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# SCIENCE POLICY & PROGRESSION PATHWAY PROGRAMME

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## Rationale

We live in an increasingly scientific and technological age where children need to acquire the knowledge, skills and attitudes to prepare them for life in the 21st century. The teaching of science develops in children an interest and curiosity about the world in which they live and fosters in them a respect for the environment. Through A Curriculum for Excellence, Science provides a range of different contexts for learning which draw on important aspects of everyday life and work. Learning in the sciences will enable children to:

- develop curiosity and understanding of the environment
- develop the skills of scientific inquiry and investigation using practical techniques
- recognise the impact the sciences make on my life, the lives of others, the environment and on society
- recognise the role of creativity and inventiveness in the development of the sciences
- develop an understanding of the Earth's resources and the need for responsible use of them
- express opinions and make decisions on social, moral, ethical, economic and environmental issues based upon sound understanding
- develop as a scientifically literate citizen with a lifelong interest in the sciences
- develop skills for learning, life and work and establish the foundation for more advanced learning and future careers in the sciences and the technologies.

## Skills in Science

Although investigating is an activity that crosses the curriculum, it has special significance for science. Firsthand investigations are central to the way in which children develop an understanding of science, providing opportunities to plan fair tests, make observations, develop hypotheses, predict, collect evidence, research, survey and discuss. Through such means, opportunities arise to deduce, calculate, draw conclusions from evidence, make judgements and debate important issues.

### **Skills Development**

Early	First	Second P5/6	Second P7
<p>*Simple investigations leading to observations and recording in visual ways.</p> <p>*Oral reports given, and questions answered.</p>	<p>*Plan simple, fair investigations with suggestions of what might happen.</p> <p>* Write short reports on investigations.</p> <p>*Answering questions re. findings.</p> <p>*Recognise simple relationships and draw conclusions.</p>	<p>*Suggest a question for exploration and decide how to find an answer.</p> <p>*Make predictions about the outcome.</p> <p>*Suggest some ways to make a fair test.</p> <p>*Select appropriate measuring devices or make appropriate observations.</p> <p>*Record findings in a range of ways.</p>	<p>*Identifying 2 or 3 questions to investigate and plan a fair test changing one variable.</p> <p>*Make a series of accurate measurements.</p> <p>*Select an appropriate way to record findings.</p> <p>*Make an organised report using appropriate illustrations.</p> <p>*Make explanations and draw conclusions from</p>

		<p>*Write short reports on investigations – key points being clear.</p> <p>*Explain what happened using scientific knowledge.</p> <p>*Make links to original predictions.</p>	<p>findings using scientific knowledge.</p> <p>*Suggest improvements to method used.</p>
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Appendix 2 gives more detail on the skills expected at each level.

The main approaches to science inquiry are:

- observing and exploring – careful observation of how something behaves, looking for changes over time and exploring ‘what happens if...?’ and ‘how could I...?’ questions
- classifying – through identifying key characteristics
- fair testing – through identifying all possible variables and then changing only one while controlling all others
- finding an association – linking two variables to determine relationships
- Investigating and research.

Children and young people develop a range of analytical thinking skills in order to make sense of scientific evidence and concepts. This involves them:

- being open to new ideas and linking and applying learning
- thinking creatively and critically
- developing skills of reasoning to provide explanations and evaluations supported by evidence or justifications
- making predictions, generalisations and deductions
- drawing conclusions based on reliable scientific evidence.

## **Framework of Study**

Science is taught through both interdisciplinary topics and discrete Science lessons.

The key concepts of Science have been clearly identified in A Curriculum for Excellence using five organisers:

- Planet Earth
- Forces, electricity and waves
- Biological systems
- Materials
- Topical science.

Programmes of Study will be taught through a balance of teacher exposition, teacher led enquiry and pupil led enquiry, considering the importance of firsthand investigation.

Progression in knowledge and understanding can be demonstrated, for example, through children and young people:

- providing more detailed descriptions and explanations of increasingly complex scientific contexts and concepts
- using a wider range of scientific language, formulae and equations
- presenting, analysing and interpreting more complex evidence to draw conclusions and make sense of scientific ideas.

They will demonstrate their progress through investigations, inquiries and challenges, and through how well they apply scientific skills in increasingly complex learning situations. For example, investigations and inquiries will become more evaluative, deal with an increasing range and complexity of variables, and involve collecting and analysing increasingly complex information.

Information relating to learning in science should form part of each pupil's individual learning log.

The Education Scotland document 'Concept development in the Sciences', can be used alongside the experiences and outcomes to plan for the development of learners' scientific knowledge, understanding and skills. It describes progression in the development of knowledge and understanding of some of the scientific concepts which are contained within the experiences and outcomes as children and young people learn within a level and then move on to the next.

## **Assessment in Science**

Assessment in the sciences will focus on:

- knowledge and understanding of key scientific concepts in the living, material and physical world,
- inquiry and investigative skills,
- scientific analytical and thinking skills,
- scientific literacy

Assessment should identify the extent to which pupils can apply these skills in their learning and their daily lives. For example:

How well do they contribute to investigations and experiments?

Are they developing the capacity to engage with and complete tasks and assignments?

To what extent do they recognise the impact the sciences make on their lives, on the lives of others, on the environment and on society?

Assessment activities will include:

- Observing children at work, individually, in pairs, in a group, and in classes.
- Questioning, talking and listening to children
- Considering work/materials / investigations produced by children together with discussion about this with them.
- End of unit assessment tests or assessments.
- Encouragement of pupils' self-assessment to promote independent learning

How to use this programme:

- Choose a bundle of Experiences and Outcomes and choose a topic (along with your class) to study. You should cover one bundle from each organiser per term.
- Highlight bundle and relevant success criteria on programme
- Identify relevant learning experiences, with breadth/challenge/application/differentiation, and assessment and add to planner sheet 2.
- Use Benchmarks in Appendix 1 to inform achievement of a level for pupils.
- Record sheets in Appendix 3 can be used to monitor pupils' progress over the course of the year.
- In composite classes, use Hand On sheets to inform which bundles have been/are yet to be covered.

## Early Level Bundles & Success Criteria

	<u>Year 1</u>	<u>Year 2</u>	<u>Year 3</u>
<b>Planet Earth</b>	<p><b>Bundle E1 (Living Things)</b> <i>I have observed living things in the environment over time and am becoming aware of how they depend on each other. SCN 0-01a</i></p> <p>I can recognise seasonal changes.</p> <p>I can name the seasons.</p> <p>I can sort objects as living and non-living.</p> <p>I can name a variety of animals and insects.</p> <p>I can sort animals by physical characteristics.</p> <p>I can match animals to their habitat and home.</p> <p>I can recognise mothers and their young.</p> <p>I can name the young of familiar species.</p> <p>I can discuss ways of looking after young and animals in my environment.</p> <p>I am becoming aware of the sources of my food.</p> <p>I can sequence the growth stages in the lifecycle of frog/ caterpillar etc.</p>	<p><b>Bundle E5</b> <b>(Growing and Looking after plants.)</b> <i>I have helped to grow plants and can name their basic parts. I can talk about how they grow and what I need to do to look after them. SCN 0-03a</i></p> <p>I can follow verbal/pictorial instructions to plant seeds indoors and outdoors.</p> <p>I can help to look after plants and living things in my local environment.</p> <p>I can name / recognise some familiar trees and plants.</p> <p>I can recognise / name leaf, stem, root and flower.</p> <p>I can label leaf, stem, root and flower.</p> <p>I can observe changes in plants being investigated.</p> <p>I realise that water, soil, light and heat are necessary for plants to grow.</p>	<p><b>Bundle E9</b> <b>(Day/Night, Space)</b> <i>I have experienced the wonder of looking at the vastness of the sky, and can recognise the sun, moon and stars and link them to daily patterns of life. SCN 0-06a</i></p> <p>I can tell what to do at different times of the day.</p> <p>I can recognise light and dark and relate to day and night.</p> <p>I can name things in the daytime and night time sky.</p> <p>I know the sun gives heat and light.</p> <p>I know the earth turns.</p> <p>I can describe different shapes of the moon.</p> <p>I can draw different shapes of the moon.</p> <p>I can recognise and name some of the planets.</p> <p>I can draw the pattern of a constellation.</p> <p>I know a rocket travels in space and astronauts have to wear special clothes.</p>
<b>Forces, Electricity and Waves</b>	<p><b>Bundle 2 (Toys/Forces)</b> <i>I have experienced, used and described a wide range of toys and common appliances. I can say 'what makes it go' and say what they do when they work. SCN 0-04a</i></p> <p><i>Through everyday experiences and play with a variety of toys and other objects, I can recognise simple types of forces and describe their effects. SCN 0-07a</i></p> <p>I can use a wide variety of toys correctly during play.</p> <p>I can recognise / name toys and common appliances.</p> <p>I can demonstrate ways of making things move.</p>	<p><b>Bundle 6 (Electricity)</b> <i>I know how to stay safe when using electricity. I have helped to make a display to show the importance of electricity in our daily lives. SCN 0-09a</i></p> <p>I am aware of when electricity can be dangerous.</p> <p>I can follow the class safety rules</p> <p>I can identify items that use electricity</p> <p>I am becoming aware of how much I depend on electricity in my everyday life</p> <p>I can suggest a way of saving electricity</p>	<p><b>Bundle 10 (Sound)</b> <i>Through play, I have explored a variety of ways of making sounds. SCN 0-11a</i></p> <p>I can make sounds using: My voice, body parts, everyday items, percussion instruments, electronic instruments.</p> <p>I can identify and reproduce: loud/soft sounds: noisy/quiet sounds, fast/slow sounds.</p> <p>I can make a junk model instrument.</p> <p>I can identify the type of sound it makes.</p>

<p><b><u>Forces, Electricity and Waves (cont.)</u></b></p>	<p>I am becoming aware that I can make things move.</p> <p>I am becoming aware that different actions move things in different ways.</p> <p>I can name different types of energy – electricity, battery, petrol.</p> <p>I can sort appliances by the types of energy used.</p>		
<p><b><u>Biological systems</u></b></p>	<p><b><u>Bundle 3 (Body)</u></b>  <i>I am aware of my growing body and I am learning the correct names for its different parts and how they work. HWB 0-47b</i></p> <p><i>I recognise that we have similarities and differences but are all unique. HWB 0-47a</i></p> <p>I can sort, match and compare by appearance.</p> <p>I can find similarities and differences between myself and others.</p> <p>I can explain how I am the same or different from others.</p> <p>I can tell others that babies grow.</p> <p>I can tell others that I was a baby and that I've grown.</p> <p>I can describe how my body has grown since I was a baby.</p> <p>I can point to some named body parts and describe how I use them.</p>	<p><b><u>Bundle 7(The Senses)</u></b>  <i>I can identify my senses and use them to explore the world around me. SCN 0-12a</i></p> <p><u>Hearing:</u>  I know that I listen with my ears.</p> <p>I can recognise a sound and take the appropriate action.</p> <p>I can recognise and name a sound.</p> <p>I can listen to and identify different sounds; listening walk, listening games e.g. animal sounds, traffic sounds, outdoor sounds: listening to sounds giving instruction e.g. phone, fire bell.</p> <p><u>Sight</u>  I know that I see with my eyes</p> <p>I can recognise : Colours, shapes and things in my environment through indoor and outdoor walks, games, interest table, photos, show and tell.</p> <p>I know a magnifying glass etc makes things easier for me to see</p> <p>I can take a photo of a chosen object</p> <p><u>Smell</u>  I know that I smell with my nose</p> <p>I can distinguish different smells</p> <p>I can identify different smells</p> <p>I can express an opinion on different smells</p> <p><u>Taste</u></p>	<p><b><u>Bundle 11 (Keeping Healthy)</u></b>  <i>I am developing my understanding of the human body and can use this to maintain and improve my health and wellbeing. HWB 0-15a, HWB 0-33a, HWB 0-48a</i></p> <p>I can independently perform a variety of personal hygiene practices (including demonstrating effective hand-washing)</p> <p>I can explain to others the importance of keeping myself and immediate environment clean, safe and healthy</p> <p>I can show a few ways to look after my body</p> <p>I can tell you different ways that I can look after my body</p> <p>I can list others that help me look after my body</p>

		<p>I know that I taste with my tongue.</p> <p>I can distinguish different tastes.</p> <p>I can identify different tastes.</p> <p>I can express an opinion on different taste at snack time and from tasting table.</p>	
<p><b>Materials</b></p>	<p><b>Bundle 4</b> <b>(Materials and Conservation)</b> <i>Through creative play, I explore different materials and can share my reasoning for selecting materials for different purposes. <a href="#">SCN 0-15a</a></i></p> <p>I can name some of the materials I have used.</p> <p>I can construct a model using different materials.</p> <p>I can change the properties of some materials e.g. sand, dough using water.</p> <p>I can explain why I have chosen a material to build and stick my model.</p> <p>I can name common material used for my clothes.</p> <p>I can select a materials appropriate for a given purpose.</p> <p>I can discuss choice of clothes for different weather conditions and investigate some properties of these materials e.g. warm, cool, waterproof</p>	<p><b>Bundle 8</b> <b>(Water and climate)</b> <i>By investigating how water can change from one form to another, I can relate my findings to everyday experiences. <a href="#">SCN 0-05a</a></i></p> <p>I can contribute and take some responsibility for looking after nature and my environment.</p> <p>I am careful not to waste materials such as paper/ glue etc.</p> <p>I know and can sort materials that can be recycled.</p> <p>I can give simple examples of saving energy – turn off lights, taps, re-usable bags, cycle or walk instead of using the car.</p>	<p><b>Bundle 12</b> <b>(Mixing and Dissolving)</b> <i>I can make and test predictions about solids dissolving in water and can relate my findings to the world around me.</i></p> <p>I can recognise hot and cold.</p> <p>I can recognise and discuss changes in water when it melts freezes and boils.</p> <p>I am aware of the need to keep safe around hot water.</p> <p>I can observe water ‘disappearing’ from puddles and indoors.</p> <p>I can relate seasons to changes in temperature.</p>

I can talk about science stories to develop my understanding of science and the world around me. (Topical Science) I can introduce an appropriate topic to discuss. I can contribute to a group/class discussion. [SCN 0-20a](#)

## First Level Bundles & Success Criteria

	Year 1	Year 2	Year 3
<b>Planet Earth</b>	<p><b>Bundle 1 (Living Things)</b>  <i>I can distinguish between living and non living things. I can sort living things into groups and explain my decisions. <b>SCN 1-01a</b></i></p> <p><i>By comparing generations of families of humans, plants and animals, I can begin to understand how characteristics are inherited. <b>SCN 1-14a</b></i>  <b>HWB 1-47a</b></p> <p><i>I can explore examples of food chains and show an appreciation of how animals and plants depend on each other for food. <b>SCN 1-02a *</b></i></p> <p>I can explain the difference between living &amp; non-living things. Living things involve: respiration, movement, reproduction, feeding, excretion, growth &amp; sensitivity. Non-living things do not.</p> <p>I can sort living things into plant &amp; animal groups using a variety of features including hair, fur, scales, wings, feathers, flowering &amp; non-flowering plants.</p> <p>I know genetic information is passed from one generation to the next and can be seen in characteristics such as: - shape of body, colour of eyes, hair etc. and that specific information which corresponds to any given characteristic is called a gene.</p> <p>I know in organisms such as animals and plants one set of genetic material is inherited from each parent; half from the mother, half from the father.</p> <p>I know a family is a group which share the same genetic characteristics. For example, cat family, dog family, human family, flowering plants family</p> <p>In each family group e.g. the cat family there are a large number of different types of cats - cat, tiger,</p>	<p><b>Bundle 5 (Growing &amp; Looking after plants)</b>  <i>I can help to design experiments to find out what plants need in order to grow and develop. I can observe and record my findings and from what I have learned I can grow healthy plants in school. <b>SCN 1-03a</b></i></p> <p><i>I can explore examples of food chains and show an appreciation of how animals and plants depend on each other for food. <b>SCN 1-02a *</b></i>  <b>HWB 1-50a</b></p> <p>I can describe what seeds/ plants need to germinate/ grow i.e. water, warmth, air &amp; stored food/ light, water and air.</p> <p>I know that the Sun is the main source of energy and</p> <p>I am aware that energy can be taken in by green plants. They are the ultimate source of food for virtually all living things.</p> <p>I can use the terms producer/ consumer, predator/hunter and prey/hunted.</p> <p>I know about, can use and can construct a simple food chain and can identify the structure of a food chain in a specific habitat.</p>	<p><b>Bundle 9 (Day/Night, Space)</b>  <i>By safely observing and recording the sun and moon at various times, I can describe their patterns of movement and changes over time. I can relate these to the length of a day, a month and a year. <b>SCN 1-06a</b></i></p> <p><i>I am aware of different types of energy around me and can show their importance to everyday life and my survival. <b>SCN 1-04a *</b></i></p> <p>I know about &amp; can explain the following:</p> <p>Identify the Earth, Sun &amp; moon and be aware of their relative sizes.</p> <p>The Earth is the planet we live on which circles the Sun.</p> <p>The Moon is a large rock which circles round the Earth.</p> <p>During the day the Sun gives us light energy. At night the light from the Sun does not reach us, so it is dark.</p> <p>Know it is day time in the part of the Earth facing the Sun, and night time in the part of the Earth away from the Sun.</p> <p>The sun gives us heat and light energy</p> <p>The Earth is round and it spins around an imaginary line through its centre called the <b>AXIS</b>.</p> <p>The time taken for one complete spin is 24 hours.</p> <p>The Earth takes 1 year to move round the Sun</p> <p>The Moon takes 1 month to move round the Earth</p> <p>As the Earth moves round the Sun we get the seasons</p>

<p><b><u>Planet Earth</u></b> <b><u>(cont.)</u></b></p>	<p>lion, and puma. This is known as variation.</p>		<p>The seasons are called Spring, Summer, Autumn and Winter</p> <p>In summer, the days are longer and usually warmer.</p> <p>In winter, the days are shorter and usually cooler</p> <p>Space Observation</p> <p>I know the moon appears to have different shapes in the sky at different times.</p> <p>I know the sun appears in a different position of the sky during the day.</p> <p>I understand what a shadow is and am aware they can be used to tell the approximate time of the day.</p>
<p><b><u>Forces, Electricity and Waves</u></b></p> <p><b><u>Forces, Electricity and Waves</u></b> <b><u>(cont.)</u></b></p>	<p><b><u>Bundle 2 (Toys/Forces)</u></b> <i>By investigating forces on toys and other objects, I can predict the effect on the shape or motion of objects. <b>SCN 1-07a</b></i></p> <p><i>By exploring the forces exerted by magnets on other magnets and magnetic materials, I can contribute to the design of a game. <b>SCN 1-08a</b></i></p> <p>I can describe forces which can change the shape if some materials – twisting, rolling, bending, squeezing, stretching, blowing.</p> <p>I know if a push &amp; pull are equal to one another there is no movement (balanced force)</p> <p><b><u>Forces &amp; Speed</u></b></p> <p>I can describe the impact of a force on a moving object – may change the speed, direction, distance or shape.</p> <p>I know about friction and that this causes moving objects to slow down.</p> <p><b><u>Force at a Distance</u></b> I know &amp; can explain the following:</p> <p>Magnets exert a force</p> <p>Magnets attract certain materials - iron and iron alloys</p> <p>Magnets have a north pole and a south pole</p>	<p><b><u>Bundle 6 (Electricity)</u></b> <i>I can describe an electrical circuit as a continuous loop of conducting materials. I can combine simple components in a series circuit to make a game or model. <b>SCN 1-09a</b></i> <b>TCH 1-14a</b></p> <p><i>I am aware of different types of energy around me and can show their importance to everyday life and my survival. <b>SCN 1-04a *</b></i></p> <p>I can explain about and use batteries.</p> <p>A battery/cell is a portable source of power, it has a positive &amp; negative terminal, it must be connected positive to negative.</p> <p><b><u>Electrical Circuits</u></b> I know and can explain the following:</p> <p>An electric current is a flow of electricity.</p> <p>A complete circuit is required for electricity to flow through conducting materials and the circuit must contain a power source.</p>	<p><b><u>Bundle 10 (Sound)</u></b> <i>By collaborating in experiments on different ways of producing sound from vibrations, I can demonstrate how to change the pitch of the sound. <b>SCN 1-11a</b></i></p> <p>I know sound is caused by vibration in a material.</p> <p>I know that the pitch of a sound is how high or low it is.</p> <p>I know that the greater the vibrations the higher the pitch.</p> <p>I know that sounds can be made higher by altering the tightness, length, width or thickness or other physical characteristic of the sound source.</p> <p>I can collaborate with others in experiments to develop my understanding of sound.</p> <p>I recognise that loud sounds can be harmful</p>

	<p>The terms attract and repel are used to describe the pushing and pulling effects of magnets</p> <p>Like poles repel</p> <p>Unlike poles attract</p> <p>Magnets have many uses in everyday life</p> <p>I can apply this knowledge to can work with others to design a game.</p>	<p>In a circuit the electricity flows from one terminal to the other via connecting wires and components.</p> <p>A conductor is a material which will allow electricity to flow through it.</p> <p>An insulator is a material which electricity does not flow through easily.</p> <p>Some components of a circuit are a bulb, switch, motor, bell, buzzer and battery.</p> <p>Switches can be used to stop the flow of an electrical current</p> <p>Electrical symbols are used to draw circuit diagrams.</p> <p>I can apply my knowledge of circuits to design and build a game or model.</p> <p>I know that mains electricity is dangerous.</p>	
<p><b><u>Biological Systems</u></b></p> <p><b><u>Biological Systems</u></b> <b><u>(cont.)</u></b></p>	<p><b><u>Bundle 3 (Body)</u></b> <b><i>By researching, I can describe the position and function of the skeleton and major organs of the human body and discuss what I need to do to keep them healthy. SCN 1-12a</i></b> <b><i>HWB 1-15a HWB 1-27a HWB 1-47b</i></b></p> <p>I know that the skeleton gives us support and helps us move and protects important organs</p> <p>I know the brain is found inside the skull; it controls what we do and think.</p> <p>I know the heart is found inside the rib cage. It pumps blood around the body. It is protected by the rib cage.</p> <p>I know the skin covers the whole body and keeps the insides in and the outsides out</p> <p>The can describe the position &amp; function of the lungs, stomach, bladder, liver &amp; kidneys.</p>	<p><b><u>Bundle 7(The Senses)</u></b> <b><i>I have explored my senses and can discuss their reliability and limitations in responding to the environment. SCN 1-12b</i></b></p> <p>I know the five senses are used to detect information.</p> <p>I know the five senses keep us safe.</p> <p>I have taken part in investigations which show the limitations of my senses ie blind-folding, taste test.</p>	<p><b><u>Bundle 11</u></b> <b><u>(Keeping Healthy)</u></b> <b><i>I know the symptoms of some common diseases caused by germs. I can explain how they are spread and discuss how some methods of preventing and treating disease benefit society. SCN 1-13a HWB 1-15a HWB 1-33a HWB 1-48a</i></b></p> <p>I know the symptoms of common diseases.</p> <p>I understand that germs can be transferred from hand to mouth, mouth to hand, hands to food, hand to hand, sneezing and coughing.</p> <p>I know some methods of preventing common diseases eg good hand washing, using handkerchief, medicines.</p> <p>I know that keeping healthy is related to good hygiene.</p>

	<p>I know how to have a healthy lifestyle by choosing a balanced diet, regular exercise, sufficient sleep and making good choices about drugs, alcohol &amp; smoking</p>		<p>I know that everyone has a responsibility for their own hygiene.</p> <p>I am aware that prevention and treatment benefit society by stopping the spread of infection and keeping people in work which means that services</p>
<p><b><u>Materials</u></b></p>	<p><b><u>Bundle 4</u></b> <b><u>(Materials &amp; Conservation)</u></b> <b><i>Through exploring properties and sources of materials, I can choose appropriate materials to solve practical challenges.</i></b> <b>SCN 1-15a</b></p> <p><b><i>Throughout all my learning, I take appropriate action to ensure conservation of materials and resources, considering the impact of my actions on the environment.</i></b> <b>TCH 1-02a SOC1-08a</b></p> <p>I can classify materials as natural or man-made (synthetic).</p> <p>I know a natural material is a material arising from nature.</p> <p>I can discuss examples of natural materials are wood, wool, cotton, stone, sand and metal ores.</p> <p>I know a made or synthetic material is a material that is made by humans.</p> <p>I can discuss examples of 'made' materials are glass, ceramics, polymers (plastics) and alloys.</p> <p>I can identify and discuss the properties of different materials. (Properties might include rigidity, flexibility, hardness, softness, roughness, smoothness, permeability (porous), waterproof</p> <p>I can identify materials and their uses linked to their properties.</p> <p>I can select materials for a particular job based on their properties.</p>	<p><b><u>Bundle 8</u></b> <b><u>(Water &amp; climate)</u></b> <b><i>By investigating how water can change from one form to another, I can relate my findings to everyday experiences.</i></b> <b>SCN 0-05a / SCN 1-05a</b> <b>SOC1-12a/ 1-12b</b></p> <p>I can describe changes in the state of water i.e. boiling, melting, evaporating, condensing &amp; freezing.</p> <p>I can describe the properties of water in each state i.e. liquid flows, solid keeps its shape, gasses go everywhere.</p> <p>I can apply the above to discuss the water cycle – the heat from the sun makes standing water change into water vapour which will fall again as liquid rain.</p>	<p><b><u>Bundle 12</u></b> <b><u>(Mixing &amp; Dissolving)</u></b> <b><i>I can make and test predictions about solids dissolving in water and can relate my findings to the world around me.</i></b> <b>SCN 1-16a HWB 1-30a</b></p> <p>I know that some substances dissolve in water (soluble) and some don't (in-soluble).</p> <p>I know when a substance dissolves the solids seem to disappear.</p> <p>I know when substances dissolve, the liquid formed is clear (can be coloured but is see-through)</p> <p>I can predict which substance will dissolve.</p> <p>I can carry out investigations to find out which substances dissolve.</p> <p>I can identify times around me when things dissolve i.e. sugar in tea, salt in water.</p> <p>I can identify times around me when things don't dissolve i.e. sand on a beach.</p>
<p><b><u>Materials</u></b> <b><u>(cont.)</u></b></p>			

	<p>(Polymers for waterproofing, Glass for windows, cotton for clothing, stone for buildings.)</p> <p>I can explain why thoughtless discarding of rubbish can endanger our environment</p> <p>I can demonstrate knowledge of facilities to help us recycle our waste</p> <p>I can help to take care of the Earth's resources</p> <p>I can explain or show why humans must show responsibility for reducing the impact they have on the environment</p>		
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### Second Level Bundles & Success Criteria

	Year 1	Year 2	Year 3
<p><b>Planet Earth</b></p>	<p><b><i>Bundle 1 (Living things)</i></b>  <i>I can identify and classify examples of living things, past and present, to help me appreciate their diversity. I can relate physical and behavioural characteristics to their survival or extinction. SCN 2-01a TCH 2-02a SOC 2-08a</i></p> <p><i>I can use my knowledge of the interactions and energy flow between plants and animals in ecosystems, food chains and webs. I have contributed to the design or conservation of a wildlife area. SCN 2-02a</i></p> <p><i>By investigating the lifecycles of plants and animals, I can recognise the different stages of their development. SCN 2-14a *</i></p> <p><i>I can use a simple key to identify a living thing.</i></p>	<p><b><i>Bundle 5 (Plants)</i></b>  <i>Through carrying out practical activities and investigations, I can show how plants have benefited society. SCN 2-02b</i></p> <p><i>I have collaborated in the design of an investigation into the effects of fertilisers on the growth of plants. I can express an informed view of the risks and benefits of their use. SCN 2-03a</i></p> <p><i>By investigating the lifecycles of plants and animals, I can recognise the different stages of their development. SCN 2-14a *</i></p> <p>I can name the parts of a plant and their functions – root, stem, leaf, flower</p> <p>I can name the parts of a flower – sepal, petal, stamen, anther, filament, stigma, style, ovary, ovule</p> <p>I can name the reproductive cells in a flower - male – anther, pollen female – ovary, ovule</p>	<p><b><i>Bundle 9 (Inheritance)</i></b>  <i>By exploring the characteristics offspring inherit when living things reproduce, I can distinguish between inherited and non-inherited characteristics. SCN 2-14b</i></p> <p>I know all species have specific methods of reproduction</p> <p>I know the journey from birth to death is known as the life cycle which is specific for each individual species.</p> <p>The study of inherited characteristics is genetics</p> <p>A gene is the unit of inheritance passed from one generation to the next</p> <p>Genes are long strands of DNA.</p> <p>In most living things half DNA is a gene from one parent and half from another.</p> <p>Characteristics such as eye and hair colour, heights, right/left handedness are inherited characteristics.</p>
<p><b>Planet Earth (cont.)</b></p>	<p><i>I can classify into vertebrates and invertebrates and explain my reasons.</i></p> <p><i>I can discuss the 5 vertebrate groups/ 7 invertebrate groups and their characteristics.</i></p>		

**Planet Earth  
(cont.)**

*I can describe how plants and animals have adapted to their environment.*

*I can suggest reasons why some species are extinct or endangered and why others have increased chances of survival e.g. the changing environment/ activities of man.*

*1. I can use the terms primary & secondary producer & consumer.*

*I can use the terms herbivore, carnivore & omnivore.*

*I know and can explain the energy flow within a food chain/web.*

*I understand that a change in one part of a food chain/web will affect other parts of the chain/web.*

*2. I can design a wildlife area and explain my reasoning behind choices made.*

*I can manage and build on an existing wildlife area explain my reasoning behind choices made.*

*I know there are two distinct groups in the animal kingdom - vertebrates and invertebrates*

*I can compare the lifecycles of the five main types of vertebrates*

*fish - spawn*

*bird - eggs which are rigid but fragile*

*amphibian (frog) - spawn and metamorphosis*

*reptile (snake) - leathery shelled eggs*

*mammal - live young*

*I can compare the lifecycles of some invertebrates e.g. butterfly, spider.*

I can describe how pollination occurs when the male cell(pollen) lands on the stigma.

I can describe cross pollination is brought about by insects or wind.

I can describe how fertilisation occurs when the male cell fuses with the female cell

I know this is known as sexual reproduction

I know the fertilized ovule develops into a seed, the ovary ripens to form a fruit.

I know seeds are dispersed by - wind, water, animals (eaten or caught in their coats) and mechanical movement

I know some plants may reproduce asexually (vegetative propagation e.g. runners in strawberry plant)

I know some plants e.g. ferns & mushrooms are non-flowering, they reproduce by spores.

I know a seed is made up of a seed coat, food store and an embryo; a seed needs water, air, a food store and warmth to germinate; a seed develops into a new plant.

I can explain the effects of fertiliser on plant growth.

I know some of the benefits & risks associated with fertilisers.

I can describe the purpose of a fertiliser and what they may contain.

I can explain simply the difference between organic and intensive farming methods.

I can describe how plants have benefited society in many ways i.e. Food, medicine, dyes, paper, fuels, construction, decoration.

Environmental factors e.g. diet can affect how a gene is expressed e.g. weight, intelligence.

Every living thing has its own DNA fingerprint.

***Bundle 9a  
(Day/Night, Space)  
By observing and researching features of our solar system, I can use simple models to communicate my understanding of size, scale, time and relative motion within it. SCN 2-06a***

I know the Sun is a star at the centre of our solar system, and it is a huge ball of hot gas

I can create a model of our solar system, showing the 8 planets in orbit around a central star which we call the Sun.

I can describe the key features of the planets including size, distance from the Sun, length of day, length of year, temperature, materials from which they are predominantly made, number of moons

Any object that orbits a planet is called a satellite. The moon is a natural satellite. I know gravitational force maintains the orbit of planets.

I know about solar & lunar eclipses.

Space Observation

I have observed and can talk about the planets moving across the night sky.

I know the stars are as large as the sun, but appear to be smaller due to the vast distance between them and the Earth,

Cosmology

I know the solar system was formed by the pull of gravity on a large cloud of rotating matter in space.

			<p>I know our Solar System is found in a Galaxy called the Milky Way</p> <p>I can describe other bodies out in space such as; asteroids, meteors, comets, satellites and stars.</p>
<p><b><u>Forces, Electricity and Waves</u></b></p>	<p><b><u>Bundle 2 (Forces)</u></b>  <i>By investigating how friction, including air resistance, affects motion, I can suggest ways to improve efficiency in moving objects. SCN 2-07a</i></p> <p><i>I have collaborated in investigations to compare magnetic, electrostatic and gravitational forces and have explored their practical applications. SCN 2-08a</i></p> <p><i>By investigating floating and sinking of objects in water, I can apply my understanding of buoyancy to solve a practical challenge. SCN 2-08b</i></p> <p>I know that friction is a force caused by one surface rubbing against another.</p> <p>I know that air resistance is a type of friction.</p> <p>I can investigate how to reduce air resistance by streamlining.</p> <p><u>Forces &amp; Speed</u></p> <p>I know about and can describe the following:</p> <p>Friction slows down or stops moving objects</p> <p>Friction tries to prevent objects moving</p> <p>Friction can be useful e.g. tyres gripping on roads/brakes</p> <p>Friction can be a problem e.g. opening a door/ moving parts of a bicycle</p> <p>Friction can be increased by making a surface rougher</p> <p>Friction can be decreased by smoothing the surface or using a lubricant</p> <p>Air resistance is caused by the surface of an object moving through the air.</p>	<p><b><u>Bundle 6 (Electricity)</u></b>  <i>I have used a range of electrical components to help to make a variety of circuits for differing purposes. I can represent my circuit using symbols and describe the transfer of energy around the circuit. (Series/ parallel circuits) SCN 2-09a</i></p> <p><i>By considering examples where energy is conserved, I can identify the energy source, how it is transferred and ways of reducing wasted energy. SCN 2-04a *</i></p> <p><i>To begin to understand how batteries work, I can help to build simple chemical cells using readily-available materials which can be used to make an appliance work. SCN 2-10a HWB 2-16a, HWB 2-17a</i></p> <p>I know a battery (cell) is a portable power source which has a store of chemical energy.</p> <p>I know that chemical energy changes to electrical energy in the wires and then to other forms of energy in the components.</p> <p>I know that batteries (cells) have a positive (+) and a negative (-) terminal and that batteries (cells) must be connected (+) to (-) i.e. pointing in the same direction.</p> <p>I know in a circuit the electricity flows from one terminal to the other via connecting wires and components</p> <p>I can build simple batteries (cells) using readily available materials eg. orange, lemon, etc;</p> <p><u>Electrical Circuits</u></p> <p>I can describe an electric current as a flow of electricity.</p>	<p><b><u>Bundle10 (Waves: Sound &amp; light)</u></b>  <i>Through research on how animals communicate, I can explain how sound vibrations are carried by waves through air, water and other media. SCN 2-11a</i></p> <p><i>By exploring reflections, the formation of shadows and the mixing of coloured lights, I can use my knowledge of the properties of light to show how it can be used in a creative way. SCN 2-11b</i></p> <p>I know sound travels by longitudinal waves and that sound vibrations travel through solid, liquid &amp; gas</p> <p>I know the denser the material, the better the sound travels.</p> <p>I can describe how the voice box works i.e. blowing air over the vocal chords, causing vibrations.</p> <p>I can describe how the ears work i.e. ears detect vibrations allowing us to hear, an ear's main components are:- outer ear, ear canal, ear drum, 3 small bones (hammer, anvil, stirrup), cochlea and nerve to brain</p> <p>I know the outer ear collects the sound waves, the ear drum vibrates, this makes the 3 small bones vibrate in turn and then the liquid in the cochlea. This affects the nerve cells in the cochlea and a message is sent to the brain.</p> <p>I can explain how hearing is limited by the size, position,</p>

**Forces,  
Electricity  
and Waves  
(cont.)**

<p>The amount of air resistance depends on the speed of an object and its surface area.</p> <p>Air resistance can be useful e.g. parachutes</p> <p>Air resistance can be a problem e.g. cars, aeroplanes and trains.</p> <p>Air resistance can be reduced by streamlining.</p> <p><u>Force at a Distance</u></p> <p>I know &amp; can explain the following:</p> <p>All things are pulled towards the centre of the Earth - this pull is caused by gravity</p> <p>Gravitational Force can be measured with a forcemeter or Newtonmeter and is measured in Newtons.</p> <p>Some objects may become electrically charged by rubbing two surfaces together – the charges produce an electrostatic force</p> <p>There are two kinds of static charge – positive &amp; negative</p> <p>Magnets are mostly made from iron or iron alloys</p> <p>Magnets exert a force</p> <p>Magnets attract certain materials</p> <p>Magnets have a North Pole and a South Pole</p> <p>Like poles repel / unlike poles attract</p> <p>Magnets in a compass point North because of the direction of the Earth's magnetic field.</p> <p>Know that magnetic and electrostatic forces can both repel and attract. These forces of attraction and repulsion have a variety of uses in everyday life</p> <p>I can apply this knowledge to can work with others to explore practical applications.</p>	<p>I know a complete circuit is required for electricity to flow: the circuit must contain a power source.</p> <p>I know a series circuit is one where the components are joined one after the other.</p> <p>I know that in a parallel circuit each item is on a different wire.</p> <p>I know what happens to the current (brightness of bulb) when you increase the number of cells in a circuit.</p> <p>I know and can use some components of a circuit: bulb, switch, motor, bell, buzzer, wires and a battery.</p> <p>I can describe how these components transfer energy.</p> <p>I know and can use electrical symbols to denote battery, wire, bulb, switch, motor, bell and buzzer</p> <p>I can use electrical symbols to draw circuit diagrams</p> <p>I know a switch is a gap in a circuit that can be opened or closed to control the flow of electricity</p> <p>I know that materials which are conductors allow electricity to pass through them; e.g. metals</p> <p>I know that materials which are insulators have important applications.</p> <p><u>Electrical Energy</u></p> <p>I know that the higher the voltage the more dangerous it is likely to be i.e. a 1.5v battery is reasonably safe, while the 240v main is not.</p> <p>Materials which are insulators have important applications which prevent electricity from harming living things.</p>	<p>move ability (direction) and efficiency of the ears.</p> <p>I can describe how animals use sounds to communicate.</p> <p><u>Light</u></p> <p>I know that light travels in straight lines.</p> <p>I know that light may be bent by lenses.</p> <p>I understand that light is reflected by shiny surface: curved faces distort the image.</p> <p>I can describe how light travels through transparent and translucent materials.</p> <p>I know that some light is absorbed by opaque materials and some bounces off and travels in all directions.</p> <p>I know that most of the light is reflected back from reflective materials. This is useful in many areas.</p> <p>I know that the image in a mirror is created by the reflected light.</p> <p>I understand the position, shape and size of a shadow depend on where the object is in relation to the light source.</p> <p>I know opaque materials block the light travelling towards them and so a shadow is cast.</p> <p>I know a shadow is not coloured.</p> <p>I have investigated light being broken up to show the colours of the visible spectrum (e.g. as in seeing a rainbow).</p> <p>I can identify the colours (and order) of the rainbow are; red, orange, yellow, green, blue, indigo and violet.</p> <p>I know that we see objects because light rays enter our eyes from that object.</p> <p>I know we recognise the colour of an object because it reflects that light wavelength and absorbs the rest.</p> <p>Coloured filters have an effect on white light.</p> <p>I know that mixing light of different colours produced another colour.</p>
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	<p>I know the main preventable causes of urinary tract infections, kidney disease and kidney stones e.g. personal hygiene, hydration, drug misuse, alcohol misuse and diet</p> <p>I am able to identify the penis, testes, sperm tube/duct, ovaries, egg tube/duct, uterus and vagina as belonging to the human <b>reproductive systems</b></p> <p>I know the function of the reproductive system e.g. make a baby</p> <p>I know some preventable causes of fertility problems e.g. alcohol misuse, anorexia, obesity</p> <p>I know the function of the <b>skeleton</b> support protection and movement</p> <p>I am able to identify the skull, spine, ribcage some bones of the arm and leg</p> <p>I know muscles are attached to bones</p> <p>I know muscles work in pairs to move bone levers</p> <p>I know muscles are attached to bones by strong tendons</p> <p>I know some common problems of bones e.g. arthritis, osteoporosis, breaks and how their incidence can be reduced e.g., calcium in diet, weight-bearing exercise etc. I can make informed decisions to help me maintain a healthy lifestyle.</p>		
<p><b>Materials</b></p>	<p><b><u>Bundle 4 (Energy and Conservation)</u></b>  <i>By considering examples where energy is conserved, I can identify the energy source, how it is transferred and ways of reducing wasted energy.</i>  <b>SCN 2-04a *</b></p> <p><i>Through exploring non-renewable energy sources, I can describe how they are used in Scotland today and express an informed view on the implications for their future use.</i> <b>SCN 2-04b</b></p> <p><i>I can investigate the use and development of renewable and sustainable energy to gain an awareness of their growing</i></p>	<p><b><u>Bundle 8 (Water/ Changing States)</u></b>  <i>I can apply my knowledge of how water changes state to help me understand the processes involved in the water cycle in nature over time.</i>  <b>SCN 2-05a</b></p> <p><i>I have participated in practical activities to separate simple mixtures of substances and can relate my findings to my everyday experience.</i>  <b>SCN 2-16a*</b></p> <p><i>I have investigated different water samples from the environment and explored methods that can be used to clean and conserve water and I am aware of the properties and uses of water.</i> <b>SCN 2-18a</b></p>	<p><b><u>Bundle 12( Mixing and Dissolving)</u></b>  <i>By contributing to investigations into familiar changes in substances to produce other substances, I can describe how their characteristics have changed.</i> <b>SCN 2-15a *</b></p> <p><i>I have participated in practical activities to separate simple mixtures of substances and can relate my findings to my everyday experience.</i>  <b>SCN 2-16a *</b></p> <p><i>By investigating common conditions that increase the amount of substance</i></p>

**Materials  
(cont.)**

*importance in Scotland or beyond. TCH 2-02b*

*Having explored the substances that make up Earth's surface, I can compare some of their characteristics and uses.*

*SCN 2-17a \*, TCH 2-02b, SOC 2-08a*

1 Energy Transfer

I can describe the law of conservation of energy – that energy can be converted from one form to another but cannot be created or destroyed.

I can describe the energy transfers that are occurring around us every day, e.g. in everyday appliances.

I know when energy transfers take place energy is lost, the less energy lost the more efficient the transfer.

2 Energy Sources

I know and explain the terms renewable and non-renewable.

I know coal, oil & gas are fossil fuels and are non-renewable.

I know and can describe alternative sources of energy including wind, wave, solar, geothermal & nuclear.

I can describe Scotland's use of energy today and contribute to discussions of energy sources in the future.

3 Energy Uses

I know that most of our electrical energy is supplied by power stations and is transferred to our homes by power lines called the National Grid.

I can describe the impact of using fossil fuels, including pollution, greenhouse effect & global warming.

I can describe the impact of using nuclear power, including storage of radioactive waste.

I can describe the impact of renewable sources of energy, including wind farms.

*By contributing to investigations into familiar changes in substances to produce other substances, I can describe how their characteristics have changed.*  
*SCN 2-15a\**

*Having explored the substances that make up Earth's surface, I can compare some of their characteristics and uses.*  
*SCN 2-17a \**

I can describe and use the following: Water is one of the most important substances on the Earth.

Water exists in 3 different states solid (ice), liquid (water), or gas (water vapour)

Water boils at 100 °C

Water freezes at 0°C

Ice melts at 0°C

Water evaporates when heated.

Water vapour condenses when cooled.

The Water Cycle is a very important process in nature.

Heat from the Sun causes liquid water (sea, rivers, puddles) to evaporate.

Water as a gas (vapour) moves upwards and as it becomes colder, it condenses into droplets to form clouds.

Wind moves clouds.

Droplets accumulate which leads to **precipitation** (rain)

Temperature plays an integral part in the water cycle i.e.

- high temperature causes evaporation
- lower temperature causes condensation and precipitation
- very low temperature causes precipitation to fall as snow or hail

Annotated diagrams are an effective way to display the mechanism of the water cycle.

Water is necessary for life e.g. growth of crops, drinking, river formation/flow etc.

I know that some objects will float in water while others will sink. Objects which float are buoyant.

*that will dissolve or the speed of dissolving, I can relate my findings to the world around me. SCN 2-16b*

*I have collaborated in activities which safely demonstrate simple chemical reactions using everyday chemicals. I can show an appreciation of a chemical reaction as being a change in which different materials are made.*  
*SCN 2-19a*

I can use the terms soluble, insoluble, dissolve and solution.

I understand dissolved materials (soluble solids) cannot be separated by filtering but can be separated by evaporation.

I understand that insoluble solids of different sizes can be separated by filtering (or sieving)

I know and can discuss reasons why the amount of substance that dissolves is affected by a range of conditions – temperature, time, amount of substance, amount of solvent.

I know that stirring speeds up dissolving.

I know that powder will dissolve faster than big lumps

I know that the amount of substance that can be dissolved can be increased up to a point by heating

I am able to relate to everyday examples such as dissolving sugar in tea or salt in water (granules or big crystals, hot or cold liquid, stirred or not stirred)

I know that the Earth's structure comprises of the core, mantle and the crust

**Materials**  
**(cont.)**

I know that the term buoyancy describes the upward pushing force (up thrust) which causes objects to float.

I know objects lighter than the upward thrust will float and objects heavier will sink.

I know that when an objects floats, the forces acting on it are balanced up thrust force = gravity

I can describe some of the factors which affect floating: material object is made of, the object's shape, the type of liquid it is in (density)

I know there are three states of matter i.e. solid, liquid & gas.

I know solids stay same size & shape, liquids stay same size (volume) but shape changes to container, gas changes shape & size to fit container.

I can use these terms to describe changes melt (solid-liquid), freeze (liquid-solid), evaporate (liquid-gas), condense (gas-liquid)

I can identify and investigate changes to the properties of materials which are reversible and can easily be changed back (physical change) e.g. Chocolate melting, salt dissolving in water, water temperature rising or falling.

I can identify and investigate changes to the properties of materials which are irreversible (chemical changes) e.g. Cooking, rusting, toasting bread, striking a match.

I can identify some of the signs of a chemical reaction i.e. bubbles, colour/texture change, heat given in/taken out.

I have investigated, can give examples of and can discuss changes in substances i.e. chocolate, bread, candle, glass.

I know there are three main types of rocks: sedimentary, igneous and metamorphic

I have collected these three types of rocks and know they have different properties and uses.

Igneous rocks: Formed from hot, molten rocky material called magma. They are hard and have crystals.

Sedimentary rocks: Formed from the soft moving sands and mud in rivers, lakes and sea. These rocks are soft and have many layers.

Metamorphic rocks: Formed when rocks close to the volcanic vent are altered by the heat or heat and pressure of the magma. These rocks are very hard.

I know that soil is a mixture of tiny pieces of rock and organic material (humus), living organisms, airspaces and water

I know the composition of soil depends on the type of rock materials and the kinds of organisms present

I know that there are three main types of soil: clay, sandy, loam

Clay: does not drain well so holds water and sometimes becomes waterlogged

Sandy: drains very well so sometimes becomes too dry

Loam: reasonable drainage, contains humus. The ideal soil for the garden

I am able to describe a mineral and some of its uses.

I know that there is no new water in the world; it is continually being re-cycled through the water cycle.

I know water should be clean before being consumed.

**Materials**  
**(cont.)**

I have investigated different water samples.

I have investigated and can discuss the methods used to clean water i.e. sedimentation, filtration, chemicals added e.g. chlorine.

I know that waste water must be cleaned before returning to the sea.

I know desalination plants remove salt from water.

I can describe the many methods used to conserve water within the home, school and globally.

I am aware that water is necessary for life - for all living things.

\* Outcomes covered over two sessions

Topical Science SCN 2-20b is ongoing and every effort is made to explore issues as and when they arise.  
SCN 2-20a The role of Famous Scientists and Inventors (especially Scottish scientists and Inventors) may be investigated alongside topics. Alternatively, they can be addressed as a special Investigation and related to literacy outcomes associated with giving a talk or presentation

## Appendix 1: Benchmarks for Achievement of a Level – Education Scotland

### Early Level:

Curriculum Organisers		Experiences and Outcomes for planning learning, teaching and assessment	Benchmarks to support practitioners' professional judgement
Planet Earth	Biodiversity & interdependence	I have observed living things in the environment over time and am becoming aware of how they depend on each other. <a href="#">SCN 0-01a</a>	<ul style="list-style-type: none"> <li>• Explores and sorts objects as living, non-living or once living.</li> <li>• Describes characteristics of living things and how they depend on each other, for example, animals which depend on plants for food.</li> </ul>
		I have helped to grow plants and can name their basic parts. I can talk about how they grow and what I need to do to look after them. <a href="#">SCN 0-03a</a>	<ul style="list-style-type: none"> <li>• Explores, observes and discusses basic needs of plants and what they need to grow including water, heat, sunlight and soil.</li> <li>• Demonstrates understanding of how plants grow from seeds.</li> </ul>
	Energy sources & Sustainability	I have experienced, used and described a wide range of toys and common appliances. I can say what makes it go and say what they do when they work. <a href="#">SCN 0-04a</a>	<ul style="list-style-type: none"> <li>• Ask questions and describes what can 'make things go', for example, batteries, wind-up toys and sunlight.</li> <li>• Talks about toys and common appliances and what they do when they work, for example, produce heat, light, movement or sound.</li> </ul>
	Processes of the planet	By investigating how water can change from one form to another, I can relate my findings to everyday experiences. <a href="#">SCN 0-05a</a>	<ul style="list-style-type: none"> <li>• Investigates the different properties of water and shares their findings with others.</li> <li>• Talks about water in nature and how it influences their everyday lives.</li> <li>• Identifies three main states of water (ice, water and steam) and uses scientific vocabulary such as 'melting', 'freezing' and 'boiling' to describe changes of state.</li> </ul>

	<b>Space</b>	I have experienced the wonder of looking at the vastness of the sky, and can recognise the sun, moon and stars and link them to daily patterns of life. <a href="#">SCN 0-06a</a>	<ul style="list-style-type: none"> <li>• Describes how the rotation of the Earth in relation to the sun gives us day and night.</li> <li>• Talks about how the pattern of night and day changes over the course of a year.</li> </ul>
<b>Forces, electricity and waves</b>	<b>Forces</b>	Through everyday experiences and play with a variety of toys and other objects, I can recognise simple types of forces and describe their effects. <a href="#">SCN 0-07a</a>	<ul style="list-style-type: none"> <li>• Explores and sorts toys and objects into groups according to whether they need to be pushed or pulled.</li> <li>• Measures, using simple equipment, how the movement of an object is affected by the size of the force or the weight of the object.</li> <li>• Demonstrates, through play, how a force can make an object stay still, start to move, speed up, slow down and change shape.</li> </ul>
	<b>Electricity</b>	I know how to stay safe when using electricity. I have helped to make a display to show the importance of electricity in our daily lives. <a href="#">SCN 0-09a</a>	<ul style="list-style-type: none"> <li>• Groups objects into those which get electricity either from mains electrical sockets or alternative sources, such as batteries and solar cells.</li> <li>• Talks about the importance of electricity in their daily lives.</li> <li>• Identifies the risks that can be caused by electricity and recognises how to stay safe.</li> </ul>
	<b>Vibrations and waves</b>	Through play, I have explored a variety of ways of making sounds. <a href="#">SCN 0-11a</a>	<ul style="list-style-type: none"> <li>• Predicts, then investigates, ways to make sounds louder and quieter.</li> <li>• Identifies different sources of sound.</li> </ul>
<b>Biological systems</b>	<b>Body systems and cells</b>	I can identify my senses and use them to explore the world around me. <a href="#">SCN 0-12a</a> <i>HWB 0-47b</i>	<ul style="list-style-type: none"> <li>• Identifies specific parts of the body related to each of the senses.</li> <li>• Uses their senses to describe the world around them, giving examples of things they see, hear, smell, taste and feel.</li> </ul>
	<b>Inheritance</b>	<i>HWB 0-47a</i>	

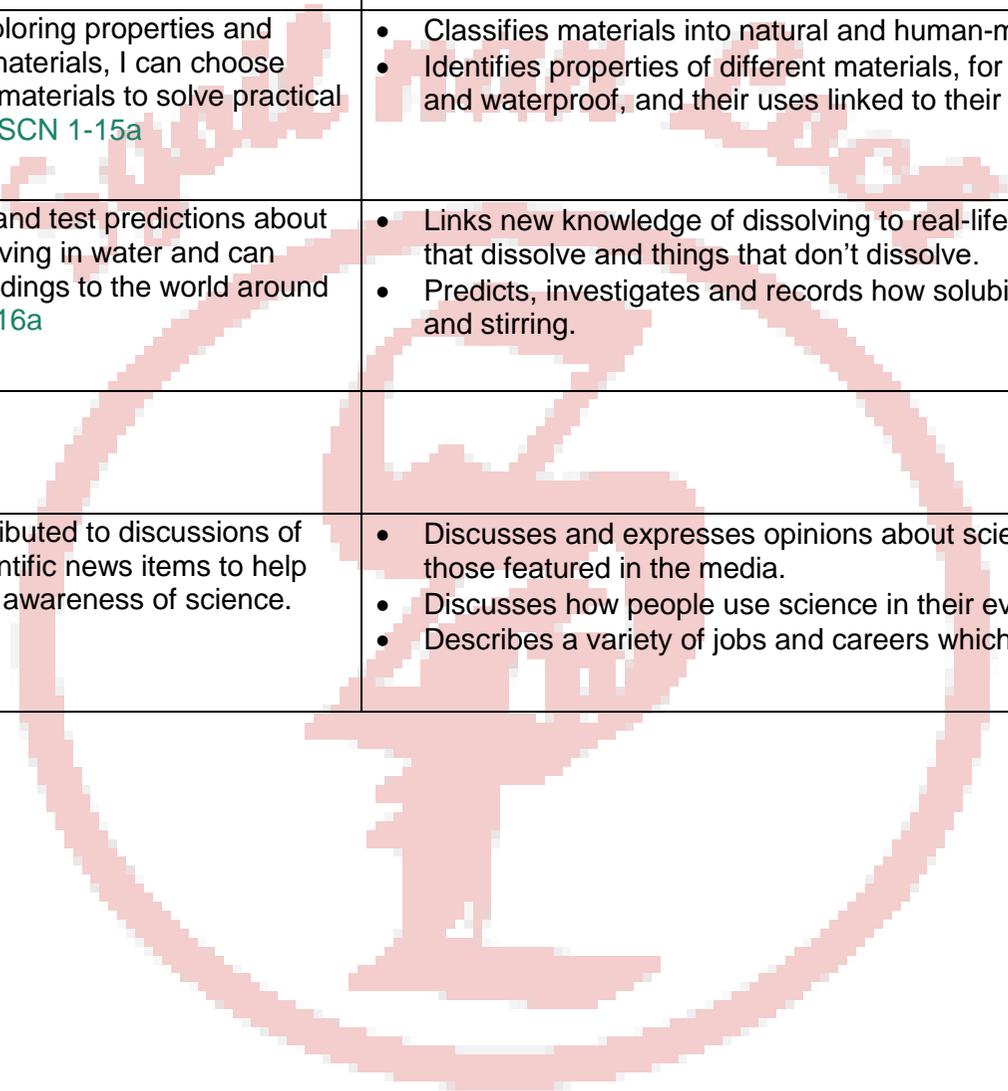
<b>Materials</b>	<b>Properties and uses of substances</b>	Through creative play, I explore different materials and can share my reasoning for selecting materials for different purposes. <a href="#">SCN 0-15a</a>	<ul style="list-style-type: none"><li>• Explores and sorts materials into different groups depending on their properties, for example, whether they are strong, smooth, rough and if they float or sink.</li><li>• Justifies the selection of appropriate materials for different uses based on their physical properties.</li></ul>
<b>Topical science</b>	<b>Topical science</b>	I can talk about science stories to develop my understanding of science and the world around me. <a href="#">SCN 0-20a</a>	<ul style="list-style-type: none"><li>• Talks about the science they encounter in their everyday experiences.</li><li>• Explores, through role-play, how science and science skills are used in a variety of jobs.</li></ul>

**First Level:**

Curriculum Organisers		Experiences and Outcomes for planning learning, teaching and assessment	Benchmarks to support practitioners' professional judgement
Planet Earth	Biodiversity and interdependence	I can distinguish between living and non-living things. I can sort living things into groups and explain my decisions. <a href="#">SCN 1-01a</a>	<ul style="list-style-type: none"> <li>Explains the difference between living and non-living things, taking into consideration movement, reproduction, sensitivity, growth, excretion and feeding.</li> <li>Creates criteria for sorting living things and justifies decisions.</li> <li>Sorts living things into plant, animal and other groups using a variety of features.</li> </ul>
		I can explore examples of food chains and show an appreciation of how animals and plants depend on each other for food. <a href="#">SCN 1-02a</a>	<ul style="list-style-type: none"> <li>Demonstrates awareness of how energy from the sun can be taken in by plants to provide the major source of food for all living things.</li> <li>Interprets and constructs a simple food chain, using vocabulary such as 'producer', 'consumer', 'predator' and 'prey'.</li> </ul>
		I can help to design experiments to find out what plants need in order to grow and develop. I can observe and record my findings and from what I have learned I can grow healthy plants in school. <a href="#">SCN 1-03a</a>	<ul style="list-style-type: none"> <li>Observes, collects and measures the outcomes from growing plants in different conditions, for example, by varying levels of light, water, air, soil/nutrients and heat.</li> <li>Structures a presentation or report, with support, to present findings on how plants grow.</li> </ul>
	Energy sources and sustainability	I am aware of different types of energy around me and can show their importance to everyday life and my survival. <a href="#">SCN 1-04a</a>	<ul style="list-style-type: none"> <li>Identifies and talks about types of energy that we get from different energy sources, for example, light, sound, heat and electrical.</li> <li>Uses knowledge of different energy sources, for example, sun, food, fuel, wind and waves, to discuss the importance of different types of energy for everyday life and survival.</li> </ul>

	<b>Processes of the planet</b>	By investigating how water can change from one form to another, I can relate my findings to everyday experiences. <a href="#">SCN 1-05a</a>	<ul style="list-style-type: none"> <li>• Uses more complex vocabulary to describe changes of states of water, for example, 'condensation' and 'evaporation'.</li> <li>• Contributes to the design of an experiment to determine the temperature at which water boils, freezes and melts, ensuring appropriate use of units.</li> <li>• Knows that pure water boils at 100°, melts at 0° and freezes at 0°.</li> </ul>
	<b>Space</b>	By safely observing and recording the sun and moon at various times, I can describe their patterns of movement and changes over time. I can relate these to the length of a day, a month and a year. <a href="#">SCN 1-06a</a>	<ul style="list-style-type: none"> <li>• Describes how the Earth spins around its axis in 24 hours resulting in day and night.</li> <li>• Observes and records the different patterns of movement of the moon and explains why the moon appears to have different shapes and positions in the sky at different times in a lunar month.</li> <li>• Demonstrates understanding of how the Earth takes one year to completely orbit the sun.</li> <li>• Demonstrates understanding of how the tilt of the Earth on its axis as it circles the sun causes the pattern of the seasons and changes to the number of daylight hours over the course of a year.</li> </ul>
<b>Forces, electricity and waves</b>	<b>Forces</b>	By investigating forces on toys and other objects, I can predict the effect on the shape or motion of objects. <a href="#">SCN 1-07a</a>	<ul style="list-style-type: none"> <li>• Predicts and then investigates how a force can make an object change speed, direction or shape, and uses vocabulary such as pushing, pulling, stretching, squashing and twisting to describe forces.</li> <li>• Investigates balanced forces and explains that if a push and pull are equal in strength and opposite in direction then there is no change in movement.</li> </ul>
		By exploring the forces exerted by magnets on other magnets and magnetic materials, I can contribute to the design of a game. <a href="#">SCN 1-08a</a>	<ul style="list-style-type: none"> <li>• Reports in writing, visually, orally how magnets exert a non-contact force on each other and attract certain materials.</li> <li>• Demonstrates through practical activities that like poles repel and opposite poles attract.</li> <li>• Gives at least two examples for how magnets are used in everyday life.</li> </ul>
	<b>Electricity</b>	I can describe an electrical circuit as a continuous loop of conducting materials. I can combine simple components in a series circuit to make a game or model. <a href="#">SCN 1-09a</a>	<ul style="list-style-type: none"> <li>• Builds simple circuits containing bulbs, switches, bells and batteries.</li> </ul>

	<b>Vibrations and waves</b>	<p>By collaborating in experiments on different ways of producing sound from vibrations, I can demonstrate how to change the pitch of the sound. <a href="#">SCN 1-11a</a></p>	<ul style="list-style-type: none"> <li>• Demonstrates how sounds can be made higher or lower pitch by altering tightness, length, width or thickness or other physical characteristics of the sound source.</li> <li>• Explains that sound is caused by a vibration in a material.</li> </ul>
<b>Biological systems</b>	<b>Body systems and cells</b>	<p>By researching, I can describe the position and function of the skeleton and major organs of the human body and discuss what I need to do to keep them healthy. <a href="#">SCN 1-12a</a></p> <p>I have explored my senses and can discuss their reliability and limitations in responding to the environment. <a href="#">SCN 1-12b</a></p>	<ul style="list-style-type: none"> <li>• Uses components to make simple models of a skeleton which identify the skull, spine, ribcage and some bones of the arms and leg and which show how the skeleton gives us support and protects our organs.</li> <li>• Describes the position and function of major organs including the brain, heart, lungs, stomach and bladder.</li> <li>• Describes how skin, as an organ, provides a barrier to infection and helps to control our temperature.</li> <li>• Structures a presentation or report, with support, on how to have a healthy lifestyle, for example, through a balanced diet, regular exercise, sufficient sleep and by avoiding substance misuse.</li> <li>• Uses their senses to detect information and explains how they help to keep people safe.</li> <li>• Investigates the reliability and limitations of the senses, for example, using taste tests, limits of sound, optical illusions and blind-fold games.</li> </ul>
		<p>I know the symptoms of some common diseases caused by germs. I can explain how they are spread and discuss how some methods of preventing and treating disease benefit society. <a href="#">SCN 1-13a</a></p>	<ul style="list-style-type: none"> <li>• Describes the symptoms of some common diseases including colds, mumps, measles, chicken pox and flu.</li> <li>• Provides explanations, supported by evidence, of how some diseases spread and discusses ways in which some diseases can be prevented through good hygiene and vaccination.</li> </ul>
	<b>Inheritance</b>	<p>By comparing generations of families of humans, plants and animals, I can begin to understand how</p>	<ul style="list-style-type: none"> <li>• Uses their own experiences to illustrate how inherited characteristics are passed from one generation to the next.</li> <li>• Knows that genetic information determines characteristics such as colour of eyes and shape of petals.</li> <li>• Demonstrates understanding of the variations within family groups.</li> </ul>



**Second Level:**

Curriculum Organisers	Experiences and Outcomes for planning learning, teaching and assessment	Benchmarks to support practitioners' professional judgement
<p><b>Biodiversity and interdependence</b></p>	<p>I can identify and classify examples of living things, past and present, to help me appreciate their diversity. I can relate physical and behavioural characteristics to their survival or extinction. <b>SCN 2-01a</b></p>	<ul style="list-style-type: none"> <li>• Classifies living things into plants (flowering and non-flowering), animals (vertebrates and invertebrates) and other groups through knowledge of their characteristics.</li> <li>• Begins to construct and use simple branched keys which can be used to identify particular plants or animals.</li> <li>• Identifies characteristics of living things and their environment which have contributed to the survival or extinction of a species.</li> <li>• Describes how some plants and animals have adapted to their environment, for example, for drought or by using flight.</li> </ul>
	<p>I can use my knowledge of the interactions and energy flow between plants and animals in ecosystems, food chains and webs. I have contributed to the design or conservation of a wildlife area. <b>SCN 2-02a</b></p>	<ul style="list-style-type: none"> <li>• Describes how energy flows between plants and animals in more complex food chains and webs and ecosystems, using vocabulary such as 'producers', 'consumers' and 'herbivore'.</li> </ul>
	<p>Through carrying out practical activities and investigations, I can show how plants have benefited society. <b>SCN 2-02b</b></p>	<ul style="list-style-type: none"> <li>• Relates findings from practical investigations to describe how plants have benefited society, for example, in medicine, dyes, fuels, construction, prevention of soil erosion and by influencing the balance of gases in the air.</li> </ul>

		<p>I have collaborated in the design of an investigation into the effects of fertilisers on the growth of plants. I can express an informed view of the risks and benefits of their use. <a href="#">SCN 2-03a</a></p>	<ul style="list-style-type: none"> <li>• Collaborates with others to present a reasoned argument, based on evidence, of the risks and benefits of using fertilisers, demonstrating understanding of the underlying scientific concepts.</li> </ul>
<b>Energy sources and sustainability</b>	<p>By considering examples where energy is conserved, I can identify the energy source, how it is transferred and ways of reducing wasted energy. <a href="#">SCN 2-04a</a></p>		<ul style="list-style-type: none"> <li>• Demonstrates understanding of the law of conservation of energy (energy can be converted from one form to another but cannot be created or destroyed).</li> <li>• Identifies the common types of energy (kinetic, potential, electrical, chemical, light, sound and heat) used in energy transfers and transformations that occur in everyday appliances.</li> <li>• Explains that when energy transfers and transformations take place, energy is converted into 'useful' and 'wasted' energy, for example a mechanical braking system transforms kinetic energy into heat energy which is dissipated to the atmosphere as 'waste' heat.</li> </ul>
	<p>Through exploring non-renewable energy sources, I can describe how they are used in Scotland today and express an informed view on the implications for their future use. <a href="#">SCN 2-04b</a></p>		<ul style="list-style-type: none"> <li>• Researches non-renewable sources of energy, such as fossil fuels and nuclear, and discusses how these are used in Scotland.</li> <li>• Draws on increasing knowledge and understanding to suggest ways in which they can reduce their own energy use and live more sustainably.</li> </ul>
<b>Processes of the planet</b>	<p>I can apply my knowledge of how water changes state to help me understand the processes involved in the water cycle in nature over time. <a href="#">SCN 2-05a</a></p>		<ul style="list-style-type: none"> <li>• Discusses the necessity of water for life, for example, for the growth of crops, for drinking and in river formation/flow.</li> <li>• Demonstrates understanding of the processes involved in the water cycle.</li> </ul>
	<p>By observing and researching features of our Solar System, I can use simple models to communicate my understanding of size, scale, time and relative motion within it. <a href="#">SCN 2-06a</a></p>		<ul style="list-style-type: none"> <li>• Reports collaboratively on the key features of the planets including size, distance from the sun, length of day, length of year, temperature, materials from which they are predominantly made and the number of moons.</li> <li>• Uses simple models to communicate understanding of size, scale, time and relative motion within our Solar System, including how solar &amp; lunar eclipses occur.</li> </ul>

## Forces

By investigating how friction, including air resistance, affects motion, I can suggest ways to improve efficiency in moving objects. [SCN 2-07a](#)

- Describes friction as a force which opposes the motion of moving objects, for example, two solid surfaces rubbing against one another or a solid surface moving through air or water.
- Finds an association between air resistance (drag), the speed of the object being investigated and the surface area exposed to the air, making links to original predictions.
- Demonstrates understanding of how friction and air resistance can both be useful, for example, in braking systems, and also a problem, for example, causing moving parts to wear.
- Describes efficient movement as that which requires the least possible energy and suggests ways to improve efficiency in moving objects, for example, by streamlining.

I have collaborated in investigations to compare magnetic, electrostatic and gravitational forces and have explored their practical applications. [SCN 2-08a](#)

- Measures gravitational force with a force meter or newton meter and records results using appropriate units (newtons).
- Explains how some objects may become electrically charged by rubbing two surfaces together and how the charges produce an electrostatic force.
- Investigates and demonstrates understanding that magnetic and electrostatic forces can both repel and attract.
- Describes practical applications of magnetic, electrostatic and gravitational forces, for example, magnetised needle in a compass.

By investigating floating and sinking of objects in water, I can apply my understanding of buoyancy to solve a practical challenge. [SCN 2-08b](#)

- Explores the factors which affect floating, for example, the object's shape and the density of the material that the object is made of, and collates, organises and summarises findings with assistance.

	<p><b>Electricity</b></p>	<p>I have used a range of electrical components to help to make a variety of circuits for differing purposes. I can represent my circuit using symbols and describe the transfer of energy around the circuit. SCN 2-09a</p>	<ul style="list-style-type: none"> <li>• Designs and builds a variety of electrical circuits for differing purposes, using an increasing range of components.</li> <li>• Draws circuit diagrams using appropriate symbols to denote a bulb, switch, motor, bell, buzzer, wires, cell and a battery.</li> <li>• Describes how components in a circuit transfer energy into different forms.</li> </ul>
	<p>To begin to understand how batteries work, I can help to build simple chemical cells using readily-available materials which can be used to make an appliance work. SCN 2-10a</p>	<ul style="list-style-type: none"> <li>• Applies knowledge and understanding to build simple batteries (chemical cells) and demonstrates understanding that a battery (cell) is a portable energy source which has a store of chemical energy.</li> <li>• Explains the process of energy transformation from battery (cell) to electrical components.</li> </ul>	
	<p><b>Vibrations and waves</b></p>	<p>Through research on how animals communicate, I can explain how sound vibrations are carried by waves through air, water and other media. SCN 2-11a</p> <p>By exploring reflections, the formation of shadows and the mixing of coloured lights, I can use my knowledge of the properties of light to show how it can be used in a creative way. SCN 2-11b</p>	<ul style="list-style-type: none"> <li>• Discusses and demonstrates through experiments how sound travels differently through air, water and solids.</li> <li>• Explains how hearing is limited by a range of factors, for example, age, position, and flexibility (direction) of ears.</li> <li>• Demonstrates and records, through practical investigations, that light travels in straight lines, can be reflected by highly-polished surfaces and that curved faces can distort the image.</li> <li>• Predicts and investigates how the position, shape and size of a shadow depend on the position of the object in relation to the light source.</li> <li>• Demonstrates that white light/sunlight can be dispersed to show the colours of the visible spectrum and identifies the colours and order of the rainbow as red, orange, yellow, green, blue, indigo and violet.</li> <li>• Explains that we see objects because they give out or reflect light rays that enter our eyes.</li> <li>• Draws on findings from practical investigations to describe the effect that coloured filters have on white light and how they can be used to make other colours.</li> <li>• Explains how we can recognise the colour of an object due the reflection and absorption of particular parts of the visible spectrum.</li> </ul>

**Body systems and cells**

By investigating some body systems and potential problems which they may develop, I can make informed decisions to help me to maintain my health and wellbeing. [SCN 2-12a](#)

*The expectation is that at least two of the following body systems will be studied at Second Level.*

**Respiratory system**

- Describes the function of the respiratory system (lungs, windpipe and bronchi), for example, in gas exchange.
- Discusses the main preventable causes of bronchitis, lung cancer and asthma, for example, smoking.

**Circulatory system**

- Describes the function of the circulatory system (heart and blood vessels), for example, transport of food, oxygen and waste materials.
- Discusses the main preventable causes of heart disease or stroke, for example, obesity, lack of exercise, smoking and high (saturated) fat diet.

**Digestive system**

- Describes the function of the digestive system (mouth, oesophagus, stomach, liver, small intestine, large intestine, rectum and anus), for example, breakdown of food and absorption of nutrients, minerals and water.
- Discusses the main preventable causes of liver disease, for example, alcohol and drug misuse.

**Reproductive system**

- Describes the function of the reproductive system (penis, testes, sperm tube/duct, ovaries, egg tube/duct, uterus and vagina), for example, to make a baby.
- Discusses some preventable causes of fertility problems, for example, alcohol misuse, anorexia and obesity.

**Skeletal system**

- Describes the function of the **skeleton** (skull, spine, ribcage some bones of the arm and leg), for example, to provide support, protection and enable movement.
- Discusses some common problems of bones (for example, arthritis, osteoporosis and breaks) and how their incidence can be reduced (for example, through calcium in the diet and weight-bearing exercise).

I have explored the structure and function of sensory organs to develop my understanding of body actions in response to outside conditions. [SCN 2-12b](#)

- Describes how senses work individually or together to keep people safe from harm.
- Demonstrates understanding of how, if one sense is impaired, it can have an effect on the other senses, either positively or negatively.
- Describes how light enters the eye through the pupil and how the pupil changes size in dark/light conditions.

I have contributed to investigations into the role of microorganisms in producing and breaking down some materials. [SCN 2-13a](#)

- Demonstrates understanding of how microorganisms, including bacteria, viruses and fungi, can multiply rapidly.
- Investigates and explains the action of some microorganisms used in food production, for example, yeast in bread and bacteria in yoghurt.
- Describes how some micro-organisms break down food causing it to be inedible or harmful if digested, and how others exist in the gut to break down food to aid digestion.
- Investigates, observes and records how microscopic organisms are necessary for the process of decomposition (the breaking down of dead material – decay).

**Inheritance**

By investigating the lifecycles of plants and animals, I can recognise the different stages of their development. [SCN 2-14a](#)

- Plants
- Describes how pollination occurs when the male cell (pollen) lands on the stigma.
  - Describes how fertilisation (sexual reproduction) occurs when the genetic information in the male cell fuses (joins) with the genetic information in the female cell.
  - Describes how the fertilised ovule develops into a seed and how the ovary ripens to form a fruit.
  - Investigates and explains how a seed germinates into a plant using water, oxygen, a food store and warmth.
- Animals
- Identifies and compares the two distinct groups of animals – vertebrates and invertebrates.
  - Researches the lifecycles of the five main types of vertebrates including fish (spawn), birds (eggs which are rigid but fragile), amphibians (spawn and metamorphosis), reptiles (leathery shelled eggs) and mammal (live young), and communicates findings using a range of media.

		<p>By exploring the characteristics offspring inherit when living things reproduce, I can distinguish between inherited and non-inherited characteristics. <a href="#">SCN 2-14b</a></p>	<ul style="list-style-type: none"> <li>• Compares the lifecycles of some invertebrates, for example, ladybird and spider.</li> <li>• Knows that genetics is the study of inherited characteristics and that inherited characteristics are carried on genes and can sometime skip a generation.</li> <li>• Explores and categorises characteristics into inherited (eye and hair colour, height and right/left handedness) and non-inherited (native language spoken and favourite colour).</li> <li>• Describes how every living thing has its own DNA fingerprint.</li> </ul>
<b>Materials</b>	<b>Properties and uses of substances</b>	<p>By contributing to investigations into familiar changes in substances to produce other substances, I can describe how their characteristics have changed. <a href="#">SCN 2-15a</a></p>	<ul style="list-style-type: none"> <li>• Investigates and explains physical changes to the properties of materials which are fully and partially reversible, for example, salt dissolving in water, chocolate melting and water freezing.</li> <li>• Uses scientific vocabulary such as 'melting', 'freezing', 'evaporating' and 'condensing' to describe changes of state.</li> <li>• Investigates and records chemical changes to the properties of materials which are irreversible, for example, cooking, rusting and striking a match.</li> <li>• Observes and identifies some of the signs of a chemical reaction, for example, production of bubbles, colour/texture change and heat given out/taken in.</li> <li>• Explores and describes the characteristics of solids, liquids and gases, for example, solids retain the same volume and shape, liquids keep the same volume but the shape changes to fit the container and that gases change shape and volume to fill the container.</li> </ul>
		<p>I have participated in practical activities to separate simple mixtures of substances and can relate my findings to my everyday experience. <a href="#">SCN 2-16a</a></p>	<ul style="list-style-type: none"> <li>• Draws on findings from practical investigations to explain how a mixture of solids of different sizes can be separated using a sieve or magnet, for example, sand and peas or salt and iron filings.</li> <li>• Selects the most appropriate practical technique for separating insoluble solids, for example, filtering or sieving.</li> <li>• Explains why a dissolved solid cannot be separated from the solvent by filtering but can be separated by evaporation.</li> <li>• Uses scientific vocabulary such as 'soluble', 'insoluble', 'dissolve' and 'solution' in context.</li> </ul>

		<p>By investigating common conditions that increase the amount of substance that will dissolve or the speed of dissolving, I can relate my findings to the world around me. <a href="#">SCN 2-16b</a></p>	<ul style="list-style-type: none"> <li>• Relates findings of practical investigations about dissolving to everyday experiences, for example, recycling, salt production and water purification.</li> <li>• Finds an association between the quantity of substance that dissolves and a range of conditions – temperature, time, particle size, stirring and quantity of solvent.</li> <li>• Investigates how a range of factors such as particle size and heat can affect the rate of dissolving.</li> <li>• Relates learning about the quantity and rate of dissolving to everyday examples such as dissolving sugar in tea or salt in water (granules or big crystals, hot or cold liquid, stirred or not stirred).</li> </ul>
	<p><b>Earth's materials</b></p>	<p>Having explored the substances that make up Earth's surface, I can compare some of their characteristics and uses. <a href="#">SCN 2-17a</a></p>	<ul style="list-style-type: none"> <li>• Analyses and compares samples of rocks, soil and minerals and reports their characteristics and uses, using a range of media.</li> </ul>
	<p><b>Chemical changes</b></p>	<p>I have investigated different water samples from the environment and explored methods that can be used to clean and conserve water and I am aware of the properties and uses of water. <a href="#">SCN 2-18a</a></p>	<ul style="list-style-type: none"> <li>• Uses knowledge of the water cycle to explain how the quantity of water on the Earth has remained approximately the same.</li> <li>• Investigates and discusses the methods used to purify water, for example, sedimentation, filtration, evaporation, desalination and the addition of chemicals such as chlorine.</li> <li>• Researches methods used to conserve water within the home, school and globally and communicates findings to others.</li> <li>• Discusses the many uses of water, for example, to support all living things, in preservation (ice) and to generate electricity.</li> </ul>
		<p>I have collaborated in activities which safely demonstrate simple chemical reactions using everyday chemicals. I can show an appreciation of a chemical reaction as being a change in which different materials are made. <a href="#">SCN 2-19a</a></p>	<ul style="list-style-type: none"> <li>• Collaborates with others to safely demonstrate simple chemical reactions, for example, effervescence.</li> <li>• Investigates examples of everyday chemical reactions, such as burning and corrosion, and names some of the new substances which are produced.</li> <li>• Uses prior knowledge to identify when a chemical reaction has occurred to produce a new substance.</li> </ul>

## Topical science

Through research and discussion, I have an appreciation of the contribution that individuals are making to scientific discovery and invention and the impact this has made on society. [SCN 2-20a](#)

I can report and comment on current scientific news items to develop my knowledge and understanding of topical science. [SCN 2-20b](#)

- Researches historic and contemporary scientists (ensuring gender balance) and their scientific discoveries and reports collaboratively to others using a range of methods.
- Describes the impact of scientific discovery, creativity and invention on society past and present, for example, in design, medicine and agriculture.
- Demonstrates understanding of how science impacts on every aspect of our lives.
- Relates the development of scientific skills in the classroom to an increasingly wide variety of science, technology, engineering and mathematics (STEM) careers.
- Explores items of current scientific interest within the school, local community, nationally or in the global media and collates, organises and summarises findings, with assistance.
- Shares opinions about a variety of topical scientific issues considering, for example, moral, ethical, societal, cultural, economic and environmental aspects.

## Appendix 2: Skills Progression – Education Scotland

### Early Level:

<b>Skills</b>	
<b>Inquiry and investigative skills</b>	<p><i>Plans and designs scientific investigations and enquiries</i></p> <ul style="list-style-type: none"> <li>- Explores and observes through play.</li> <li>- Asks questions arising from play activities.</li> <li>- Makes simple predictions of what might happen.</li> <li>- Makes suggestions about what to do to answer the selected question.</li> </ul> <p><i>Carries out practical activities within a variety of learning environments</i></p> <ul style="list-style-type: none"> <li>- Discusses obvious risks and takes appropriate steps to protect themselves and others.</li> <li>- Uses their senses to acquire information.</li> <li>- Measures using simple equipment and non-standard units.</li> </ul> <p><i>Analyses, interprets and evaluates scientific findings</i></p> <ul style="list-style-type: none"> <li>- Presents and sorts data/information, for example, using displays, photographs, simple charts and drawings.</li> <li>- Provides oral descriptions of what was done and what happened.</li> <li>- Recognises similarities, patterns and differences in the findings and links these to the original question.</li> <li>- Discusses, with support, how the experiment might be improved.</li> <li>- Relates findings to everyday experiences.</li> <li>- Identifies and discusses new knowledge and understanding.</li> </ul> <p><i>Presents scientific findings</i></p> <ul style="list-style-type: none"> <li>- Communicates findings to others verbally and through drawings, photographs, displays and simple charts.</li> <li>- Responds to questions about their investigation.</li> </ul>
<b>Scientific analytical thinking skills</b>	<ul style="list-style-type: none"> <li>- Demonstrates natural curiosity and shows development of basic skills of analysis in simple and familiar contexts, for example, through asking questions, experimenting and making predictions.</li> <li>- Demonstrates creative thinking by offering suggestions and solutions to everyday problems.</li> <li>- Demonstrates reasoning skills by explaining choices and decisions.</li> </ul>
<b>Skills and attributes of scientifically literate citizens</b>	<ul style="list-style-type: none"> <li>- Talks about science, showing developing understanding of risks and benefits, and listens to the views of others.</li> <li>- Demonstrates awareness of the importance of respecting living things and the environment and of managing the Earth's resources responsibly.</li> <li>- Demonstrates a developing understanding of science in the world around them.</li> <li>- Explores the ways in which people use science and science skills as part of their job.</li> </ul>

**First Level:**

**Skills**

**Inquiry and investigative skills**

*Plans and designs scientific investigations and enquiries*

- Collaborates with others to identify questions to find out more about a specific scientific concept, idea or issue.
- Makes predictions about the scientific investigation/enquiry being planned.
- Contributes to the design of procedures for carrying out scientific investigations.

*Carries out practical activities in a variety of learning environments*

- Identifies risks and hazards and ensures safe use of all tools, equipment and procedures.
- Collaborates to undertake investigations.
- Observes and collects information and makes measurements using appropriate equipment and units.

*Analyses, interprets and evaluates scientific findings*

- Records and presents data/information using a range of methods including tables, charts and diagrams, using labelling and scales.
- Organises data and information and identifies significant patterns and relationships.
- Interprets findings and discusses links to the original question.
- Reports on limitations of their investigation and possible improvements.
- Relates findings to their wider experiences of the world around them.
- Identifies and discusses additional knowledge or understanding gained.

*Presents scientific findings*

- Presents data/information using a range of methods including tables, charts and diagrams, using labels and scales.
- Reports in writing, orally or visually using a variety of media.
- Structures a presentation or report, with support, to present findings in a coherent and logical way.

**Scientific analytical thinking skills**

- Applies learning in the sciences.
- Provides creative solutions to scientific issues and problems.
- Contributes to the design processes and uses components to make models.
- Demonstrates reasoning skills and draws on understanding of science concepts to make and test predictions.
- Provides explanations which are supported by evidence.

**Skills and attributes of scientifically literate citizens**

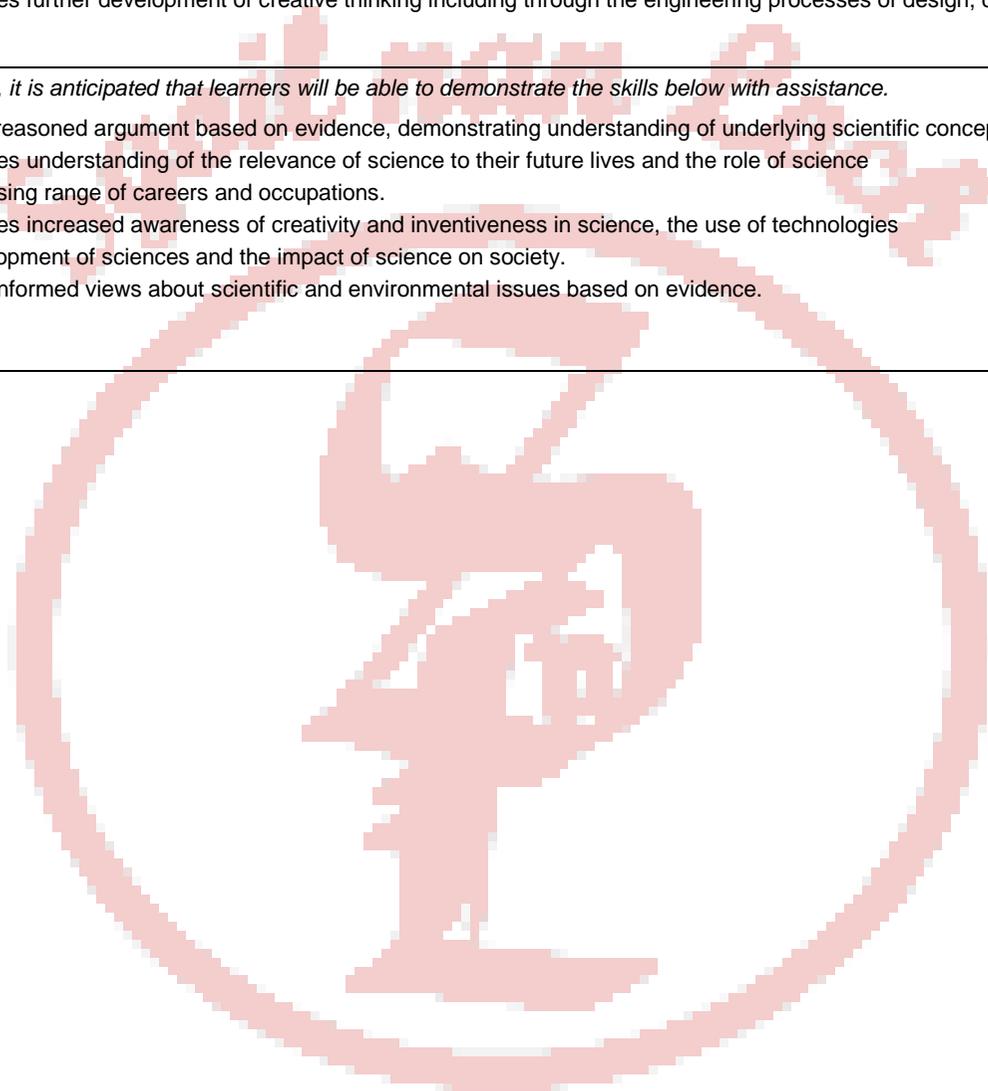
- Expresses informed views of scientific issues, both orally and in writing, and respects the views of others.
- Makes connections between science and their own health and wellbeing.
- Demonstrates awareness of their own impact on the world.
- Demonstrates awareness of how people use science in their everyday lives and in a variety of jobs and careers.
- Discusses science topics in real-life contexts including those appearing in the media.



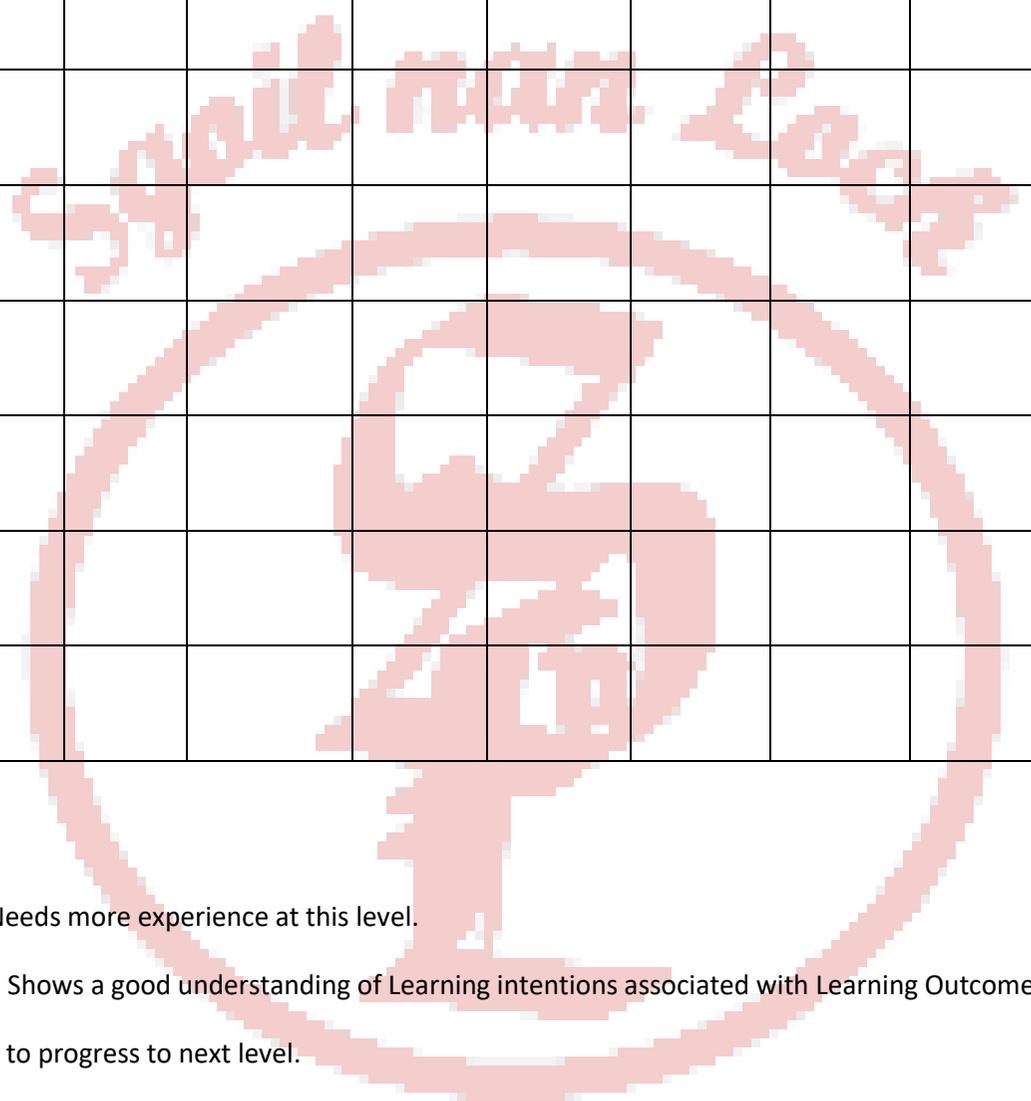
**Second Level:**

<b>Skills</b>	
<b>Inquiry and investigative skills</b>	<p data-bbox="409 252 976 276"><i>Plans and designs scientific investigations and enquiries</i></p> <ul data-bbox="409 312 1543 400" style="list-style-type: none"><li>- Formulates questions and predictions (hypotheses), with assistance, based on observations and information.</li><li>- Identifies the independent, dependent and controlled variables, with assistance.</li><li>- Anticipates some risks and hazards.</li></ul> <p data-bbox="409 435 1077 459"><i>Carries out practical activities in a variety of learning environments</i></p> <ul data-bbox="409 496 1469 619" style="list-style-type: none"><li>- Applies appropriate safety measures.</li><li>- Contributes to carrying out all the procedures.</li><li>- Makes observations and collects information and measurements using appropriate devices and units.</li><li>- Manages identified controlled variables to ensure validity of results.</li></ul> <p data-bbox="409 659 936 683"><i>Analyses, interprets and evaluates scientific findings</i></p> <ul data-bbox="409 719 1346 967" style="list-style-type: none"><li>- Selects appropriate methods to record data/information.</li><li>- Identifies relationships between the independent and dependent variables.</li><li>- Makes links to original questions or predictions.</li><li>- Relates findings to the wider world.</li><li>- Draws basic conclusions consistent with findings.</li><li>- Identifies and discusses additional knowledge and understanding gained.</li><li>- Recognises anomalous results and suggests possible sources of error.</li><li>- Evaluates the investigation and suggests one way of improving it if it was to be repeated.</li></ul> <p data-bbox="409 1007 678 1031"><i>Presents scientific findings</i></p> <ul data-bbox="409 1067 1469 1248" style="list-style-type: none"><li>- Presents data/information by choosing from an extended range of tables, charts, diagrams, graphs, including bar graphs and line graphs.</li><li>- Reports collaboratively and individually using a range of methods.</li><li>- Collates, organises and summarises findings, with assistance, using headings or questions to provide structure for presentations.</li><li>- Uses appropriate scientific vocabulary and acknowledges sources, with assistance.</li></ul>

<b>Scientific analytical thinking skills</b>	<ul style="list-style-type: none"><li>- Applies scientific analytical thinking skills, with assistance, working with less familiar (or familiar but more complex) contexts.</li><li>- Applies understanding, and a combination of more than one science concept, to solve problems and provide solutions.</li><li>- Demonstrates further development of creative thinking including through the engineering processes of design, construction, testing and modification.</li></ul>
<b>Skills and attributes of scientifically literate citizens</b>	<p><i>At Second Level, it is anticipated that learners will be able to demonstrate the skills below with assistance.</i></p> <ul style="list-style-type: none"><li>- Presents a reasoned argument based on evidence, demonstrating understanding of underlying scientific concepts, and engages with the views of others.</li><li>- Demonstrates understanding of the relevance of science to their future lives and the role of science in an increasing range of careers and occupations.</li><li>- Demonstrates increased awareness of creativity and inventiveness in science, the use of technologies in the development of sciences and the impact of science on society.</li><li>- Expresses informed views about scientific and environmental issues based on evidence.</li></ul>





Developing : Needs more experience at this level.

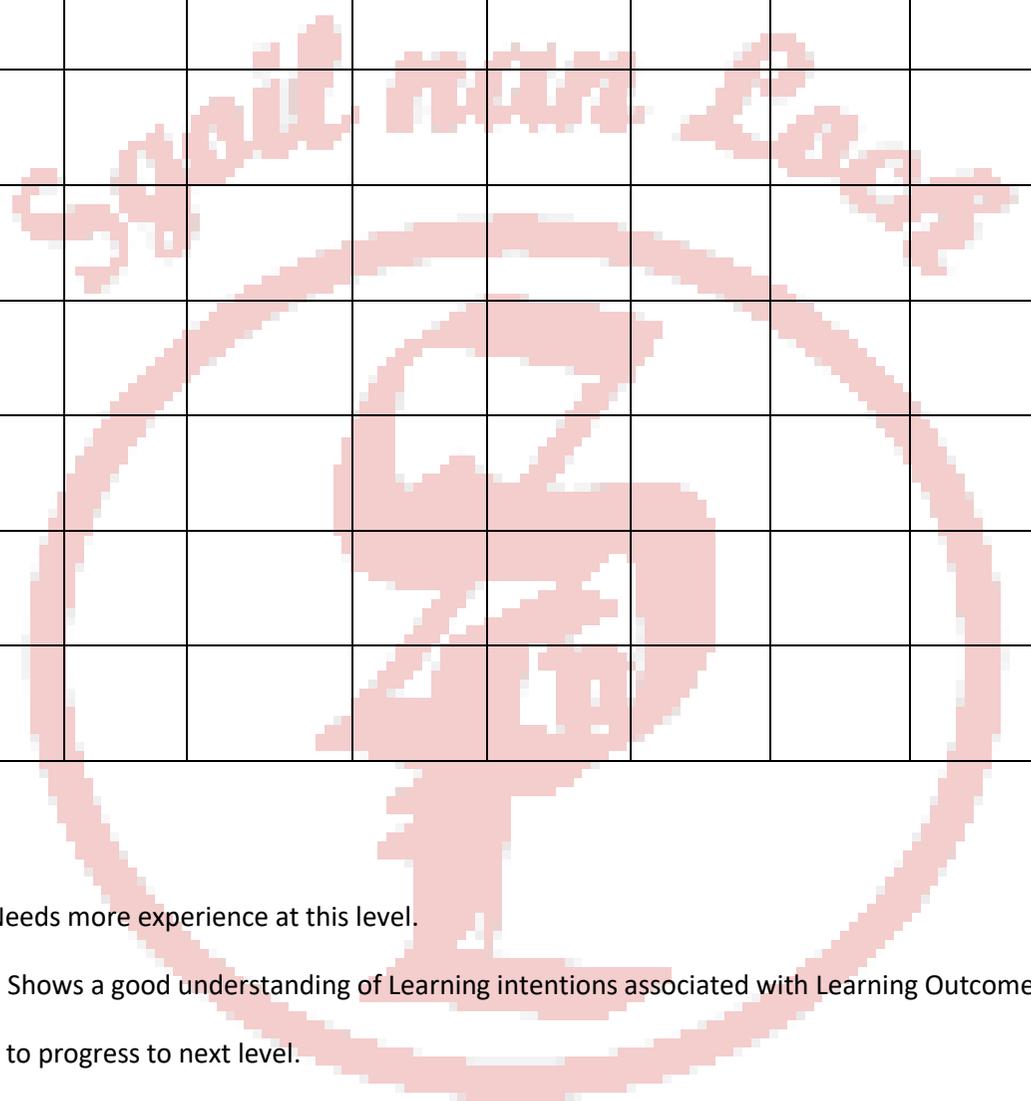


Consolidating: Shows a good understanding of Learning intentions associated with Learning Outcome.



Secure: Ready to progress to next level.



Developing : Needs more experience at this level.

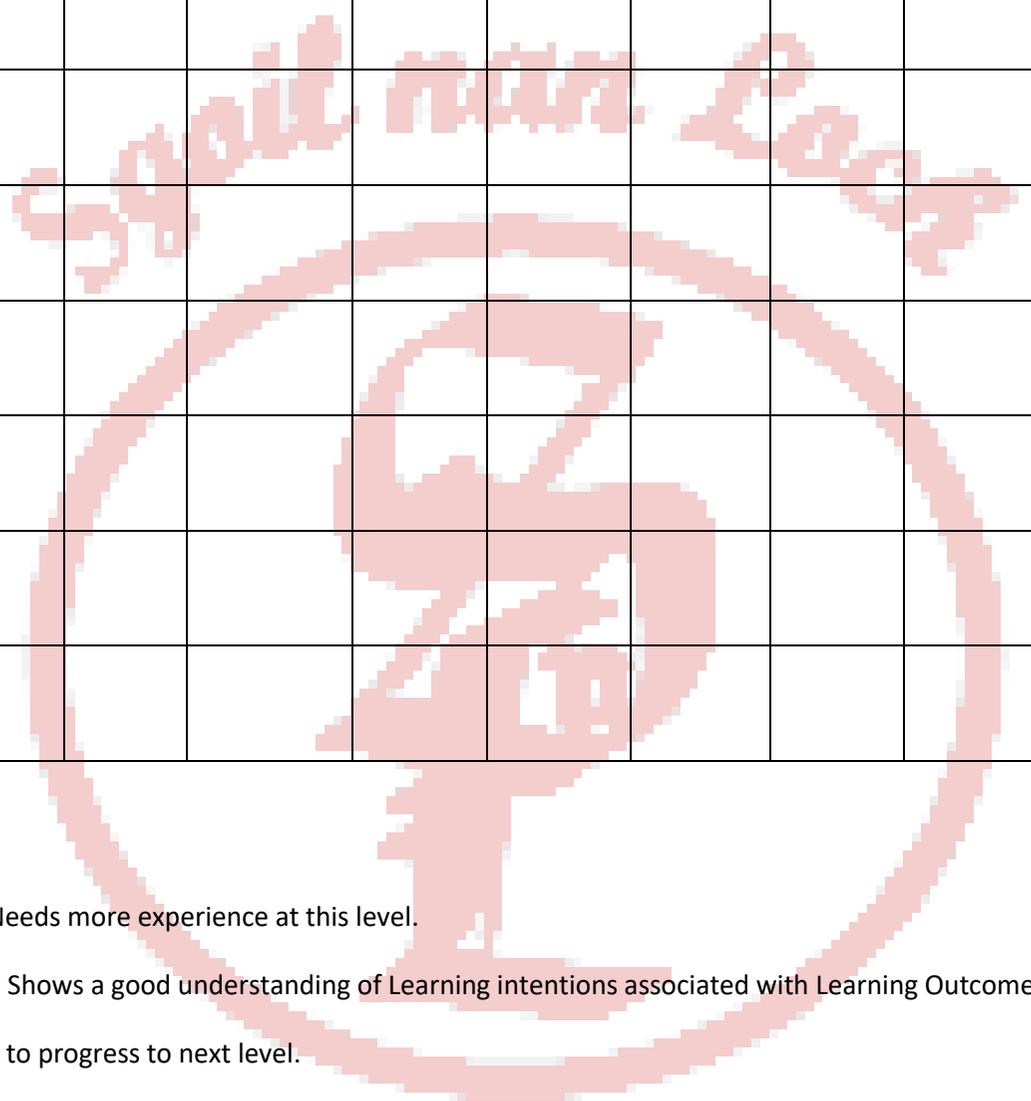


Consolidating: Shows a good understanding of Learning intentions associated with Learning Outcome.



Secure: Ready to progress to next level.



Developing : Needs more experience at this level.



Consolidating: Shows a good understanding of Learning intentions associated with Learning Outcome.



Secure: Ready to progress to next level.