Finham Primary School

Science: Working Scientifically Overview

<table>
<tr><td>KS1</td><td colspan="5">Working Scientifically

1. Ask simple questions and recognise that they can be answered in different ways.

2. Observe closely, using simple equipment.

3. Perform simple tests.

4. Identify and classify.

5. Use their observations and ideas to suggest answers to questions.

6. Gather and record data to help in answering questions.</td></tr>
<tr><td>Year 1</td><td>Seasons (1)
(Biology)
- Gather and record data about weather conditions in autumn, drawing on observation and using simple equipment (such as a container to measure rainfall)
- Use data to create a pictogram and use this to describe changes in day length over the seasons.
- Use their evidence to describe some other</td><td>Animals including humans
(Biology)
- Make first hand close observations of animals from each of the groups (Possible visit?)
- Compare the structure of two animals from the same or different group e.g. wings, feathers, vertebrates/invertebrates.
- Classify animals using a range of features e.g. lay eggs/give birth to live young. herbivore, omnivore</td><td>Plants
(Biology)
- Can sort and group parts of plants using similarities and differences e.g. the shape of leaves, the colour of the flower/blossom.
- Can use simple charts and Venn diagrams etc. to identify and classify plants.
- Use photographs and their own observations to talk about how plants</td><td>Everyday Materials
(Chemistry)
- Compare and group together a variety of everyday materials based on their simple physical properties.
- Classify objects made of one material in different ways e.g. a group of objects made of metal.
- Classify one type of object made from a range of materials e.g. a collection of spoons made of different materials.
- Chose an appropriate method for testing an object for a particular property.</td><td>Seasons (2)
(Biology)
- Collect information about the weather regularly throughout the year
- Present this information in tables and charts to compare the weather across the seasons
- Collect information, regularly throughout the year, of features that change with the</td></tr>
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	features of the weather, surroundings, themselves, animals, and plants found in autumn. - Demonstrate their knowledge in different ways e.g. creating seasonal artwork, creating a pictogram (and use this to ask and answer related questions) - **Measure the daily rainfall in a container for one week (could be in ml or in non-standard measurement)** - **Draw a table of weather conditions and mark tallies in the chart to match.** - **Pictogram of rainfall amount to match the measurements taken.**	- Identify animals by matching statements to named images. - Take measurements of parts of the body and present results in a table to interpret. - Conduct simple sense experiments. E.g. Which part of my body is good for feeling, which is not? Which food/flavours can I identify by taste? Which smells can I match? - **Measure the hand span or foot length of their classmates (cm or non-standard measurement)** - **Create a tally table to show the spread of the data**	change over time (e.g. seed to sapling to tree) and over the year (deciduous and fruit bearing trees). - Plant seeds and observe how they grow and change by making simple observations. - Point to and name the parts of a plant, recognising that they are not always the same e.g. leaves and stems may not be green, the leaves are different shapes. - **Plant seedling and measure the height of the seedlings weekly using a ruler.** - **Bar chart (also filled in weekly) to show the trend over time.**	- Use their test evidence to answer the questions about properties e.g. Which cloth is the most absorbent? - Test the properties of objects e.g. absorbency of cloths, strength of party hats made of different papers, stiffness of paper plates, waterproofness of shelters. - **Complete an experiment to show how absorbent various materials are – measurement can be taken in ml of water absorbed.** - **Bar chart to show this data and allow for conclusions to be drawn from the data set.**	seasons e.g. plants, animals, humans - Present this information in different ways to compare the seasons - Gather data about day length regularly throughout the year and present this to compare the seasons - Use gathered evidence to describe the general types of weather and changes in day length over the seasons. - Use evidence to describe some other features of their surroundings, themselves, animals, plants that change over the seasons - Demonstrate knowledge in different ways e.g. creating seasonal artwork - **Measuring the length of the day in hours and minutes (would need to be**

					done as second hand research). - Bar chart of the day length across the months to show the trend of days getting longer and shorter.

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<tr><td>Year 2</td><td>Animals and Living Things and their Habitats
(Biology)

- Ask questions and use secondary sources to find out about the life cycles of some animals

- Observe animals growing over a period of time e.g. chicks, caterpillars, a baby

- Ask questions of a parent about how they look after their baby

- Ask pet owners questions about how they look after their pet

- Investigate the effect of exercise on their bodies

- Classify food in a range of ways, including using the Eatwell guide

- Investigate washing hands, using glitter gel

- Describe, using diagrams, the life cycle of some animals, including humans, and their growth to adults e.g. by creating a life cycle book for a younger child</td><td>Plants
(Biology)

- Make close observations of seeds and bulbs

- Classify seeds and bulbs

- Research and plan when and how to plant a range of seeds and bulbs

- Look after the plants as they grow – weeding, thinning, watering etc.

- Make close observations and measurements of their plants growing from seeds and bulbs

- Make comparisons between plants as they grow

- Identify similarities and difference between bulbs and seeds</td><td>Uses of Everyday Materials
(Chemistry)

- Classify and sort materials by their properties e.g. manmade, natural

- Investigate and observe what happens to different materials during testing and use this to inform explanation of their properties

- Investigate which materials are fit for a purpose e.g. What is the best material for an umbrella?

- Explain from their observations how materials change when a force is exerted on them by squashing, bending, twisting and stretching.

- Investigate the transparency of objects, recording class data in a table and drawing simple conclusions from the findings.

- Ask and answer questions about everyday materials</td></tr>
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	- Collate what they know about looking after a baby/animal by creating a parenting/pet owners' guide - Explain how development and health might be affected by differing conditions and needs being met/not met - Explore the outside environment to find objects that are living, dead and have never lived - Sort items/organisms into living, dead and never lived - Classify objects found in the local environment - Observe animals and plants carefully, drawing and labelling diagrams - Create simple food chains for a familiar local habitat from first hand observation and research - Create simple food chains from information given - Explain what animals eat using a premade food chain - Identify key features that mean the animal or plant is suited to its micro- habitat - Explain in simple terms why an animal or plant is suited to a habitat - **Measure the heights of children within the class (cm) and compare these measurements to that of different year groups.** - **Place this data into a table and create a bar chart using the information – What does this tell us about growing up?**	- **Measure in cm the height of plants that are grown in various places around the school over time.** - **Create a pictogram of the heights of the plants.**	- **Count number of objects made from different materials in various part of the school e.g. outside, classroom, office.** - **Create a pictogram of the data.**

<table>
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1. Ask relevant questions and use different types of scientific enquiries to answer them.
2. Set up simple practical enquiries, comparative and fair tests.
3. Make systematic and careful observations and, where appropriate, take accurate measurements using standard units, using a range of equipment, including thermometers and data loggers.
4. Gather, record, classify and present data in a variety of ways to help in answering questions.
5. Record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables.
6. Report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions.
7. Use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions.
8. Identify differences, similarities or changes related to simple scientific ideas and processes.
9. Use straightforward scientific evidence to answer questions or to support their findings</td></tr>
<tr><td>Year 3</td><td>Plants
(Biology)
- Observe what happens to plants over time when the leaves or roots are removed.
- Observe the effect of putting cut white carnations or celery in coloured water.
- Investigate what happens to plants when they are put in different conditions e.g. in darkness, in the cold, deprived of air, different types of soil, different fertilisers,</td><td>Rocks and Fossils
(Chemistry)
- Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties.
- Devise tests to explore the properties of rocks and use data to rank the rocks*
- Link rocks changing over time with their properties e.g. soft rocks get worn away more easily</td><td>Animals including humans
(Biology)
- Classify food in a range of ways
- Use food labels to explore the nutritional content of a range of food items
- Use secondary sources to find out the types of food that contain different nutrients * * *
- Use food labels to answer enquiry questions e.g. How much fat do different types of pizza contain? How much sugar is in soft drinks?
- Plan a daily diet contain a good balance of nutrients and record and present findings * * * * *
- Explore the nutrients contained in fast food
- Use secondary sources to research the parts and functions of the skeleton *</td><td>Light
(Physics)
- Observe and identify changes to the size and orientation of shadows, relative to their proximity to the light source.
- Observe and identify the difference in shadows of opaque, translucent and transparent objects/materials.
- Observe how shadows are formed and affected by different circumstances.</td><td>Forces and Magnets
(Physics)
- Record and report on findings from investigations, involving how things move on different surfaces *
- Compare and group materials following magnetic testing, recording findings and use the outcome to answer questions about which materials are magnetic *
- Make and investigate predictions on</td></tr>
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	varying amount of space. - Spot flowers, seeds, berries and fruits outside throughout the year. - Observe flowers carefully to identify the pollen and model flowers being visited by pollinators e.g. bees and butterflies - Research different types of seed dispersal. - Classify seeds in a range of ways including by how they are dispersed. - Use the features of seeds to decide on their method of dispersal. - Draw and label a diagram of their created flowering plant to show its parts, their role and the method of pollination and seed dispersal. - **Measure the height of plants under the**	- Present their understanding of how fossils are formed e.g. in role play, comic strip, chronological report, stop-go animation etc. - Identify plant/animal matter and rocks in samples of soil - Devise a test to explore the water retention of soils. - **Measure the time it takes for drops of water to soak through different rock samples.** - **Table ranking the permeability of the different rocks.**	- Investigate pattern seeking questions such as ; Can people with longer legs run faster?; Can people with bigger hands catch a ball better? - Compare, contrast and classify skeletons of different animals - **Experiment into hand size and catching success rate – Measuring of hand size in cm and number of catches made in given time.** - **Scatter graph of the information to see if there is a correlation between these two things – What conclusions can be drawn?** - **Measure the amount of sugar in different fizzy drinks (teaspoons or grams) and produce a bar chart to show this information.**	- Investigate the size of shadows according to times of day and year, by tracing shadows outside and comparing differences. - Classify materials according to opaque, transparent and translucent. - Use oral and written explanations to report on why shadows are formed and how the length and size of a shadow can be changed. - Investigate questions related to an object and the shadow it will cause * - **Measure their shadow lengths at set times of the day in cm (using metre stick)** - **Line graph to show the shadow length (to be produced as a class as line graphs are introduced but only to interpret)**	whether two magnets will attract or repel, depending on which poles are facing. - **Measuring the distance over which different magnets attract a paper clip.** - **Constructing a table to show this data.**

	different light conditions in cm using a ruler. - **Produce a bar chart comparing the growth in each condition.**				

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<tr><td>Year 4</td><td>Animals and humans
(Biology)
- Construct and interpret a variety of food chains, identifying producers, predators and prey
- Can create food chains based on research *
- Identify differences, and similarities of different types of teeth according to herbivore, omnivore and carnivore</td><td>Electricity
(Physics)
- Construct and investigate a range of circuits
- Investigate which materials can be used instead of wires to make a circuit
- Classify materials that conduct electricity and those that don’t following investigation and record findings *
- Investigate the effect of a switch and</td><td>States of Matter
(Chemistry)
- Observe closely and classify a range of solids and liquids
- Explore making gases visible
- Classify materials according to whether they are solids, liquids and gases
- Observe a range of materials melting
- Investigate how to melt ice more quickly</td><td>Sound
(Physics)
- Experiment with at least three different instruments to observe and explore volume and pitch
- Make predictions and draw conclusions about the pitch and volume of sounds *
- Note how vibrations make sounds of different volumes and travel to our ears
- Identify and show how sound travels through</td><td>Living things and their habitats
(Biology)
- Observe plants and animals in different habitats throughout the year and use recordings to compare and contrast the living things observed
- Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment
- Classify living things found in different habitats based on their features
- Create a simple identification key based on observable features</td></tr>
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	- Can record the teeth in their mouth (make a dental record) - Recreate the human stomach and observe representation of how food breaks down - Label the different parts of the digestive system. - **Count the number of canines in the mouth of various herbivores, carnivores and omnivores (second hand research)** - **Produce a table of this information – What does this tell us about herbivores, carnivore and omnivores?**	combinations of switches in simple circuits - Investigate switches and consider variations for specific uses, such as a pressure switch for a burglar alarm - Apply their knowledge of conductors and insulators to design and make different types of switches - **Measure the flow of electricity using an amp meter (A) and see how this is affected by adding more components.** - **Create a line graph of this data to help form conclusions.**	- Observe the changes that are non-reversible - Investigate melting point of different materials - Explore freezing different liquids - Observe and measure temperature of icy water, tap water, hot water - Observe water evaporating and condensing - Set up investigations to explore changing the rate of evaporation * - Use secondary sources to find out about the water cycle * - Using found data, explain what affects how quickly a solid melts - From their data, can explain how to speed up or slow down evaporation	particles and into the ear - Make own instruments that produce a range of pitches. - **Measure decibel level of sounds from different distances.** - **Line graph of the distance from source and volume in decibels.**	- Use research to explore human impact on the local environment e.g. litter, tree planting * - Use secondary sources to find out about how environments may naturally change * - Use secondary sources to find out about human impact, both positive and negative, on environments and write a report on this *

			- Present learning about the water cycle in a range of ways e.g. diagrams, explanation text, story of a water droplet. - **Measure time for ice cubes to melt in different locations (hours and minutes) and temperature in the location (°C)** - **Produce a bar chart to show the different melting times.**		

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2. Take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate.
3. Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.
4. Report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations.
5. Use test results to make predictions to set up further comparative and fair tests.
6. Identify scientific evidence that has been used to support or refute ideas or arguments.</td></tr>
<tr><td>Year 5</td><td>Earth and Space
(Physics)

- Use secondary sources to help create a model e.g. role play or using balls, to show the movement of the Earth around the Sun and the Moon around the Earth

- Use secondary sources to create a model to show why day and night occur

- Make first-hand observations of how shadows caused by the Sun change through the day

- Make a sundial and report on findings following observation</td><td>Forces
(Physics)

- Investigate the pull on different objects using a newton meter and record forces in Newtons (N)

- Report on conclusions relating to an object’s mass and its weight in Newtons

- Investigate the effect of friction in a range of contexts

- Investigate the effects of water resistance in a range of contexts e.g. dropping shapes through water, pulling shapes e.g. boats along the surface of water</td><td>Properties and changes of materials
(Chemistry)

- Investigate the properties of different materials in order to recommend materials for particular functions depending on these properties e.g. test waterproofness and thermal insulation to identify a suitable fabric for a coat

- Explore adding a range of solids to water and other liquids e.g. cooking oil, as appropriate

- Investigate rates of dissolving by carrying out comparative and fair test and records findings * *

- Separate mixtures by sieving, filtering and evaporation, choosing the most suitable method and equipment for each mixture

- Explore a range of non-reversible changes e.g. rusting, adding fizzy tablets to water, burning

- Carry out comparative and fair tests involving non-reversible changes e.g. What affects the rate of rusting? What affects the amount of gas produced?</td><td>Living things and their habitats
(Biology)

- Grow and observe plants that reproduce asexually e.g. strawberries, spider plant, potatoes

- Organise mammals into different groups - sea and land and marsupials and use scientific evidence to refute/support correct/incorrect statements (such as ‘dolphins are fish’)

- Draw and label appropriate scientific diagrams following use of secondary sources and first-hand observations relating</td><td>Animals including humans
(Biology)

- Use data to compare and find patterns, for example to compare the gestation times for mammals and look for patterns e.g. in relation to size of animal or length of dependency after birth/Look for patterns between the size of an animal and its expected life span.

- Measure gestation lengths of different mammals and their masses in g/kg (second hand research).</td></tr>
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	of the changing place of the shadow, making conclusions as to what this demonstrates and how the sundial was used to indicate the time. - Research time zones - Consider the views of scientists in the past and how evidence was used to deduce the shapes and movements of the Earth, Moon and planets before space travel. - **Measure shadow length hourly for one day (in m and cm)** - **Produce a line graph showing the shadow length vs time of day to explore the corelation**	- Investigate the effects of air resistance in a range of contexts e.g. parachutes, spinners, sails on boats - Explore how levers, pulleys and gears work - Research how the work of scientists such as Galileo Galilei and Isaac Newton helped to develop the theory of gravitation. - **Measure the mass of objects (g) and the weight of the object (N).** - **Create a scatter graph of the information – Is there a link that can be easily identified.**	- Research new materials produced by chemists e.g. Spencer Silver (glue of sticky notes) and Ruth Benerito (wrinkle free cotton). - **Measure the time taken for sugar to dissolve in water at different temperatures (also must measure the temperature of the water)** - **Draw a line graph showing the temperature vs the time taken to dissolve.**	to the life cycle of a range of animals. - Compare and contrast the life cycles of different living things and present findings - Identify which insects complete which type of metamorphosis and present findings - Identify the key differences between some amphibians – for example, toads and frogs, and present findings in different forms	- **Produce a scatter graph of the gestation vs animal mass - Can you spot a correlation?**

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1. Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.
2. Take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate.
3. Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.
4. Report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations.
5. Use test results to make predictions to set up further comparative and fair tests.
6. Identify scientific evidence that has been used to support or refute ideas or arguments.</td></tr>
<tr><td>Year 6</td><td>Light
(Physics)

- Plan and conduct a test to investigate how light travels and explain/present the findings
- Investigate the use of mirrors to reflect light and record using straight line diagrams to indicate the direction of light
- Use mirrors, torches and protractors to demonstrate and record how light is reflected in a mirror and how we see ourselves in a mirror
- Measure and record the angle of incidence and angle of reflection</td><td>Animals including humans
(Biology)

- Plan and conduct a scientific enquiry to identify different food groups
- Use labelled diagrams to support understanding of how nutrients and oxygen are delivered around the body
- Use information to identify the main components of the heart
- Predict what will happen to the heart during exercise</td><td>Living things and their habitats
(Biology)

- Classify plants and animals and record conclusions from the use of classification keys
- Use information about the characteristics of an unknown animal or plant to assign it to a group
- Use secondary sources to learn about the formal classification system devised by Carl Linnaeus and why it is important
- Research an unfamiliar animal or</td><td>Evolution and Inheritance
(Biology)

- Follow lines of enquiry to support the explanation of the process of evolution
- Demonstrate an understanding, with specific examples, of how an animal or plant has evolved over time e.g. penguin, peppered moth.
- Identify characteristics that will make a plant or animal suited or not suited to a particular habitat.</td><td colspan="2">Electricity
(Physics)

- Draw circuit diagrams of a range of simple series circuits, using recognised symbol
- Communicate structures of circuits using circuit diagrams with recognised symbols
- Construct electric circuits and demonstrate, following investigation, how variation in the working of particular components can be changed
- Plan and select resources for a fair scientific enquiry, deciding which variables to control
- Record results from an experiment using tables and graphs
- Evaluate and explain their investigation, results and conclusions
- Measure the voltage of a circuit (V) and how this affects the volume of a buzzer (decibels).</td></tr>
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	using a protractor and detailed diagram. - **Measure the shadow length in cm when an opaque object is placed in front of a light source and is moved away.** - **Produce a line graph to show the results of this experiment.**	- Construct and analyse the variables that make a fair test - Conduct a fair investigation on the effects of exercise on the heart - Use scientific equipment to track results and record data using tables and graphs ** - Analyse whole class data after investigation to compare and reflect on findings and draw conclusions - Use information acquired to write a scientific report on how the human circulatory system works. - **Measure heart rate changes over a period of exercise (bmp)** - **Produce a line graph of time verse bmp.** - **Second hand research of animal size and bmp – produce a**	plant using its characteristics to establish where it belongs in the classification system	- Compare the ideas of Charles Darwin and Alfred Wallace on evolution. - Research the work of Mary Anning and understand how this provided evidence of evolution. - Refer to and use examples of fossil evidence that support the theory of evolution. - **Measure number of seeds collected by various 'beaks' in a given time limit (seconds).** - **Find the median of the seeds collected and create a table of the data – use this to identify findings from the experiment.**	- **Create a line graph showing the voltage of the circuit verse the volume in decibels – Can you draw any conclusions from this data set?**

		scatter graph of this information to see if patterns can be spotted.			