Investigate living things in various habitats Explore conditions of growth and how animals adapt to environments Uses of keys in the identification of species Explore food chains and life cycles Explore characteristics of specific groups, e.g. mammals, birds, fish Explore conditions of growth in detail including reproduction	Page 84	Page 62, 64, 66, 68, 70, 78, 82
	Science and the Environment	Explore technology in the everyday context Identify the positive/negative effects of technology on our environment Look at technology and important scientists/inventions in our world	Page 91	
Winter/Spring	Light	Characteristics of light – energy form, spectrum, reflection, refraction Uses of lens. Importance of sight Importance of the sun – photosynthesis Dangers of sunlight	Page 85	Page 95
	Sound	Characteristics of sound – vibration, energy, travel, travel through materials Making fo sound through percussion, vibration Importance of hearing	Page 85	
Summer	Heat	Use/explanation of terms conduction, convection, radiation Transfer of heat, sources, renewable, non-renewable heat Use of thermometer	Page 86	Page 128

	Materials and change	<p>Effects of heating/cooling on solids, liquids and gases</p> <p>Conductors and insulators of change</p> <p>Mixing, separating and dissolving of materials</p> <p>Testing of materials under different criteria, e.g. use of water, force</p> <p>Fire triangle – oxygen, fuel, heat.</p> <p>Heat at home</p>	Page 89	
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