

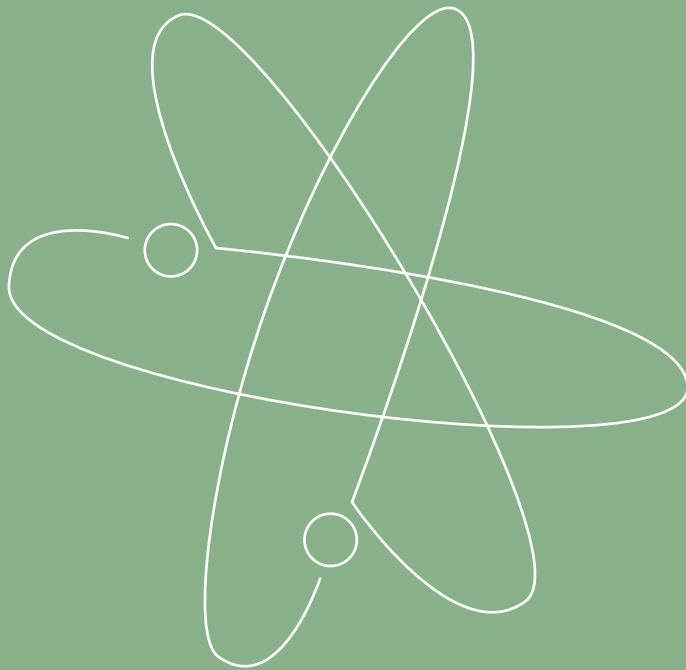
PRIMARY

Social, Environmental and Scientific Education: Science

Guidelines for Teachers of Students with

MODERATE

General Learning Disabilities



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Introduction

Science is concerned with enabling the student to gain knowledge and understanding of the physical and biological aspects of his/her environment. The curriculum emphasises the importance of starting with what is familiar to the student in the everyday environment. As his/her skills of observation and investigation are developed, work can be broadened to include the wider environment.

Social, Environmental and Scientific Education

Social, Environmental and Scientific Education (SESE) is presented through three subject areas in the *Primary School Curriculum*. These are history, geography and science. The curriculum states that an understanding of the term 'environment' is essential to an appreciation of the nature of SESE and it offers the following:

The word 'environment' is used in this curriculum to denote the surroundings or external conditions with which an individual (human or other living organism) or community interacts. (Primary School Curriculum, 1999.)

Within this definition 'environment' is categorised into two broad groups, natural environments and human environments. While presented as three discrete subjects in the curriculum, history, geography and science are closely related and each seeks to provide for the students an understanding of one aspect of 'environment' both at local and global level.

By studying the constituent subjects of SESE, students are enabled to develop an awareness and appreciation of the natural, human, social, cultural and historical dimensions of life. They are also encouraged to develop an understanding of the physical world, the relationship of humans with their environment, and the historical process through which that relationship has grown.

Science

Understanding and relating to the world through science

Activities in this area aim to raise awareness of, and interest in, the way in which things work in the immediate and local environment. Science activities help to develop an awareness of cause and effect, and involve building up knowledge that enables the student to anticipate and predict. Activities are planned to allow the students to explore and experience different forms of energy, such as light, sound and heat. Structured play with objects, toys and water will lead the students towards an understanding of the different forces that affect their immediate environment. Activities are included that draw the student's attention to the varying physical characteristics of himself/herself, adults, and other students. Suggestions are also outlined that enable exploration of animals and plants in the context of their habitats in the local environment. Many activities are aimed at increasing the awareness of, and stimulating the desire to explore, the characteristics of everyday materials.

Science activities provide important learning experiences for students with moderate general learning disabilities, because they

- contribute to the student's understanding of his/her immediate physical environment
- encourage the development of observation and listening skills
- foster the student's natural curiosity, thus encouraging independent inquiry
- can capture the imagination and motivate students with a limited attention span
- encourage learning through first-hand experience
- provide a range of experiences that allows each student to respond at his/her level of ability without mastering complex facts or theories
- allow knowledge and skills to be broken down into smaller steps that are gradually developed through concrete, practical activities
- allow for sufficient repetition to consolidate skills
- promote fun and enjoyment
- help in the student's interactions with the world through making things work and caring for living things

- foster and build on student's ideas and interests
- promote personal and social skills through working on group projects through participation, communication, sharing strengths, and valuing and listening to other students' thoughts and ideas.

Early scientific concepts

Science in the early years seeks to extend student's knowledge and understanding of the physical and biological world, and to help them develop more effective, systematic ways of finding out. Everyday play activities and the immediate environment offer rich opportunities for learning, and for capitalising on young students' natural interest in the world around them. For example, through water-play they learn about sinking and floating and the effect of water on different materials. Observing and looking after plants and animals can enhance their understanding of what is needed for life, and encourage respect for living things. Bringing animals into the classroom can be a very valuable experience for students who rarely come into contact with them in their daily lives. The environment around the school may be rich with opportunities to explore and investigate plant life, and the local environment should be used fully as a source of scientific wonder. Outdoor play provides a wealth of opportunities for making things move and for experiencing forces.

The task of the teacher is to identify the scientific potential of these activities and to build on it. In the early years, many of these activities will be predominantly play-based. Progression in such experiences is enhanced by discussion between the adult and the student. It is through this interaction that knowledge is assimilated and learning extended.

Science can be a springboard for activities that are novel and creative, which stimulate students' interest and enhance the learning environment.

Sensory activities

Science should provide a variety of experiences for all students, to enable them to develop their ability to reach out, explore and investigate their world through their senses. Many students with moderate general learning disabilities have not fully developed these senses, and therefore need a carefully planned curriculum in order to develop the process of sensory integration and to learn about the properties of the materials and processes that make up our world.

Multisensory activity lies at the heart of scientific experience for these students, enabling them to gain access to the curriculum and helping them make sense of the world around them. Fun is an integral component of all science activities, to which multisensory work lends itself particularly well. There is nothing that students enjoy more than being allowed to play with sand and water, to blow bubbles, to make ice-pops and to test magnets. These are appropriate to the student's learning needs and can be used to reach students of many ages. Science is an excellent medium for the exploration of both familiar and unfamiliar stimuli. Without such experiences it is difficult for students to gain a sense of self, or to venture into exploring the wider environment. Activities that stimulate the individual senses can be used to teach the students how their own bodies work and feel.

By creating an atmosphere in the classroom in which the student's excitement is shared and fostered, an ethos of enthusiastic curiosity is allowed to develop.

- Curiosity is an essential starting point for learning.
- Science activities should be fun.
- Learning in this area should be first-hand and practical.
- Play has a major role in this process.
- Structured activities should not be introduced until exploration through play has been developed.

School planning

Planning sections in the *Primary School Curriculum: Science, Teacher Guidelines*, pages 26-29 give advice on this aspect of planning, some of which will also be applicable when planning for students with moderate general learning disabilities. The following sections outline some additional aspects of planning that may need to be considered.

Curriculum and organisational planning

The issues that may need to be discussed as part of the school's planning for science include the following:

The purpose and nature of science in the school

A shared understanding of the purpose and nature of science will help clarify for all school staff the role that it can play in the overall education of the student with moderate general learning disabilities. Discussion on the general approaches that may be adopted will promote a co-ordinated and collaborative approach to the planning, teaching and assessment of science throughout the school. While much of the curriculum involves investigation of objects in the immediate environment, extra resources that need to be purchased should be identified and agreed plans for their use drawn up. Suggestions for a range of materials that are appropriate to the teaching of science topics are given on pages 59 to 64.

Providing for individual differences

All students are entitled to a broad and balanced science curriculum, with each student engaging in the activities at his/her own level and with his/her particular needs in mind. Where they are appropriately planned, students with moderate general learning disabilities can participate in science activities. These activities allow students to develop new skills that in time will give them access to further areas of knowledge. Although students with moderate general learning disabilities may not understand the more complex concepts underlying some activities, scientific experiences provide them with opportunities to try out, challenge, change or replace ideas. Open-ended tasks allow for learning at a range of levels. While one student with moderate general learning disabilities observes changes in materials during an activity, another may question why such changes are taking place. Both are developing the scientific skills of observation.

The concepts and knowledge to be explored by the student are outlined in three content strands: *Living things, Energy and forces, and Materials*. Individual schools and teachers, both mainstream and special, will choose and modify activities and learning outcomes to suit the learning needs of their particular students. For some students, it may be useful to use material from the *Guidelines for Teachers of Students with Severe and Profound General Learning Disabilities* and the *Guidelines for Teachers of Students with Mild General Learning Disabilities*, in order to facilitate progress and allow students to demonstrate achievement and experience success.

Communication and language and the science curriculum

Students are given opportunities to develop appropriate language associated with science, by talking and listening to adults and other students during play and in other planned situations. In participating in science activities, all forms of communication will be accepted and encouraged, including meaningful facial expressions, gestures and body language. Students unable to communicate verbally may use other forms of communication, such as signing, symbols and visual aids. Some students who experience communication difficulties may need to use technological aids to supplement or replace spoken communication. Appropriate provision should also be made for students who need technological aids in practical and written work.

The exploration of the school environment

Schools differ considerably in the facilities available to them. As part of the planning process, some schools may set up a bird table, hang feeders from branches, or lay out a school garden. Students should work outdoors regularly, in order to observe the effects of seasonal change, to investigate materials, and to explore animals and plants in a variety of habitats. If the school grounds do not already have a rich variety of plants, thought could be given to creating an area where plants might be grown. Special attention could be given to selecting plants that will have maximum sensory impact in colour, taste, smell, and texture. Plants that attract butterflies and other insects might also be considered. All plants should be safe to touch and taste.

The exploration of the local environment

The planning process should involve teachers in becoming familiar with the locality of the school, the range of habitats in the area, and other interesting features of the local natural environment. Parents and local people may help to enrich and support the science programme by:

- sharing knowledge and expertise
- helping to organise visits to places of interest, such as farms, forests, the seashore
- working with small groups of students.

Health and safety issues

All staff members should observe safety procedures when structuring activities, and every effort should be made to enable students to become aware of, and to adopt, *safe practices*. They should observe safety procedures in designing and making tasks, particularly when they are using tools and materials. Students gradually develop an awareness that there are dangers involved in some scientific activities, and that they can reduce the risks by responding to requests and simple instructions.

Safety procedures will need to be drawn up for science trips in the locality. Preliminary visits by teachers to the site can be used to identify potential hazards, and to ensure that they are accessible for all students. It is also important to ensure that there are sufficient adults to supervise the students, and that activities are carefully structured and organised.

Classroom planning

Many excellent ideas are to be found in the *Primary School Curriculum: Science, Teacher Guidelines*, pages 32-33. Possible additional planning issues are referred to on the following pages.

Curriculum and organisational planning

Possible extra planning issues for science include the following:

- Some students will need individual help with exploration activities. It may be necessary to organise extra help, plan group work, or incorporate turn-taking routines in the lesson.
- Provision may need to be made for students who need to use aids or adapted equipment to enable participation in activities within the class or outside the school.
- Provision may also need to be made for students who use means of communication other than speech, such as signing, symbols, communication boards and other forms of assistive technology.

It is important that teachers

- ensure that the lesson content is clear and that the materials used are appropriate
- are aware of the pace at which students work and the physical effort required
- balance consistency and challenge according to individual needs
- start scientific explorations with the students' spontaneous questions regarding phenomena in their natural environment
- provide opportunities for cross-curricular activities
- model safe practices and communicate safety expectations
- model strategies of exploration and investigation for students
- instruct students in the proper care and handling of living things.

Overview of Primary School Curriculum, Science

Skills development

Working scientifically

- Questioning
- Observing
- Predicting
- Investigating and experimenting
- Estimating and measuring
- Analysing—sorting and classifying
- Recording and communicating

Designing and making

- Exploring
- Planning
- Making
- Evaluating

These skills will be developed as work is completed on the strands outlined below.

Living things

- Myself
- Animals and plants

Environmental awareness and care

Energy and forces

- Light
- Sound
- Heat
- Magnetism
- Electricity

Materials

- Properties and characteristics of materials
- Materials and change

Skills and concept development in the science curriculum

Working scientifically

Through science education students construct, modify and develop a broad range of scientific concepts and ideas. They are enabled to respond to sensory experiences, observe, explore and experiment with materials and objects, and participate in investigations with support. They learn about cause and effect, object permanence, and the ways in which they themselves can change materials. They begin to seek solutions to practical problems. They collect evidence, engage in simple evaluation, and become aware of when they need help to complete an investigation. They begin to link their scientific knowledge with their everyday experiences. They learn how to ask appropriate questions, collect evidence, record, evaluate, and communicate in a variety of ways.

Working co-operatively and collaboratively with peers and adults helps the student to extend the breadth of his/her experience and to acquire social and co-operative skills.

Through completing the strand units of the science curriculum the student is enabled to:

Questioning

- ask or respond to questions about animals and plants, familiar objects, and events in the immediate environment:
 - *What is it? Where does it live?*
 - *What do you hear, see or smell?*
 - *How does it move? What helps these plants to grow?*
 - *How many marbles can this toy boat carry?*
 - *How many cabbage leaves will this snail eat in one day?*
 - *How far can it move in a minute?*
 - *Which material will make the best umbrella?*
- ask or respond to questions that may lead to investigations:
 - *What will happen if we add water?*
 - *Will the ball bounce better on the carpet or on the tarmac?*

Observing

- use the senses to observe animals, plants, objects and events in the immediate environment
- observe characteristics such as the shape, size, colour, pattern, texture, sound, and smell of familiar things in the local environment
- observe differences and similarities:
 - *hot/cold, wet/dry, heavy/light*
- use magnifying lenses, timers and scales to aid observations
- observe gradual changes in living things, familiar objects, and events over a period:
 - *growth of a seed*
 - *weather diary*
 - *evaporation of puddles in the school yard.*

Predicting

- guess and suggest what will happen next in a structured situation:
 - *What will happen to the ruler if we place it in water?*
 - *I think it will float/sink.*

Investigating and experimenting

- carry out simple investigations set by the teacher, make observations, and collect data
- begin to suggest approaches and methods of solving problems with or without prompting
- begin to identify one or two variables with guidance from the teacher, for example that heat and water are necessary for growth.

Estimating and measuring

- describe mass and length, using non-standard units and informal language
- compare and estimate:
 - *is bigger than, is heavier than*
- match objects of equal length
- use appropriate simple instruments:
 - *rulers, stop-watches, measuring jugs.*

Analysing

Sorting and classifying

- sort and group objects according to observable features, for example colour, shape, size:
 - *set of red objects, set of floaters, set of heavy things*
 - *animals observed in varying habitats*
- begin to look for and recognise patterns and relationships in observations:
 - *falling leaves and seasonal changes.*

Recording and communicating

- describe his/her observations verbally or non-verbally, using an increasing vocabulary, and listen and respond to the reports of others
- represent findings, with or without aid:
 - *displaying findings from the investigation*
 - *drawing or constructing pictures using collage*
 - *models/friezes*
 - *ICT: simple written or word-processed accounts*
 - *taking photographs, making video recordings of an investigation.*

Records should not detract from an investigation: they should be complementary to and, preferably, part of the activity.

Designing and making

Students observe and handle familiar objects and materials and communicate their ideas about them. They talk about what they are going to make. They assemble and rearrange materials in simple constructions, and talk about what they have made.

Through completing the strand units of the science curriculum the student should be enabled to:

Exploring

- handle and manipulate a range of materials in structured and unstructured situations
- observe, investigate and describe familiar objects with/without prompting:
 - *state what he/she likes or dislikes about objects*
 - *discuss or indicate why people have a need for them*
- explore a wide range of everyday objects and how they work, with or without direction (objects explored may depend on task to be completed.):
 - *stapler, paper-punch, whistle, egg whisk, laminator, food processor.*

Planning

- discuss/indicate, using appropriate vocabulary, what he/she would like to design or make:
 - *a Hallowe'en mask, a cake, a pond net, a pair of sunglasses*
- choose appropriate materials from a given limited range:
 - *choose between cherries and raisins to decorate a cake*
 - *make choices based on taste, colour, smell, shape, and texture*
- show an awareness that some materials are more suitable than others for a specific task:
 - *choose card rather than tissue paper to make a greeting card*
- talk about the plan and communicate it to others:
 - *through discussion, indicating what to do first, next, last*
 - *through drawing pictures*
 - *through modelling materials, for example sand, Plasticine, Duplo*
 - *through ICT.*

Making

- understand that materials can be linked together:
 - *students are given opportunities to put things together and take them apart*
- change the shape of materials by playing and experimenting:
 - *making Play-Doh shapes and sticking them together*
- make simple objects:
 - *demonstrating an understanding of the use of different materials, for example putting rice instead of wool inside a tin to make a shaker*
- develop craft-handling skills and techniques needed to carry out the plan:
 - *cutting and tearing, assembling, sticking, moulding or modelling, folding, tying knots, cutting curved edges, marking out lines or shapes*
- use a range of tools:
 - *scissors, pencils, hole-punch, stapler*
- use a range of materials:
 - *Plasticine, adhesives, construction kits, string, cardboard, straws, paper fasteners, paper clips, pipe cleaners, clay, fabric, reclaimable domestic waste*
- choose one method rather than another for finishing their model:
 - *choose to paint rather than varnish a clay pot.*

Evaluating

- respond to sensory aspects of finished work:
 - *look at finished product, smell varnish, feel paint or glue*
- talk about his/her own work during the task, verbally or non-verbally
- report to others on what has been done in a variety of ways
- indicate whether they are pleased with the result
- listen to and discuss the work of peers in a positive way.

Integration

Activities in mathematics, visual arts and home economics will inform and complement this unit on skills development.

Living things

Myself

The student should be enabled to

attend to the varying physical characteristics of self, adults and other students.

Phase 1	Phase 2	Phase 3
<p>Respond differently to various family members, to the teacher, to the doctor.</p> <p>Show by expression, gesture or vocalisation that changes in appearance are noticed: <i>new haircut, ear-rings, beard shaved off.</i></p>	<p>Show recognition of family members, class-mates, and the teacher, and seek their company when in unfamiliar surroundings.</p>	<p>Point out family members, friends, class members in group photos.</p>

The student should be enabled to

identify parts of the body.

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Phase 1	Phase 2	Phase 3
<p>Look in the mirror and imitate adult actions involving the main parts of the body.</p> <p>Show awareness of the functions of main parts of the body: <i>play with dolls or dinosaurs with moving parts.</i></p> <p>Identify, by touch or other means, some of the main parts of the body: <i>touch head, arm, leg, on request.</i></p>	<p>Initiate actions involving the main parts of the body: <i>clap hands, stamp feet in action songs and rhymes.</i></p> <p>Carry out an action on verbal request: <i>respond to 'Put your hand on your head'.</i></p> <p>Participate in games such as <i>'Simon says', 'Hokey Pokey'.</i></p> <p>Make jigsaws from pictures of people cut up.</p>	<p>Participate in art activities such as life-size body painting, in which students outline each other's body shape and paint or decorate the results with collage.</p> <p>Identify missing body parts from pictures.</p>

The student should be enabled to

recognise and measure physical differences between people.

Phase 1	Phase 2	Phase 3
Identify differences in height, using a measuring chart, (Initially the differences should be quite noticeable.): <i>'Ciara is bigger than Noreen'.</i>	Identify differences in age: <i>know that grandparents are old and a baby is young.</i>	Identify differences in hair colour, eye colour, skin colour: <i>'Michael and Lisa have blue eyes.'</i> <i>'Seán has freckles. Jennifer has a tan'.</i>

The student should be enabled to

identify differences in gender.

Phase 1	Phase 2	Phase 3
Indicate, by pointing, signing or naming, boy/girl.	Name/sign/point to man/woman.	Read/recognise the symbols/words for ladies/gents outside public toilets, and indicate understanding by making the correct choice.

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The student should be enabled to

name and identify external parts of the male and female body.

Phase 1	Phase 2	Phase 3
Point to/sign parts of the body.	Identify, by naming, signing or pointing to, parts of the body, using appropriate anatomical terms where possible.	Identify, by naming, signing or pointing to, parts of the body (including private parts), using appropriate anatomical terms where possible.

The student should be enabled to

become aware of some changes that occur as students grow and mature.

Phase 1	Phase 2	Phase 3
Recognise that physical growth has taken place since birth: <i>height, foot size.</i>	Become aware of other physical changes: <i>growing out of clothes/shoes, losing milk teeth.</i>	Show some understanding of the physical changes taking place in both males and females during growth to adulthood. (Integration: SPHE).

The student should be enabled to

become aware that people have a variety of needs for growth.

Phase 1	Phase 2	Phase 3
Be aware that we need to eat food in order to grow bigger and stronger.	Know that some things are good for the body and some are not: <i>food, exercise, sleep, medicine.</i>	Recognise the need for a balanced, healthy diet: <i>make a nutritious sandwich for lunch.</i>

The student should be enabled to

develop an awareness of human birth.

Phase 1	Phase 2	Phase 3
Recognise that all living things grow and change, become aware of new life through observing closely how other animals grow and change: <i>caterpillar to butterfly, baby animals being born (video).</i>	Begin to identify the main phases of the human cycle: <i>baby, girl, teenager, woman, mammy, granny.</i>	Through stories or videos, identify that a baby grows and is nurtured in the mother's womb until ready to be born: <i>a visit to class by a pregnant mother before and after the birth of her child.</i>

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The student should be enabled to

identify and understand ways in which we can protect ourselves against disease and infection.

Phase 1	Phase 2	Phase 3
Show some understanding by responding to requests to blow his/her nose and disposing of tissue appropriately, wash hands before eating and after using the toilet, with physical or verbal prompting.	Go to the toilet, wash hands and face, brush hair, blow nose independently and, when appropriate, with decreasing assistance. (Integration: SPHE). Know not to remain in wet or dirty clothes.	Identify needs: <i>hygienic eating practices, daily shower, taking proper care of teeth, hygiene in relation to taking exercise, protecting skin from dangerous rays. (Integration: SPHE).</i>

Living things

Plants and animals

The student should be enabled to
observe and explore a wide range of familiar living things.

Phase 1	Phase 2	Phase 3
<p>Variety and characteristics of living things</p> <p>Become aware of common plants and animals in the environment by looking, touching, smelling, and tasting (where appropriate): <i>observe the trail left behind by a snail on a pane of glass, smell flowers and herbs in the classroom or school garden.</i></p>	<p>Variety and characteristics of living things</p> <p>Observe footprints or droppings left by a variety of animals, take note of insects that are attracted to a particular plant, identify the birds that visit the bird-table: <i>size, colour, number.</i></p> <p>Observe a wider variety of animals, in their natural habitat whenever possible: <i>visit a farm, participate in field trips to ponds, the seashore.</i></p>	<p>Variety and characteristics of living things</p> <p>Observe common insects and mini-beasts in habitats such as ponds, trees, hedges, grass, rocks, soil, stream, bog, seashore: <i>use a stop-watch to time the movement of a woodlouse across glass.</i></p> <p>Participate in a project to grow a herb garden.</p> <p>Have opportunities to go on field trips to local garden centres, forests.</p>

The student should be enabled to
identify a range of familiar living things.

Phase 1	Phase 2	Phase 3
<p>Variety and characteristics of living things</p> <p>Identify, by verbal or non-verbal means, familiar animals, using live animals, objects of reference, pictures, or symbols: <i>recognise a dog barking on a tape/video, respond to 'Show me the dog', point out a bird when out walking.</i></p>	<p>Variety and characteristics of living things</p> <p>Identify, by verbal/non-verbal means, living things such as dogs, cats, birds, plants, and trees from pictures in books, on screen, in real life.</p>	<p>Variety and characteristics of living things</p> <p>Communicate about a variety of living things, sort them into animals and plants, identify them on television, video, computer programmes.</p>

The student should be enabled to
handle living things appropriately with guidance.

Phase 1	Phase 2	Phase 3
<p>Variety and characteristics of living things</p> <p>Show a response of pleasure, interest or anxiety in the presence of animals: <i>watch an animal with interest and reach out to stroke it when permitted and when it is safe to do so.</i></p>	<p>Variety and characteristics of living things</p> <p>Help with plant care, for example watering, help with the feeding and cleaning out of class aquarium.</p> <p>Hold out food for a horse after a riding lesson, assist in the grooming of trusted animals.</p>	<p>Variety and characteristics of living things</p> <p>Participate in caring for plants and animals in the school environment.</p> <p>Assist in taking care of a pet at home, where appropriate.</p>

The student should be enabled to
recognise and identify external parts of plants and animals.

Phase 1	Phase 2	Phase 3
<p>Variety and characteristics of living things</p> <p>Be aware of the smell, texture and appearance of herbs and other plants.</p> <p>Identify, by touch or other means, some parts of plants: <i>leaf, flower, stem.</i></p>	<p>Variety and characteristics of living things</p> <p>Recognise and identify by verbal/non-verbal means the leaf, stem, root, branch, flower, trunk.</p>	<p>Variety and characteristics of living things</p> <p>Recognise and identify, by touch or other means, the external parts of animal bodies: <i>head, leg, wing, tail, beak, feathers, claws, fur.</i></p>

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The student should be enabled to
become aware of animals and plants of other environments.

Phase 1	Phase 2	Phase 3
<p>Variety and characteristics of living things</p> <p>Experience and anticipate trips into the wider environment for example a farm, a zoo: <i>show reaction to unfamiliar animals, observe differences in size and colour, how different animals move on ground, in water, in the air, listen to sounds made by different animals.</i></p>	<p>Variety and characteristics of living things</p> <p>Develop an awareness by listening to stories and watching nature programmes about plants and animals from other environments: <i>show curiosity about unusual animals, participate in the making of a class book of 'Our favourite animals', 'Zoo animals', attempt to represent animals in artwork and drama.</i></p>	<p>Variety and characteristics of living things</p> <p>Recognise that some animals and plants can be found in places beyond his/her immediate environment: <i>identify penguins, kangaroos, palm trees in pictures, know that polar bears live in cold places, camels live in the desert.</i></p>

The student should be enabled to
sort and group living things into sets.

Phase 1	Phase 2	Phase 3
<p>Variety and characteristics of living things</p> <p>Play with a toy farm and put all the sheep, pigs, etc. together.</p> <p>Put all the flowers on one table and all the leaves on another.</p>	<p>Variety and characteristics of living things</p> <p>Sort according to the following criteria:</p> <ul style="list-style-type: none"> ■ <i>animals/plants</i> ■ <i>animals that have fur, feathers, scales.</i> 	<p>Variety and characteristics of living things</p> <p>Sort according to certain characteristics:</p> <ul style="list-style-type: none"> ■ <i>fruit and vegetables</i> ■ <i>farm animals/pets/wild animals</i> ■ <i>animals or plants that provide food</i> ■ <i>animals that hibernate/migrate.</i>

The student should be enabled to
observe growth and change in some living things.

Phase 1	Phase 2	Phase 3
<p>Processes of life</p> <p>Become aware that plants need water and animals need food and water: <i>observe the way different plants grow, look at the difference in size between baby and adult animals.</i></p> <p>Observe how animals feed and care for their babies.</p>	<p>Processes of life</p> <p>Observe the life cycle of plants and recognise whether they are living or dead: <i>examine foliage, watch and measure the way different plants grow.</i></p> <p>Recognise that plants also need light: <i>keep in a dark cupboard and well watered but observe that they don't grow properly.</i></p> <p>Recognise that seeds grow into flowering plants: <i>observe the growth of sunflowers.</i></p>	<p>Processes of life</p> <p>Observe which animals produce eggs and which animals produce live young.</p> <p>Participate in making an animal home: <i>a wormery, a caterpillar garden, a woodlice chamber.</i></p> <p>Count the number of leaves that a caterpillar eats in a day.</p>

The student should be enabled to
appreciate that living things have essential needs for growth.

Phase 1	Phase 2	Phase 3
<p>Processes of life</p> <p>Recognise that plants need water to grow: <i>help with watering plants on the nature table.</i></p>	<p>Processes of life</p> <p>See the need to water plants on the nature table: <i>have the job of watering these plants.</i></p> <p>Explore the need of plants for water, heat and light by growing broad beans.</p>	<p>Processes of life</p> <p>Explore conditions for the growth of bulbs and seeds: <i>in soil, damp moss, wet paper.</i></p> <p>Investigate how plants respond to light: <i>make or adapt a suitable container for growing seeds.</i></p>

The student should be enabled to

become aware that animals and plants undergo seasonal change in appearance or behaviour.

Phase 1	Phase 2	Phase 3
<p>Processes of life</p> <p>Notice obvious seasonal change: <i>recognise bare trees, flowers in bloom, apples on trees.</i></p>	<p>Processes of life</p> <p>Notice colour change, leaf fall, the appearance of bulbs and shoots, hibernation, the birth of young animals.</p>	<p>Processes of life</p> <p>Become familiar with the life cycle of common plants and animals.</p>

Environmental awareness and care

Many of the objectives of this strand will be achieved as students complete work in other areas of the science curriculum.

Linkage: Environmental awareness and care is a cross-curricular strand common to science and geography.

Integration: Myself and the wider world—environmental care.

The student should be enabled to

observe, identify and appreciate the natural and human features of the local environment.

Phase 1	Phase 2	Phase 3
Have experience of an attractive, welcoming, colourful, clean classroom: <i>attend to new artwork on walls, new flowers indoors or outdoors.</i>	Observe and identify attractive elements of physical, natural and human features: <i>colours and features of playground, colours of flowers and trees in the school grounds/park during the different seasons, water features in the local environment.</i>	Identify positive aspects of natural and built environments through observation, discussion and recording: <i>colours, textures and shapes in materials/buildings/walls, express his/her view on features he/she finds attractive or unattractive.</i>

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The student should be enabled to

identify, discuss and implement simple strategies for improving and enhancing the environment.

Phase 1	Phase 2	Phase 3
Begin to develop a sense of responsibility for taking care of and enhancing the environment: <i>watering plants on the nature table, changing water in vases of flowers, putting food on the bird table.</i>	Develop a sense of responsibility for taking care of and enhancing the environment: <i>hanging works of art on the classroom wall, participating in the planting of trees and flowers in the school grounds, setting stones in the garden to create habitats.</i>	Take pride in his/her classroom, keep work spaces clean and tidy, keep home and surroundings clean, tidy and safe.

The student should be enabled to

become aware of ways in which the environment can be polluted or harmed.

Phase 1	Phase 2	Phase 3
<p>Identify common waste products: <i>know that sweet papers and empty milk cartons are rubbish.</i></p> <p>Know that rubbish has to be disposed of in an appropriate way: <i>put used tissues into a bin in the classroom.</i></p>	<p>Know that broken things that cannot be fixed become waste materials: <i>throw broken plates and cups in the bin, become aware that small rubbish bins are emptied into larger containers stored in the school grounds.</i></p>	<p>Know that in the preparation of food there are waste products: <i>put vegetable peelings into a special bin for the compost heap.</i></p> <p>Become aware of litter, pollution and vandalism: <i>identify the types of litter around the school and the activities that created them.</i></p> <p>Recognise that some materials decay naturally while others survive a long time in the environment: <i>fruit and leaves rot but plastic does not.</i></p>

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The student should be enabled to

identify and help to implement simple strategies for protecting, conserving and caring for the environment.

Phase 1	Phase 2	Phase 3
<p><i>'Things I can do':</i></p> <ul style="list-style-type: none"> ■ <i>caring for clothes, toys, and other possessions</i> ■ <i>tidying the classroom by putting objects in appropriate storage boxes</i> ■ <i>disposing of litter appropriately.</i> 	<p><i>'Things we can do together':</i></p> <ul style="list-style-type: none"> ■ <i>caring for one's own property and that of others</i> ■ <i>keeping the classroom, school and play spaces clean and tidy</i> ■ <i>turning off the tap to save water</i> ■ <i>collecting paper or cans for recycling.</i> 	<p>Participate in activities that contribute to and protect the environment:</p> <ul style="list-style-type: none"> ■ <i>creating and maintaining a school garden with compost heap</i> ■ <i>engaging in an anti-litter campaign</i> ■ <i>organising the collection of papers, aluminium cans or other materials for recycling.</i>

Energy and forces

The student should be enabled to explore simple properties of light.

Phase 1	Phase 2	Phase 3
<p>Light</p> <p>Show an awareness of and different reactions to various light sources:</p> <ul style="list-style-type: none"> ■ <i>experience contrasts of light and dark, noticing and anticipating changes</i> ■ <i>track a moving light</i> ■ <i>explore rope lights, bubble tubes, mirror balls, fibre optics, ultra-violet light</i> ■ <i>observe light coming in through a window or from a candle</i> ■ <i>switch on and off lights on battery operated toys.</i> 	<p>Light</p> <p>Experience darkness in a darkened or multi-sensory room and observe as the light is gradually increased.</p> <p>Search for people and objects in the dark.</p> <p>Cover and uncover his/her eyes, try on sunglasses and note the difference.</p> <p>Look for different sources of light in the classroom/school: <i>overhead light, computer light.</i></p>	<p>Light</p> <p>Have opportunities to explore different light sources and light-changing materials that create different effects (reflective, fluorescent, translucent paper materials): <i>participate in making stained-glass windows.</i></p> <p>Demonstrate an understanding of simple properties of light: <i>Choose a range of materials in order to affect the light, for example colour filters and reflectors.</i></p> <p>Explore a range of types of light: <i>table lamps, fairy lamps, torches, light wands, candle light, observe the lighting effects, repeat the activity in a dark room and in a light room.</i></p>

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The student should be enabled to observe colours in the environment.

Phase 1	Phase 2	Phase 3
<p>Light</p> <p>Show interest in the colour of plants, animals or materials.</p> <p>Identify, by pointing or other means: <i>primary colours at home, in school, in animal and plant life.</i></p>	<p>Light</p> <p>Identify by pointing, naming, or other means: <i>primary and secondary colours in the environment, at school, and at home.</i></p>	<p>Light</p> <p>Explore dark and bright colours and become aware of different shades of colour: <i>make a tie-dye T-shirt in an art lesson, make a colour spinner.</i></p>

The student should be enabled to
sort objects into sets according to colour.

Phase 1	Phase 2	Phase 3
<p>Light</p> <p>Match colours in the environment: <i>respond to 'Show me a red ball', 'Find me another red ball', match a blue lid to a blue box.</i></p>	<p>Light</p> <p>Find objects to place on different surfaces: <i>'Our yellow table'.</i></p> <p>Sort objects into sets of two colours.</p>	<p>Light</p> <p>Distinguish between colours and match them: <i>sort coloured paper pieces correctly in a class project on the rainbow.</i></p>

The student should be enabled to
discuss differences between day and night, light and shade.

Phase 1	Phase 2	Phase 3
<p>Light</p> <p>Experience a range of bright and dark visual contrasts: <i>react to changes from light to dark by blinking, being startled.</i></p>	<p>Light</p> <p>Listen to stories or rhymes about light and dark and night and day.</p> <p>Show understanding that we sleep during the night when it is dark and go to school during the day when it is bright.</p>	<p>Light</p> <p>Realise that we cannot see in the dark but that some animals can, for example a cat, an owl.</p>

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The student should be enabled to
recognise that light comes from different sources.

Phase 1	Phase 2	Phase 3
<p>Light</p> <p>Explore a variety of light sources in a darkened area of the room: <i>torches, lights, candles.</i></p>	<p>Light</p> <p>Recognise that the moon and the stars give us light, the sun and fire give us heat and light.</p> <p>Locate or name some common sources of light: <i>torch, lamp, light-bulb, candle.</i></p>	<p>Light</p> <p>Identify other light sources: <i>lighthouses, car headlights, 'cats' eyes' on the road.</i></p> <p>Investigate, using plastic mirrors for safety, the way light is reflected from mirrors.</p>

The student should be enabled to
explore how shadows are formed.

Phase 1	Phase 2	Phase 3
<p>Light</p> <p>Play with shadows in the playground.</p> <p>Become aware of the shape of silhouettes and shadows cast by people and objects: <i>look at shadows created in a darkened room, use a strong torch or projector to project silhouette of himself/herself/parts of the body/objects with clear lines, observe the shadows of people and objects on a sunny day.</i></p> <p>Relate the shape of shadows and silhouettes to the people and objects that make them: <i>look from a person/object to a projected image, show smile of recognition of familiar shadow or silhouette, with some help identify what is being projected by its outline.</i></p>	<p>Light</p> <p>Experiment with the shape of shadows and silhouettes of people and objects: <i>experiment with making silhouettes in a darkened room, using a strong torch or projector hold up parts of the body/objects to be projected, move himself/herself or object through light to observe moving silhouette, move around in sunshine and watch his/her own shadow.</i></p>	<p>Light</p> <p>Compare his/her own body shape with that of other students, using light to project the image of a head onto a wall: <i>observing and drawing the outline.</i></p> <p>Make shapes/animals with hands in the classroom using an overhead projector.</p> <p>Participate in shadow theatre using puppets.</p>

The student should be enabled to
investigate the relationship between light and materials.

Phase 1	Phase 2	Phase 3
<p>Light</p> <p>Have opportunities to investigate materials which do/do not allow light to pass through them: <i>a glass jar, building block.</i></p>	<p>Light</p> <p>Explore everyday objects: <i>sunglasses, visors, blinds, lampshades.</i></p> <p>Explore materials that do not allow light to pass through and thus form shadows: <i>sort materials according to whether or not they allow light to pass through them.</i></p>	<p>Light</p> <p>Make a pair of shades using coloured film or plastic.</p>

The student should be enabled to

investigate the fact that light can be broken into many different colours.

Phase 1	Phase 2	Phase 3
<p>Light</p> <p>Have opportunities to investigate how mirrors and other shiny surfaces are good reflectors of light.</p>	<p>Light</p> <p>Observe how a prism is used to create the colour spectrum.</p> <p>Observe what happens when light shines on oil/on a plastic ruler standing in water.</p>	<p>Light</p> <p>Participate in making a rainbow using a torch with a narrow beam, a clear plastic box filled with water, and a mirror in a dark room: <i>observe what happens when the light beam shines on the mirror under the water and the light is then reflected onto a white card/ sheet of paper.</i></p>

The student should be enabled to

explore how objects may be magnified, using a simple lens or magnifier.

Phase 1	Phase 2	Phase 3
<p>Light</p> <p>Observe objects from the environment, for example insects from the garden, using a magnifying glass.</p>	<p>Light</p> <p>Participate in the making of a kaleidoscope.</p>	<p>Light</p> <p>Participate in the making of a periscope.</p>

The student should be enabled to

appreciate that living things need sun to grow.

Phase 1	Phase 2	Phase 3
<p>Light</p> <p>Investigate plants' need for light by growing cress.</p>	<p>Light</p> <p>Investigate plants' need for light by growing broad beans.</p>	<p>Light</p> <p>Investigate plants' need for light by growing spring bulbs.</p>

The student should be enabled to

be aware of the dangers of excessive sunlight.

Phase 1	Phase 2	Phase 3
Light Put on a hat, sunscreen or shades during hot weather.	Light Become aware of the sun's rays on the skin.	Light Become aware of the danger of looking at the sun.

The student should be enabled to
explore simple properties of sound.

Phase 1	Phase 2	Phase 3
<p>Sound</p> <p>Respond to a range of sounds: <i>laughs/is startled at/asks about unfamiliar sounds in the class and school environment.</i></p> <p>Experience contrasts of silence and sound.</p> <p>Feel vibrations when instruments are played.</p>	<p>Sound</p> <p>Explore different sound-making sources: <i>musical instruments, sounds made using his/her own body, such as clapping hands and knees, slapping thighs, clicking fingers, tapping cheeks.</i></p>	<p>Sound</p> <p>Have opportunities to explore a wide range of familiar and unfamiliar musical instruments: <i>tuned and untuned percussion instruments.</i></p> <p>Use switches to make sounds on a computer, or operate music on a tape recorder.</p>

The student should be enabled to
recognise and identify a variety of sounds in the environment.

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Phase 1	Phase 2	Phase 3
<p>Sound</p> <p>Locate sources of sound: <i>move eyes/turn head towards sources of sounds, recognise familiar voices, repeat actions that make sounds.</i></p>	<p>Sound</p> <p>Keep very quiet and identify in his/her immediate environment a variety of sound sources: <i>a dog barking, footsteps, babies crying, car horns blowing, the school bell, siren sounds.</i></p> <p>Recall sources of sounds: <i>remember the location of sound, identify noises made behind a screen such as a bell ringing, scissors cutting through paper, water being poured into a jug.</i></p> <p>Listen to a tape recording of familiar voices: <i>other students in the class, school staff, family members.</i></p>	<p>Sound</p> <p>Describe sounds and classify them into sound families: <i>animals, people.</i></p> <p>Have opportunities to participate in activities that encourage sound discrimination and the identification of sound sources: <i>listen to tapes of familiar environmental sounds, listen to 'sound stories' on commercially produced tapes or on tapes created by the teacher.</i></p> <p>Go on a 'listening walk'.</p> <p>Make a 'sound map' of the school.</p>

The student should be enabled to

identify and differentiate between high and low sounds, loud and soft sounds.

Phase 1	Phase 2	Phase 3
<p>Sound</p> <p>Experience a range of auditory contrasts: <i>made by adult, other students, on a cassette tape or CD.</i></p>	<p>Sound</p> <p>Make high and low sounds using his/her own body: <i>sing, clap hands, stamp feet, vocalise.</i></p> <p>Begin to control the sounds he/she makes: <i>loud, quiet.</i></p>	<p>Sound</p> <p>Make loud and soft sounds using objects: <i>play a tambourine, a drum/shaker, hammer pegs, bang bricks on the table, blow a whistle.</i></p>

The student should be enabled to

explore ways of making different sounds, using a variety of materials.

Phase 1	Phase 2	Phase 3
<p>Sound</p> <p>Play a tambourine, drum, shaker.</p> <p>Hammer pegs, bang bricks on the table.</p> <p>Listen to his/her own amplified voice: <i>be encouraged to make sounds into the microphone, repeat sounds made by himself/herself, such as laughing, shouting, saying his/her own name.</i></p>	<p>Sound</p> <p>Investigate how changes in materials, volume and beaters affect the sound produced: <i>explore how different notes may be achieved by blowing and tapping on containers filled with water.</i></p> <p>Make sound effects to accompany a poem, a story or a song.</p>	<p>Sound</p> <p>Understand and explore how different sounds may be made by making a variety of materials vibrate: <i>the skin of a drum, a plastic ruler on the table, the string of an instrument, the 'seed' in a referee's whistle.</i></p> <p>Make a simple telephone using tins and string/wire: <i>experiment with this to find out how it works best.</i></p>

The student should be enabled to
make a range of simple percussion instruments.

Phase 1	Phase 2	Phase 3
<p>Sound</p> <p>Bang on saucepan lids, biscuit boxes.</p>	<p>Sound</p> <p>Participate in the making of a shaker: <i>put peas in a container, make papier mâché balloon shakers, attach bottle tops to sticks.</i></p>	<p>Sound</p> <p>Place a variety of rubber bands across a shoebox to make a home-made 'guitar'.</p> <p>Make papier mâché maracas and drums.</p> <p>Use bottles filled with water at a variety of levels to create a xylophone.</p> <p>Use a comb and greaseproof paper.</p>

The student should be enabled to
recognise the difference between hot and cold.

Phase 1	Phase 2	Phase 3
<p>Heat</p> <p>React with a grimace to a cold dinner being served.</p> <p>Show reaction to cold water in the swimming pool.</p> <p>Have his/her attention drawn to changes in weather temperature.</p>	<p>Heat</p> <p>Have opportunities to react to and indicate differences: <i>ice cubes, hot-water bottles, foot spa, greenhouse, hydrotherapy pool, sauna.</i></p>	<p>Heat</p> <p>Recognise that it is warm when the sun shines and cold when there is wind and snow: <i>check the temperature outside before going to the playground and decide whether or not to put on a sweatshirt.</i></p>

The student should be enabled to
identify ways of keeping objects and substances warm and cold.

Phase 1	Phase 2	Phase 3
<p>Heat</p> <p>Recognise that clothes keep us warm and cosy: <i>coat, hat, gloves, scarf.</i></p> <p>Experience the cooling effects of a fan, the heating effect of a hairdryer.</p>	<p>Heat</p> <p>Identify ways in which food is heated: <i>cooker, microwave oven, hob.</i></p> <p>Explore melting ice: <i>Who can keep an ice cube the longest?</i></p>	<p>Heat</p> <p>Indicate understanding of the importance of keeping objects and substances hot and cold: <i>know to put tea-cosy on a tea-pot, to put ice-cream in the fridge, use the microwave to heat food, operate a fan to stay cool.</i></p>

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The student should be enabled to
become aware of different sources of heat.

Phase 1	Phase 2	Phase 3
<p>Heat</p> <p>Experience heat coming from a classroom heater, cooker, hairdryer. (Note the safety aspects.)</p>	<p>Heat</p> <p>Identify sources of heat when asked: <i>fire, radiators, the sun.</i></p>	<p>Heat</p> <p>Identify ways in which homes and buildings are heated: <i>radiator, boiler, gas fire, electric fire, coal fire.</i></p> <p>Identify further sources of heat: <i>hot-water bottle, electric blanket.</i></p>

The student should be enabled to

compare temperatures in different places in the classroom, school and environment.

Phase 1	Phase 2	Phase 3
<p>Heat</p> <p>Know that the kitchen is hot when the dinner is being cooked, the playground may be cold during the winter months.</p>	<p>Heat</p> <p>Dress up warmly to go on a nature trail in the winter, choose to wear a T-shirt and shorts for a summer outing to the beach.</p>	<p>Heat</p> <p>Show an awareness of different climates in other countries: <i>'What should be packed for a visit to Florida?'</i></p>

The student should be enabled to

use magnets of different shapes and sizes in purposeful play, to explore their effects on different materials.

Phase 1	Phase 2	Phase 3
<p>Magnetism and electricity</p> <p>Show surprise or interest when objects are attracted using magnets.</p>	<p>Magnetism and electricity</p> <p>Use magnets to sort materials in a junk box into those that are magnetic and those that are not.</p>	<p>Magnetism and electricity</p> <p>Explore how magnets have poles, and investigate how these poles attract and repel each other: <i>bar magnets could be strapped with Sellotape on to the top of toy cars: if attracted to each other the cars will 'crash' and if repelled by each other the cars will 'move away' from each other.</i></p>

The student should be enabled to

investigate the fact that magnets attract certain materials.

Phase 1	Phase 2	Phase 3
<p>Magnetism and electricity</p> <p>Play with magnetic letters and numerals.</p> <p>Learn that magnets can push or pull objects on which they act: <i>investigate how near/far away they need to be to work.</i></p>	<p>Magnetism and electricity</p> <p>Examine and classify objects and materials as magnetic and non-magnetic: <i>discover that magnets attract only materials made from iron and steel.</i></p> <p>Explore the use of magnets to lift and hold objects: <i>how magnets can be used in cranes, door catches, handbags.</i></p> <p>Make a fridge magnet.</p> <p>Investigate that magnets attract certain materials through other materials: <i>magnets attracting materials through water, glass, plastic.</i></p> <p>Investigate if the force of the magnet can be blocked by putting something in its way, or by wrapping something around the magnet: <i>wrap a magnet in paper and see if it will pick up any paper clips, repeat this with the magnet wrapped in paper, plastic, a handkerchief, aluminium, investigate how many layers of each material are needed.</i></p>	<p>Magnetism and electricity</p> <p>Explore how magnets have poles and investigate how these poles attract and repel each other.</p> <p>Investigate how magnets may be made: <i>stroking a piece of iron/steel with a magnet.</i></p> <p>Discover that if they are heated or dropped they can lose their magnetism.</p> <p>Experiment to see if magnets work through cardboard, water, plastic, paper, wood: <i>get the paper clip out of a container without getting his/her fingers or magnets wet.</i></p> <p>Participate in making a fishing game using a magnet.</p> <p>Learn that magnets can push or pull magnetic materials: <i>an adult draws a maze on a piece of cardboard. A paper clip could be attached to a toy mouse and the mouse placed on the cardboard. Find out if a magnet can be used to guide the mouse through the cardboard.</i></p> <p>Participate in designing and making a container (incorporating a magnet) that will keep all the teacher's paper clips together.</p>

The student should be enabled to

respond to sensory experiences provided by a variety of electrical appliances and equipment.

Phase 1	Phase 2	Phase 3
<p>Magnetism and electricity</p> <p>Show an interest in a variety of electrical equipment: <i>experience the vibrations of a food blender, watch clothing rotate in a washing machine, listen to a tumble-drier, respond to computer displays by tracking moving objects and reacting to sounds.</i></p> <p>React to sensory experiences: <i>light from bulbs, sounds from buzzers, movement.</i></p> <p>Attend to experiences of the senses in a focussed way: <i>looking, listening, tracking.</i></p> <p>Anticipate results: <i>responding before, during and after experiences of the senses.</i></p>	<p>Magnetism and electricity</p> <p>Use a switch to give sensory feedback.</p> <p>Join in to control events: <i>operate switches associated with computers and battery-operated toys (with and without support).</i></p>	<p>Magnetism and electricity</p> <p>Initiate the operation of equipment in order to gain a sensory feedback: <i>turning on a tape recorder/CD player, relax his/her feet in foot spa, use computer programmes to obtain pictures, letters, audio clips.</i></p>

The student should be enabled to

explore the effects of static electricity.

Phase 1	Phase 2	Phase 3
<p>Magnetism and electricity</p> <p>Experience a crackling noise when taking off a jumper.</p>	<p>Magnetism and electricity</p> <p>Attract pieces of tissue paper by rubbing comb or plastic ruler on his/her head.</p>	<p>Magnetism and electricity</p> <p>Experience a tingling sensation when cleaning the television screen/computer screen.</p>

The student should be enabled to

become aware of the uses of electricity in school and at home.

Phase 1	Phase 2	Phase 3
<p>Magnetism and electricity</p> <p>Participate in observation and use of a wide range of switched equipment and devices powered by electricity: <i>television, radio, tape recorder, video, CD player, computer.</i></p> <p>Use switches that operate electrical items, with physical and verbal prompting: <i>light on/off, tape-recorder on/off.</i></p>	<p>Magnetism and electricity</p> <p>Demonstrate an understanding that there are many different appliances and pieces of equipment that require the operation of a switch in order to work: <i>give an adult items of equipment to be turned on, press a switch to operate the computer.</i></p> <p>Independently activate switches to produce a sound, picture, light, or vibration or to activate an appliance: <i>turn on the television or CD player by himself/herself.</i></p>	<p>Magnetism and electricity</p> <p>Communicate understanding of the functional use of electrical appliances at school and in the home: <i>television, kettle, vacuum cleaner, washing machine, cooker, fridge-freezer.</i></p> <p>Have responsibility for using electrical equipment to carry out tasks at home and in school (being aware of issues in relation to safety).</p>

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The student should be enabled to

participate in the building of simple circuits.

Phase 1	Phase 2	Phase 3
<p>Magnetism and electricity</p> <p>Communicate a response to changes in circuits: <i>indicating an awareness of bulbs, lights, batteries, buzzers.</i></p>	<p>Magnetism and electricity</p> <p>Demonstrate an understanding that some pieces of equipment are operated by mains electricity, and others are operated by battery.</p> <p>Demonstrate an understanding that some games and tools need one battery to operate them, others may need up to four, and that not all batteries are the same shape or size.</p>	<p>Magnetism and electricity</p> <p>Under adult supervision, make contributions to a class project involving building simple circuits using batteries, bulbs and wires: <i>actively join in with circuit making, join components (with and without support).</i></p>

The student should be enabled to

become aware that electrical appliances must be treated with care.

Phase 1	Phase 2	Phase 3
<p>Magnetism and electricity</p> <p>Listen to warnings about the dangers of electricity: <i>respond to 'No', or 'Stop'.</i></p>	<p>Magnetism and electricity</p> <p>Respond, with some verbal and physical prompting, to instructions about the safe use of equipment.</p>	<p>Magnetism and electricity</p> <p>Independently observe safety rules, following visual cues if necessary.</p>

The student should be enabled to

explore forces such as pulling and pushing, through informal activity with toys.

Phase 1	Phase 2	Phase 3
<p>Forces</p> <p>Respond to forces in planned situations: <i>participate in physical push-and-pull movements, such as being rocked, turned, rolled, swung, bounced, lifted, pushed in a wheelchair.</i></p> <p><i>(Show various reactions: smiles or frowns when pulled in a blanket or pushed in a wheelchair.)</i></p>	<p>Forces</p> <p>Demonstrate an understanding that movement can be caused by pushing and pulling a variety of large and small pieces of equipment: <i>actively investigate equipment that can be pushed, pulled, rolled, anticipate a tower falling when pushed, follow the progress of a boccia ball that he/she has rolled, ask to be pushed on the swing, push swing doors/wheels on his/her own wheelchair, pull toys along floor, push floats in the pool.</i></p>	<p>Forces</p> <p>Co-operate with others in push/pull games and activities: <i>ten-pin bowling, skittles, boccia, trampoline, go-kart, trolley.</i></p> <p>Move large and small objects: <i>flower pots in garden centre, furniture in classroom.</i></p>

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The student should be enabled to

explore how the shape of objects can be changed by squashing, pulling, and other forces.

Phase 1	Phase 2	Phase 3
<p>Forces</p> <p><i>See Materials table, page 60.</i></p>	<p>Forces</p> <p><i>See Materials table, page 60.</i></p>	<p>Forces</p> <p><i>See Materials table, page 60.</i></p>

The student should be enabled to

become aware of and explore how the movement of water and moving air can cause objects to move.

Phase 1	Phase 2	Phase 3
<p>Forces</p> <p>Participate in water play: <i>pushing objects into water, splashing to make things move.</i></p>	<p>Forces</p> <p>Participate in balloon races on Sports Day.</p> <p>Bring a toy boat to the pond accompanied by an adult.</p>	<p>Forces</p> <p>Have the opportunity to fly a kite (commercially produced or home-made) on a windy day.</p> <p>Learn to canoe on an adventure weekend with friends.</p>

The student should be enabled to

observe and investigate the movement of objects, such as toys, on various materials and surfaces.

Phase 1	Phase 2	Phase 3
<p>Forces</p> <p>Participate in an experiment to investigate how far a toy car will roll: <i>on level ground or on a slope, on a rough or smooth surface, observe and communicate about discoveries.</i></p>	<p>Forces</p> <p>Participate in an experiment to investigate how far a ball will roll: <i>on grass, on tarmac.</i></p> <p>Measure and record results, using non-standard units.</p>	<p>Forces</p> <p>Participate in an experiment to investigate how far a go-kart will travel: <i>on grass, on bubble-wrap paper, on cement.</i></p> <p>Measure and record results, using standard units.</p>

The student should be enabled to

investigate how forces act on objects.

Phase 1	Phase 2	Phase 3
<p>Forces</p> <p>Explore selected equipment that can be pushed or pulled: <i>pull a string that rings a bell, watch the ball he/she has helped to roll.</i></p>	<p>Forces</p> <p>Participate in push-and-pull activities: <i>play on a see-saw with an adult and another student.</i></p>	<p>Forces</p> <p>Make and test predictions about objects: <i>discover that a gentle push will move a toy a short distance, but a stronger push will move it a longer distance.</i></p>

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The student should be enabled to

explore how some objects may be slowed down.

Phase 1	Phase 2	Phase 3
<p>Forces</p> <p>Put out hands or feet to slow down rolling ball.</p>	<p>Forces</p> <p>Follow instructions on how to slow down objects: <i>pulling them back, applying brakes to a wheelchair or bicycle.</i></p>	<p>Forces</p> <p>Demonstrate knowledge of how to slow objects down: <i>independently slow down a wheelchair or bicycle by pulling back or applying brakes.</i></p>

Materials

The student should be enabled to

observe and investigate a range of familiar materials in the immediate environment.

Phase 1	Phase 2	Phase 3
<p>Use all his/her senses to explore a wide variety of objects and materials during free play: <i>roll and stretch dough, splash and pour water, tear and scrunch paper.</i></p> <p>Handle and use basic tools and equipment during the exploration of materials: <i>use paint brushes and paint, use a plastic hammer to strike pegs on a pegboard.</i></p> <p>Explore a variety of natural and manufactured materials in context: <i>use touch and smell to explore water, wood, textiles, paper, food, plastic, metal, rock.</i></p>	<p>Explore the properties of a range of natural materials (sand, water, leaves, bark, shells, stones, feathers): <i>be aware of the different colours, textures, shapes and smells, and indicate preferred materials.</i></p> <p>Explore objects and materials provided, in an appropriate way, with direction: <i>mix materials, such as sand and water, water and flour, jelly and water.</i></p>	<p>Use materials, in an appropriate way, without direction: <i>pour, mix, tear, squeeze a variety of materials, use toothpaste, hair gel, shaving foam.</i></p> <p>Investigate materials used to construct buildings, and to make furniture, clothes, tools, toys, school equipment: <i>water, air, rock, fabrics, paper, metal, wood, plastic.</i></p> <p>Combine materials: <i>make dough mixtures, mix paints, make paper decorations.</i></p>

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The student should be enabled to

describe and compare materials, noting the difference in colour, shape and texture.

Phase 1	Phase 2	Phase 3
<p>Investigate materials to discover their different properties: <i>manipulate, taste, touch, watch and communicate findings in relation to these materials, splash in puddles, play with snowballs, feel leaves, feel along brick and stone buildings, use touch to explore a carefully constructed 'tactile' corridor.</i></p>	<p>Visit woods, country parks, farmland, beaches, where possible.</p> <p>Describe familiar and unfamiliar objects according to simple properties: <i>size, shape, texture.</i></p> <p>Engage in sorting and matching activities: <i>make a set of soft/bendy/hard objects, participate in a feely-bag game or a 'feely walk'.</i></p>	<p>Have opportunities to visit and explore the properties of natural materials found near various geographical features: <i>ponds, beaches.</i></p> <p>Have access to, and explore, the properties of an increasing variety of manufactured materials: <i>visit bakeries, shops, restaurants, craft shops.</i></p>

The student should be enabled to

know about some everyday uses of common materials.

Phase 1	Phase 2	Phase 3
Identify some common materials by naming or pointing to them: <i>paper, stone, sand, wood.</i>	Recognise and name some common types of material: <i>paper, rock, wood, used to construct toys, school equipment, tools, clothes, houses.</i>	Begin to distinguish between natural and manufactured materials: <i>examine fabrics in clothes shops: cotton, plastic, leather jackets.</i>

The student should be enabled to

group materials according to certain criteria.

Phase 1	Phase 2	Phase 3
Communicate about an object according to one of its properties: <i>given a choice indicate a soft/small/red object.</i>	<p>Indicate, verbally or non-verbally, that a material has a specific, named property: <i>flexibility, transparency, magnetism, strength.</i></p> <p>Compare simple differences between materials: <i>compare two objects for one difference, such as colour, size, texture, and smell.</i></p> <p>Participate in a class project on collage, exploring different themes: <i>early work will concentrate on colour/texture, later work might include a 'metallic' collage.</i></p>	<p>Investigate materials to discover their properties: <i>roughness, ability to float, shape, perishable/frozen.</i></p> <p>Describe the simple properties of familiar materials: <i>compare objects as being rough or smooth, hot or cold, discriminate between food and non-edible substances.</i></p> <p>Identify, by verbal or non-verbal means, a wide variety of foods.</p> <p>Distinguish between raw and cooked food: <i>know some foods are usually cooked before being eaten, give examples of foods that are prepared by baking/cooking.</i></p>

The student should be enabled to
investigate materials for different properties.

Phase 1	Phase 2	Phase 3
Investigate materials: <ul style="list-style-type: none"> ■ <i>that are heavy or light</i> ■ <i>that keep us warm</i> ■ <i>that are attracted by magnets.</i> 	Investigate the absorbency of various fabrics and materials: <i>materials that absorb water and those that are waterproof.</i>	Begin to explore how different materials may be used: <ul style="list-style-type: none"> ■ <i>in the construction of homes: his/her own home, the homes of animals</i> ■ <i>in the construction of everyday appliances.</i>

The student should be enabled to
recognise that the shape of some materials can be changed.

Phase 1	Phase 2	Phase 3
See <i>Mixing and other changes</i> , pages 45-46.	See <i>Mixing and other changes</i> , pages 45-46.	See <i>Mixing and other changes</i> , pages 45-46.

Materials and change

The student should be enabled to explore the effects of water on a variety of materials.

Phase 1	Phase 2	Phase 3
<p>Heating and cooling</p> <p>Observe and experience the way materials change when wet: <i>respond with interest when materials are seen to change, drop objects in water to see if they float or sink, feel the difference between wet and dry materials.</i></p>	<p>Heating and cooling</p> <p>Mix materials with water: <i>salt, coffee, powder paint, sand, marbles, observe what happens.</i></p>	<p>Heating and cooling</p> <p>Have experience of the planning process in testing the strength of paper when soaked in water: <i>collect different types of paper, watch closely when paper soaks up water, predict which paper will be strongest, which will tear or disintegrate.</i></p>

The student should be enabled to observe and describe materials when they are wet and when they are dry.

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Phase 1	Phase 2	Phase 3
<p>Heating and cooling</p> <p>Observe the effect of pouring milk: <i>on corn flakes, Rice Krispies and other cereals.</i></p> <p>Mix water with soil or sand to make mud pies or sandcastles.</p>	<p>Heating and cooling</p> <p>Make observations during an art lesson: <i>paper, paint, glue.</i></p>	<p>Heating and cooling</p> <p>Experiment with papier mâché.</p>

The student should be enabled to identify some materials that are waterproof.

Phase 1	Phase 2	Phase 3
<p>Heating and cooling</p> <p>Identify the clothes he/she wears on a rainy day: <i>raincoat, umbrella, boots, hat.</i></p>	<p>Heating and cooling</p> <p>Choose to wear a waterproof jacket on a rainy day.</p>	<p>Heating and cooling</p> <p>Suggest materials or clothes suitable for rainy days.</p> <p>Make a class collection of paper and plastic carrier bags: <i>discuss which of the bags would be best for carrying wet swimming gear.</i></p>

The student should be enabled to

explore the effects of heating and cooling on everyday objects and materials.

Phase 1	Phase 2	Phase 3
<p>Heating and cooling</p> <p>Watch the effect of the sun's heat on his/her ice-pop.</p> <p>Respond with interest to the ways in which ice-cream, butter, chocolate, water, pop-corn, toffee, syrup change when heated/cooled.</p>	<p>Heating and cooling</p> <p>Explore ways in which liquids and solids may be kept hot or cold: <i>the effect of wrapping or covering, using different materials, such as paper, fabrics, foil, using flasks and coolers.</i></p> <p>Know that an ice-cream will melt if left near heat, that chocolate can be melted in the microwave.</p> <p>Test, under supervision, the effects of heating and cooling on water.</p>	<p>Heating and cooling</p> <p>Use a hairdryer to dry hair.</p> <p>Take ice-cubes from the freezer to cool drinks.</p> <p>Actively and safely assist in cooking and baking food.</p> <p>Observe and anticipate the way food changes when it is cooked or baked: <i>the effect of heat on dough, cakes or buns rising, permanent changes (baking bread in an oven).</i></p> <p>Make and flavour ice-cream in a cookery class.</p> <p>Make a clay pot and observe how it changes after being put in the kiln.</p>

The student should be enabled to

begin to investigate how materials may be changed by mixing.

Phase 1	Phase 2	Phase 3
<p>Mixing and other changes</p> <p>Mix paints to make new colours, mix water and sugar/water and salt, mix the ingredients for a cake.</p>	<p>Mixing and other changes</p> <p>Explore liquids that will not mix: <i>oil and water</i>.</p> <p>Investigate non-reversible changes: <i>heating butter and eggs, adding water to plaster, baking clay</i>.</p> <p>Explore irreversible changes: <i>mix plaster of Paris to make moulds of hands, feet or face masks</i>.</p>	<p>Mixing and other changes</p> <p>Investigate reversible changes: <i>freezing water, heating chocolate, dissolving sugar in water, drying clay</i>.</p> <p>Make different varieties of chocolate buns using mixing, heating or cooling: <i>Rice Krispie buns</i>.</p> <p>Make suitable refreshments for guests at a concert: <i>lemonade, adding water to concentrated fruit juice</i>.</p>

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The student should be enabled to

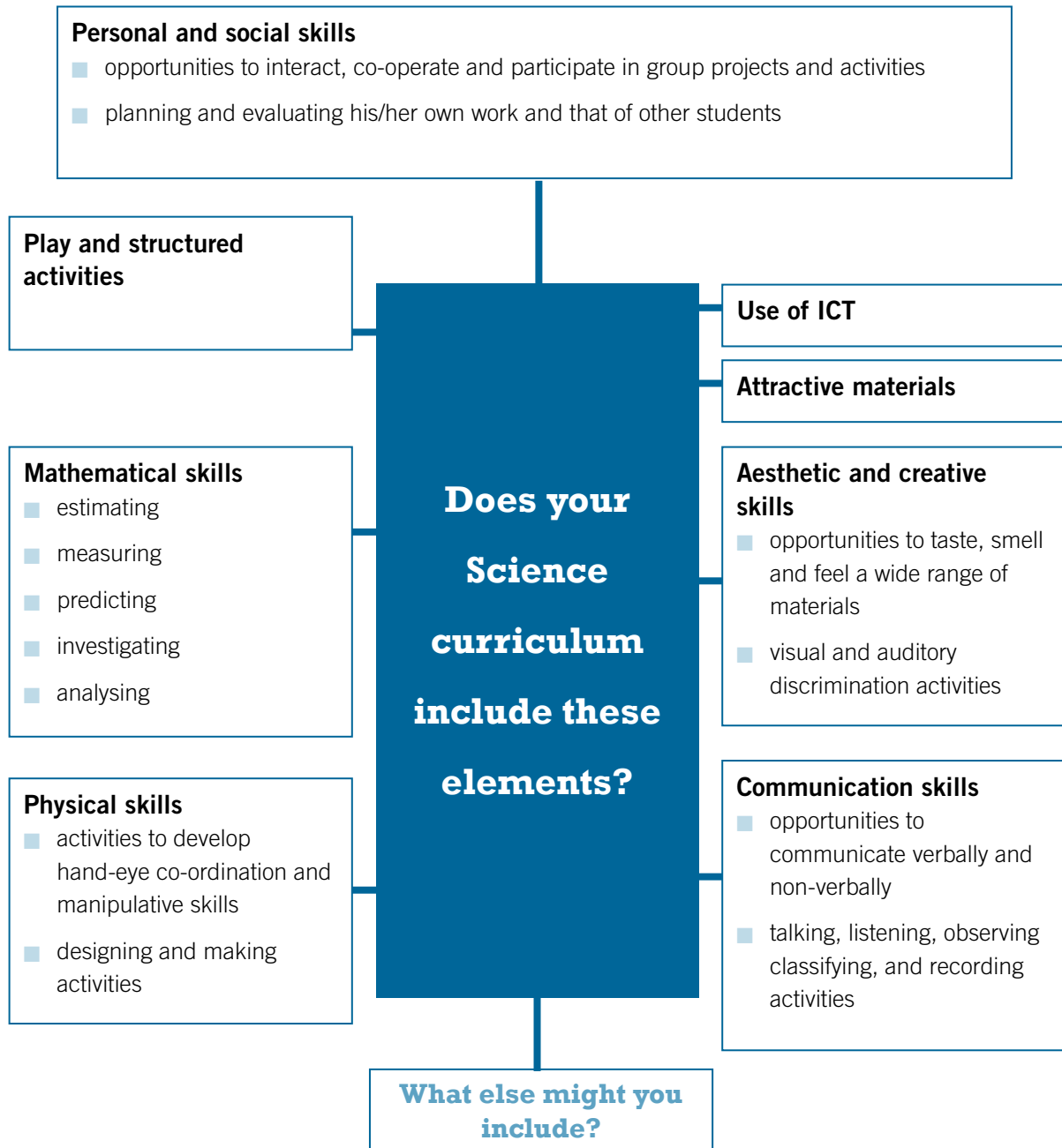
examine the changes that take place in materials when physical forces are applied.

Phase 1	Phase 2	Phase 3
<p>Mixing and other changes</p> <p>Explore how some materials can be squashed, bent, squeezed, hammered, twisted, stretched: <i>Play-doh, Plasticine</i>.</p>	<p>Mixing and other changes</p> <p>Use manipulative skills to mould materials: <i>using hands to shape or explore dough, clay</i>.</p> <p>Observe the effect of whisking water and washing-up liquid: <i>blow bubbles with the suds created</i>.</p>	<p>Mixing and other changes</p> <p>Observe the changes when materials are beaten, whisked, mixed, squashed, pulled, or bent: <i>mash potatoes, whisk eggs to make an omelette</i>.</p> <p>Observe these changes and communicate what happens in a variety of ways.</p>

The student should be enabled to

explore some simple ways in which materials may be separated.

Phase 1	Phase 2	Phase 3
<p>Mixing and other changes</p> <p>Use sieves of varying meshes during sand and water play: <i>lift stones out of a mixture of stones and water so that the water is left.</i></p>	<p>Mixing and other changes</p> <p>Use magnets or rulers charged with static electricity to separate materials.</p>	<p>Mixing and other changes</p> <p>Separate water and salt through evaporation.</p> <p>Allow sediment to settle in a jar of liquid.</p> <p>Separate oil and water: <i>pour off oil.</i></p>



Exemplars

The following pages outline some examples of appropriate themes and topics that may be explored with students with moderate general learning disabilities. A unit of work on forces is described and a sample of a student self-assessment profile is included. Some suggestions for resources are also included.

No.	Exemplar title	Page
1.	A thematic approach to planning in SESE: Spring	49
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Exemplar 1: SESE: Science

A thematic approach to planning in SESE: Spring

Geographical aspects	Historical aspects	Scientific aspects
<p>The local natural environment</p> <ul style="list-style-type: none"> Explore and discuss some aspects of the physical and natural environments in the immediate locality of the school. <p>Weather</p> <ul style="list-style-type: none"> Observe and discuss a variety of weather conditions, using simple vocabulary: <ul style="list-style-type: none"> - <i>rainy/sunny/foggy days.</i> Record weather observations using a weather chart or diary. Discuss the suitability of different kinds of clothes for different weather conditions. <p>People at work</p> <ul style="list-style-type: none"> Discuss the work of the farmer during spring. 	<p>Time and chronology</p> <ul style="list-style-type: none"> Become aware of and discuss the sequence of events in simple stories: <ul style="list-style-type: none"> - <i>the days of the week</i> - <i>the seasons</i> - <i>the life cycle of the frog, sheep, a flower.</i> Record sequences of events using simple time lines: <ul style="list-style-type: none"> - <i>the growth of a broad bean.</i> Listen to some stories associated with the traditions and customs of spring: <ul style="list-style-type: none"> - <i>St Brigid and the St Brigid's cross</i> - <i>St Patrick.</i> 	<p>Plants and animals</p> <ul style="list-style-type: none"> Observe, discuss and identify a variety of plants and animals in different habitats in the immediate environment: <ul style="list-style-type: none"> - <i>common trees and other plants</i> - <i>common birds observed in trees and hedges/visiting the bird table.</i> Sort or group living things into sets: <ul style="list-style-type: none"> - <i>Spring flowers, leaves, trees, birds, vegetables.</i> Recognise and identify the external parts of living things: <ul style="list-style-type: none"> - <i>flower, leaf, stem, root</i> - <i>tail, leg, beak, feathers.</i> Observe growth and change in some living things: <ul style="list-style-type: none"> - <i>bulbs and seeds planted in the classroom.</i> Explore the conditions for growth of bulbs and seeds: <ul style="list-style-type: none"> - <i>in soil, damp moss, wet paper.</i> Become aware that animals and plants undergo seasonal changes in appearance or behaviour: <ul style="list-style-type: none"> - <i>the appearance of buds and shoots.</i> <p>Other curricular areas</p> <p>SPHE</p> <ul style="list-style-type: none"> Growing and changing <p>Mathematics</p> <ul style="list-style-type: none"> Number, measurement <p>Communication and language</p> <ul style="list-style-type: none"> Development of new vocabulary

Exemplar 2: SESE: Science

A thematic approach to planning in SESE: Our school

History	Geography	Science	Other curricular areas	
<p>Explore and record significant events and changes over time: <i>new buildings, playgrounds.</i></p> <p>Collect and examine simple evidence: <i>photographs of students when younger, old school photographs.</i></p> <p>Listen to oral evidence from past students.</p> <p>Compare photographs, clothes worn or toys used at different ages: <i>things that have changed/ stayed the same.</i></p> <p>Role-play of lessons long ago.</p>	<p>Physical environment: <i>local weather, landmarks, habitats.</i></p> <p>Human environments: <i>journey to and from school, local people, shops, schools, amenities.</i></p> <p>Environmental awareness and care: <i>litter, recycling project.</i></p>	<p>Living things: <i>Plants and animals: habitats, bird life in school grounds: make a bird box, bird table.</i></p> <p>Energy and forces: <i>lighting, heating, playground equipment.</i></p> <p>Materials in use in school: <i>building, furniture.</i></p>	<p>Communication and language</p> <p>Development of listening and communicating skills: <i>listening to stories & folklore, interviews.</i></p> <p>Development of new vocabulary.</p>	<p>PE</p> <p>Playground games, old and new.</p> <p>Rules for safety.</p>
			<p>Mathematics</p> <p>Number, measurement: <i>number of classes, students, teachers.</i></p> <p>Estimation and measurement: <i>distances and heights.</i></p> <p>Shape: <i>windows, doors, tables.</i></p> <p>Graphs: <i>numbers of students, classes, teachers.</i></p>	<p>Visual arts</p> <p>Displays in topic area.</p> <p>Models of school now and long ago.</p>
				<p>Music</p> <p>Street rhymes and skipping songs: <i>Dusty bluebells.</i></p>

Exemplar 3: SESE: Science

Topic: Insects

Learning outcomes	Resources
<p>Understanding and relating to the world</p> <ul style="list-style-type: none"> – to develop observational skills and identify main parts of the body: <i>wings, legs, body, head, colour, size</i> – to look closely at similarities and differences, pattern and change, different insects – to find out where insects live – to find out what they eat – to observe and talk about movements and change in insects <p>Communication and language</p> <ul style="list-style-type: none"> – to talk about insects using symbol, sign or word – to listen to stories about insects – to use information books – to label drawings, using a variety of materials, for example magnetic letters, sandpaper letters, pen and paper – to copy or trace labels written by an adult – to write his/her own name and the names of insects on drawings (as above) <p>Mathematics</p> <ul style="list-style-type: none"> – to count spots on a ladybird – to count wings, legs or rings on other insects – to compare size (ant and spider). 	<ul style="list-style-type: none"> • Collection of insects indoors, real and plastic • Hand and finger puppets, for example caterpillar, which changes into butterfly • Designated area outside with insect-attracting plants, for example buddleia plants • Displays of magnifiers, containers, a large bug viewer, etc. • Butterfly garden: specialised kit which can be bought containing live caterpillars • Ladybird feeder • Wormery • Displays of pictures of insects, stories and information books—life cycle posters • Displays of models made by students • Games and jigsaw puzzles, for example Incy Wincy Spider game.

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Activities and experiences

- Read Eric Carle's *The Very Hungry Caterpillar*, *The Bad-Tempered Ladybird*, *The Very Quiet Cricket*.
- Observe insects in natural settings and for short periods of time in the class.
- Handle and examine insects with care.
- Identify insects in information books (real-life photographs).
- Construct a woodlice chamber.
- Feed the caterpillars (using the butterfly kit) and observe the process of metamorphosis.
- Make simple drawings or collage pictures of insects, etc.
- Make insects, for example a spider or ladybirds, from Plasticine.

Exemplar 4: **SESE: Science****Topic:** A unit of work based on forces

Strand unit from the curriculum	Development of the unit
<p>The student should be enabled to</p> <ul style="list-style-type: none"> – explore, through informal activity with toys, forces such as pushing and pulling – explore how the shape of objects can be changed by squashing, pulling, and other forces – investigate how forces act on objects: <i>group objects that will sink/float.</i> 	<p>The students should learn that</p> <ul style="list-style-type: none"> – a push is needed to make things move – a pull can also make things move – pushes and pulls can speed up or stop a moving object (although a barrier is the most effective way of stopping something) – squashing, squeezing, stretching, and twisting involve pushes and pulls and can change the shape of an object, for example squeezing a sponge or squashing a can – some things float and some things sink in water – the material from which an object is made is important and affects buoyancy – objects can be grouped into floaters and sinkers – some things float high in the water – some things float and sink, for example a sponge, a container, Plasticine.

Exemplar 4: SESE: Science

Working scientifically

Students should be enabled to

Observe

- Observe characteristics of objects to be tested:
 - it is big, small, light, heavy
 - it is squashy, stretchy
 - it is made of wood/plastic/metal.

Question

- Ask questions such as:
 - What happens when you put x in the water?
 - Does all wood float?
 - What makes an object move?

Predict

- Guess what will happen next:
 - I think it will float/sink
 - I think it will go faster.

Sort and classify

- Sort and group objects:
 - sets of objects that float/sink
 - sets of things that can be squashed.

Investigate and experiment

- Carry out simple investigations on floating and sinking:
 - test which objects float and sink in water:
Can you make the floaters sink?
 - investigate ways of moving a large, heavy box.

Estimate and measure

- Describe weight and length:
 - this object is heavier/lighter than the last one we tested
 - when I gave it a push it went as far as the door.

Record and communicate

- Record findings pictorially:
 - charts, posters, photos of things that sink/float.
- Record by making a set of floaters/sinkers.
- Describe observations orally:
 - to make the table move you push/pull it.

Exemplar 4: SESE: Science

Methodology

Among the methods and teaching approaches that may be used are

- discovery learning
- teacher-guided learning
- prompting, verbal and physical.

Assessment

Among the techniques that may be used are

- teacher observation
 - *outcomes of student-student and teacher-student discussions*
 - *willingness to try different ideas*
 - *willingness to work with others*
- teacher-designed tasks
 - *pictures/photos/worksheets*
- portfolio assessment
 - *samples of recording and communication completed by students*
 - *annotated drawings of work.*

Exemplar 5: SESE: Science

Topic: Colour and light: sample student profile

I have looked at my eyes.	
I can recognise colours in the environment.	
I have looked at colours in nature.	
I have played with shadows.	
I can identify colour and light.	
I can recognise and name some colours.	
I recognise primary/secondary colours.	
I have experimented with transparent and opaque materials.	
I have made a rainbow.	
I have seen the effect of light on plants.	
I have made a coloured spinner.	
I have looked at light sources (sun, lamp, candle, etc.)	
I have mixed colours using paint.	
I have made colours lighter and darker.	
I have made a kaleidoscope/periscope.	
I have made light (lit a candle, used a bulb and battery).	
I have looked at mirrors and reflectors.	
I know the dangers of looking at the sun.	

Exemplar 6: SESE: Science

Topic: Exploring materials: water play

Level: Early learner

Learning outcomes

Scientific investigation

- Promote at first hand the exploration of materials.
- Encourage the sorting, grouping and describing of materials and events in their immediate environment, using their senses and noting similarities and differences.

Physical processes

- Experience forces that push, pull, and make things move.
- Have early experiences of devices, for example toys.
- Link the feeling of hot and cold in water.

Activities

- Students play with water in large water tray, pouring water in and out of various vessels: *plastic bottles, beakers, colanders, funnels, and bowls.*
- Play with a hosepipe, sprinklers, a watering can (different roses), spray guns, and bicycle pumps.
- Add warm and cold water.
- Add food colouring to water.
- Make bubbles, blow bubbles through tubes, blow bubbles under water.
- Make objects float and sink.
- Play with assorted mechanical toys that move about in the water.

Exemplar 7: SESE: Science

Theme: Magnetism

Energy and forces

Learning outcomes	Resources
<p>Objective</p> <ul style="list-style-type: none"> The students should be enabled to use magnets of different shapes and sizes in purposeful play, to explore their effects on different materials. <p>Background</p> <ul style="list-style-type: none"> When we bring magnets near magnetic materials, we can experience the pull of the magnet. 	<ul style="list-style-type: none"> Large and small items, for example a toy car, a small plastic bottle, metal spoons, a bottle opener, a variety of bottle tops, plastic bricks, a selection of keys, jigsaw pieces, card/wood, a soft toy, paper clips, a selection of coins, etc. Two trays or hoops for classifying items A selection of magnets (disc, bar, ring, horseshoe, magnetic wands, magnetic marbles).

Introduction

→ Discuss with the group the items on the table, how they are alike/unlike. Talk about how they could move the objects. Teacher could introduce the wand magnets and allow students to describe size, shape, colour, how they feel, what they might be used for, etc.

Development

■ Students are asked to guess what will happen when the wand magnet is placed near an item. They take turns to place a wand magnet near the item of their choice. They are encouraged to describe what happened, what they saw, felt, etc. You may get the following words: *stick, pull, move, jump*. The students could be encouraged to name the wand magnet. The other magnets may be introduced and students continue to explore as with a wand magnet.

Follow-up activities

→ Students classify materials by placing an item that the magnet picked up/did not pick up into the appropriate hoop/tray.

Indian rope trick

→ As a fun ending to this lesson, the following 'trick' will capture the students' attention. A paper clip could be tied to a piece of string and Blu Tack used to attach the other end of the string to the side of a desk. The paper clip should be hanging down. A magnet could be used to attract the paper clip up in the air without touching it.

Exemplar 7: SESE: Science

Follow-up activities

The fishing game

- **Materials:** a thin piece of garden cane, thin card, paper clips, a large shoe box, string, scissors, and small magnets.
- Fish shapes could be cut out. They could be numbered and/or coloured and paper clips placed on each one. A large box could be decorated to make it look like a fish tank and the fish placed inside. The small magnets should be attached to the cane using the string. The students take turns to use the magnets to pull a fish out of the box, by colour, number, size, etc.

Cork/polystyrene boats

- The students could make boats from small pieces of cork or polystyrene, a toothpick, and material for a sail. Some boats could have thumbtacks/paper clips on the bottom. The boats could be placed in margarine containers with water, the students could observe if there is any movement when a magnet is placed near a container. The students could find out which boats can be controlled by magnets.

Attracting and repelling activities

- Bar magnets could be strapped with Sellotape on to the top of toy cars. If attracted to each other, the cars will 'crash', and if repelled by each other, the cars will 'move away' from each other.

Content areas	Resources
Materials	Materials <ul style="list-style-type: none">• sand, paint, pasta, dough, shaving foam, shells, stones, feathers, clay• funnels, jugs, corks• polystyrene sheets, blocks, balls, and beads• sieves, plastic, various meshes• samples of different fabrics and fibres• food colourings• samples of soaps and detergents• scented candles or soap• joss-sticks• dyes• materials from the kitchen or bathroom (sugar, salt, soda, chalk, oil, soda water, tea, coffee, bath salts, flour)• pebbles, stones, bricks, and rocks• samples of different metals• samples of different woods• samples of different types of paper (blotting paper, tissue paper, paper towels, waxed paper, newsprint)

General resources to support the science curriculum

<p>Indoors</p> <p>Exploring materials</p> <ul style="list-style-type: none"> Water, sand, soil, sawdust, clay, flour, Play-doh, Plasticine, salt Liquids: <i>paint, oil, vinegar, liquid soap, glycerine</i> Cooking ingredients. 	<p>Outdoors</p> <p>Exploring materials</p> <ul style="list-style-type: none"> Wood, bark, stones, gravel, soil, sand water: <i>rain, snow, puddles, frost.</i>
<p>Indoors</p> <p>Construction</p> <ul style="list-style-type: none"> A variety of construction kits, bricks and blocks of different shapes and sizes, pulleys, cogs 	<p>Outdoors</p> <p>Construction</p> <ul style="list-style-type: none"> Crates, tubes, barrels, planks, blocks, pulleys, tyres, etc.
<p>Indoors</p> <p>Junk</p> <ul style="list-style-type: none"> Containers of different materials and sizes, for example cardboard boxes, plastic pots A variety of paper and fabrics, etc. A variety of containers with/without lids. 	<p>Outdoors</p> <p>Work bench</p> <ul style="list-style-type: none"> Tools, sandpaper, wood offcuts, nails, screws, washers, bottle tops Objects to explore and take apart, for example telephones, clocks.
<p>Indoors</p> <p>Moving toys</p> <ul style="list-style-type: none"> A variety of small wheeled vehicles, trains, wind-up toys, toys that move in different ways, for example by pushing, pulling, blowing, springs, batteries 	<p>Outdoors</p> <p>Large moving toys</p> <ul style="list-style-type: none"> Wheelbarrows, bikes, large trucks, scooters, for example kites, windmills, etc.
<p>Indoors</p> <p>Living things</p> <ul style="list-style-type: none"> Keeping plants and animals indoors Mini-beasts: <i>snails, caterpillars</i> Plants: <i>seeds, bulbs.</i> 	<p>Outdoors</p> <p>Environmental area</p> <ul style="list-style-type: none"> Tubs and pots, flowers, bushes, trees, logs, stones, a pond.

Indoors	Outdoors
<p>Collections</p> <ul style="list-style-type: none"> ■ Materials: metal, wood, plastic, etc. and objects with different properties, for example rough/smooth, stretchy or bendy, magnetic, float/sink ■ Natural materials: fruit, seeds, shells, stones, feathers ■ Fabric, threads and strings 	<p>Local environment</p> <ul style="list-style-type: none"> ■ Gardens, parks, trees, flower beds, buildings, building sites, bridges, ponds, puddles

Indoors	Outdoors
<p>Equipment</p> <ul style="list-style-type: none"> ■ Magnifying glasses, measuring equipment, for example scales, spring balances, rules, stop-watches, egg timers, a thermometer, a measuring jug 	<p>Climbing equipment</p> <ul style="list-style-type: none"> ■ Ladders, ropes, swings, climbing frames, a see-saw

Indoors	Outdoors
<p>Sand tray</p> <ul style="list-style-type: none"> ■ Colanders, sieves, funnels, sand wheel, forks, trowels, containers of different sizes, moulds, etc. 	<p>Water tray</p> <ul style="list-style-type: none"> ■ A pump, a water wheel, plastic piping, containers, funnels, objects made of different materials, hollow and solid objects, boats

Indoors	Outdoors
<p>Resources specific to science</p> <ul style="list-style-type: none"> ■ Magnets, batteries, bulbs, bulb-holders, mirrors, prisms, lenses, colour filters, torches, a kaleidoscope, reflectors, etc. 	