Science Skills Based Long Term Plan – Luttons Class 2 Year C

Year 3 Working Scientifically:
Key Skills (taught throughout LKS2) to be addressed throughout the year across all topic areas

Key Learning:

Sort/group/compare/classify/identify

- Compare and contrast functions, diets, teeth, changes over time.
- Record similarities and differences.
- Decide ways and give reasons for sorting, grouping, classifying, identifying things/objects, living things, processes or events based on specific characteristics.

Research

- Create/invent design something based on what they have found out applying both research and/or practical experiences.
- Find out about the work of famous scientists – historical and modern day.
- Finding things out using secondary sources of information.

Modelling

- Act out something to represent something else about the world around us.

Recording of 'explore/observe'

- Observe and record relationships between structure and function.
- Observe and record changes/stages over time.
- Explore/observe things in the local environment/real contexts and record observations.
- Record observations/explorations/processes using simple scientific language.

Questioning

- Explore their own ideas about 'what if…?' scenarios e.g. humans did not have skeletons.
- Begin to understand that some questions are testable/can be tested in the classroom and some cannot.
- Within a group suggest relevant questions about what they observe and about the world around them.

Planning

- Help to decide about how to set up a simple fair test and begin to recognise when a test is not fair.
- As a group, begin to make some decisions about the best way of answering their questions.
- With support/as a group, set up simple practical enquiries including comparative and fair tests, e.g. make a choice from a list of at least one variable that needs to be kept the same when conducting a fair test.
- Find/suggest a way to compare things e.g. materials, magnets

Equipment and measuring

- Collect data from their own observations and measurements, using notes/simple tables/standard units.
- Help to make some decisions about what observations to make, how long to make them for and the type of simple equipment that might be used.
- Make simple accurate measurements using whole number standard units, using a range of equipment.
- Gathering data in a variety of ways to help in answering questions.
- Learn how to use new equipment e.g. data loggers.
- Explore and observe with increased accuracy using a hand lens or microscope.

Communicating Recording

- Record and present findings using simple scientific language and vocabulary, including discussions, oral and written explanations, notes, annotated drawings, pictorial representations, labelled diagrams, simple tables, bar charts (using ranges and intervals chosen for them, displays or presentations.
- Record, classify and present data in a variety of ways to help in answering questions.
- Communicate their findings in ways that are appropriate for different audiences.

Describe results

- Describe and compare the effect of different factors on something.
- With help, look for changes and patterns in their observations and data.
- Use their results to consider whether they meet predictions.

Explain results

- Read and spell scientific vocabulary correctly and with confidence.
- Use their own experience and some evidence or results to draw simple conclusions and answer questions.
- Talk about and record their findings using simple scientific language.
- Explain why things have happened.

Trusting my results

- Say whether what happened was what they expected and notice any odd results that seem odd.
- Begin to recognise when a test is not fair and suggest improvements.

Collaborating

- Act out something to represent something else about the world around us.

Vocabulary:	**Notes and Guidance (non-statutory):**
Research: relevant questions scientific enquiry comparative and fair test systematic careful observation accurate measurements Equipment: thermometer data logger Data: gather record classify present Record: drawings labelled diagrams keys bar charts tables Oral and written explanations: conclusion predictions differences similarities changes evidence improve secondary sources guides keys construct interpret	Pupils in years 3 and 4 should be given a range of scientific experiences to enable them to raise their own questions about the world around them. They should start to make their own decisions about the most appropriate type of scientific enquiry they might use to answer questions; recognise when a simple fair test is necessary and help to decide how to set it up; talk about criteria for grouping, sorting and classifying; and use simple keys. They should begin to look for naturally occurring patterns and relationships and decide what data to collect to identify them. They should help to make decisions about what observations to make, how long to make them for and the type of simple equipment that might be used. They should learn how to use new equipment, such as data loggers, appropriately. They should collect data from their own observations and measurements, using notes, simple tables and standard units, and help to make decisions about how to record and analyse this data. With help, pupils should look for changes, patterns, similarities and differences in their data in order to draw simple conclusions and answer questions. With support, they should identify new questions arising from the data, making predictions for new values within or beyond the data they have collected and finding ways of improving what they have already done. They should also recognise when and how secondary sources might help them to answer questions that cannot be answered through practical investigations. Pupils should use relevant scientific language to discuss their ideas and communicate their findings in ways that are appropriate for different audiences. These opportunities for working scientifically should be provided across years 3 and 4 so that the expectations in the programme of study can be met by the end of year 4. Pupils are not expected to cover each aspect for every area of study.

Science Skills Based Long Term Plan – Luttons Class 2 Year C

Year 4 Working Scientifically:
Key Skills (taught throughout LKS2) to be addressed throughout the year across all topic areas

Key Learning:

Sort/group/compare/classify/identify

- Make a simple guide to local living things.
- Use guides or simple keys to classify/identify (local small invertebrates).
- Use their observations to identify and classify.
- Record similarities, differences or changes related to simple scientific ideas or processes or more complex groups of objects/living things/events and begin to give reasons for these.

Research

- Recognise when and how secondary sources might help them to answer questions that cannot be answered through practical investigations.
- Create/invent design something based on what they have found out applying both research and/or practical experiences.
- Find out about the work of famous scientists – historical and modern day.

Modelling

- Make a visual representation or a model if something to represent something they have seen or a process that is difficult to see.
- Suggest their own ideas on a concept and compare these with models or images.

Recording of 'explore/observe'

- Suggest their own ideas on a concept and compare these with what they observe/find out.
- Develop simple descriptions from their observations using relevant scientific language to discuss their ideas.
- Observe and record relationships between structure and function.
- Observe and record changes/stages over time.
- Explore/observe things in the local environment/real contexts and record observations.

Questioning

- Choose/select a relevant question that can be answered (by research or experiment/test)
- Ask/raise their own relevant questions with increasing confidence and independence about what they observe and about the world around them.

Planning

- Investigate the effect of something on something else.
- Start to make their own decisions about the most appropriate type of scientific enquiry they might use to answer scientific questions (is a fair test the best way to investigate their question)
- Recognise when a test is necessary.
- Carry out simple fair tests (with increasing confidence and make some of the planning decisions about what to change and measure/observe)

Equipment and measuring

- Begin to identify where patterns might be found and use this to begin to identify what data to collect.
- Make more of the decisions about what observations to make, how long to make them for and the type of equipment that might be used.
- Learn how to use new equipment, such as data loggers and measure temperature in degrees Celsius (°C) using a thermometer.
- Understand precautions for working safely.
- Collect and record data from their own observations and measurements, using notes/simple tables/standard units, to help to make decisions.
- Make accurate measurements using standard units (and more complex units and parts of units) using a range of equipment.

Communicating Recording

- Record findings using simple scientific language and vocabulary, including discussions, oral and written explanations, notes, annotated drawings, pictorial representations, labelled diagrams, tables and bar charts (where intervals and ranges agreed through discussion), displays or presentations.
- Begin to select the most useful ways to record, classify and present data from a range of choices.
- Make decisions on how best to communicate their findings in ways that are appropriate for different audiences.

Describe results

- Notice/find patterns in their observations and data.
- Describe the effect of something/different factors on something else.
- Help to make decisions about how to analyse their data.

Explain results

- Begin to develop their ideas about relationships and interactions.
- Reporting on findings from enquiries (beginning to identify the scientific facts in their data).
- Use relevant scientific language to discuss, communicate, report their findings.
- Read and spell scientific vocabulary correctly and with confidence.

Trusting my results

- Use results to suggest improvements, new questions and predictions for setting up further tests.
- With help, pupils should look for similarities and differences in their data (between different groups of results).

Collaborating

- Make a visual representation or a model of something to represent something they have seen or a process that is difficult to see.
- Suggest their own ideas on a concept and compare these with models or images.

Vocabulary:	**Notes and Guidance (non-statutory):**
Research: relevant questions scientific enquiry comparative and fair test systematic careful observation accurate measurements Equipment: thermometer data logger Data: gather record classify present Record: drawings labelled diagrams keys bar charts tables Oral and written explanations: conclusion predictions differences similarities changes evidence improve secondary sources guides keys construct interpret	Pupils in years 3 and 4 should be given a range of scientific experiences to enable them to raise their own questions about the world around them. They should start to make their own decisions about the most appropriate type of scientific enquiry they might use to answer questions; recognise when a simple fair test is necessary and help to decide how to set it up; talk about criteria for grouping, sorting and classifying; and use simple keys. They should begin to look for naturally occurring patterns and relationships and decide what data to collect to identify them. They should help to make decisions about what observations to make, how long to make them for and the type of simple equipment that might be used. They should learn how to use new equipment, such as data loggers, appropriately. They should collect data from their own observations and measurements, using notes, simple tables and standard units, and help to make decisions about how to record and analyse this data. With help, pupils should look for changes, patterns, similarities and differences in their data in order to draw simple conclusions and answer questions. With support, they should identify new questions arising from the data, making predictions for new values within or beyond the data they have collected and finding ways of improving what they have already done. They should also recognise when and how secondary sources might help them to answer questions that cannot be answered through practical investigations. Pupils should use relevant scientific language to discuss their ideas and communicate their findings in ways that are appropriate for different audiences. These opportunities for working scientifically should be provided across years 3 and 4 so that the expectations in the programme of study can be met by the end of year 4. Pupils are not expected to cover each aspect for every area of study.

Science Skills Based Long Term Plan – Luttons Class 2 Year C

Year 5 Working Scientifically:
Key Skills (taught throughout UKS2) to be addressed throughout the year across all topic areas

Key Learning:

Sort/group/compare/classify/identify

- Compare and contrast things beyond their locality.
- Compare more complex processes, systems, functions (e.g. life cycles of different living things, organ systems of different animals).
- Suggest reasons for similarities and differences.

Research

- Research the work of famous scientists – (historical and modern day) and use this to find out how scientific ideas have changed over time.
- Find things out using a wide range of secondary sources of information.

Modelling

- Create simple models to describe scientific ideas (e,g, circulatory system).
- Use simple models to describe scientific ideas (e.g. of movement of the Sun and Earth, solar system, shadow clocks, magnetic compasses for navigation).

Recording of 'explore/observe'

- Read, spell and pronounce scientific vocabulary correctly.
- Use their developing scientific knowledge and understanding and relevant scientific language to discuss, communicate and explain their findings.
- Explore more abstract systems/functions/changes and record their understanding of these (e.g. circulatory system)
- Observe changes over different periods of time.

Questioning

- Raise different kinds of questions.
- Refine a scientific question so that it can be investigated.
- Ask their own pertinent questions.

Planning

- Explain which variables need to be controlled and why.
- Make most of the planning decisions and carry out fair tests.
- Recognise when it is appropriate to carry out a fair test and plan how to set it up.

Equipment and measuring

- Recording data and results of increasing complexity.
- Follow safety guidelines.
- Make their own decisions about what observations to make or measurements to use and how long to make them for (recognising the need for repeat readings on some occasions).
- Decide how to record data from a choice of familiar approaches.
- Choose the most appropriate equipment to make measurements.
- Explain how to use equipment accurately.

Communicating Recording

- Record data and results of increasing complexity using tables, bar and line graphs, and models.
- Report findings from enquiries using discussion, drawings (annotated), oral and written explanations of results, and conclusions.
- Present findings in written form, displays and other presentations.

Describe results

- Identify patterns that might be found in the natural environment.
- Look for patterns and notice relationships between things and describe these.

Explain results

- Use their developing scientific knowledge and understanding and relevant scientific language to explain their findings.
- Draw conclusions based on their data and observations.
- Read and spell scientific vocabulary correctly and with confidence.

Trusting my results

- Use test results to make predictions to set up further comparative and fair tests.
- Comment on how reliable their data is.

Vocabulary: Plan, variables, measurements, accuracy, precision, repeat, readings **Record Data:** scientific diagrams, labels, classification keys, tables, scatter graphs, bar graph and line graphs predictions further comparative and fair test report and present conclusions, causal relationships, explanations, degree of trust, oral and written display and presentation **Evidence:** support, refute ideas or arguments identify, classify and describe patterns systematic quantitative measurements	**Notes and Guidance (non-statutory):** Pupils in years 5 and 6 should use their science experiences to: explore ideas and raise different kinds of questions; select and plan the most appropriate type of scientific enquiry to use to answer scientific questions; recognise when and how to set up comparative and fair tests and explain which variables need to be controlled and why. They should use and develop keys and other information records to identify, classify and describe living things and materials, and identify patterns that might be found in the natural environment. They should make their own decisions about what observations to make, what measurements to use and how long to make them for, and whether to repeat them; choose the most appropriate equipment to make measurements and explain how to use it accurately. They should decide how to record data from a choice of familiar approaches; look for different causal relationships in their data and identify evidence that refutes or supports their ideas. They should use their results to identify when further tests and observations might be needed; recognise which secondary sources will be most useful to research their ideas and begin to separate opinion from fact. They should use relevant scientific language and illustrations to discuss, communicate and justify their scientific ideas and should talk about how scientific ideas have developed over time. These opportunities for working scientifically should be provided across years 5 and 6 so that the expectations in the programme of study can be met by the end of year 6. Pupils are not expected to cover each aspect for every area of study.

Year 6 Working Scientifically:
Key Skills (taught throughout UKS2) to be addressed throughout the year across all topic areas

Key Learning:

Sort/group/compare/classify/identify

- Compare and contrast things beyond their locality and analyse advantages/disadvantages, pros/cons of their findings.
- Use and develop classification systems, keys and other information records (databases) to classify or identify.
- Compare and contrast more complex processes, systems, functions (e.g. sexual and asexual reproduction)

Research

- Research the work of famous scientists – historical and modern day and use this to find out how scientific ideas have changed over time and had an impact on our lives.
- Interview people to find out about information and collect data.
- Recognise which secondary sources will be most useful to research their ideas and begin to separate opinion from fact.

Modelling

- Identify some positive and some limitations of models used to describe/explain scientific ideas.
- Use and make own versions of simple models to describe and explain scientific ideas (e.g. periscopes, simple lever, burglar alarm).

Recording of 'explore/observe'

- Encounter more abstract ideas and begin to recognise how these ideas help them to understand and predict how the world operates.
- Use correct scientific knowledge and understanding and relevant scientific language to explain their findings and justify their scientific ideas.
- Explore more abstract systems/functions/changes/behaviours and record their understanding of these (e.g. the relationship between diet, exercise, drugs, lifestyle and health; evolutionary changes; burning, rusting; reflection and refraction of light; friction, air resistance, gravity)
- Read, spell and pronounce scientific vocabulary correctly.

Questioning

- Recognise scientific questions that do not yet have definitive answers.
- Use observations/data gathered to construct a further (testable or research) question.
- Raise different kinds of questions.

Planning

- Plan enquiries, including recognising and controlling variables where necessary.
- Select and plan the most appropriate type of science enquiry to use to answer scientific questions.

Equipment and measuring

- Recognise that data might be unreliable and describe how to make it more reliable.
- Make their own decisions about what measurements to take (and identify the ranges and intervals used).
- Take measurements, using a range of equipment, with increasing accuracy and precision.
- Choose and use the most appropriate equipment to support observation, make measurements, collect data.
- Record data and results of increasing complexity.
- Follow (and suggest) safety guidelines.

Communicating Recording

- Make decisions on the most appropriate format to present scientific data.
- Record data and results of increasing complexity using scientific diagrams and labels, recognised symbols, classification keys, tables, bar and line graphs, and models.
- Report findings from enquiries using discussion, drawings (annotated), oral and written explanations of results, explanations involving causal relationships, and conclusions.
- Present findings in written form, displays and other presentations.

Describe results

- Look for different causal (cause and effect) relationships in their data (something affecting something else) and describe the pattern succinctly.
- Identify patterns that might be found in the natural environment over long periods of time and describe how these have been used to develop scientific theories (e.g. evolution)

Explain results

- Identify evidence that refutes or supports their ideas.
- Use their evidence to justify their ideas.
- Use correct scientific knowledge and understanding and relevant scientific language to explain their findings.
- Read, spell and pronounce scientific vocabulary correctly.

Trusting my results

- Use their results to identify when further comparative tests and observations might be needed.
- Be able to explain differences in repeated measurements/readings or unexpected results.
- Recognise the limitations of some data.

Vocabulary: Plan, variables, measurements, accuracy, precision, repeat, readings **Record Data:** scientific diagrams, labels, classification keys, tables, scatter graphs, bar graph and line graphs predictions further comparative and fair test report and present conclusions, causal relationships, explanations, degree of trust, oral and written display and presentation **Evidence:** support, refute ideas or arguments identify, classify and describe patterns systematic quantitative measurements	**Notes and Guidance (non-statutory):** Pupils in years 5 and 6 should use their science experiences to: explore ideas and raise different kinds of questions; select and plan the most appropriate type of scientific enquiry to use to answer scientific questions; recognise when and how to set up comparative and fair tests and explain which variables need to be controlled and why. They should use and develop keys and other information records to identify, classify and describe living things and materials, and identify patterns that might be found in the natural environment. They should make their own decisions about what observations to make, what measurements to use and how long to make them for, and whether to repeat them; choose the most appropriate equipment to make measurements and explain how to use it accurately. They should decide how to record data from a choice of familiar approaches; look for different causal relationships in their data and identify evidence that refutes or supports their ideas. They should use their results to identify when further tests and observations might be needed; recognise which secondary sources will be most useful to research their ideas and begin to separate opinion from fact. They should use relevant scientific language and illustrations to discuss, communicate and justify their scientific ideas and should talk about how scientific ideas have developed over time. These opportunities for working scientifically should be provided across years 5 and 6 so that the expectations in the programme of study can be met by the end of year 6. Pupils are not expected to cover each aspect for every area of study.

Autumn Term 1 (Arthur and the Golden Rope)
Material Properties and Changes: states of matter

Key Learning:

- Compare and group materials together, according to whether they are solids, liquids or gases.
- 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).
- Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.
- Solids, liquids and gases can be identified by their observable properties.
- Solids have a fixed size and shape (the size and shape can be changed but it remains the same after the action).
- Liquids can pour and take the shape of the container in which they are put.
- Liquids form a pool not a pile.
- Solids in the form of powders can pour as if they were liquids but make a pile not a pool.
- Gases fill the container in which they are put.
- Gases escape from an unsealed container.
- Gases can be made smaller by squeezing/pressure.
- Liquids and gases can flow.

Working Scientifically

- Decide ways and give reasons for sorting and grouping things/objects based on specific characteristics.
- Use their observations to identify and classify.
- Suggest reasons for similarities and differences.
- **Use and develop classification systems to classify or identify.**
- Act out something to represent something else about the world around us.
- Make a visual representation or a model of something to represent somethings they have seen or a process that is difficult to see.
- Use simple models to describe scientific ideas.
- **Encounter more abstract ideas and begin to recognise how these ideas help them to understand and predict how the world operates and identify some positives and some limitations of models used to describe/explain scientific ideas.**

Possibilities for Working Scientifically:

- Grouping and classifying a variety of different materials.
- Exploring the effect of temperature on substances such as chocolate, butter, cream (for example, to make food such as chocolate crispy cakes and ice-cream for a party).
- Research the temperature at which materials change state, for example, when iron melts or when oxygen condenses into a liquid. Observe and record evaporation over a period of time, for example, a puddle in the playground or washing on a line.
- Investigate the effect of temperature on washing drying or snowmen melting.

5 Types of Scientific Enquiry:

- <u>Identifying and Classifying</u>
  Can you group these materials and objects into solids, liquids and gases?
  How would you group these materials/objects based on their temperature?
- <u>Pattern Seeking</u>
  Is there a pattern in how long it takes different sized ice lollies to melt?
- <u>Observing over time</u>
  How does the level of water in a glass change when left on the windowsill?
  How does the mass of an ice cube change over time?
- <u>Comparative tests</u>
  Does seawater evaporate quicker than fresh water?

Focus Assessed Lessons:

- Drying materials
- Investigating ice cubes
- Dunking biscuits
- Measuring temperature
- Melting conclusions

- Record observations/explorations/processes using simple scientific language.
- Suggest their own ideas on a concept and compare these with what they observe/find out.
- Explore more abstract changes and record their understanding of these.
- **Explore more abstract changes and record their understanding of these (e.g. burning/rusting)**
- With support/as a group, set up simple practical enquiries including comparative and fair tests, e.g. make a choice from a list of at least one variable that needs to be kept the same when conducting a fair test.
- Carry out simple fair tests with increasing confidence and make some of the planning decisions about what to change and measure/observe.
- Make most of the planning decisions and carry out fair tests.
- **Plan enquiries, including recognising and controlling variables where necessary.**
- Learn how to use new equipment e.g. data loggers.
- Learn how to use new equipment, such as data loggers and measure temperature in degrees Celsius (°C) using a thermometer.
- Explain how to use equipment accurately.
- **Choose and use the most appropriate equipment to support observation, make measurements and collect data.**
- Say whether what happened was what they expected and notice any odd results that seem odd.
- Describe the effect of something/different factors on something else.
- Draw conclusions based on their data and observations and use test results to make predictions to set up further comparative and fair tests.
- **Use their evidence to justify their ideas.**

Vocabulary:
solid, solidify, iron, ice, melt, freeze, liquid, evaporate, condense, gas, container, changing state, heated, heat, cooled, cool, degrees Celsius °C, thermometer, water cycle, evaporation, condensation, temperature, melting, warm/cool, water, water vapour.

Notes and Guidance (non-statutory):
Pupils should explore a variety of everyday materials and develop simple descriptions of the states of matter (solids hold their shape; liquids form a pool not a pile; gases escape from an unsealed container). Pupils should observe water as a solid, a liquid and a gas and should note the changes to water when it is heated or cooled.
Note: Teachers should avoid using materials where heating is associated with chemical change, for example, through baking or burning.

Scientists and Inventors:

- **Garrett Morgan** was an American inventor, famous for inventing the first modern gas mask and the first three-signal traffic lights.
- **Antoine Lavoisier and Joseph Priestley** - These two scientists were mainly responsible for the discovery of oxygen.
- **William Thomson**, who is better known as **Lord Kelvin**, determined the temperature of absolute zero (the coldest possible temperature).
- **Anders Celsius** was a Swedish astronomer who created a temperature scale, divided into small parts called degrees.
- **Daniel Fahrenheit** was a German physicist. He is famous for inventing a thermometer that used mercury.

Autumn Term 2 (Queen of Darkness)
Health: health and nutrition

Key Learning:

- Identify that, animals including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat.
- An adequate and varied diet is beneficial to health (along with a good supply of air and clean water).
- Regular and varied exercise is beneficial to health. (focus on energy in versus energy out. Include information on making informed choices).

Working Scientifically

- Compare and contrast diets.
- Record similarities and differences related to simple scientific ideas or processes or more complex groups of objects and begin to give reasons for these.
- Compare and contrast more complex processes, systems, functions.
- **Compare and contrast things and analyse advantages/disadvantages, pros/cons of their findings.**
- Create/invent/design something based on what they have found out applying both research and/or practical experiences.
- Create/invent/design something based on what they have found out applying both research and/or practical experiences.
- Find things out using a wide range of secondary sources of information.
- **Interview people to find out information and collect data. (to compare and contrast diets and group them according to what they eat)**
- As a group, begin to make some decisions about the best way of answering their questions.
- Choose/select a relevant question that can be answered (by research or experiment/test)
- Ask their own pertinent questions and refine a scientific question so that it can be investigated.
- **Use observations/data gathered to construct a further (testable or research) question.**
- Talk about and record their findings using simple scientific language.
- Develop simple descriptions from their observations and use relevant scientific language to discuss their ideas.

Possibilities for Working Scientifically:

- Compare and contrast the diets of different animals (including their pets).
- Decide ways of grouping them according to what they eat.
- Research different food groups and how they keep us healthy. Design meals based on what they find out.

5 Types of Scientific Enquiry:

- Identifying and Classifying
  How can we group the food that we eat?
- Comparative test
  Which is the best exercise for keeping our bodies healthy?
- Research
  Why do different types of vitamins keep us healthy and which foods can we find them in?

Focus Assessed Lessons:

- N/A

Notes and Guidance (non-statutory):

Pupils should continue to learn about the importance of nutrition.

• Use their developing scientific knowledge and understanding and relevant scientific language to explain their findings. • **Explore more abstract systems/functions/changes/behaviours and record their understanding of these (e.g. the relationship between diet, exercise, drugs, lifestyle and health)** • Collect data from their own observations and measurements, using notes/simple tables/standard units. • Collect and record data from their own observations and measurements, using notes/simple tables/standard units to help to make decisions. • Record data and results of increasing complexity. • **Record data and results of increasing complexity.** • Record and present findings using simple scientific language and vocabulary, including discussions, oral and written explanations, notes, annotated drawings, pictorial representations, labelled diagrams, simple tables, bar charts (using ranges and intervals chosen for them, displays or presentations. • Record findings using simple scientific language and vocabulary, including discussions, oral and written explanations, notes, annotated drawings, pictorial representations, labelled diagrams, tables and bar charts (where intervals and ranges agreed through discussion), displays or presentations. • Report findings from enquiries using discussion, drawings (annotated), oral and written explanations of results, and conclusions. • **Report findings from enquiries using discussion, drawings (annotated), oral and written explanations of results, explanations involving causal relationships, and conclusions.** • Use their results to consider whether they meet predictions. • Begin to develop their ideas about relationships and interactions. • Look for patterns and notice relationships between things and describe these. • **Identify evidence that refutes or supports their ideas.** • Explain why things have happened and begin to recognise when a test is not fair and suggest improvements. • Use relevant scientific language to discuss, communicate, report their findings. • Comment on how reliable their data is. • **Recognise the limitations of some data.** **Vocabulary:** nutrition, nutrients, carbohydrates, protein, fats, fibre, water, vitamins, minerals.	

Spring Term 1 (Rose Blanche)
Animals: skeletons and movement

Key Learning:

- Identify that humans and some other animals have skeletons and muscles for support, protection and movement.
- Identify animals (vertebrates) which have a skeleton which supports their body, aids movement and protects vital organs (be able to name some of the vital organs).
- Identify animals without internal skeletons/backbones (invertebrates) and describe how they have adapted other ways to support themselves, move and protect their vital organs.
- Know how the skeletons of birds, mammals, fish, amphibians or reptiles are similar (backbone, ribs, skull, bones used for movement) and the differences in their skeletons.
- Know that muscles, which are attached to the skeleton, help animals move parts of their body.
- Explore how humans grow bigger as they reach maturity by making comparisons linked to body proportions and skeleton growth e.g. do people with longer legs have longer arm spans?
- Recognise that animals are alive; they move, feed, grow, use their senses and reproduce.

Working Scientifically

- Compare and contrast functions.
- Record similarities, differences or changes related to more complex groups of living things and begin to give reasons for these.
- Compare more complex processes, systems or functions.
- **Compare and contrast more complex processes, systems or functions.**
- Finding things out using secondary sources of information.
- Recognise when and how secondary sources might help them to answer questions that cannot be answered through practical investigations.
- Find things out using a wide range of secondary sources of information.
- **Recognise which secondary sources will be most useful to research their ideas and begin to separate opinion from fact.**
- Observe and record relationships between structure and function.
- Observe and record relationships between structure and function.

Possibilities for Working Scientifically:

- Identifying and grouping animals with and without skeletons.
- Observing and comparing their movement.
- Exploring ideas about what would happen if humans did not have skeletons.

5 Types of Scientific Enquiry:

- Identifying and Classifying
  How do the skeletons of different animals compare?
- Pattern Seeking
  Do male humans have larger skulls than female humans?
- Comparative tests
  How does the skull circumference of a girl compare with that of a boy?

Focus Assessed Lessons:

- Investigating the human skeleton
- Skeleton research
- Skeleton explanations
- Close observation of fish

Notes and Guidance (non-statutory):

Pupils should be introduced to the main body parts associated with the skeleton and muscles, finding out how different parts of the body have special functions.
Pupils should build on their learning from years 3 and 4 about the main body parts and internal organs (skeletal, muscular and digestive system) to explore and answer questions that help them to understand how the circulatory system enables the body to function.
Pupils should learn how to keep their bodies healthy and how their bodies might be damaged – including how some drugs and other substances can be harmful to the human body.

- Create simple models to describe scientific ideas.
- **Use and make their own versions of simple models to describe and explain scientific ideas.**
- Explore their own ideas about 'what if..?' scenarios e.g. humans did not have skeletons.
- Suggest their own ideas on a concept and compare these with models or images.
- Use their developing scientific knowledge and understanding and relevant scientific language to discuss, communicate and explain their findings.
- **Use correct scientific knowledge and understanding and relevant scientific language to explain their findings.**
- Make simple accurate measurements using whole number standard units, using a range of equipment.
- Make accurate measurements using standard units (and more complex units and parts of units) using a range of equipment.
- Choose the most appropriate equipment to make measurements.
- **Choose and use the most appropriate equipment to support observation, make measurements and collect data.**
- With help, look for changes and patterns in their observations and data.
- Help to make decisions about how to analyse their data.
- Look for patterns and notice relationships between things.
- **Use their results to identify when further comparative tests and observations might be needed.**
- Read and spell scientific vocabulary correctly and with confidence.
- Read and spell scientific vocabulary correctly and with confidence.
- Read, spell and pronounce scientific vocabulary correctly.
- **Read, spell and pronounce scientific vocabulary correctly.**

Vocabulary:

skeleton, bones, joints, relax, muscles, ball joint, socket joint, hinge joint, gliding joint.

Scientists and Inventors:

- **Marie Curie** was a famous scientist who developed the use of x-rays, which meant that a lot more patients could be correctly diagnosed and treated.

Spring Term 2 (One Thousand and One Arabian Nights)
Environment: classification

Key Learning:

- 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.
- Give reasons for classifying plants and animals based on specific characteristics.
- Living things can be grouped into micro-organisms, plants and animals.
- Vertebrates can be grouped as fish, amphibians, reptiles, birds and mammals.
- Invertebrates can be grouped as snails and slugs, worms, spiders and insects.
- Plants can be grouped as flowering plants (inc. trees and grasses) and non-flowering plants (such as ferns and mosses).

Working Scientifically

- Record similarities and differences.
- Make a simple guide to local living things.
- Compare and contrast things beyond their locality.
- **Compare and contrast things beyond their locality and analyse.**
- Decide ways and give reasons for sorting, grouping, classifying, identifying living things based on specific characteristics.
- Use guides or simple keys to classify/identify (local small invertebrates)
- Suggest reasons for similarities and differences.
- **Use and develop classification systems, keys and other information records (databases) to classify or identify.**
- Find out about the work of famous scientists – historical and modern day.
- Find out about the work of famous scientists – historical and modern day.
- Research the work of famous scientists (historical and modern day) and use this to find out about how scientific ideas have changed over time.
- **Research the work of famous scientists (historical and modern day) and use this to explain how scientific ideas have developed and changed over time and had an impact on our lives.**
- Explore/observe things in the local environment/real contexts and record observations.
- Explore/observe things in the local environment/real contexts and record observations.

Possibilities for Working Scientifically:

- Using classification systems and keys to identify some animals and plants in the immediate environment.
- Research unfamiliar animals and plants from a broad range of other habitats and decide where they belong in the classification system.

5 Types of Scientific Enquiry:

- Identifying and Classifying
  How would you make a classification key for vertebrates/invertebrates or microorganisms?
- Pattern Seeking
  Is there a pattern between the size and shape of a bird's beak and the food it will eat?
- Comparative tests
  Which is the most common invertebrate on our school playing field?
- Research
  What do different types of microorganism do? Are they always harmful?

Focus Assessed Lessons:

- Invertebrate research
- Creating keys
- Outdoor keys

Notes and Guidance (non-statutory):

Pupils should build on their learning about grouping living things in year 4 by looking at the classification system in more detail. They should be introduced to the idea that broad groupings, such as micro-organisms, plants and animals can be subdivided. Through direct observations where possible, they should classify animals into commonly found invertebrates (such as insects, spiders, snails, worms) and vertebrates (fish, amphibians, reptiles, birds and mammals). They should discuss reasons why living things are placed in one group and not another. Pupils might find out about the significance of the work of scientists such as Carl Linnaeus, a pioneer of classification.

- Use their developing scientific knowledge and understanding and relevant scientific language to discuss, communicate and explain their findings.
- **Use correct scientific knowledge and understanding and relevant scientific language to explain their findings.**
- Begin to understand that some questions are testable/can be tested in the classroom and some cannot.
- Start to make their own decisions about the type of science enquiry they might use to answer scientific questions (is a fair test the best way to investigate their questions)
- Refine a scientific question so that it can be investigated.
- **Select and plan the most appropriate type of science enquiry to use to answer scientific questions.**
- Gather data in a variety of ways to help in answering questions.
- Collect and record data from their own observations using notes/simple tables to help make decisions and use results to suggest improvements, new questions to predictions for setting up further tests.
- Decide how to record data from a choice of familiar approaches.
- **Make decisions on the most appropriate format to present scientific data.**
- Explore and observe with increased accuracy using a hand lens or microscope.
- Learn how to use new equipment (hand lens/microscope).
- Explain how to use equipment safely.
- **Choose and use the most appropriate equipment to support observation.**
- Record, classify and present data in a variety of ways to help in answering questions.
- Begin to select the most useful ways to record, classify and present data from a range of choices and with help, look for similarities and differences in their data (between different groups of results).
- Identify patterns that might be found in the natural environment.
- **Present findings in written form, displays and other presentations and identify and describe patterns that might be found in the natural environment.**

Vocabulary:

classify, compare, Linnaean, Carl Linnaeus, classification, domain, kingdom, phylum, class, order, family, genus, species, characteristics, microorganisms, organism, flowering, non-flowering, vertebrates, invertebrates

Scientists and Inventors:

- **Libbie Hyman** was a zoologist who is best known for her work on the classification of invertebrates.
- **Robert Hooke** was an English scientist. He invented the compound microscope (a microscope with two lenses), which allowed him to look at very small objects.

Summer Term (Odysseus/ Grendel a cautionary tale about chocolate/Charlie and the Chocolate Factory)
Material Changes: reversible and irreversible changes

Key Learning:

- Know that some materials will dissolve in liquid to form a solution and describe how to recover a substance from a solution.
- Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating.
- Demonstrate that dissolving, mixing and changes of state are reversible changes.
- Changes can occur when different materials are mixed.
- Some material changes can be reversed and some cannot.
- Recognise that dissolving is a reversible change.
- Mixtures of solids (of different particle size) can be separated by sieving.
- Mixtures of solids and liquids can be separated by filtering if the solid is insoluble (un-dissolved).
- Evaporation helps us separate soluble materials from water.
- Changes to materials can happen at different rates (factors affecting dissolving, factors affecting evaporation – amount of liquid, temperature, wind speed).
- Freezing, melting and boiling changes can be reversed.
- Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets.
- Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic.
- Compare a variety of materials and measure their effectiveness (e.g. hardness, strength, flexibility, solubility, transparency, thermal conductivity, electrical conductivity)
- Heat always moves from hot to cold.
- Some materials (insulators) are better at slowing down the movement of heat than others.
- Objects/liquids will warm up or cool down until they reach the temperature of their surroundings.
- Explain that some changes result in the formation of new materials and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda.

Working Scientifically

- Observe and record changes over time.
- Observe and record changes over time.
- Observe changes over different periods of time.
- **Use correct scientific knowledge and understanding and relevant scientific language to explain their findings and justify scientific ideas.**
- Within a group suggest relevant questions about what they observe and about

Possibilities for Working Scientifically:

- Carrying out tests to answer questions, for example, 'Which materials would be the most effective for making a warm jacket, for wrapping ice cream to stop it melting, or for making blackout curtains?'.
- Compare materials in order to make a switch in a circuit.
- Observe and compare the changes that take place, for example, when burning different materials or baking bread or cakes.
- Research and discuss how chemical changes have an impact on our lives, for example, cooking.
- Discuss the creative use of new materials such as polymers, super-sticky and super-thin materials.

5 Types of Scientific Enquiry:

- <u>Observing over time</u>
  How does a container of salt-water change over time?
  How does a sugar cube change as it is put in a glass of water?
  How does our compost heap change over time?
- <u>Comparative tests</u>
  Which type of sugar dissolves the fastest?

Focus Assessed Lessons:

- Question raising after dissolving
- Change of state cartoon
- Dissolving
- Sugar cube stacks

the world around them.

- Ask/raise their own relevant questions with increasing confidence and independence about what they observe and about the world around them.
- Raise different kinds of questions.
- **Raise different kinds of questions and recognise scientific questions that do not yet have definitive answers.**
- Help to decide about how to set up a simple fair test and begin to recognise when a test is not fair.
- Recognise when a test is necessary.
- Recognise when it is appropriate to carry out a fair test and explain which variables need to be controlled and why.
- **Select and plan the most appropriate type of scientific enquiry to use to answer scientific questions.**
- Find/suggest a way to compare things while understanding precautions for working safely.
- Begin to identify where patterns might be found and use this to begin to identify what data to collect.
- Decide how to record data from a choice of familiar approaches while following safety guidelines.
- **Make their own decisions about what measurements to take and identify the ranges and intervals used while following and suggesting safety guidelines.**
- Help to make some decisions about what observations to make, how long to make them for and the type of simple equipment that might be used.
- Make more of the decisions about what observations to make, how long to make them for and the type of equipment that might be used.
- Make their own decisions about what observations to make or measurements to use and how long to make them for (recognising the need for repeat readings on some occasions).
- **Take measurements, using a range of equipment, with increasing accuracy and precision and recognise that data might be unreliable and describe how to make it more reliable.**
- Communicate their findings in ways that are appropriate for different audiences.
- Make decisions on how best to communicate their findings in ways that are appropriate for different audiences.

Notes and Guidance (non-statutory):

Pupils should explore reversible changes, including, evaporating, filtering, sieving, melting and dissolving, recognising that melting and dissolving are different processes.
Pupils should build a more systematic understanding of materials by exploring and comparing the properties of a broad range of materials, including relating these to what they learnt about magnetism in year 3 and about electricity in year 4.
Note: Pupils are not required to make quantitative measurements about conductivity and insulation at this stage. It is sufficient for them to observe that some conductors will produce a brighter bulb in a circuit than others and that some materials will feel hotter than others when a heat source is placed against them.
Pupils should explore changes that are difficult to reverse, for example, burning, rusting and other reactions, for example, vinegar with bicarbonate of soda. They should find out about how chemists create new materials, for example, Spencer Silver, who invented the glue for sticky notes or Ruth Benerito, who invented wrinkle-free cotton.
Note: Safety guidelines should be followed when burning materials.

Scientists and Inventors:

- **Spencer Silver,** a chemist who accidentally invented the delicate adhesive used in Post-it Notes
- **Ruth Benerito** was an American chemist. She is best known for developing wrinkle-free cotton fabric.

- Record data and results of increasing complexity using tables, bar and line graphs and models.
- **Record data and results of increasing complexity using scientific diagrams and labels, recognised symbols, classification keys, tables, bar and line graphs and models.**
- Describe and compare the effect of different factors on something.
- Notice and find patterns in their observations and data.
- Look for patterns and notice relationships between things and describe these.
- **Look for different causal (cause and effect) relationships in their data and describe the pattern succinctly.**
- Use their own experience and some evidence or results to draw simple conclusions and answer questions.
- Report on findings from enquiries and begin to identify the scientific facts in their data and investigate the effect of something on something else.
- Use their developing scientific knowledge and understanding and relevant scientific language to explain their findings.
- **Be able to explain differences in repeated measurements/readings or unexpected results.**

Vocabulary:

dissolve, solution, separate, separating, solids, liquids, gases, evaporating, reversible changes, dissolving, mixing, evaporation, filtering, sieving, melting.
properties, hardness, solubility, transparency, electrical conductor, thermal conductor, response to magnets, irreversible, new material, burning, rusting, magnetism, electricity, chemists, Spencer Silver, Ruth Benerito, quantitative, measurements, conductivity, insulation, chemical.