Year 5 Unit Progression in disciplinary knowledge, followed by unit summaries

Year 5	Properties/changing materials Explain the processes and outcomes of some reversible and irreversible changes which include changes of state.	Forces: contact & non-contact Identify and explain the effects of unbalanced forces	Forces: contact & non-contact Describe the orbits of the earth and moon	Alive (Structure and Function) Describe how human structure and function changes as they age.	Reproduction Describe and compare the process of sexual reproduction in some animals	Reproduction Describe and compare the process of sexual and asexual reproduction in some plants.
Disciplinary progression	Children can identify CV and DV in a given enquiry and use to plan and carry out an investigation, interpreting results **presented on line-graphs.**	Children can identify **possible CV and DV** and **knowledge of enquiry structure to generate** an enquiry question; plan and carry out an investigation, **questioning** and interpreting results **organised** in diagrams and tables.	Children can identify possible CV and DV and knowledge of given enquiry structure to generate an enquiry question; plan and carry out an investigation, interpreting results **and making new predictions**.	Children can identify possible CV and DV and knowledge of **all enquiry structures** to generate an enquiry question; plan and carry out an investigation, interpreting **and questioning** results and making new predictions.	Children can identify possible CV and DV and knowledge of **all enquiry structures** to generate an enquiry question; plan and carry out an investigation, interpreting **and questioning** results and making new predictions	Children can identify possible CV and DV and knowledge of **all enquiry structures** to generate an enquiry question; plan and carry out an investigation, interpreting **and questioning** results and making new predictions
Observing and measuring	• **I use my knowledge of variables and measures to make reasoned decisions about what to observe and measure and which equipment to use.** • **I know that systematic observation is based on the control variable** • **I can read scales that involve decimal numbers and negative numbers.**	• **I know that repeating measurements and observations increases their reliability.**	• I use my knowledge of variables and measures to make reasoned decisions about what to observe and measure and which equipment to use.	•	•	
Recording Data	• **I know how to organise data using my knowledge of control and dependent variables in tables, charts and diagrams.** • **I know that a line graph represents changes over time**. • **I know that the x axis is the control variable** • **I know that the y axis is the dependent variable**	• **I know that scientific diagrams mainly contain labelled features relevant to the variables** • I know how to organise data using my knowledge of control and dependent variables in tables, charts and diagrams.	• I know that scientific diagrams mainly contain labelled features relevant to the variables • I know how to organise data using my knowledge of control and dependent variables in tables, charts and diagrams. •	• I know that scientific diagrams mainly contain labelled features relevant to the variables • I know that a line graph represents changes over time. • I know that the x axis is the control variable • I know that the y axis is the dependent variable	• I know that scientific diagrams mainly contain labelled features relevant to the variables • I know how to organise data using my knowledge of control and dependent variables in tables, charts and diagrams.	• I know that scientific diagrams mainly contain labelled features relevant to the variables • I know how to organise data using my knowledge of control and dependent variables in tables, charts and diagrams.
Asking and exploring questions	• **I can identify how to control variables in different enquiry types** • I can design a fair test	• I can identify how to control variables in different enquiry types • **I know how to use variables to generate an enquiry question for different enquiry types.** • I can design a fair test	• I know how to use variables to generate an enquiry question for different enquiry types. • I can design a fair test	• I know how to use variables to generate an enquiry question for different enquiry types. • **I can explain my choice of enquiry choice**	• I know how to use variables to generate an enquiry question for different enquiry types. • I can explain my choice of enquiry choice	• I can identify how to control variables in different enquiry types • I can explain my choice of enquiry choice
Performing Tests	• **I can plan and perform part of an investigation independently**	I can plan and perform part of an investigation independently	• I can plan and perform part of an investigation independently			I can plan and perform part of an investigation independently
Concluding, prediction, evaluating	•	• **I can use my scientific knowledge to question my findings and decide when further testing is required.** • **I know that all results allow me to question and predict, however, not all results are reliable**	• **I know that predictions are based on my scientific knowledge of how variables are likely to behave.**	• I know that predictions are based on my scientific knowledge of how variables are likely to behave. • I can use my scientific knowledge to question my findings and decide when further testing is required.	• I know that predictions are based on my scientific knowledge of how variables are likely to behave.	• I know that predictions are based on my scientific knowledge of how variables are likely to behave. • I can use my scientific knowledge to question my findings and decide when further testing is required. • I know that all results allow me to question and predict, however, not all results are reliable

Applications & Communication	• **I know that relevant scientific language and illustrations can be used to communicate and justify my ideas** • **I can use my knowledge of science to understand its uses and implication**	• I know that relevant scientific language and illustrations can be used to communicate and justify my ideas • I can use my knowledge of science to understand its uses and implication	• **I know how scientific ideas have developed over time**.			• **I know that relevant scientific language and illustrations can be used to communicate and justify my ideas** • I know how scientific ideas have developed over time. • **I can use my knowledge of science to understand its uses and implication**

Year 5 Unit Plans

UKS2 Y5 A1	Are all changes to materials irreversible? 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. They should explore reversible changes, including, evaporating, filtering, sieving, melting and dissolving, recognising that melting and dissolving are different processes. 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. 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. Safety guidelines should be followed when burning materials. Pupils might work scientifically by: 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?' They might compare materials in order to make a switch in a circuit. They could observe and compare the changes that take place, for example, when burning different materials or baking bread or cakes. They might research and discuss how chemical changes have an impact on our lives, for example, cooking, and discuss the creative use of new materials such as polymers, super-sticky and super-thin materials.						
Lesson Qs	**Elicitation / Activate** What happens when thermal energy is added to or lost from a state of matter?	How does mixing materials change its function?	How can we separate materials?	How can we separate a solution?	What is an irreversible change?	How are insulators and conductors useful?	**Application / Assess** BIG Q: Are all changes to materials irreversible?
Key Concepts Changing materials	Prior knowledge: • Materials are made from matter. • Matter can be structured as solid, liquid or gas. • To know that some materials are magnetic.	• Know that soluble materials (substance) are able to be dissolved in a liquid. • Know that a solution contains a liquid and a soluble material.	• Know that mixtures can be separated in different ways, including filtering, sieving, and evaporating	• Know that you can recover a substance from a solution by evaporating off the liquid • Know that some changes are reversible	• Know that some changes are irreversible as a new material is formed. • Know that burning a substance is an irreversible change. • Know that chemical changes which involve acids are irreversible.	• Know that materials that allow heat in the form of thermal energy or electrical energy to flow through are conductors. • Know that materials that restrict the flow of energy are called insulators.	• To know that the greater the transparency of the material the more light it lets through. • Know that materials that do not easily change when forces are applied are hard.
Disciplinary Concepts	***Observing and measuring*** • *I know that I observe / measure the dependent variable.* • *I know that the control variable is the variable that is changing* • *I know that systematic observation is one that is controlled.* • *I know that temperature is measured in ^{0}C using alcohol and digital thermometers.* ***Recording Data*** • *I can label and identify features I have observed* • *I know that a diagram is simplified and contains key features.*	**Observing and measuring** • I use my knowledge of variables and measures to make reasoned decisions about what to observe and measure and which equipment to use. • I know that systematic observation is based on the control variable **Performing Tests** • I can plan and perform part of an investigation independently	**Recording Data** • I know how to organise data using my knowledge of control and dependent variables in tables, charts and diagrams. **Asking and exploring questions** • I can identify how to control variables in different enquiry types • I can design a fair test	**Recording Data** • I know that a line graph represents changes over time. • I know that the x axis is the control variable • I know that the y axis is the dependent variable	**Recording Data** • I know how to organise data using my knowledge of control and dependent variables in tables, charts and diagrams. **Asking and exploring questions** • I can identify how to control variables in different enquiry types • I can design a fair test	**Observing and measuring** • I can read scales that involve decimal numbers and negative numbers. **Recording Data** • I know that a line graph represents changes over time. • I know that the x axis is the control variable • I know that the y axis is the dependent variable **Communicating** • I know that relevant scientific language and illustrations can be used to communicate and justify my ideas **Applications** • I can use my knowledge of science to understand its uses and implication	**Observing and measuring** • I use my knowledge of variables and measures to make reasoned decisions about what to observe and measure and which equipment to use. • I know that systematic observation is based on the control variable

Key learning tasks	Provide them ice, warm water, ice cube tray, chocolate etc. How can they use these materials to explore the question. Capture the process – represented in a diagram with scientific labels.	• Comparative and fair test enquiry e.g. How does the amount of material affect the time it takes to dissolve? • Identify the CV and DV • Identify the system for performing the test and collecting results based on CV and DV. • Record results in a given table.	• Comparative and fair test enquiry e.g How does the structure of the material affect the process for separation? (different forms of coffee as an example) • Identify the CV being tested and the control variables being kept the same and DV • Use variables to organise how to collect and record results.	• Observation over time enquiry :e.g. How does the solution change over time? OR How does the amount of solute affect the rate of evaporation? • Identify the CV and DV and how the test was fair (test described and performed in advance) • Provide results in a line graph –chn identify and label the axes • Predict the outcome using the line graph for a new CV quantity (time)	• Comparative and fair test enquiry – identify the CV and DV. • Use variable to design fair test • Use variable to organise and record results • Conclude from results then predict the outcome for new changes in materials – whether revisable or irreversible based on scientific findings – linked to generalisation.	Observation over time, e.g. How does the type of material affect the time it takes for warm water to cool? Model finding the CV and DV for one material, GP in in adding new material data to the line graph. Independent practice in testing and adding data to the line graph for third material Predict which material would be best for keeping food cool in the summer.	How would you separate these mixtures – applied knowledge – design your process.
Generalisation	*Materials have properties (**structure**) which enables **function** and therefore a use,* e.g. thermal conductors and insulators. *Materials are made from matter. Matter can be structured as solid, liquid or gas. Changing the thermal energy (heating, cooling) can cause a change of state (work done)*	If you change the material's properties through mixing (structure) you change its use (function). Mixing materials can change structure and function.	If you change the material's properties through mixing (structure) you change its use (function). Mixing materials can change structure and function. Some changes can be reversible.	If you change the material's properties through mixing (structure) you change its use (function). Mixing materials can change structure and function. Some changes can be reversible.	If you change the material's properties (structure) through heating, you change its use (function). Some changes can be irreversible. This is because a new substance is made.	*Materials have properties (**structure**) which enables **function** and therefore a use,* e.g. thermal conductors and insulators.	**Generalisation**: *Materials have properties (**structure**) which enables **function** and therefore a use,* e.g. thermal conductors and insulators. If you change the material's properties through mixing (structure) you change its use (function). Changes are either reversible or irreversible.

UKS2 Y5 A2	**BIG Q: How can forces affect movement?**					
Lesson Qs	**Elicitation / Activate**	How are the forces of friction and gravity the same and different?	How does water resistance affect objects movements?	How does air resistance affect objects movements?	How do mechanisms affect movement?	**Application / Assess** How can forces affect movement?
Key Concepts Changing materials	• *To know that things move further on smoother surfaces.* • *To know that some forces need contact between two objects.*	• Know that gravity is an attractive force which causes unsupported objects fall to earth. • To know that friction is a force acting between two surfaces • To know that friction tries to slow things down or halt them. • To know that the same object will move differently on different surfaces.	• To know that water resistance is the force acting between an object and body of water.	• To know that air-resistance is the force acting between an object and a body of air.	• To know that a mechanism makes work easier or changes the direction of movement. • To know that levers, pulleys and gears, allow a smaller force to have a greater effect	
Disciplinary Concepts		**Observing and measuring** • I know that repeating measurements and observations increases their reliability • *I know that force is measures in N using a Newton meter* **Recording Data**	**Observing and measuring** • I know that repeating measurements and observations increases their reliability • I know that force is measures in N using a Newton meter **Asking and exploring questions**	**Observing and measuring** • I know that repeating measurements and observations increases their reliability **Asking and exploring questions** • I know how to use variables to generate an enquiry question for different enquiry types. • I can design a fair test	**Observing and measuring** • I know that repeating measurements and observations increases their reliability **Concluding, prediction, evaluating** • I can use my scientific knowledge to question my findings and decide when further testing is required. • I know that all results allow me to question and predict, however, not all results are reliable	**Communicating** • I know that relevant scientific language and illustrations can be used to communicate and justify my ideas **Applications** • I can use my knowledge of science to understand its uses and implication

		• I know that scientific diagrams mainly contain labelled features relevant to the variables • I know how to organise data using my knowledge of control and dependent variables in tables, charts and diagrams. **Asking and exploring questions** • I know how to use variables to generate an enquiry question for different enquiry types. • I can design a fair test	• I know how to use variables to generate an enquiry question for different enquiry types. • I can design a fair test **Performing Tests** • I can plan and perform part of an investigation independently **Concluding, prediction, evaluating** • I can use my scientific knowledge to question my findings and decide when further testing is required. • I know that all results allow me to question and predict, however, not all results are reliable	**Performing Tests** • I can plan and perform part of an investigation independently **Concluding, prediction, evaluating** • I can use my scientific knowledge to question my findings and decide when further testing is required. • I know that all results allow me to question and predict, however, not all results are reliable	**Asking and exploring questions** • I know how to use variables to generate an enquiry question for different enquiry types. • I can design a fair test **Applications** • I can use my knowledge of science to understand its uses and implication	
Key learning tasks		• Label how friction and gravity affect movement of objects • Comparative and fair test enquiry • ID the CV and DV possible for enquiry. • Id the CV and DV that will be selected to form the enquiry question. • Id the CV which will stay the same. • Justify through observation why repeating measurements increases reliability. • Select an appropriate method for finding the reliable result, e.g. the most frequent • Chn use CV and DV to construct and complete the results table	• Label how water resistance affects objects • Comparative and fair test enquiry • Id the CV and DV possible for enquiry. • Id the CV and DV that will be selected to form the enquiry question. • Id the CV which will stay the same. • Justify through observation why repeating measurements increases reliability. • Select an appropriate method for finding the reliable result, e.g. the most frequent • Chn use CV and DV to construct and complete the results table • Chn conclude how the change int he CV affected the DV. • Chn justify or question their results with their scientific knowledge.	• Label how air resistance affects objects • Comparative and fair test enquiry • Id the CV and DV possible for enquiry. • Id the CV and DV that will be selected to form the enquiry question. • Id the CV which will stay the same. • Justify through observation why repeating measurements increases reliability. • Select an appropriate method for finding the reliable result, e.g. the most frequent • Chn use CV and DV to construct and complete the results table • Chn conclude how the change int he CV affected the DV. • Chn justify or question their results with their scientific knowledge	• Research and label everyday examples of mechanism (levers, pulley and gears) make work easier iry • Id the CV and DV possible for enquiry. • Id the CV and DV that will be selected to form the enquiry question. • Id the CV which will stay the same. • Justify through observation why repeating measurements increases reliability. • Select an appropriate method for finding the reliable result, e.g. the most frequent • Chn use CV and DV to construct and complete the results table • Chn conclude how the change int he CV affected the DV. • Chn justify or question their results with their scientific knowledge	•
Generalisation	• *Forces describe how contacting and non-contacting objects affect each other.*	Friction is a force that can affects an object's movement by slowing it down or stopping it. Gravity is a force which can affect an object's movement by causing it fall to the Earth through attraction	Water resistance is a force that can affects an object's movement by slowing it down or stopping it or change its direction.	Air resistance is a force that can affects an object's movement by slowing it down or stopping it or change its direction.	Mechanisms can be used to change the size of force making the work easier. **Forces can affect an object's movement by causing it to start moving, stop moving, speed up, slow down, or change direction.**	**Forces can affect an object's movement by causing it to start moving, stop moving, speed up, slow down, or change direction.**

UKS2 Y5 Sp1	**BIG Q: How do forces impact planets and moons?**

	Pupils should be introduced to a model of the Sun and Earth that enables them to explain day and night. Pupils should learn that the Sun is a star at the centre of our solar system and that it has eight planets: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune (Pluto was reclassified as a 'dwarf planet' in 2006). They should understand that a moon is a celestial body that orbits a planet (Earth has one moon; Jupiter has four large moons and numerous smaller ones). Note: Pupils should be warned that it is not safe to look directly at the Sun, even when wearing dark glasses.					
Lesson Qs	**Elicitation / Activate**	What causes night and day?	Why does the moon appear to change during an orbit?	What makes up a solar system?	What force causes the planets to orbit the sun?	**How do forces impact planets and moons?**
Key Concepts Forces: contact & non-contact	• Know that forces describe how objects affect each other. • Know a force is active power	• Know that earth spins on its axis. • Know that one spin is 24 hours • Know that this causes the surface of the earth to face towards the sun in the day time and away from the sun at night. • Know that the Earth rotation makes it appear as if the sun is moving across the sky. • Know that the sun, earth and moon are approximately spheres.	• Know that the moon orbits the earth. • Know that the moon appears differently in the night sky at different points in its orbit. • Know that the time between two full moons is an orbit cycle.	• Know that sun is a star. • Know that sun is the centre of our solar system. • Name the eight planets in the solar system. •	• Know that gravity is an attractive force which causes unsupported objects fall to earth. • Know that the sun's gravitational force cause the planets to orbit it.	Forces describe how contacting and non-contacting objects affect each other. An unbalanced force causes a change in movement e.g. gravity. Forces in balance maintain their movement, e.g. orbit.
Disciplinary Concepts	**Observing and measuring** I use my knowledge of variables and measures to make reasoned decisions about what to observe and measure and which equipment to use. **Asking and exploring questions** I know how to use variables to generate an enquiry question for different enquiry types	**Communicating** • I know how scientific ideas have developed over time. (discuss earth being flat)	**Performing Tests** • I can plan and perform part of an investigation independently. • I can design a fair test **Asking and exploring questions** • I know how to use variables to generate an enquiry question for different enquiry types	**Recording Data** • I know that scientific diagrams mainly contain labelled features relevant to the variables • I know how to organise data using my knowledge of control and dependent variables in tables, charts and diagrams.	**Recording Data** • I know that scientific diagrams mainly contain labelled features relevant to the variables • I know how to organise data using my knowledge of control and dependent variables in tables, charts and diagrams.	**Concluding, prediction, evaluating** • I know that predictions are based on my scientific knowledge of how variables are likely to behave. **Communicating** • I know how scientific ideas have developed over time. (discussing 9 planets, now 8)

<table>
<tr>
<td>Key learning tasks</td>
<td>Discussion:
Why did people once think Earth was flat? How did scientists change this idea?

 What should we observe? (light/dark on UK)

 Why is rotation the control variable? (Because it's the cause of change</td>
<td>Explain how ideas of night and day have changed over time.</td>
<td>Research enquiry how the moon looks different at different points in its cycle.

• Control variable – days
• DV – shape of moon</td>
<td>How can we identify the planets? Identify the planets from the order they are in from the sun. Notice how they orbit the sun at the centre.</td>
<td>Discussion: Gravity is an attractive force.
The Sun’s gravitational force pulls the planets into orbit around it.
Simple Data Table: Gravity’s Effect on Different Planets

Children use a simplified set of data about planets:

<table>
<tr><th>Planet</th><th>Distance from Sun (CV)</th><th>Time to Orbit Sun (DV)</th></tr>
<tr><td>Mercury</td><td>Close</td><td>88 days</td></tr>
<tr><td>Earth</td><td>Medium</td><td>365 days</td></tr>
<tr><td>Neptune</td><td>Far</td><td>165 years</td></tr>
</table>

Children write one generalisation sentence:
“The Sun’s gravitational force pulls the planets towards it, and because of this attraction they orbit the Sun.</td>
<td>“What would happen if…?” Orbit Prediction Task
Resources:
• Scenario cards
• Mini whiteboards or recording sheets
Scenario Cards (simple, conceptual):
1. If Earth rotated more slowly, what would happen to day and night?
2. If the Moon orbited faster, what would happen to the phases?
3. If Earth moved further from the Sun, what would happen to the length of a year?
4. If the Sun’s gravitational force became stronger, what would happen to the planets’ orbits?

“Is this model accurate?” (Evaluate Evidence)

Resources:

3 simple but flawed diagrams purposely containing mistakes

e.g., Sun orbiting Earth

Moon emitting its own light

Earth not tilted AND showing day/night wrongly</td>
</tr>
<tr>
<td>Generalisation</td>
<td>Forces are powerful pushes or pulls that make things move, change shape, or do something different when objects interact with each other.</td>
<td>The earth moves regularly to cause day and night.</td>
<td>The moon moves around the earth and appears to look different in the sky during its orbit.</td>
<td>The planets in the solar system orbit the sun at the entre.</td>
<td>The sun’s gravitational force causes the planets to orbit it.</td>
<td>Forces describe how contacting and non-contacting objects affect each other. An unbalanced force causes a change in movement e.g. gravity. Forces in balance maintain their movement, e.g. orbit.</td>
</tr>
</table>

UKS2 Y5 Sp 2	**BIG Q: How does the structure and function of animals change as they grow?** Pupils should indicate stages in the growth and development of humans. They should learn about the changes experienced in puberty. Pupils could work scientifically by researching the gestation periods of other animals and comparing them with humans; by finding out and recording the length and mass of a baby as it grows.					
Lesson Qs	**Elicitation / Activate**	What do babies need to survive?	How do toddlers and children change over time?	How do our bodies change during adolescents (puberty)?	How does the structure of an animal (human) change throughout its lifecycle?	**Application / Assess**
Key Concepts Alive (structure and function)	• EY- growing and changing animals adult and their young • KS1- life cycles of animals (humans) notice that animals (humans) have offspring which grow into adults	• Know that babies are dependent upon an adult	• Know that a toddler can move around their world. • Know that children grow rapidly	• Know that adolescents experience puberty which enables them to reproduce	• Know that adults are fully grown human • Know as humans age, their bodies begin to change	
Disciplinary Concepts	**Recording Data** • I know that scientific diagrams mainly contain labelled features relevant to the variables	**Asking and exploring questions** • I know how to use variables to generate an enquiry question for different enquiry types. • I can explain my choice of enquiry type	**Asking and exploring questions** • I know how to use variables to generate an enquiry question for different enquiry types. • I can explain my choice of enquiry type **Recording Data** • I know that a line graph represents changes over time. • I know that the x axis is the control variable • I know that the y axis is the dependent variable	**Asking and exploring questions** • I know how to use variables to generate an enquiry question for different enquiry types. • I can explain my choice of enquiry type **Recording Data** • I know that scientific diagrams mainly contain labelled features relevant to the variables **Concluding, prediction, evaluating** • I know that predictions are based on my scientific knowledge of how variables are likely to behave. • I can use my scientific knowledge to question my findings and decide when further testing is required.	**Recording Data** • I know that scientific diagrams mainly contain labelled features relevant to the variables **Concluding, prediction, evaluating** • I know that predictions are based on my scientific knowledge of how variables are likely to behave. • I can use my scientific knowledge to question my findings and decide when further testing is required.	

Key learning tasks	"**Task:** Pupils list **three observable differences** between the two images using scientific vocabulary (size, structure, movement, proportion, survival needs).	**Key Task 1 – Classification Task: Structural Differences (15 minutes)** Give pupils a range of scientific statements or images to sort into: 1. **Offspring structures** 2. **Adult structures** 3. **Shared structures** Examples: • "Soft bones" • "Fully developed lungs" • "Large head compared to body" • "Strong limbs for running" • "Produces milk" • "Dependent for food"	Pupils generate questions they could answer using growth data. Examples: • "Does height increase steadily between ages 1 and 12?" • "Does mass increase at the same rate as height?" • "Do children grow more quickly at certain ages?" Pupils then choose **one question** their line graph could help answer. Provide a **simplified data set** of average height from age 1–12 Pupils identify: • **Dependent variable:** average height • **Control variables:** species (human), measurement unit (cm), age intervals, method of measurement They write these onto their sheet before drawing the graph. Pupils create a **line graph** showing changes in Pupils write or discuss: • **"What pattern did you observe about how children change as they grow?"** • **"What did our line graph show about child development?"** height over time.	**Enquiry Question Generation Using Variables (15 minutes)** Introduce variables: • **Independent variable:** what you change • **Dependent variable:** what you measure/observe • **Control variables:** what you keep the same Give pupils **safe scientific examples** using growth and development: Example enquiry types they can choose from: • **Research enquiry** (e.g., "How does height typically change between ages 10 and 16?") • **Pattern seeking** (e.g., "Is there a pattern in the age different children begin growth spurts?") • **Observation over time** (e.g., "How do shoe sizes tend to change between childhood and adolescence?" using secondary data) **Task:** Pupils create an enquiry question using variables, e.g.: • "How does the *average height* (dependent variable) change as *age* increases (independent variable) in adolescence?" • "Is there a relationship between *age* and *foot size* during adolescence?"	Pupils produce a **scientific diagram** of the human life cycle. **Success criteria (linked to disciplinary knowledge):** Diagram shows life stages in sequence Only **relevant structural features** labelled (e.g.: • babies have proportionally larger heads • children gain permanent teeth • adolescents undergo rapid limb growth • adults have full size and strength • older adults may lose height) Clear labels, simple clean lines, no decorative elements Diagram focuses on **variables** (life stage + structural feature) Give pupils a variable to focus on (e.g., height, mass, foot length, arm span, teeth number) or allow choice. **Task:** Pupils make predictions such as: • "I predict that between childhood and adolescence, height will increase rapidly because…" • "I predict that between adulthood and older	**Task:** Children produce a **scientific diagram** of the **human life cycle** *or* **another** chosen animal (e.g., frog, chicken, butterfly). Children use **variables** to write a scientific enquiry question that could be investigated using a chosen enquiry type. **Step-by-step task:** 1. Choose an organism (human, frog, butterfly, chicken, etc.) 2. Choose a structural change to explore (height, limb length, body proportion, wing growth, mass). 3. Identify variables: ○ Independent variable ○ Dependent variable ○ Control variables 4. Write a scientifically valid enquiry question, e.g.: ○ "How does a human's average height (dependent variable) change as age (independent variable) increases?" ○ "Is there a pattern between age and wingspan in growing birds?" 5. Children then justify the **type of enquiry** needed:

				They then **explain which enquiry type fits their question** and why **Task:** Pupils produce a **labelled scientific diagram** showing structural changes related to adolescence: Pupils complete: • **"One structural change in adolescence that supports reproduction is…"** • **"The type of enquiry I would use to investigate growth is…"** • **"One thing I now know about using variables is…"**	adulthood, height will decrease slightly because…" Predictions must use **scientific knowledge** from previous lessons.	○ Observation over time ○ Pattern-seeking ○ Research ○ Fair testing (rare here, but possible) ○ Classification & grouping
Generalisation	As animals (humans)) grow their structure changes (stages/ages).	Adult animals (humans), offspring do not always have the same structure as their parents.	Adult animals (humans), offspring do not always have the same structure as their parents.	As animals (humans) grow their structure changes enabling reproduction (function).	Adult animals (humans), offspring do not always have the same structure and function as their parents but do grow into the same type of adult (species).	Adult animals (humans), offspring do not always have the same structure and function as their parents but do grow into the same type of adult (species). As animals (humans) grow their structure and function develops and changes (stages/ages) enabling reproduction after a certain age (link to safeguarding SRE curriculum).

UKS2 Y5 Su 1	**BIG Q: How do different types of animals reproduce?** Pupils should find out about different types of reproduction, including sexual and asexual reproduction in plants, and sexual reproduction in animals.					
Lesson Qs	**Elicitation / Activate**	How do humans change over a lifetime?	What is the function of the human reproductive system?	How do other animals (not mammals) reproduce?	How does the structure of an insect change throughout its lifecycle?	**Application / Assess**
Key Concepts Changing materials	• Y3 Know that plants mature and create flowers and seeds • Know that the flower attracts pollinators. • Know that pollinators carry pollen from one plant to another causing pollination to occur.	• Know the life cycle of a mammal (human)	• Know that mammals require sperm from a male to fertilise an ovary from a female. • Know that a fertilised egg grows in the female's uterus until the offspring is ready to be born.	• Know that a bird's embryo is grown outside of the female within a protective egg, until it is ready to be hatched. • Know that an amphibian's embryo is laid as soft spawn in water until they are ready to hatch.	• Know that insects have four stages within their life cycles – egg lava, pupa and adult.	Animals have different parts (structure) which enables the function of reproduction. This allows the species to thrive and survive. As animals grow, their structure and function develops and changes (stages / ages) enabling reproduction after a certain age.

	• Know that a seed forms as a result of pollination • Know that seeds disperse by wind, explosion, animals and water. • Know that seeds disperse to find room to grow new plants. • Life Cycles			• Know that amphibian offspring undergo metamorphosis into a mature adult.		(link to safeguarding / SRE curriculum)
Disciplinary Concepts		**Recording Data** • I know that scientific diagrams mainly contain labelled features relevant to the variables • I know how to organise data using my knowledge of control and dependent variables in diagrams. **Asking and exploring questions** • I know how to use variables to generate an enquiry question for different enquiry types. • I can explain my choice of enquiry type	**Recording Data** • I know that scientific diagrams mainly contain labelled features relevant to the variables • I know how to organise data using my knowledge of control and dependent variables in diagrams **Asking and exploring questions** • I can explain my choice of enquiry type	**Concluding, prediction, evaluating** • I know that predictions are based on my scientific knowledge of how variables are likely to behave.	**Concluding, prediction, evaluating** • I know that predictions are based on my scientific knowledge of how variables are likely to behave.	**Asking and exploring questions** • I know how to use variables to generate an enquiry question for different enquiry types. • I can explain my choice of enquiry type **Recording Data** • I know that scientific diagrams mainly contain labelled features relevant to the variables • I know how to organise data using my knowledge of control and dependent variables in tables, charts and diagrams. **Concluding, prediction, evaluating** • I know that predictions are based on my scientific knowledge of how variables are likely to behave.
Key learning tasks		Observation over time enquiry Identify the control variable and the DV – discuss how to record and measure the changes. (research may be required to find the data or provide data to organise the enquiry) e.g Over a lifetime, how do humans change?	Label the structure and function of the key knowledge. Look at the data for gestation periods for different sized mammals. What is the CV and what is the DV. How do these form a question? Model how to make a prediction from the data Conclude as a class.	Watch a time lapse of an incubated egg. Comparative and fair testing – how does the size of egg affect the incubation time? What is the CV and DV? Therefore what is your prediction (drawing on the knowledge from gestation period)	Repeat previous lesson for - How does the size of insect affect metamorphosis time?	

		What will the question be if we know the enquiry type and CV and DV? Rationale for why obs over time. Decide how to record data based on CV and DV.				
Generalisation	Reproduction allow the species to continue to survive and thrive through generations.	As animals grow, their structure and function develop and changes (stages / ages) enabling reproduction after a certain age. (link to safeguarding / SRE curriculum)	• Humans have different parts (structure) which enables the function of reproduction. This allows the species to thrive and survive.	• Animal groups (e.g. birds and amphibians) have different parts (structure) which enables the function of reproduction. • This allows the species to continue to thrive and survive. • As animals grow, their structure and function develops and changes (stages / ages) enabling reproduction after a certain age.	Animal groups (Insects) have different parts (structure) which enables the function of reproduction. This allows the species to thrive and survive. As animals grow, their structure and function develops and changes (stages / ages) enabling reproduction after a certain age.	Animals have different parts (structure) which enables the function of reproduction. This allows the species to continue to thrive and survive. As animals grow, their structure and function develops and changes (stages / ages) enabling reproduction after a certain age. (link to safeguarding / SRE curriculum)

UKS2 Y5 Su2	**BIG Q: How do different types of plants reproduce?** Pupils should find out about different types of reproduction, including sexual and asexual reproduction in plants, and sexual reproduction in animals.					
Lesson Qs	**Elicitation / Activate**	How does the plant's male structure and function enable reproduction?	How does the plant's female structure and function enable reproduction?	How does an asexual plant reproduce?	What is the lifecycle of a plant?	**Application / Assess**
Key Concepts Changing materials	Year 3: • Know that plants mature and create flowers and seeds • Know that the flower attracts pollinators. • Know that pollinators carry pollen from one plant to another causing pollination to occur. • Know that a seed forms as a result of pollination • Know that seeds disperse by wind, explosion, animals and water. • Know that seeds disperse to find room to grow new plants.	• Know that plants that reproduce sexually need pollen from a male and female plant.	• Know that plants that reproduce sexually need pollen from a male and female plant.	• Know that asexual plants do not require male and female pollen and therefore do not have flowers.	• Know that seeds germinate and grow into mature plants	NC aim: Describe the life process of reproduction in some plants. Plants have different parts (structure) which enables the function of reproduction. This allows the species to thrive and survive. As plants grow, their structure and function develops and changes (stages) enabling reproduction after a certain stage.

Disciplinary Concepts	**Asking and exploring questions** • I know how to use variables to generate an enquiry question for different enquiry types. • I can explain my choice of enquiry type **Concluding, prediction, evaluating** • I know that predictions are based on my scientific knowledge of how variables are likely to behave.	**Recording Data** • I know that scientific diagrams mainly contain labelled features relevant to the variables	**Recording Data** • I know that scientific diagrams mainly contain labelled features relevant to the variables **Concluding, prediction, evaluating** • I can use my scientific knowledge to question my findings and decide when further testing is required.	**Recording Data** • I know that scientific diagrams mainly contain labelled features relevant to the variables **Performing tests** I can plan and perform part of an investigation independently	**Recording Data** • I know how to organise data using my knowledge of control and dependent variables in tables, charts and diagrams. **Concluding, prediction, evaluating** • I know that all results allow me to question and predict, however, not all results are reliable	**Communication** • I know that relevant scientific language and illustrations can be used to communicate and justify my ideas • I know how scientific ideas have developed over time. **Application** • I can use my knowledge of science to understand its uses and implication
Key learning tasks	*Planting seeds to begin investigation – germination to maturity. Choose variables and an enquiry question. Measure every lesson.*	Key Learning Task: Using a provided dataset (e.g., height or foot length across ages 1–12), children draw a **line graph** showing how the dependent variable changes over time. They label: • X-axis = age (years) • Y-axis = measured variable (cm/kg) • Title representing the relationship Children identify independent, dependent, and control variables, then write a short interpretation: **"From the data, I can see…"** **"The pattern suggests…"**	Key Learning Task: Children first generate an enquiry question using variables (e.g., "How does average height change during adolescence?"). They identify the enquiry type (pattern seeking, research, observation over time) and justify it. Next, pupils create a **scientific diagram** comparing pre-adolescent and adolescent body structures, labelling only features relevant to their chosen variables (height, limb length, body proportions, or muscle development). They then compare their diagram to growth data provided and write a prediction: **"I predict that between ages ___ and ___ the greatest change will be…"** They evaluate their findings and identify whether more data would help improve accuracy.	Key Learning Task: Children compare growth data from two different animal species (e.g., dog vs. human). They classify which changes are structural (e.g., limb length) and which are functional (e.g., mobility). Children sketch simple comparative diagrams of each life stage, label key variables, and write a short evaluation: **"This data suggests… However, we would need more information about…"**	Key Learning Task: Children create a **scientific lifecycle diagram** of humans (or another chosen animal). They label structural changes at each stage, ensuring labels relate to variables (e.g., height, strength, teeth, limb proportion). They then make predictions about how a chosen structural variable changes over the lifecycle and compare their expectations to a real dataset. They evaluate any mismatches and suggest what additional evidence is needed. Children complete: **"Although offspring do not look like adults, they become the same species because…"**	Key Learning Task 1 — Life Cycle Synthesis Diagram: Children produce a final, high-quality scientific diagram of the complete human lifecycle *or* another animal's lifecycle. **Diagram must include:** • All life stages in order • Only structural features relevant to the variables (e.g., limb length, height, body proportion, fur/feathers, mobility) • Clear, scientific labels • Annotations linking *structure to function* Children write 2–3 explanatory sentences summarising the structural progression over time. Children predict growth trends for one variable across the lifecycle (e.g., height, foot

						length, mass, wingspan). Then they compare their predictions to a new (previously unseen) dataset. Children write a short conclusion: **Children complete a structured written task answering the big question: "How do animals (including humans) grow and change over time?"**
Generalisation		As plants grow, their structure and function develops and changes to enable reproduction (male).	As plants grow, their structure and function develops and changes to enable reproduction (female).	As plants grow, their structure and function develops and changes to enable reproduction (asexual).	Plants have different parts (structure) which enables the function of reproduction. This allows the species to thrive and survive.	Plants have different parts (structure) which enables the function of reproduction. This allows the species to thrive and survive. As plants grow, their structure and function develops and changes (stages) enabling reproduction after a certain stage.