Science Year 5 Skills and knowledge documents to support medium term planning

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Topic	**Forces Earth and Space** Earth and Space	**Forces Earth and Space** Unbalanced Forces	**Materials** Mixtures and Separation	**Materials** Properties and Change	**Living things and habitats** Life cycles and reproduction	**Animals including humans** Human Timeline **Making connections** Does the size of an asteroid affect its impact strength?

Progression of Working Scientifically Skills

	Year 3	Year 4	Year 5	Year 6
Posing questions	Asking my own scientific questions & using different ways to answer them. Beginning to raise further questions during the enquiry process. Considering what makes a testable question. Beginning to recognise that there are different types of enquiry and that they are suitable for different questions. Beginning to make suggestions about how different questions could be answered. Asking scientific questions. Raising questions throughout the enquiry process. Identifying testable questions. Selecting the most appropriate enquiry method to answer questions and give justification.		Asking scientific questions. Raising questions throughout the enquiry process. Identifying testable questions. Selecting the most appropriate enquiry method to answer questions and give justification.	
Planning	Able to plan tests (inc. fair tests) with help. Able to plan different types of scientific enquiries to answer questions.		Able to plan different types of scientific enquiries to answer questions.	
Predicting	Making predictions about what they think will happen by:		Making increasingly scientific predictions by:	

	● Using scientific Knowledge and/or personal experience to explain their prediction (because…) ● Beginning to consider cause and effect when making predictions, where appropriate. ● Predicting a trend by considering how the changing variable will affect the measured variable. (The smoother the surface, the longer the distance the car will travel) Making increasingly scientific predictions by: ● Using previous scientific Knowledge and evidence to inform their predictions. ● Using scientific language to describe a potential outcome or explain why they think something will happen. ● Making links between topics to evidence a prediction.	● Using previous scientific Knowledge and evidence to inform their predictions. ● Using scientific language to describe a potential outcome or explain why they think something will happen. ● Making links between topics to evidence a prediction.
Observing (Qualitative)	Able to observe, describe & compare using scientific language. Using their senses to describe, in more detail and with simple scientific vocabulary, what they notice or what has changed. Able to observe, describe and compare in detail using scientific language. Using their senses to describe, in detail and with a broader range of scientific vocabulary, what they notice or what has changed.	Able to observe, describe and compare in detail using scientific language. Using their senses to describe, in detail and with a broader range of scientific vocabulary, what they notice or what has changed.

Measuring (Quantitative)	Able to use a variety of equipment to measure accurately (such as data loggers, newton meters, weighing scales, thermometers, stopwatches, rules, metre sticks, trundle wheels, measuring cylinders) Using standard units to measure and compare. Using measuring equipment with increasing accuracy. Reading scales with unmarked intervals between numbers. Able to select different equipment to measure with precision & take repeat readings when needed Using standard units to measure and compare with increasing precision (decimals). Reading a wider variety of scales with unmarked intervals between numbers.	Able to select different equipment to measure with precision & take repeat readings when needed Using standard units to measure and compare with increasing precision (decimals). Reading a wider variety of scales with unmarked intervals between numbers.
Researching	Gathering specific information from a variety of sources. Gathering answers to open-ended questions from a variety of sources.	Gathering answers to open-ended questions from a variety of sources.
Recording	Able to gather, record and present data in different ways inc. drawings, labelled diagrams, tables. Choosing how to record data and results using scientific diagrams, labels, classification, keys, tables.	Choosing how to record data and results using scientific diagrams, labels, classification, keys, tables.

Grouping and classifying	Classifying things & using keys. Sorting and classifying with precise reason.	Sorting and classifying with precise reason.
Graphing	Recording and presenting data in different ways inc. scattergrams and bar charts. Learning to choose how to record data and results using scatter, bar and line graphs.	Learning to choose how to record data and results using scatter, bar and line graphs.
Analysing and drawing conclusions	Communicating my findings in a variety of ways. Explaining using cause and effect and scientific facts and ideas Able to use relevant scientific language. Gathering the things I've learned and say why they matter to me. Explaining using cause and effect, scientific facts and own ideas. Able to use relevant scientific language.	Gathering the things I've learned and say why they matter to me. Explaining using cause and effect, scientific facts and own ideas. Able to use relevant scientific language.
Evaluating	Able to talk about how to improve my work. Learning to evaluate and able to improve my own work.	Learning to evaluate and able to improve my own work.

<table>
<tr><th colspan="4">Y5: Autumn 1</th></tr>
<tr><th colspan="4">Topic title: Earth and Space</th></tr>
<tr>
<td>Prior Learning
Reception
Explore the natural world around them.
Describe what they see, hear and feel whilst outside.

Y1- Seasonal Changes
Observe changes across the four seasons.
Observe and describe weather associated with the seasons and how day length varies.

Future learning: (KS3)
Gravity on different planets, our Sun as a star, galaxies, seasons explained by the Earth’s tilt, day length in different hemispheres, light year as a measure of astronomical distance.</td>
<td>Knowledge:
Describe the movement of the earth, and other planets, relative to the Sun in the solar system.
Know that gravity is the force that keeps celestial bodies in their orbits.
Describe the movement of the Moon relative to the Earth and describe the phases of the Moon.
Describe the Sun, Earth and Moon as approximately spherical bodies.
Use the idea of the Earth’s rotation to explain day and night and the apparent movement of the Sun across the sky.
Explain how the seasons occur.
Explain how a sundial works.
Describe the geocentric and heliocentric models.
List some of the uses of satellites and explain why space junk poses a problem to them.</td>
<td>Skills:

Pose and identify testable questions about the movement of the celestial bodies in our Solar System.
Use a model to represent the Solar System.
Design and draw a table to record data on moons.
Accurately draw day and night and seasons diagrams.
Calibrate a sundial using a compass and torch and use it to measure time.
Analyse patterns in temperature data for the Earth and use them to predict temperature values for the Earth in the future.</td>
<td>Key Vocabulary:
Sun, Moon, Earth, planets (Mercury, Jupiter, Saturn, Venus, Mars, Uranus, Neptune) spherical, Solar System, rotate, star, orbit.</td>
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<td colspan="2">Critical Content Statements:
The Sun is a star. It is at the centre of our solar system.
There are 8 planets, which travel around the Sun in fixed orbits.
Earth takes 365 ¼ days to complete its orbit around the Sun.
The Earth rotates (spins) on its axis every 24 hours.
As Earth rotates, half faces the Sun (day) and half is facing away from the Sun (night)
As the Earth rotates the Sun appears to move across the sky.
The Moon orbits the Earth. It takes about 28 days to complete its orbit.</td>
<td colspan="2">Common Misconceptions Pupils May Have:
Some pupils may think that:
The Earth is flat.
The Sun is a planet.
The Sun rotates around the Earth
The Sun moves across the sky during the day.
The Sun rises in the morning and sets in the evening.
The Moon appears only at night.</td>
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• The Sun, Earth and Moon are approximately spherical.	Night is caused by the Moon getting in the way of the Sun or the Sun moving further away from the Earth.

Y5: Autumn 2			
Topic title: Unbalanced Forces			
Prior learning: **Y3- Forces and magnets** Compare how things move on different surfaces. Notice that some forces need contact between two objects, but magnetic forces can act at a distance. Observe how magnets attract or repel each other and attract some materials and not others. Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet and identify some magnetic materials. Describe magnets as having two poles. Predict whether two magnets will attract or repel each other. **Future learning:** **KS3** Forces as pushes or pulls, arising from the interaction between two objects. Using force arrows in diagrams. Moment as the turning effect of a force. Forces measures in Newtons, measurements of stretch or compression as force is changed.	**Knowledge:** • Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object. • Describe the relationship between mass and gravity. • Describe air resistance and its effects. • Describe friction and its effects. • Describe water resistance and its effects. • Describe the relationship between surface area and air and water resistance. • Explain how to make an object aerodynamic or streamlined. • Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect. • Describe the effects of levers, pulleys and simple machines on movement.	**Skills:** Analyse predictions, data and anomalies to write a conclusion. Plan a fair test to investigate air resistance. Write a method. Evaluate a method and judge the degree of trust. Design a results table. Calculate the mean average from repeat data. Draw and annotate a diagram. Draw an accurate line graph.	**Vocabulary:** Force, gravity, Earth, air resistance, water resistance, friction, mechanisms, simple machines, levers, pulleys, gears.

Critical Content Statements:	**Common Misconceptions Pupils May Have:**
• A force causes an object to start moving, speed up, slow down or change direction. • Gravity is a force that acts at a distance • Everything is pulled to the Earth by gravity and this causes unsupported objects to fall. • Air resistance, water resistance and friction are contact forces that act between moving surfaces. The object may be moving through air or water, or the air or water may be moving over a stationary object. • A mechanism is a device that allows a small force to be increased to a larger force. The pay back is that it requires greater movement. The small force moves a long distance and the resulting large force moves a small distance. • Pulleys, levers and gears are all mechanisms also known as simple machines.	Some children may think that • The heavier the object the faster it falls, because it has more gravity acting on it. • Forces act in pairs which are equal and opposite • Smooth surfaces have no friction • Objects always travel better on smooth surfaces • A moving object has a force which is pushing it forwards and it stops when the pushing force wears out. • A non-moving object has no forces acting upon it. • Heavy objects sink and light objects float.

Y5: Spring 1			
Topic title: Mixtures and Separation			
Enquiry question: What is a mixture? Can materials be separated?			
Prior learning: **Nursery** **Nursery** Explore how things work. Talk about the differences in materials and changes they notice. **Reception** Describe what they see, hear and feel whilst outside. **Y1** Describe simple physical properties of a variety of everyday materials. Y4 States of matter **Future learning:**	**Knowledge:** Define the term **mixture** and name some common examples. Define the term **sieving** and explain how sieving separates mixtures. Define the term **filtering** and explain how filtering separates mixtures. Define the terms **solution** and **dissolve** and name some common examples of solutions. Recall some factors that affect the time taken to dissolve. Describe the effect of temperature on the time taken to dissolve. Define the term **evaporating** and explain how evaporating separates solutions. Identify when sieving, filtering and evaporating should be used.	**Skills:** Research a mixture to find out what substances it is made from. Draw and annotate a diagram to explain how sieving separates a solid-solid mixture. Identify and justify which type of enquiry to use to answer my testable question. Identify solutions by observing and describing their appearance. Suggest which variables to change, measure and control when investigating how temperature affects the time taken to dissolve. Choose which measurements to take and how long to take them for.	**Vocabulary:** dissolve evaporation filtering insoluble mixture sieving soluble solution

Critical Content Statements:	**Common Misconceptions Pupils May Have:**
• A mixture is formed when two or more substances are mixed and remain present. • A material made of just one substance, like salt, is not a mixture. • A material made from more than one substance, like sand, is a mixture. • Some liquids and solids can be separated using sieving, filtering and evaporation. • Sieving can be used to separate mixtures of solids with different-sized particles. • Filtering can be used to separate a mixture of a solid and a liquid, if the solid has not dissolved. • Some substances will dissolve in a liquid to form a solution. • The factors that affect the time taken to dissolve, including temperature and stirring. • Evaporation can be used to separate a solution.	• Solids dissolved in liquids have vanished and so you cannot get them back.

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<tr><th colspan="4">Y5: Spring 2</th></tr>
<tr><th colspan="4">Topic title: Properties and Change</th></tr>
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<td>Prior learning:
Y1
Y2 uses of everyday materials
Future learning:
Y6</td>
<td>Knowledge:
Determine the hardness of different materials and link this to their uses.
Determine the transparency of different materials and link this to their uses.
Determine the thermal and electrical conductivity of different materials and link this to their uses.
Demonstrate, identify and describe reversible and irreversible changes.</td>
<td>Skills:
Evaluate the hardness test to determine the degree of trust in the results.
Plan and draw a table of results.
Write a detailed, organised and easy to follow method.
Write a prediction using prior knowledge of the states of matter.
Analyse observations about rusting and use them to support a conclusion.
Measure accurately in centimetres.</td>
<td>Vocabulary

Thermal/ electrical insulator, conductor, change of state, reversible/ non reversible change, burning, rusting, new material.</td>
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<td colspan="2">Critical Content Statements:
Scientists study materials to find out about their properties.
Materials have different properties, such as hardness, solubility, transparency, conductivity and response to magnets. This makes them useful in different ways.
Dissolving, mixing and changes of state are reversible changes.
Some changes result in making new materials. These are usually irreversible.
Burning and rusting are irreversible processes.</td>
<td colspan="2">Common Misconceptions Pupils May Have:
Some children may think
Thermal insulators keep cold in or out.
Thermal insulators warm things up
Solids dissolved in liquids have vanished and so you cannot get them back.
Lit candles only melt, which is a reversible change.</td>
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<tr><td colspan="4">There are lots of misconceptions around reversible and irreversible changes, including around the permanence or impermanence of the change. There is confusion between physical and chemical changes and reversible and irreversible changes. They do not correlate simply. Chemical changes result in a new material being formed. These are mostly irreversible. Physical changes are often reversible but may be permanent. These do not result in new materials e.g. cutting a loaf of bread. It is still bread, but no longer a loaf. The shape, not the material has been changed.</td></tr>
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<tr><th colspan="4">Y5: Summer 1</th></tr>
<tr><th colspan="4">Topic title: Lifecycles and reproduction</th></tr>
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<td>Prior learning:
Y2 (Animals including humans)
Notice that animals have offspring which grow into adults.
Y3 – Plants
Explore the part that flowers play in the lifecycle of flowering plants, including pollination, seed formation and seed dispersal.
Future learning:
KS3
Reproduction in humans (as an example of a mammal, including the structure and function of the male and female reproductive systems, menstrual cycles (without details of hormones), gametes, fertilisation, gestation and birth, to include the effect of maternal lifestyle on the foetus through the placenta.</td>
<td>Knowledge:
Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird.
Describe the life process of reproduction in some plants and animals.
Order the stages in growth and development from birth to old age.
Describe physical and developmental changes from a baby through to old age.
Describe changes that occur in males and females during puberty.
Suggest ways to manage the changes that occur during puberty.
Recall what is meant by a gestation period.
Describe how gestation varies across animals and compare this to humans.</td>
<td>Skills:
Observe and compare equivalent parts in different flowers.
Research the life cycles of different mammals.
Pose questions to compare the life cycles of different birds.
Suggest how one temperature may affect egg hatching.
Use data to describe a relationship and make predictions.
Represent root growth over time on a line graph.</td>
<td>Life cycle, reproduce, fertilises, asexual, plantlets, runners, tubers, bulbs, cuttings. puberty, adolescence, reproduction, characteristic, data, estimate, fertilisation, germination, gestation, gills, incubation, line graph, line of best fit, lungs, mating, metamorphosis, offspring, ovule, pollen, pollination, reproduction.</td>
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<td colspan="3">Critical Content Statements:
When babies are young, they grow rapidly. They are very dependent on their parents.
As they develop, they learn many skills
At puberty a child’s body changes and develops
The stages of growth for humans are: baby, toddler, child, teenager, adult, old age.</td>
<td>Common Misconceptions Pupils May Have:
Some children may think that
All plants start out as seeds
All plants have flowers
Plants that grow from bulbs do not have seeds</td>
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• As we grow up our bodies develop and change physically. • Gestation period is the time it takes for a baby to grow inside it's mother before it is born.	• Only birds lay eggs. • A baby grows in a mother's tummy

Y5: Summer 2			
Topic title: Making connections			
Enquiry question: How does the flow of liquids compare?			
Prior learning: **this unit builds on learning from Year 3 units.**	**Knowledge:** • Recall key knowledge from previous units. • Apply knowledge in new contexts.	**Skills:** • Carry out a full scientific enquiry.	**Vocabulary:** bar chart, bone, carbohydrate, conclusion, evaluate, fat, flower, fruit, friction, grip strength, joint, light source, material, muscle, nutrition, opaque, predict, property, protein, seed, shadow, trustworthy, variable.