# St Luke's Science Progression of Learning – Knowledge and Skills

## Science SC 1 Skills progression

| | EYFS | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|
| **Overview of learning**<br>Red is new learning / skill | Say what they think will happen<br>Make an observation and say if they were right | Gathering data through observation and classification<br>Use equipment (magnifying glass)<br>Record results simply (in a table /with pictures /by grouping) | Plan and conduct simple tests to answering specific questions, Know to change one variable and control the others, answer the specific question | Setting up experiments with an understanding of fair testing. Making predictions that have reasoning behind them. Collecting different types of data (beyond observation) and reporting on and explaining findings | Setting up experiments and collecting different types of data (beyond observation) and reporting on and explaining findings | Justify conclusions using scientific evidence. -Know how to independently write a simple scientific enquiry write-up including an introduction, a list of equipment, a numbered method, a detailing of results and a conclusion | Apply a higher level of understanding to planning, conducting record and concluding. |
| **PREDICT AND PLAN**<br>Ask questions<br><br>Predict | **Know and ask questions about their environment** using how, why and what if<br><br>Respond to 'I wonder' questions<br><br>**-Make a guess about what they think will happen using "I think" statements during class discussions,** apply this within play<br><br>Explain their thought process behind what they think based on real life experience and what has been read to them.<br><br>Suggest a way to answer a question<br><br>**Test as a response to an adult led question "What would happen if…"** | -That scientific investigation begins with a question they want to find the answer to<br>**-Say what they think the outcome of the experiment may be**<br>-Ask questions about the world and then make observations to answer these questions. | **-Make a prediction on the outcome of the experiment and say why they think that.**<br>-Plan a simple test (reduced variables e.g- are all soft materials flexible) | -That they can set up their own simple practical enquiries by identifying a question they want the answer / responding to a given question to and **making sure the test is fair**<br>**-Understand that fair testing means changing one variable at a time (independent variable) and one thing that may change (that is measured (dependent variable)**<br>-That predictions should have reasoning behind them (based on scientific understanding or real life experiences) | -That they can set up their own simple practical enquiries by identifying a question they want the answer to and making sure the test is fair (Y3)<br>**-To plan and carry out comparative tests**<br>-Understand that fair testing means changing one variable at a time (independent variable) and one thing that may change (that is measured (dependent variable) Y3<br>**-Make relevant predictions based on their increasing scientific knowledge** that will be tested in a scientific enquiry. | -That scientific enquiry is framed by asking relevant questions and using different types of scientific enquiry to answer them (Y3/4) independently **plan a fair test recognising and controlling variables where necessary**<br>-plan in factors to ensure reliability of results (e.g. take multiple measurements) | -Recognising and controlling variables where necessary<br>-Understand that fair testing means changing one variable at a time (independent variable) and one thing that may change (that is measured (dependent variable)<br>**-Know how to choose appropriate variables to test a hypothesis** (e.g. plant height as a dependent variable when measuring effect of light on plant growth)<br>-Know examples of instances where scientific evidence has been used to support or refute ideas or arguments (e.g. fossil records as evidence of natural selection)<br>-That a theory is an explanation of observations that has been tested to some extent and that a hypothesis is an explanation that has not yet been tested, but that can be tested through a scientific enquiry |
| **CONDUCT**<br>Observe<br>Measure<br>Time | **Try out their guesses and observe what happens**<br><br>Observe and interact with natural processes, such as ice melting, a sound causing a vibration, light travelling through transparent material, an object casting a shadow, a magnet attracting an object<br><br>**Observe how one thing changes over time e.g plant growth**<br><br>Verbally compare objects and materials within their environment | **-Use simple equipment to observe (**eg. Magnifying glass**)**<br>**-That objects can be identified or sorted into groups based on their observable properties** (Classification) | -Set up and **perform simple tests** e.g. how seeds and bulbs grow into mature plants<br>-Use systematic observation to gather results to answer a question.<br>-That observation is a valid way of collecting data about changes.<br>*Use of rulers for std measure once taught in maths(plants)* | -That equipment should be used systematically and carefully to **take accurate measurements using standard units** and a range of equipment, including thermometers,<br>data loggers (light unit), rulers (metres in humans and mm in plants)<br>stopwatches (humans) | -That equipment should be used systematically and carefully to take accurate measurements using standard units and a range of equipment, including thermometers (changes of state) | - That scientific enquiries are limited by the accuracy of the measurements (and measuring equipment) and by the extent to which conditions can vary, **-That repeating enquiries, measurements and taking measures to keep conditions as consistent as possible can improve an enquiry**<br>-take accurate measurements using standard units, using a range of equipment, **taking repeat readings when appropriate** | **- Know how to accurately use further measuring devices,** recognizing the relative accuracy of each device<br>e.g. heart rate monitors (humans)<br>**-Know how and when to repeat measurements**, how to find an average of a set of measurements and -how to recognize and remove outliers from a set of data, justifying the removal as a potential mis-measurement |
| **RECORD**<br>Draw<br>Tables | After close observation, draw pictures of the natural world, including animals and plants. | **Write down words and numbers into pre-drawn tables or draw pictures to** | **Record results to experiments in different ways: a table, a labelled diagram** | **Results can be classified and presented in a variety of ways to help answer questions** e.g. recording findings using | -Know how to draw bar charts; how to label a diagram using lines to connect information to the diagram; how to use a coloured key | Data can be gathered and presented in a variety of ways to help answer questions e.g. recording | Data can be gathered and presented in a variety of ways to help answer questions<br>-Choose the best recording method to present their data |

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| Labelled diagrams<br>**KS2 Graphs** | Identify and name things they have observed<br><br>**Talk about what they see, hear and feel based on their observations**<br>Use simple equipment to measure e.g. use sand timers for time or unifix cubes for distance<br><br>Make their own recordings, e.g draw, label, pictograms, write | **record what they find** | | simple scientific language, drawings (Y1), labelled diagrams (Y2), keys, bar charts, and tables (Y2)<br>For example: Know how to draw bar charts; how to label a diagram using lines to connect information to the diagram; how to use a coloured key how to draw a neat table; how to draw a classification key. | how to draw a neat table; how to draw a classification key how to show the relationship between an independent variable in a two-way table; and how to label specific results in a two-way table (e.g. use for classification of animals, vertebrae / not, carnivore / not)<br>Know – with structured guidance - how to write a simple scientific enquiry write-up including an introduction, a list of equipment, a numbered method, **a detailing of results and a conclusion** | findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables of increasing complexity using scientific diagrams and labels, classification keys, scatter graphs, bar and line graphs<br>-**Know how to independently write a simple scientific enquiry write-up including an introduction, a list of equipment, a numbered method, a detailing of results and a conclusion** | -Know how to independently write a simple scientific enquiry write-up including an introduction, a list of equipment, a numbered method, a detailing of results and a conclusion<br>-To include areas of improvement and further research questions to investigate |
| **CONCLUDE**<br>Analyse<br>Notice patterns<br>Explain | **Understand some important processes and changes in the natural world around them,** including the seasons and changing states of matter (melting and freezing)<br><br>**Suggest a relationship between cause and effect by using the word because** | **-Use their observations and ideas to suggest answers to questions**<br><br>-Suggest an answer based on real life experience | **-That they can use their observations and taught scientific knowledge to suggest plausible answers to questions** | **-Use results to draw simple conclusions that answer the investigation question based on their results.**<br>-Draw a conclusion based on the relationship between the independent and the dependent variable (the bigger the… the smaller the… – the 'er 'er rule)<br>-Report on findings from enquiries, (including oral and written explanation) | -Report on findings from enquiries,<br>**-Draw a conclusion based on the relationship between the independent and the dependent variable (the bigger the… the smaller the.. – the 'er 'er rule)**<br>**- be able to use straightforward scientific evidence to answer questions or to support their findings.**<br>-use results to draw simple conclusions suggest improvements and raise further questions<br>-identify differences, similarities or changes related to simple scientific ideas and processes<br>-Ask and be able to plan further questions as a result of the enquiry (e.g. effect of changing sunlight on a plant – does this work with other plants / different types of light / etc) | -Use test results generate further questions, make predictions and set up further comparative and fair tests<br>**-Justify their conclusions using scientific evidence.**<br>**-Make conclusions that include noticing causal relationships** and explanations of and degree of trust in results | **-Analyse and compare data, noticing patterns and relationships**<br>-Know how to present brief oral findings from an enquiry, speaking clearly and with confidence and using notes where necessary<br>-Know how to identify conditions that were imperfectly controlled and explain how these might affect **Make conclusions that include noticing causal relationships** and explanations of and degree of trust in results results (confounding results) |
| VOCAB | Guess (predict), look, observe, explore, same, different, cause, effect, because, label, compare | properties, observe, test, magnifying glass, object, record, equipment | **properties, observe, test, magnifying glass, object, record, equipment** investigate, measure, predict, conclude, data, sketch, label, | **investigate, measure, predict, conclude, label,** prediction, measurement, enquiry, dependent variable, independent variable, fair test, present, similar, differences, diagram, key, chart, evidence | **investigate, measure, predict, conclude, label, prediction, measurement, enquiry,** dependent variable, independent variable, variable, comparative, fair test, present, similar, differences, diagram, key, chart, evidence | **investigate, measure, predict, conclude, label, prediction, measurement, enquiry, dependent variable, independent variable, variable, comparative,** fair test, present, similar, differences, diagram, key, chart, evidence, relationship, controls, component, effect, interpret, justify, cause & effect. | **investigate, measure, predict, conclude, label, prediction, measurement, enquiry, dependent variable, independent variable, variable, comparative,** fair test, present, similar, differences, diagram, key, chart, evidence, relationship, controls, component, effect, interpret, justify, cause & effect, theory, hypothesis, repeatable, causal relationships, phenomena, |

# St Luke's Science Progression of Learning – Knowledge and Skills

**Knowledge progression**

| PLANTS | | | | | | | |
|---|---|---|---|---|---|---|---|
| | **EYFS** | **1** | **2** | **3** | **4** | **5** | **6** |
| **Key Knowledge** | **-Plants need water**<br><br>-Name simple plants - sunflower, lavender, daffodil<br>-Know that things that are alive, change over time | **Identify and name at least 2 garden plants and two wild plants including deciduous and evergreen trees**<br><br>Identify ***leaves***, ***flowers*** *(blossom), petals, fruit,* ***roots****, bulbs, seeds,* ***trunk****, branches,* ***stem***<br><br>-Know that evergreen trees maintain their leaves throughout the year and that deciduous trees shed their leaves in autumn<br><br>-Know that a flowering plants consist of roots, stem, leaves and flowers, and that a tree's stem is called a trunk | **- Plants grow from seeds and bulbs**<br><br>**-Plants need water, light and the right *temperature*.**<br><br>*-Germination* is when a seed starts to grow.<br><br>-Know that seeds and bulbs need to be buried underground in soil and that they will grow into adult plants under the right conditions (water, warmth)<br>-Know that plants that are deprived of light, food (water) or the right temperature will not grow and will die.<br>-Know that plants produce seeds that grow into new plants that are the same. | **-Know that the roots collect water and minerals from the soil, and hold the plant firmly in the ground**<br>Know that the stem holds up the leaves so that they can gather light to make food and holds up the flowers so that they can receive pollen and disperse their fruits;<br>**know that the stem also transports water and minerals from the roots to the other parts of the plant**<br>Know that the leaves make food by trapping light and using its energy to turn carbon dioxide and water into carbohydrates<br>Know that the function of a flower is reproduction, where flowers of the same kind exchange pollen – made by an anther<br><br>**-Plants need air, light, water, *nutrients* from soil, and room to grow.**<br><br>***-Pollination* leads to seed *formation* then seed *dispersal***<br> | -Know what distinguishes plants as a group from animals (make own food from sunlight, usually do not move around)<br>***Taught in living things*** | **-Plant begins as a seed, grow then produces seeds**<br>*Revision of Y3 content (below)*<br>*-Know that the function of a flower is reproduction, where flowers of the same kind exchange pollen – made by an anther – in a process called fertilisation, and a structure in the flower's ovary called an ovule becomes a seed; the ovary then becomes a fruit which helps the seed leave the plant in a process called dispersal*<br>*-Pollination leads to seed formation then seed dispersal*<br>**Y5:**<br>– in a process called fertilisation, and a structure in the flower's ovary called an ovule becomes a seed; the ovary then becomes a fruit which helps the seed leave the plant in a process called dispersal | |
| Possible class tasks | Explore the natural world around them<br>Describe what they see, hear and feel whilst outside. | Label the basic structure of a common/wild flowering plant? | | How water is *transported* in plants. Celery in blue food dye (predict, observe, conclude)<br>Draw a diagram to show the stages of the life cycle of a flowering plant include pollination, seed formation and seed dispersal | | See living things and their habitats | |
| Working Scientifically focus | Observe plants growing from seeds<br>Bean plant in a jar. | **What's the most common plant?**<br>*Observe, record, conclude* | What conditions are best for germinating seeds and growing plants?<br>Can a plant grow without light? OR<br>Can a plant grow without water?<br>Full investigation<br>Measure size of plant using a ruler (cm) | What happens to a plant with no leaves? Take a plant and remove its leaves – how long it survive without its leaves? (ruler including mm)<br>Full investigation | Knowledge taught in living things no plant working scientifically focus | | |
| Vocab | **Plant, water, life, change, growth** | energy, growth, deciduous, evergreen, flower, plant, tree, structure, roots, stem, leaf, trunk, flower, daisy, rose, daffodil | -Germination reproduction, bulb, seed, survival, temperature | Pollination seed formation, dispersal fruit, nectar , petal, pollen, stigma, style, stamen, function, dispersal, | | Pollination seed formation, dispersal fruit, nectar, anther, ovary, ovule, petal, pollen, stigma, style, stamen, function, exchange, dispersal, fertilization | |

# St Luke's Science Progression of Learning – Knowledge and Skills

| **Animals** including humans | | | | | | | |
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| | **EYFS** | **1** | **2** | **3** | **4** | **5** | **6** |
| Key Knowledge **Bold to be retained by all** | **-Know that things that are alive, change over time**<br>-Know some of the differences between babies and adults (size, colours can change etc)<br>-Know the names of some baby animals e.g. chick, tadpole | **Name at least one *fish, amphibian*, and *reptile*.**<br><br>**Identify *cow, dog, cat, pig, blackbird, sparrow,***<br><br>**Identify simple differences between animals** – eg legs/no legs, *wings, feathers, fur, scales, beak*, what they eat.<br><br>**Know that herbivorous animals eats plants; a carnivorous animal eats other animals; omnivorous animals eat both animals and plants**<br><br>**Name at least 2 common animals that are carnivores, herbivores and omnivores**<br><br>-Know that fish, amphibians, reptiles, birds and mammals are similar in that they have internal skeletons and organs; these are known as vertebrates, which means they are animals that have a backbone<br>-Know that fish are different in having gills so that they can breathe underwater and scaly skin<br>-Know that amphibians are different in that they begin their lives with gills but then develop lungs and breath on land<br>-Know that reptiles are different in that they breath air **and** have scaly skin<br>-Know that birds are different to other animals in that they have feathers and wings<br>-Know that mammals are different to other animals in that they have fur/hair and they feed milk to their young. | **Know animals including humans have babies** (*offspring*) **that grow into adults**.<br><br>**Know that animals, including humans, need food, water and air to survive** | **Know that animals, including humans, cannot make their own food.**<br><br>**Know that different animals eat different sorts of food.**<br><br>**Know animals have *skeletons* to protect and support them.**<br><br>Taught alongside animals **including humans** below<br>See key knowledge | **Understand a food chain starts with the sun, then a plant, then an animal, usually a herbivore then carnivores.**<br><br>-Know that a food chain traces the path of energy through a habitat<br>-Know that all energy for a food chain initially comes from the Sun which is absorbed and turned into energy by plants which are called producers<br>Know that consumers take in energy by eating<br>Know that an animal that is eaten by another is called prey, and that an animal that eats other animals is called a predator<br>Know that the first consumer in a food chain is called a primary consumer, the second is called a secondary consumer and above it is called a tertiary consumer<br>Know that the arrows in a food chain show the direction that energy is travelling through a habitat.<br><br>**<u>Plant knowledge</u>**<br>-Know what distinguishes plants as a group from animals (make own food from sunlight, usually do not move around)<br><br>You may want to teach this alongside living things and habitats | **See living things and their habitats (Environment) focus on life cycles of humans and animals** | **See living things and their habitats (Environment) focus on classification** |
| Possible class tasks | Observe life cycles of animals: caterpillar-butterfly, egg hatching to chick/duckling<br>Identify changes over time | What common animals are carnivores, herbivores and omnivores?<br>Categorise Dinosaurs – Carnivore, herbivore, omnivore | **See** animals **including humans** below | **See** animals **including humans** below | Recording using labelled diagrams (food chains starting with the sun) | | |
| Working Scientifically focus | | Identify and classify animals into groups<br>Do all creatures that live in water have scales? | | | No full investigation due to unit knowledge | | |
| Vocab | | energy, growth, habitat, fish, amphibian, reptile, bird, mammal, offspring, carnivore, herbivore, omnivore, vertebrate, skeleton, organ, spine, brain, heart | | | **predator, prey, producer, consumer**, primary, secondary, tertiary | | |

# St Luke's Science Progression of Learning – Knowledge and Skills

| Animals including **humans** | | | | | | | |
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| | **EYFS** | **1** | **2** | **3** | **4** | **5** | **6** |
| Key Knowledge **Bold to be retained by all** | **Know basic hygiene**, eg wash hands.<br><br>**Know the importance of and be able to perform good oral hygiene**<br><br>Name ***head, hands, arms, legs, , face, ears, eyes, hair, mouth, nose***<br><br>**-Know that things that are alive, change over time**<br>-Know some of the differences between babies and adults e.g babies can't talk or walk | **Name *head hands, neck, arms, elbows, legs, knees, face, ears, eyes, hair, mouth, nose, teeth, tongue***<br><br>-Have an awareness that we also have parts inside our body - bones, heart, lungs, blood.<br><br>**-Know that eyes are associated with sight, ears with sound, nose with smell, tongue with taste and skin with touch and that these are all our senses.**<br><br>Know how to keep our teeth clean - how many times a day for how long.<br>To know what keeps our body healthy - sleep, diet, exercise<br>Handwashing and being hygienic | **Know humans need to eat good foods like *vegetables, fruits*, things like *rice* and *bread* and potatoes, and *protein*, and not too much *fat* and *sugar*.**<br><br>**Understand that to stay *healthy*, humans need to -*exercise*** to help their body stay strong and fit<br>**-keep things clean,** including washing and brushing teeth,<br>-Eat the right amounts of different types of food<br><br>-Know the basic food groups: fruit and vegetables, carbohydrates, protein, dairy, fat and sugary foods<br>-Know that more than half of our diet should be made up of carbohydrates, fruit and vegetables<br>-Know that fats and sugary foods should be eaten rarely and in small amounts<br>-Know that people need to exercise often | **Know that animals, including humans, cannot make their own food.**<br><br>Know they need to eat the right types and amount of food (year 2 recap)<br>That getting the right amount of each food group (including over half of the diet made up of fruit, vegetables and carbohydrates) is called a balanced diet (year 2 recap)<br><br>**Know that different animals eat different sorts of food.**<br><br>**Know that proteins are good for growth, carbohydrates for energy and fruit and vegetables provide vitamins and minerals which help keep us healthy (e.g. calcium for healthy bones and teeth)**<br>Know that lack of a nutrient or excess if a food can cause ill health e.g. sugar and tooth decay; excess fat from fatty foods and created in the body from excess calories – builds up in the body and can cause obesity, heart disease and strain on joints and growing bones<br>**Know humans and some other animals have *skeletons* to protect and support them.**<br>Know that human skeletons are made up of bones and cartilage<br>**Know that skeletons provide support for muscles and protect the body; for example, the rib cage protects the vital organs in the human body**<br>Know that some animals (such as insects) have an exoskeleton – a solid covering on the outside of their body<br>Know that many invertebrates (such as earthworms and slugs) have water held inside by muscles which act like a skeleton<br><br>**Know humans have *muscles* for movement**<br>Know that muscles can only contract, so they must be arranged in pairs in the body so that as one contracts the other loosens | Know that adult humans have 32 teeth<br>**Identify teeth – *incisors, canines, pre-molars and molars*,** wisdom teeth<br><br>**Know what the different teeth do –**<br>**Know that incisors slice food, canines tear food (especially meat) and that molars grind food**<br>Know that children develop an initial set of teeth which are gradually replaced between the ages of 6 and 12<br><br>**Be able to label the different parts of the *digestive system – mouth, tongue, teeth,*** *oesophagus,* ***stomach,*** *small* ***intestine,*** *large intestine*<br><br>**Know that food passes through the body with the nutrients being extracted and the waste products excreted, and that this process is called digestion**<br><br>-Know that the process of digestion involves breaking complex foodstuffs into simpler building blocks that can be absorbed by the body. It begins with food being chewed in the mouth by the teeth and saliva added<br>-Know that food is squeezed down the oesophagus towards the stomach in a wave-like action called peristalsis<br>-Know that the stomach releases acid and enzymes to continue breaking down the food; the stomach is an organ; an organ is a part of living thing that is self-contained and has a specific important job<br>-Know that further enzymes and bile break down the food further as it moves through the duodenum towards the small intestine<br>-Know that the small intestine adds more enzymes and then absorbs the nutrients<br>-Know that the large intestine absorbs water from the undigested food<br>-Know that undigested food is stored in the rectum before being excreted through a muscle called the anus | **Identify changes for humans as they age, using a timeline.**<br>**Understand how *puberty* prepares our bodies for being adult.**<br>Know other animals age at different rates.<br><br>**Know that humans go through stages of development; they begin as fertilized eggs and then develop into embryos before developing into babies;** once they are born, these newborn babies become infants (roughly 2 months to 2 years) then into young children (roughly 2-12 years old); children develop into adults during adolescence (roughly 12-16 years old) at which age they become physically capable of reproduction; as adults develop into old age (roughly 55+ years old) they experience changes in their body which require them to move more carefully and rest more frequently<br>Links to RSHE<br><br>Also cover plant reproduction (see Y5 plant knowledge) | **Identify *heart, blood vessels,*** *veins, arteries*<br><br>**Know that blood travels around the body transporting nutrients and water that has been absorbed into the bloodstream from digestion; blood also carries oxygen around the body which is used to power the body; this use of oxygen to create energy is called respiration**<br><br>**Describe one way that diet, exercise, *drugs* can affect the body positively and one way negatively.**<br><br>Know that the heart and lungs are organs protected by the ribcage<br>**Know that the heart beats, pumping blood around the body and that blood vessels carry the blood;** arteries carry blood away from the heart; veins carry blood towards the heart; capillaries are tiny blood vessels that connect arteries and veins<br>Know that the heart is composed of four chambers: two atria and two ventricles; the aorta is the largest artery in the body and most major arteries branch off from it<br>**Know that when we exercise, our heart beats more frequently so that the oxygen that is used around the body can be replenished**; it returns to a resting heart rate afterwards; fitter people tend to have lower resting heart rates<br>-Know that drugs are chemicals that have an impact on the natural chemicals in a person<br><br>**Know that drugs can be harmful or helpful, depending on what they are and how they are used; know that all drugs can be harmful if overused**<br>Know that paracetamol and aspirin are examples of drugs that can be helpful as a painkiller<br>Know that alcohol and tobacco are examples of drugs that are legal to adults but that can have serious negative effects, such as liver disease and lung disease, respectively |
| Possible class tasks | Talk about what is the same and what different about friends and family<br>Talk about how do we keep our teeth clean<br>Visit from Dental hygienist | Label basic parts of the body/ Human Torso<br>Name which part of the body is associated with each sense? | Research<br>Explore food groups.<br>Record ways that exercise affects the body<br>**What damage can too much sugar have on our bodies? (predict collate record conclude)** | Compare how plants and humans obtain food<br>Identify and name bones using skeleton model<br>Examine how muscles work<br>Investigate pairs of muscles | Explain what are the different purposes of teeth in animals and humans? | -Describe and record the changes of life from a baby and as we go through puberty?<br>Draw a *life-cycle diagram* for a human.<br>-Children to create a collage using pictures | Draw diagrams and describe ways in which nutrients and water are transported within animals, including humans?<br>Describe the short term effects happen to your body through exercise?<br>Describe the long term effects on our body through regular exercise? |

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| | . | | **What is the effect of exercises on my body? Observation and record (sweating, heart rate increase, out of breath)** | | | labelling stages of development. -Research using secondary sources of information - gestation periods of different mammals compared to humans | |
| Working Scientifically focus | | Are all red/green apples sweet/sour? **Focus: full investigation** | See working scientifically tasks above. | Does having a longer humorous mean that you can throw a ball further? Standard measure rulers measure metres Does having a longer thigh bone mean that you can run faster? stopwatches **Focus: full investigation** | How does sugar affect our teeth? *(used with eggshell to replicate if an old tooth can not be found) drop eggshell/tooth into water / coke / fruit juice* **Focus: full investigation** | No full investigation due to knowledge content. See focus WS tasks above | How quickly does heart recover after exercise? OR Which types of exercises increase heartrate the most? Full investigation measure recover to resting heart rate |
| Vocab | ***head, hands, arms, legs, , face, ears, eyes, hair, mouth, nose, teeth, dentist*** *healthy, clean, dirty* | Name ***head hands,*** *neck,* ***arms,*** *elbows,* ***legs,*** *knees,* ***face, ears, eyes, hair, mouth, nose,*** *teeth,* ***tounge***<br><br>Name some senses: Sight, hear, touch | reproduction, offspring, adult, survival, hygiene, **exercise** **Vegetables, fruit, protein** | **vitamin, balanced diet,** cartilage, invertebrate, contract, loosen, ribcage, **skeleton, muscles** | **mouth, tongue, teeth**, oesophagus, **stomach,** small **intestine**, large intestine digestion, excretion, peristalsis, anus, duodenum, small intestine, large intestine, stomach, rectum, esophagus, tongue, saliva, acid, | **You need to identify here what on puberty is being taught as the science curriculum and what is being taught as RSHE curric and adapt your vocab accordingly** | ***heart, blood vessels,*** *veins, arteries* artery, aorta, atrium, capillary, circulatory system, vein, pulse, ventricle, replenished, resting heart rate, diet, **oxygen,** respiration, **drugs** |

# St Luke's Science Progression of Learning – Knowledge and Skills

| Environment: Living things and their habitats; rocks; evolution and Inheritance | | | | | | | | |
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| | **EYFS** | **1** | **2** | **3** | **4** | **5** | **6** | |
| Key Knowledge **Bold to be retained by all** | **-Know that things that are alive, change over time**<br>-Know that animals, like humans have places that they like to live and that this provides them adequate shelter<br>**-Know that a place can be home to lots of different animals of different sizes (e.g. insects – mammals)**<br>-Know some names for animals within a studied place (habitat) e.g. woodlouse, rabbit, butterfly | See animals and humans | **Identify if something is *alive, dead*, or *never alive*.**<br>Know Living things move, grow, consume nutrients and reproduce (plants incl seeds and animals)<br>Know that dead things used to do these things, but no longer do; and that things that never lived have never done these things.<br>Dead things include dead animals and plants as well as parts of plants and animals that are no longer attached e.g. leaves and branches, shells, fur, hair and feathers.<br><br>**Know the habitat provides food, water and *shelter*.**<br><br>**Know that animals and plants live in a habitat to which they are suited**, which means that animals have suitable features that help them move and find food. Plants have suitable features that help them grow well:<br>e.g. polar bears, sharks, cacti<br><br>**Know that within a habitat there are different microhabitats (e.g. in a woodland, the leaf litter or on the bark of trees), which has different conditions (e.g. light / dark, damp / dry)**<br><br>**Know what a food chain is and understand that the arrows on a food chain show the direction that the energy travels.** | **Know fossils are formed when something dies and is buried in rock or mud** so that it cannot be rotted or eaten by scavenging animals; in time layers of sediment build, squashing the mud and turning it to stone around the dead plant or animal<br><br>**Know that soil is a mixture of crumbled rock and dead plants and animals** broken down by the action of weather (weathering)<br><br>**Know that there are three kinds of rocks: igneous, sedimentary and metamorphic**<br>Know that the Earth has a solid crust made up of tectonic plates with molten rock beneath<br><br>Know that igneous rocks form from molten rock below the Earth's crust (e.g. granite and basalt<br>Know that sedimentary rock is formed when small, weathered fragments of rock or shell settle and stick together, often in layers (e.g. limestone and sandstone)<br>Know that metamorphic rocks form when rocks in Earth's crust get squashed and heated in processes such as when tectonic plates press against each other (e.g. marble and slate)<br>Know that some rocks and stone are manmade and others are natural<br><br>Know what the terminology permeable. non permeable, | **Know that animals can be grouped based on their physical characteristics (e.g. vertebrates and invertebrates) and based on their behaviour (e.g. herbivores, carnivores and omnivores)**<br>Know that living things are divided into kingdoms: the animal kingdom, plants, fungi, bacteria, and single-celled organisms<br>**Know that a classification key uses questions to sort and identify different living things**<br><br>Know that a species is a group of living things have many similarities that can reproduce together produce offspring<br>**Understand that plants and animals can be affected if the *environment* changes.**<br>e.g. making it more difficult for animals to survive and reproduce; in extreme cases this leads to extinction, where an entire species dies<br>Know that human activity – such as climate change caused by pollution - can change the environment for many living things, endangering their existence | **Name some differences in the lifecycles of groups of animals: mammal, amphibian reptile, insect and birds** eg M only ones that start as babies inside mothers, are fed milk by their mothers, or A and I have thousands of eggs.<br><br>**Know that the life cycle of a living thing is a series of stages of development starting with a fertilized egg in animals or a seed in many plants**<br><br>**Know that in most mammals (e.g. dogs) a fertilized egg develops in the womb into an embryo and is then born and fed on milk before it is weaned onto the food that is adapted to eat**; it then develops to maturity in a period called adolescence after which it can reproduce and the cycle can begin again<br><br>**Know that in amphibians (e.g. frogs) a fertilized egg develops** into an embryo and **then hatches, it then develops adult characteristics**, **metamorphoses into the adult form after which it can reproduce and the cycle can begin again**<br><br>**Know that in many insects (e.g. butterflies) a fertilized egg develops into wingless feeding form** called a larva (caterpillar); the larva feeds then later becomes a pupa (chrysalis) with a protective cocoon; inside this cocoon, the pupa metamorphoses into the adult butterfly after which it can | **Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals**<br><br>Know difference *vertebrates* and *invertebrates*<br><br>**Know the 5 vertebrate groups (fish, bird, mammal, reptile, amphibians)**<br><br>**Know some common invertebrate groups, eg insects , spiders, worms, snails)**<br><br>Know that an *arthropod* is an invertebrate with a hard , external skeleton and jointed limbs<br>Know that insects are a type of arthropod; their bodies consist of six legs, a head, a thorax and an abdomen; most insects also have a pair of antennae and a pair of wings<br>Know that an *arachnid* (e.g. spider) is a type of arthropod with eight legs and no antennae or wings<br>Know that a *crustacean* is a type of arthropod with two pairs of antennae (e.g. woodlouse)<br>Know that a *myriapod* is an arthropod with a flat and long or cylindrical body and many legs (e.g. centipede)<br><br>**Know that there are three types of micro-organism: viruses, fungi and bacteria**<br>Know that germs are disease-causing bacteria | **<u>Evolution and Inheritance</u>**<br>**Know that living things produce offspring of the same kind.**<br><br>**Know offspring are similar to but not identical to parents (*variation*).**<br><br>**Understand that variation has meant living things have changed over time.**<br><br>Understand that variation means that animals become more or less able to survive where they live.<br><br>**Know that animals and plants that are able to survive are *adapted* to suit their environment and that this adaptation may lead to evolution.**<br><br>**Know that living things changes over time and that this gradual change is called evolution**<br><br>Know that the process of *adaptation* leads to *evolution*<br><br>**Know that fossils tell us about living things from millions of years ago.** |

# St Luke's Science Progression of Learning – Knowledge and Skills

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| | | | | | | reproduce and the cycle can begin again<br><br>**Know that in birds a fertilized egg hatches in a nest (a hatchling) and is fed by its parents until it is ready to fly** (i.e. becomes a fledgling); **it then leaves the nest and grows into an adult** after which it can reproduce and the cycle can begin again | | |
| Possible class tasks | Explore an area of the school grounds (pond)<br>Identify different animals that are found | | Draw arrows on a *food chain* to show what eats what (specific living things).<br>Identify plants and animals in at least one micro-habitat and one larger habitat. Compare difference between things that are living, dead or never been alive.<br>Explain how do animals get their food?<br>Draw diagrams of food chains<br><br>Discuss and explain is a leaf alive when its attached to a plant, what about when it isn't attached? Is a feather alive? | Classify **Put rocks into groups based on their appearance and simple properties** eg colour, hard, soft, *crumbly, hard, grainy*, have *crystals*, have *fossils* in them<br>How many different types of rocks are there?<br>Group different rocks based on their appearance and properties.<br>Research and explain how fossils are formed when things that have lived are trapped within rocks?<br>Compare fossils to the animals they belong to<br>Explain How is soil formed | Follow a key to identify animals and plants<br>Explore animals and plants in a local habitat.<br>Access environmental dangers in the local habitat, research endangered and extinct species<br>**Know how to use a classification key to identify living things**<br>Create a classification key to sort plants on the school premises | Draw a life cycle diagram for another mammal (M), an amphibian (A), a reptile (R), an insect (I), a bird (B).<br>Compare the life cycles of amphibians and insects<br>Observe changes in frogspawn – frog development | Children will research information on Edward Jenner using secondary sources of information<br><br>**Be able to put example animals and plants into the right group giving reasons for classifying plants and animals based on specific characteristics.**<br><br>Give reasons for classifying plants and animals based on specific characteristics. | Explain how have living things changed over time?<br>What does variation and inheritance mean?<br>Observe inheritance and variation by looking at photographs of children and their parent. What traits have they inherited?<br>Research and discuss plants and animals that live and survive in different habitats |
| Working Scientifically focus | Same as animals inc humans:<br>Lifecycles of chicks and butterflies see animals including humans<br>How many different animals can we find in one place?<br>Predict what we think we will see and then test this.<br>Predict, observe, record | | What's the investigation e.g. are snails omnivores? OR<br>What conditions do woodlice prefer? **Full investigation** | *Are all rocks permeable? (possible measure in ml)*<br>**Full investigation** | Is it safe to eat – investigate if there is truth to the 5 second rule<br>Children work in groups to test a single food type. 1. Control, 2. picking one up immediately, 3. after five seconds 4. after 10 seconds. Seal all pieces inside separate, labelled sandwich bags. Observing the pieces over time, children record any changes | No investigation see working scientifically class tasks – observation of frog life cycle to include metamorphosis | What are the variable that affect mould growth (damp, light, etc)<br>OR what are the variables that affect yeast growth (sugar / warmth)<br>Full investigation | No investigation see working scientifically class tasks |
| Vocab | Depending on animals studied to include names of identified animals. E.g. worms, woodlouse, ladybirds | | **Living, dead,** life cycle, birth, decay, **suited,** suitable, basic needs, **food**, food chain, source, nutrients, consumption. **Habitat** (e.g. pond, woodland etc), Microhabitat (e.g. under logs, in the bushes), environment, adapt(ed), shelter. | **igneous, metamorphic, sedimentary,** palaeontologist, weathering, molten rock, crust, tectonic plates, scavengers, **fossil** permeable. non permeable, natural, manmade | **predator, prey, producer,** environment, extinction, endangered<br>kingdom, classification key, species, fungi, bacteria, climate change, characteristics, offspring, extinction, pollution | **reproduce**<br>**life cycle,** life span, embryo, womb, weaned, adolescence, metamorphosis, pupa, larva, chrysalis, caterpillar, tadpole, hatchling, fledgling, insect | microorganism, virus, thorax, arthropod, abdomen, arachnid, antenna, jointed limbs | **evolution**, natural selection, variation, advantageous |

# St Luke's Science Progression of Learning – Knowledge and Skills

# St Luke's Science Progression of Learning – Knowledge and Skills

## Materials / Properties and changes of materials / States of matter

| | EYFS | 1 | 2 | 3 | 4 | 5 | 6 |
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| Key Knowledge **Bold to be retained by all** | Know that some materials float and others sink.<br><br>Know wood floats and stone sink<br><br>Recognise plastic, glass, wood and stone as materials<br><br>**Know similarities and differences between materials- Hard, soft, smooth, rough** | **Name objects and then say what they are made of**, covering **wood, plastic, *glass, metal, water and rock***, *brick, paper, fabric*.<br><br>Know there is a difference between an object and the material it is made from.<br><br>Know that materials can be hard, soft, strong, weak, absorbent, heavy, light, solid and runny, smooth and rough; these descriptions denote the properties of a material<br>Say whether a material is ***hard/soft;*** *stretchy/stiff; shiny/dull rough/smooth;* ***bendy/not bendy; waterproof/not waterproof****; absorbent/not absorbent;*<br><br>Investigation: Testing different materials to ascertain certain properties. Which materials are waterproof? Which material is best to keep you dry? | **Know that applying forces (e.g. *bending, stretching, squashing and twisting)* to solid objects can change their shape**<br>-Know rigid means something that will not bend without breaking<br>-Flexible is something that can bend without breaking<br>-Know the difference between opaque, transparent<br><br>**Link a property to how suitable materials are for particular uses:** (eg bricks used for houses cannot be squashable, material used for windows must be transparent) **including wood, metal, plastic, glass, brick, rock, paper and cardboard**<br><br>Know that materials can have useful properties that make them suitable for a given job (including being waterproof, flexible, rigid, opaque and transparent)<br><br>Know that many types of plastic are waterproof, that metal is usually strong, that rock is hard and rigid, some plastics are flexible, | See Rocks and light<br>-Know the difference between opaque, transparent and translucent | **Know that things are composed of a material in one of three states of matter: solid, liquid or gas**<br>Know that things are made of particles (tiny building blocks) and that these are organized differently in different states<br><br>**Know that materials can *change state* when heated or cooled**<br>**Know that when solids turn into liquids, this is called melting and that the reverse process is called freezing**<br>Know that when liquids turn into gases, this is called evaporation and that the reverse process is called condensation<br>Know that there are bonds between the particles (building blocks) in a solid; as temperature increases, these bonds are somewhat overcome as the particles absorb energy and solids can change into liquids; with a further increase in temperature, the particles become even more energetic and the bonds are overcome entirely so the liquid changes into a gas<br><br>Know that water changes state at about 0°C and 100°C<br><br>Know that *evaporation* is different from *boiling*<br><br>Know evaporation is more rapid at higher temperatures.<br><br>**Know that water flows around our world in a continuous process called the water cycle**<br>Know that rain condenses in clouds and falls to earth as rain, snow or hail in a process called precipitation<br><br>Know that, along with evaporation, water on the Earth's surface moves to the air in a process called transpiration in which water turns into water vapour (gas) on the surface of leaves on plants | **Understand meaning of *solubility; as* when a solid dissolves in a liquid it is described as being soluble** (e.g. sugar in water); when it cannot it is insoluble (e.g. sand in water)<br>-Know that in some solid materials the bonds between particles break when surrounded by a liquid; this allows the liquid to absorb the solid; when this happens, and the result is a solution;<br>Know that a given amount of solvent can only absorb a certain amount of solid before no more will dissolve; when this happens the liquid is said to be saturated<br>-Know that when a solvent is evaporated from a solution, the original solute is left behind; the remaining solid will often form crystals – the slower the solvent evaporates, the larger the crystals that will be formed<br>-Know that some materials are soluble in water and some are not.<br><br>***Understand properties: hardness, solubility, transparency, conductivity (thermal* and *electric*), and *magnetic (see class tasks)***<br><br>**Know methods of separating materials – *filtering, sieving* and evaporating**.<br>Know that filtering allows solids and liquids to be separated and that sieving allows solids made up of different sizes parts to be separated<br><br>**Know a property and suggest an associated use of metals, wood and plastic.**<br><br>**Know that a reversible change is one that can be reversed** and that examples of this are mixing, dissolving and changes of state where no chemical reaction takes place<br><br>**Know that an irreversible change is one that cannot be reversed** and that examples of this often involve a chemical change where a new material is made, often a gas (e.g. burning, boiling an egg, the reaction of bicarbonate of soda and acid)<br><br>Know that materials' different properties can be tested through acting upon them, including testing to find whether materials are magnetic, thermally conductive and electrically conductive; know that the various properties of different materials make them suitable for a given function | |
| Possible class tasks | Identify What are the different materials that we use?<br>What objects are made of within our classroom. | **Group materials according to their properties** | Classify and group materials according to how easily materials can be *squashed, bent, twisted and stretched*<br>What are the uses of everyday materials?<br>Classify and group the uses of everyday materials.<br>Classify the suitability of different materials.<br>Who discovered new materials? To find out about people who have developed new | | Draw a diagram of the *water cycle*<br>Investigate how we sort materials into solid, liquid and gas, using fizzy drinks to investigate how much gas weighs.<br>Observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C).<br><br>**Group materials according to whether they are solids, liquids or gasses** | **Group materials by these properties: *hardness, solubility, transparency, conductivity (thermal* and *electric*), and *magnetic*.**<br>-Conduct two irreversible chemical changes to make new materials<br>Explore and conclude: How can solids be separated? (Sieving) e.gHow can solids be separated from liquids(filtering /)<br>How can solids that have dissolved be reversed (evaporation)<br>Experimenting with different materials to predict and discover which are reversible and non-reversible. | |

# St Luke's Science Progression of Learning – Knowledge and Skills

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| | | | materials, by learning about John McAdam. | | | | |
| Working Scientifically focus | Link to floating and sinking<br>Does all wood float? | Which materials are waterproof?<br>Which material is the strongest?<br>Full investigation | What material is the best to make… | | How does temperature affect how quickly something dries? (thermometer)<br>**Focus: Conduct, record and conclude** | *How can I separate sand, salt and stones?*<br>Plan, predict, conduct, record, conclude how to separate a mixture of sand, salt and small stones by sieving followed by dissolving in water (so the salt is absorbed), followed by filtering to remove the sand from the mixture, followed finally by evaporation of the water to recover the salt.<br>Whats the best material to make a lunchbox, when it needs to have several properties (insulation, strength, wipeable) | |
| Vocab | *Wood, plastic, stone, glass,* ***hard, soft, smooth, rough*** | ***bendy/not bendy; waterproof/not waterproof;*** *absorbent/not absorbent;* property**, wood, plastic, glass, metal**, water, rock hard, soft, strong, weak, heavy, light, solid, runny, smooth, rough | ***squashed, bent, twisted and stretched*** **suitable,** waterproof, flexible, rigid, transparent, opaque | | **condensation, evaporation, reversible,** boiling point, melting point, liquid, gas, thermometer, **water cycle,** continuous precipitation, | hardness, solubility, transparency, conductivity (thermal and electric), and magnetic<br>irreversible, dissolve, soluble, insoluble, solvent, solution, filter, sieve, saturation, crystallization, thermal, chemistry<br><br>. | |

# St Luke's Science Progression of Learning – Knowledge and Skills

## Forces and Magnets

| | EYFS | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|
| Key Knowledge<br>**Bold to be retained by all** | **Know some things *float* and some *sink***<br>See materials unit | | Know a *force is used to* to *bend* and *squash* materials<br>Taught in materials | **Know that a force can be thought of as a push or a pull**<br><br>**Know that some forces need contact between two objects, but magnetic forces can act at a distance**<br><br>**Know that objects move differently on rough and smooth surfaces; objects resist movement more on rough surfaces because there is higher friction as the object moves and that this is called friction**<br><br>**Know magnets *attract* and *repel* each other**<br><br>**Know magnets have 2 *poles* called *north* and *south***<br><br>**Know that N and N, and S and S, repel and N and S attract**<br><br>Know that there is a magnetic field around a magnet which is strongest at each pole<br><br>**Know that some materials are magnetic, meaning that they are attracted to a magnet, while other materials are non-magnetic** | | **Know *unsupported* objects fall because of *gravity* between earth and the object.**<br><br>Know that a force is measured in a unit called Newtons, named after a British scientist called Sir Isaac Newton who discovered lots about gravity and how planets move<br><br>Know that pull forces can be measured using a device called a force meter<br><br>**Identify forces and their effects:**<br>***Air resistance, water resistance,* friction**<br>**Know air resistance, water resistance and friction act between moving surfaces in contact**<br><br>Know that air resistance is a force felt by an object as it moves through the air; it slows it down<br>Know that ***water resistance*** is a force felt by an object as it moves through water<br><br>Know that the shape of an object determines how much air resistance or water resistance it experiences; shapes of object that experience little air resistance or water resistance are described as *streamlined*<br><br>Know how to draw a force diagram with arrows representing the different forces acting on an object<br><br>**Know *levers, pulleys* and gears make allow a smaller force to have a greater effect**<br>Know that a lever is a rigid length resting on a pivot which can be used to move a heavy or firmly fixed load<br><br>Know that a pulley is a wheel with a grooved rim around which a cord passes. It can be used to raise heavy weights<br><br>Know that a gear is a rotating wheel with cut teeth that mesh with the teeth of another gear so that turning one gear turns an adjacent gear in the opposite direction<br><br>Know that the amount of matter (stuff) in an object is its mass<br><br>Know that gravity is a force that acts between all objects in the universe, but that it acts much more strongly between objects that have more mass and that are close together<br><br>Know that acceleration is a change in speed and that unbalanced forces acting on an object cause it to accelerate | |
| Possible class tasks | | | See materials | Research different types of forces acting on objects<br>Test which everyday materials are magnetic?<br>**Predict whether two magnets will attract or repel each other, depending on which poles are facing** | | Explore how does gravity cause objects of the same size and shape but of different mass to fall? | |

# St Luke's Science Progression of Learning – Knowledge and Skills

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| | | | | **Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet,** | | | |
| Working Scientifically focus | | | See materials | *What surfaces have more friction? (measured by speed or distance travelled?)* Investigate the speed of a toy car over different surfaces | | What variables might affect the speed at which a parachute falls? Parachute experiment Air Resistance<br>(e.g. mass/ surface area/ height dropped from)<br>OR Does the area of an object affect whether it floats or sinks? Boat Race investigation/Water Resistance<br><br>**Fully investigation Plan, conduct, record, conclude & explain** | |
| Vocab | *Float, sink, light, heavy* | | | magnetic, non-magnetic, pole, north, south, sliding friction, static friction, elastic, resist, attraction, repulsion | | acceleration, air resistance, buoyancy, effort, force meter, fulcrum, gravity, load, mass, mesh, Newton, pivot, rigid, streamlined, terminal velocity, unsupported, water resistance, weight | |

# St Luke's Science Progression of Learning – Knowledge and Skills

## Electricity

| | EYFS | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|---|
| Key Knowledge<br>**Bold to be retained by all** | **Identify things at home and school that run on electricity**<br><br>Know to be careful with plug sockets, not to put fingers in them | | | | **identify common appliances that run on electricity**<br><br>**Identify the following things in a circuit:**<br>***Cell, wire, bulb, switch, buzzer, lamp*.**<br><br>**Know how to construct a simple circuit using components**<br><br>**Know there must be a complete loop for electricity to flow.**<br><br>Know that exposure to high levels of electrical current can be dangerous<br><br>**Know that electrical current flows well through some materials, called electrical conductors, (most metals) and poorly through other materials, called electrical insulators (wood, plastic)**<br>Know that electrical conductivity (how well a material conducts electricity) is an example of a property<br>Know that wires – which contain a conductor inside them, usually made of metal – can allow electrical current to flow around a circuit<br>Know that when electrical current flows through a circuit's components within that circuit – such as buzzers which make a noise and bulbs which emit light – begin to work<br>Know that a switch functions by completing or breaking a complete circuit, an open switch stops the electricity and a closed switch lets it flow.<br><br>Know a circuit with everything in a single loop is a *series* circuit.<br><br>A battery is a device that stores chemical energy and converts it to electrical energy. | | **Use the circuit *symbols* for bulb, switch, cell, wire** motor and buzzer.<br><br>**Know that in a series circuit more cells make lights brighter or buzzer sound louder.**<br><br>Know that more cells provide greater voltage, so more energy. Know voltage is a measure of the power of a cell to produce electricity; it is a measure of the 'push' of electric current, not the size of the electric current<br>**Know that as the number and voltage of cells in a circuit increases, the brightness of a bulb or the volume of a buzzer will increase (though too high a voltage may 'blow' the bulb or buzzer) use the investigation to teach this**<br><br>Understand that an open switch stops the electrical *energy* flowing to the bulb or buzzer<br><br>Know that current electricity is the flow of charged particles called electrons around a circuit<br><br>Know that two bulbs in a circuit can be wired up to create a series circuit or a parallel circuit; if one bulb blows in a series circuit the other will not shine as the circuit has been broken; in contrast, if one bulb blows in a parallel circuit, there will still be a complete circuit for the other bulb so it will continue to shine; use this knowledge to explain the advantages of using parallel circuits (e.g. in the lighting in homes) |
| Possible class tasks | Identify what uses electricity, things that need to be plugged in (constantly) or have batteries (phone/ipads) that can be charged | | | | Investigate building circuits containing different components **including lamps**<br>Create a simple circuit, create the circuit with a switch, create the circuit with a switch and a buzzer, testing insulators and conductors.<br>Predict if the components in a simple circuit will work (show incomplete circuits and ones with switches that are open) | | -Constructing circuits with a bulb, switch, motor and buzzer.<br>-Making a bulb brighter, making a burglar alarm and pressure pad<br>-Build a parallel and series circuit, explain how they work, place a build in different places within the circuit and investigate the effect<br>Predict how components will function in a given circuit, depending on whether or not there is a cell to provide electrical current to the circuit<br>Investigating how parallel and series circuits can affect the components in the circuit |
| Working Scientifically focus | | | | | Investigation which materials is the best conductor?<br>Full investigation: Plan, conduct, record, conclude & explain | | How can I make my bulb shine brighter? |
| Vocab | Electricity, battery, phone, ipad, computer, | | | | **circuit,** appliance, charge, electron, battery, cell, bulb, buzzer, flow, series, complete circuit, switch, wire, current, electricity, negative terminal, positive terminal, chemical reaction, | | series circuit, parallel circuit, resistance, voltage<br>revise Y4 vocab |

## Light & Sound

| | EYFS | 1 | 2 | 3 | 4 | 5 | 6 |
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# St Luke's Science Progression of Learning – Knowledge and Skills

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| Key Knowledge<br>**Bold to be retained by all** | **Know they must not look at the sun directly - light from the sun can be dangerous**<br><br>Know all objects have a shadow( in the daytime)<br><br>Know that their shadows can change e.g. different size / shapes<br><br>Know that the sun gives us light (light source) | See seasonal changes | | **Know we need light to see and that darkness is the absence of light**<br>Know that light travels in straight lines<br><br>**Know they must not look at the sun directly - light from the sun can be dangerous. Know that sunglasses can protect eyes from sunlight but looking at the Sun directly – even with sunglasses – can damage the eyes**<br><br>**Know that light is reflected** when it travels from a light source and then 'bounces' off an object<br><br>**Know we get shadows when light is blocked by an opaque object.** We do not get shadows from transparent objects as light passes through them<br>Know that opacity/transparency and reflectiveness are properties of a material<br><br>**Know that as objects move towards a light source, the size of the shadow increases** (find out through investigation)<br><br>Know that everything that we can see is either a light source or something that is reflecting light from a light source into our eyes<br>Know that many light sources give off light and heat e.g. filaments in traditional bulbs heat up until they glow<br><br>Know that the Sun is a light source, but that the Moon is not and is merely reflecting light from the Sun<br><br>Know how to draw a diagram with straight lines representing light (being blocked to form shadows or being reflected) | **Know sounds are made by something *vibrating*** when an object vibrates; some of the energy from the vibrating object is transferred to the air, making the air particles move<br><br>**Know that sounds travel through a medium** (e.g. particles in the air) **to get to our ears** as a result sounds does <u>not</u> travel through a vacuum which has no particles in it at all<br>Know that sound is a form of energy that transfers in a longitudinal wave e.g. like that seen in a slinky - <u>not</u> a transverse wave - like that seen in water ripples<br>Know that longitudinal sound waves are detected in the ear by humans and that the brain interprets this as the sounds we hear<br><br>**Know that pitch is how high or low a sound is and that this is determined** by how many vibrations per second are being made **by the vibrating object**<br>Know the faster the vibration the higher the pitch and the number of vibrations per second is called frequency<br><br>**Know the *volume* of a sound depends on the strength of the vibration producing it.**<br><br>**Know that the volume of a sound is quieter if the listener is further away from the object** | | **Understand that we see a light because it sends light to our eyes**<br><br>**Know that light (appears to) travel in straight lines** (taught in Y3 bold by Y6)<br><br>**Use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye.**<br><br>Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them<br><br>Know how to draw a diagram to show why the shape of a shadow will match the shape of an object<br><br>**Understand that we see other objects because light hits them and they reflect it to our eyes.** (taught in Y3 bold by Y6)<br><br>Know that translucent objects allow some light to pass through, but some of the light changes direction as it passes through the object; this means that an something seen through a translucent object is not clearly defined<br><br>Know that when light passes from one medium to another (e.g. from air to water), it changes direction; this is called refraction<br><br>Know that white light comprises all the colours of light<br><br>Know that white light refracted by two surfaces in a prism will spread out so that all of its constituent colours can be seen; this array of colours is called a spectrum; it happens because the different colours of that constitute white light travel at different speeds. |
| Possible class tasks | Observe their shadow on a sunny day. Is it the same shape as their body? Do their arms / legs look longer or shorter than in real life?<br>Shadow spotting.. can you spot the shadows of things that are outside? Can they find anything without a shadow? | | | Investigate how shadows are formed and change (shape, definition)<br>Explain what a shadow is<br><br>Use a data logger to record light levels and that this can be plotted on a graph to show how this changes over the course of a day | How does sound travel?<br>-Investigating vibrations and the link between the size of vibration and the loudness of sound. Cover the base of a can or container covered with plastic and secure with a band, so the surface it tight. Sprinkle salt or sand on the surface, strike the tuning fork which is then held at an inch height over the drum. Observe, record observations and conclude what happens as the vibrations from the tuning fork reach the drum head.<br><br>Children could explore which materials sound travels well in and which it does not | | How do we show that light travels in a straight line to explain why shadows have the same shape as the objects that cast them?<br>- Refraction of light through glass, water and air with the disappearing coin and the reversed arrow experiments<br>Splitting white light into the colour spectrum using prisms and torches on black card, finely spraying a hose pipe in sunlight to create a rainbow |
| Working Scientifically focus | Is my shadow the same shape as me?<br>Observe, conclude | | | **How does the closeness of the light source to the object affect the size of the shadow? OR what is the relationship between how opaque / transparent an object is and the strength of its shadow?**<br>**Focus: Conduct, record and conclude** | No full investigation see working scientifically class task | | |
| Vocab | Shadow, light, sun, bigger, smaller, longer, shorter | | | mirror, **reflect, shadow, light source**, **reflectors**, image, beam, **solid, opaque, transparent, translucent** object, source, data logger | particle, vibration, percussion instrument, wind instrument, string instrument, frequency, volume, pitch, transverse wave, longitudinal wave, medium, vacuum | | angle of reflection, refraction, spectrum, translucent, medium, |

# St Luke's Science Progression of Learning – Knowledge and Skills

| Seasonal Change, Earth and Space | | | | | | | |
|---|---|---|---|---|---|---|---|
| | EYFS | 1 | 2 | 3 | 4 | 5 | 6 |
| Key Knowledge<br>**Bold to be retained by all** | Identify different features outdoors eg *cold, damp, shady warm* areas.<br>**Understand the effect of changing seasons on the natural world around them.**<br>**-Know it is cold in winter and sometimes snows**<br>-Know we wear warm clothes in winter<br>**-Know it is often warm in summer,** we often wear shorts and t shirts.<br>**-Know we need to wear sun cream to stop our skin burning** in the summer (and other times when it is hot and the sun is out e.g. early Autumn/late Spring)<br>**-Know that Autumn starts warmer then gets colder again**<br>**-Know that spring starts colder then gets warmer again** | **Say what differences there are between the four *seasons*.**<br>-Know the sun gives us warmth and light<br><br>**Observe and describe weather associated with the seasons and how day length varies**<br>Know that days are longer in the summer and shorter in winter<br>Know that weather changes through the year, getting hotter in the summer and colder in the winter<br>Know that the winter is likely to bring ice on the ground when water freezes due to the cold<br><br>Know that there are 12 months (365 days) in a year and these are split into seasons.<br>Link to plants and deciduous and evergreen | | **See light** | | Remember they must not look directly at the sun even with dark glasses (revise from Y3 light)<br><br>Know we live on a *planet*.<br>**Know there are 8 planets in our *solar system*,** and name them Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune<br>**Know planets orbit a *star*,(**exceptionally hot ball of gas**) our star is the sun**.<br><br>Know that the Earth spins around an imaginary line through its centre called an axis and that this axis is tilted relative to the Earth's orbit<br>**Know that night and day are the result of the Earth rotating (turning)** on its axis<br>**Know the sun does not move – it just seems to because the earth is *rotating***<br>Know that the tilt of the Earth towards and away from the Sun's light as the Earth orbits the Sun leads to the seasons as during winter the light is spread over a wider area<br>Know that a solar eclipse occurs when the Moon is between the Sun and the Earth, casting a shadow on the Earth; a lunar eclipse occurs when the Earth is between the Sun and the Moon, casting a shadow on the Moon<br><br>Know the Earth, Moon and Sun are roughly *spherical*.<br>Know planets may have moons *orbiting* them.<br>Know that the Moon orbits the Earth roughly every 28 days<br>Know that as the Moon orbits the Sun, different parts of it are lit up by the Sun, which is why we see a different shape lit up on the Moon as the lunar cycle progresses<br><br>Know that our solar system makes up a tiny fraction of the universe<br>Know that humans have sent man-made satellites into orbit that assist with telecommunication<br>Know that all the planets in the solar system orbit the Sun and that the further away they are from the Sun, the longer their orbit | |
| Possible class tasks | Explore the natural world around them<br>Describe what they see, hear and feel whilst outside.<br>Identify how the clothes they wear at different times in the year change | How does the weather change across the seasons?<br>Describing the weather changes across the seasons.<br>Seasonal walks<br>Monitor seasonal changes.<br>to observe differences<br>Answer questions:<br>How does the weather change in Summer?<br>What happens in Spring?<br>How does the weather change in Spring?<br>What happens in Summer?<br>How much rain falls over 2 weeks?<br>Record data in a table | | | | Observe the different phases of the Moon?<br>Children to monitor the changes of the moon phrase over a period of 28 days and record<br>Video lapse of shadows moving/day and night<br>Can we show the rotation of the Earth? | |
| Working Scientifically focus | | No full investigation but see class tasks for working scientifically elements | | | | **No investigation but working scientifically class tasks will pick up on WS skills** | |
| Vocab | Cold, warm, autumn, seasons, spring, summer, winter, snow, weather, temperature, | **Snow, rain, wind, day length, hot, cold**, **seasons** freezing, melting, **Sun, clouds, wind, snow, ice**, **spring, summer, autumn, winter**, rainfall, **temperature** | | | | **planet**, satellite, **sphere,** solar system, eclipse, **star,** universe, constellation, axis, **Moon**, rotating, lunar, solar, telescope, rotation **Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune, orbit, rotate** | |