Year 1- Animal Survival

Big question	How do animals survive?	**Type of topic**	Building block topic	7 sessions 3 knowledge blocks

Knowledge Block 1: Feeding for survival

Substantive Knowledge (key ideas)

- Animals are groups of **organisms** that need to consume food to survive.
- Food provides **energy** and the building blocks of **growth**.
- There are many different groups of animals including f**ish, amphibians, reptiles, birds and mammals**. They have different structures, and they eat different types of foods.
- **Mammals** give birth to live young, **fish** can breathe underwater using gills, **birds** have wings and beaks, **reptiles** cannot breathe underwater, and **amphibians** live on land and in water.
- Some eat other animals (**carnivores**), and others only eat vegetables (**herbivores**), and some like to eat both plants and meat (**omnivores**)
- Common animals that are **carnivores** include lions, cats, sharks and snakes
- Common animals that are **herbivores** include cows, horses, sheep, elephants and deer
- Common animals that are **omnivores** include humans, bears, monkeys and seagulls

Retrieval Practice: *Monthly Review*	**Retrieval practice: *Weekly Review***	**Suggested problem-solving ideas/ activities**	**Purpose of Practical Activity**	**Disciplinary Knowledge Instructed/Undertaken/Revisited (Working Scientifically)**	**Assessment Opportunities**
Session 1: Review ELG The Natural World- making observations and drawing pictures of animals. Children to name a variety of	First session of the unit will only focus on monthly review to establish prior knowledge and give time to address any gaps in that prior knowledge	Children learn about 5 groups of animals - birds, mammals, reptiles, fish and amphibians. Sorting pictures into the 5 different groups based on the descriptions given for each group.	The purpose of this activity is to apply the substantive knowledge that there are different groups of animals, and they can be identified by observing their different structures through identifying and classifying.	**Identifying and classifying (3)-** using a set of criteria to sort the animals into the correct group	

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animals including snails. Session 2: Key vocabulary- **properties** Session 3: recalling property groups Session 4: recalling uses of some materials and their properties	Session 2: Key vocabulary- organisms, energy, growth Session 3: Key vocabulary- carnivores, herbivores, omnivores Session 4: Name some carnivore, herbivores and omnivores .	Hunt for snails in the school grounds describing/photographing where they were found and what other plants and animals were also there. Predict from this what snails might eat and test predictions.	The purpose of this activity is to allow further opportunities for observing and recording data in different ways. This should first be modelled clearly by the teacher and some scaffolding put in place to aid with the recording of data.	**Observing closely, using simple equipment (3)**- They use appropriate senses, aided by equipment such as magnifying glasses or digital microscopes, to make their observations. **Gathering and recording data to help in answering questions (2)-** record their observations using photographs, videos, drawings, labelled diagrams or in writing.	
		Children keep food diaries for themselves and a pet to tackle the question: "Do all animals eat the same food?" Use what they find to predict what hyenas (dogs) and tigers (cats), and field mice (hamsters) might eat.	The purpose of this activity is to use disciplinary knowledge together with substantive knowledge to answer a scientific question.	**Gathering and recording data to help in answering questions (3)-** Children use their personal experiences to suggest appropriate answers to the question. They need to be taught to relate their answers to the evidence they have in the form of their food diary and pet's food diary. They record the information using pre prepared tables and will need instruction on how to fill in the information for both themselves and a pet.	

Sample Hampshire Science Learning Journey

Knowledge Block 2: Moving for survival

Substantive Knowledge (key ideas)

- Animals must move to get their food
- They will move in different ways to get their food
- Animals that eat other animals are called **predators**
- Animals that are eaten by other animals are called **prey**
- Animals feeding relationships can be illustrated in a **food chain**

Retrieval Practice: ***Monthly Review***	**Retrieval practice:** ***Weekly Review***	**Suggested problem-solving ideas/ activities**	**Purpose of Practical Activity**	**Disciplinary Knowledge Instructed/Undertaken/Revisited (Working Scientifically)**	**Assessment Opportunities**
Session 5: Key vocabulary- **organisms, energy, growth** Session 5: Key vocabulary- **carnivores, omnivores, herbivores**	Session 5: identify some birds, fish, reptiles, amphibians and mammals Session 6: Key vocabulary- **predator, prey**	Show short videos of animals hunting or trying to avoid being predated. Children describe how predators and prey move similarly and differently. Then show some unknown animals and children predict if they think they are predators or prey.	The purpose of this activity is for children to apply the substantive knowledge of **predators** and **prey** to real world examples.	**Observing closely, using simple equipment (4)-** make careful observations to support identification, comparison and noticing change. **Gathering and recording data to help in answering questions (4)-** classify using simple prepared tables and/or sorting rings. Illustration of feeding relationships (1)	

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		Explore habitats in the local environment identifying the plants and minibeasts that live there. Children predict what they might eat and why they think that. Check their ideas through Internet research and construct a simple food chain from what is found.	The purpose of this activity is for children to continue to develop their observing and recording skills alongside applying substantive knowledge of predators and prey. They will also apply the substantive knowledge of food chains to produce a simple one of their own.	**Observing closely, using simple equipment (5)-** use appropriate senses, aided by equipment such as magnifying glasses or digital microscopes, to make their observations **Identifying and classifying (4)-** use secondary sources	

Knowledge Block 3: Sensing for survival

Substantive Knowledge (key ideas)

- Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets)
- Identify, name, draw and label the basic parts of the human body and say what part of the body is associated with which sense
- Animals have **senses** to help them survive
- Animals have developed a range of ways to find prey or avoid being eaten

Retrieval Practice: ***Monthly Review***	**Retrieval practice:** ***Weekly Review***	**Suggested problem-solving ideas/ activities**	**Purpose of Practical Activity**	**Disciplinary Knowledge Instructed/Undertaken/Revisited (Working Scientifically)**	**Assessment Opportunities**
Session 7: identify some birds, fish, reptiles, amphibians and mammals	Session 7: illustrating data- food chains-	Which of our senses is the most accurate at identifying food? Make different coloured and flavoured jellies (make sure the colour does not match the flavour), they then test each jelly using their sight, taste and smell separately.	The purpose of this activity is to introduce the idea of performing simple tests. Based on the instructed substantive knowledge, a question is posed, and simple tests are carried out	**Performing simple tests (1)- use** practical resources provided to gather evidence to answer questions	
		Spiders prey on woodlice; what senses do woodlice use to detect the spiders and how do they avoid being eaten? This could be tested using a choice chamber activity with damp and dry and light and dark areas. https://www.science-sparks.com/choice-chambers-animal-behaviour-investigation/ Children take photos of a part of the school grounds and make a camouflage coat that a teddy could wear to protect from being eaten by the great teddy bear eating monster	The purpose of this activity is to introduce the idea of performing simple tests. Based on the instructed substantive knowledge, a question is posed, and simple tests are carried out	**Performing simple tests (2)- use** practical resources provided to gather evidence to answer questions. They carry out this test to make observations over time.	

Year 2- Pushes and pulls

Big question	Why and how do objects move?	**Type of topic**	Building block topic	8 sessions 4 knowledge blocks

Knowledge Block 1: How things move

Substantive Knowledge (key ideas)

- Objects can move (be in **Motion**) in various ways-roll, slide and bounce

Retrieval Practice: ***Monthly Review***	**Retrieval practice:** ***Weekly Review***	**Suggested problem-solving ideas/ activities**	**Purpose of Practical Activity**	**Disciplinary Knowledge Instructed/Undertaken/Revisited (Working Scientifically)**	**Assessment Opportunities**
Session 1: Revisit ELG- Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter. AND Revisit the fundamental movement skills they have already acquired: • rolling • crawling • walking • jumping • running • hopping • skipping • climbing Session 2: Key vocabulary- **changed, physical force**	First session of the unit will only focus on monthly review to establish prior knowledge and give time to address any gaps in that prior knowledge Session 2: Key vocabulary- **motion**	Investigate how different objects move down a slope. Blocks, bouncy balls, toy cars, etc. Can one object move in more than one way, e.g., balls can roll and bounce.	The purpose of this activity is to closely observe objects in motion using simple equipment. Scaffolds in place to reduce cognitive load for some children, to select appropriate vocabulary from, to help them describe.	**Observing closely, using simple equipment (1)** (11)**-** Children encouraged to suggest what equipment they should use to support their observations. **Using their observations and ideas to suggest answers to questions (1)** (6)**-** focus on descriptions of movement for clarity. Vocabulary development opportunity.	

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Knowledge Block 2: Forces change how objects move

Substantive Knowledge (key ideas)

- The **pushing** or **pulling** of an object can affect its motion.
- Pushing or pulling can do three things, **slow down**, **speed up** or **change the direction** of an object.

Retrieval Practice: ***Monthly Review***	**Retrieval practice:** ***Weekly Review***	**Suggested problem-solving ideas/ activities**	**Purpose of Practical Activity**	**Disciplinary Knowledge Instructed/Undertaken/Revisited (Working Scientifically)**	**Assessment Opportunities**
Session 3: Key vocabulary- **property, suitable** Session 4: identify suitable materials for buildings	Session 3: Key vocabulary- **pushing, pulling** Session 4: Identifying the three things pushing and pulling can do	Show children a marble run and challenge them to find out how they could make a marble move down a run really slowly (draw out an investigation question e.g., how does the material affect how fast a ball rolls down a slope?)	The purpose of this activity is to allow children to ask simple questions and to revisit the idea of variables (changing one factor and its effect on another) *This should be modelled clearly by the teacher and the idea of the two variables clearly instructed and checked.* Explicit teaching of how to record this data is important. Lots of practice filling in tables to help support their understanding of the purpose and layout of tables. You can differentiate the task by giving the table with headings to some children or the framework of the table without headings filled in. The independent variable ('the thing we choose to change') will appear in the first column of your table. The dependent variable ('the thing we are judging / observing / measuring') will go in the second column.	**Asking simple questions and recognising that they can be answered in different ways (1)** (2) - focus on the a effects b questions and draw out how we can then plan an enquiry identifying the change and measure (independent and dependent variables) **Gathering and recording data to help in answering questions (1)** (12)**-** encourage children to think about what they have found out and how they will record their findings. Designing their own table increases the level of demand, but actively teaching about how tables are constructed and how to interpret them will help children make another important decision in their scientific enquiries i.e. 'How will we record our results?' Recap recording of change and measure in the planning mind map- simple table of findings.	

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Knowledge Block 3: Making forces bigger					
Substantive Knowledge (key ideas) ● The larger the push/pull the bigger the effect on motion					
Retrieval Practice: *Monthly Review*	**Retrieval practice: *Weekly Review***	**Suggested problem-solving ideas/ activities**	**Purpose of Practical Activity**	**Disciplinary Knowledge Instructed/Undertaken/Revisited (Working Scientifically)**	**Assessment Opportunities**
Session 5: identify suitable materials for buildings Session 6: Key vocabulary- **strongest, flexible**	Session 5: Identifying the independent variable within an enquiry question Session 6: Key vocabulary- **motion**	How does the length/steepness of a slope affect how far a ball/car/tin will roll off the end? Was it a push or a pull that made it go further?	The purpose of this activity is to continue to develop children's use and understanding of variables. This would still require scaffolding, but more independent thought is applied, and some basic data collection is carried out.	**Asking simple questions and recognising that they can be answered in different ways (2)** (3) - identifying the change and measure (independent and dependent variables) **Gathering and recording data to help in answering questions (2)** (13) - data collected in the form of a results table.	

Knowledge Block 4: Forces can change the shape of objects					
Substantive Knowledge (key ideas) • Pushing and pulling objects can change their shape.					
Retrieval Practice: ***Monthly Review***	**Retrieval practice:** ***Weekly Review***	**Suggested problem-solving ideas/ activities**	**Purpose of Practical Activity**	**Disciplinary Knowledge Instructed/Undertaken/Revisited (Working Scientifically)**	**Assessment Opportunities**
Session 7: Identify suitable materials for toys Session 8: Identify suitable materials for clothing	Session 7: Identifying the heading in a results table Session 8: Key vocabulary- **pushing, pulling**	Which material would be best for a teddy bungee cord? From this you should draw out an investigation question e.g., does the length of elastic band affect how elastic it is? Which sock is the most elastic? How does the denier of tights affect how elastic they are? Which recipe play dough needs the greatest push to squash it? How does the height an egg is dropped from affect how big the splat pattern is? (You could use wet tissue paper balls)	The purpose of any of these activities is to continue to improve the understanding of variables in science investigations. This will still require some scaffolding, but more independent work can be attempted here with support from the teacher guiding the direction of groups. Basic data collection should be carried out.	**Asking simple questions and recognising that they can be answered in different ways (3)** (4) - identifying the change and measure (independent and dependent variables) **Gathering and recording data to help in answering questions (4)** (14)- data collected in the form of a results table.	

Year 3- Animals: Skeletons and movement

Big question	Why do we have a skeleton?	**Type of topic**	Building block	6 sessions 3 knowledge blocks
Knowledge Block 1: Skeletons protect vital organs				
Substantive Knowledge (key ideas) • All **vertebrates** have internal **skeletons** that protect **vital organs**. • **Invertebrates** have **exoskeletons** that protect **vital organs**.				

Retrieval Practice: ***Monthly Review***	**Retrieval practice:** ***Weekly Review***	**Suggested problem-solving ideas/ activities**	**Purpose of Practical Activity**	**Disciplinary Knowledge Instructed/Undertaken/Revisited (Working Scientifically)**	**Assessment Opportunities**
Session 1: Recap the vocabulary the children should have encountered at KS1 in animal survival- **mammals, reptiles, amphibians, fist and birds, predator, prey, omnivore, herbivore, carnivore** Session 2: Key vocabulary- **exert, attractive forces**	First session of the unit will only focus on monthly review to establish prior knowledge and give time to address any gaps in that prior knowledge Session 2: Key vocabulary- **vertebrates, vital organs, skeletons**	Compare X-rays and skeletons of animals looking for similarities and differences and predicting where vital organs are.	The purpose of this activity is to give the children the opportunity to apply the understanding of the substantive knowledge that skeletons protect vital organs by identifying where they think they may be found in a number of different skeletons. This also clarifies children's understanding of what vital organs are and where they might be found. A great precursor to learning about the functions of such organs later on the Key Stage.	**Identifying differences, similarities or changes related to simple scientific ideas and processes (1)** **Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables (3)**- Recording using drawings and/or labelled diagrams	

Sample Hampshire Science Learning Journey

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Knowledge Block 2: Skeletons support weight

Substantive Knowledge (key ideas)

- Skeletons support the weight of land animals.
- Stronger bones can **support** a greater **mass.**

Retrieval Practice: *Monthly Review*	**Retrieval practice: *Weekly Review***	**Suggested problem-solving ideas/ activities**	**Purpose of Practical Activity**	**Disciplinary Knowledge Instructed/Undertaken/Revisited (Working Scientifically)**	**Assessment Opportunities**
Session 3: Key vocabulary- **non-contact force** Session 4: Key vocabulary- **pole**, **attractive, repulsive**	Session 3: Key vocabulary- **invertebrates, vital organs, exoskeletons** Session 4: Key vocabulary-. **Support, strength/ stronger weight**	Look at X rays to identify broken and healed bones.	The purpose of this activity is to encourage children to describe the similarities and differences between the bones observed and make predictions as to what animal the bones might belong to, which part of the body might they come from, and possibly think about how they might have become broken? Can they make a generalisation about the types of broken bones linked to the Key Idea that stronger bones can support more weight?	**Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions (1)**- encourage the children to think of ways in which they can record the classifications- tables, Venn diagrams, Carroll diagrams. Check carefully beforehand that the children know how to use each one. **Using straightforward scientific evidence to answer questions or to support their findings (1) -** Answer the question based on observations they have made, measurements they have taken or information they have gained from the secondary sources. The answers are consistent with the evidence.	
		How does the length of a bone affect its bending strength and compressional strength? (You could use paper tubes) How does the diameter of a bone affect its bending strength and compressional strength? (You could use paper tubes)	The purpose of these activities is to continue to practice the skills associated with planning an enquiry. How to identify, measure and control variables. The children should be encouraged to make a prediction using the substantive knowledge they have been taught that stronger bones can support more weight.	**Setting up simple practical enquiries, comparative and fair tests (6)-** Planning Mindmap. Shift the focus onto the control variable now. Encourage the children to start to identify these more independently. **Making systematic and careful observations and, where appropriate, taking accurate measurements using**	

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		Consider why some bones might need to be stronger than others and then get them to predict relative size of bones from some animals based on how they move.	Children will consider what constitutes 'stronger'. Does longer always mean stronger?	**standard units,** using a range of equipment, including thermometers and data loggers**- (4)**	

Knowledge Block 3: Skeletons support movement

Substantive Knowledge (key ideas)

- Bones are **connected** (but can move relative to each other) at joints.
- **Muscles** connect to bones and move them when they **contract**.
- Stronger bones can **anchor** stronger muscles.

Retrieval Practice: *Monthly Review*	**Retrieval practice: *Weekly Review***	**Suggested problem-solving ideas/ activities**	**Purpose of Practical Activity**	**Disciplinary Knowledge Instructed/Undertaken/Revisited (Working Scientifically)**	**Assessment Opportunities**
Session 5: Taking accurate measurements. Reviewing the best unit for different items being measured. Session 6: Review what affects the strength of magnetic forces - The strength of the magnet. - The distance between the magnet and the object. - The material the object is made from.	Session 5: Review what is meant by **exoskeleton** Session 6: Key vocabulary **Support, strength/stronger Weight, connected, contract, anchor, muscles**	* Give children a large empty torso where they sketch in pencil what they think the skeleton is like. Get them to move in a variety of ways and feel how they move and adapt their skeleton. Show a real or model skeleton and ask them to identify similarities and differences. ^ Children draw round their own hands, they feel their hands and look at how it can move and draw in where they think there are bones and put circles wherever they think there are joints, they then compare their ideas with a picture of a real hand	The purpose of these activities is to enable application and assessment of the understanding that skeletons protect **vital organs** (*) and that bones are **connected** at **joints** (^). Following clear teacher instruction about stronger bones and stronger **muscles**, children will also start to consider the size of bones relative to each other.	**Using straightforward scientific evidence to answer questions or to support their findings (2)** **Recording findings using simple scientific language, drawings, labelled diagrams,** keys, bar charts, and tables- **(4)**	
		Give children some bones from a chicken skeleton that is not assembled. They try and identify what each bone	The purpose of this activity is to give the children the opportunity to apply the understanding of the substantive knowledge that bones are connected	**Recording findings using simple scientific language, drawings, labelled diagrams,** keys, bar charts, and tables- recording observations. **(5)**	

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		does and justify their choices, they again compare with a complete chicken skeleton	(but can move relative to each other) at joints. They can build upon the ideas previously explored about what constitutes 'stronger' bones to try to identify the purpose of the different bones presented with. The children will be making observations and predictions.	**Using results to draw simple conclusions, <u>make predictions</u> for new values, suggest improvements and raise further questions (2)**	
		Look at a cleaned chicken leg to see how it moves and then let children remove the skin from another one to see how muscles are attached.	The purpose of this activity is for children to experience first-hand what is meant by 'muscles connect to bones'. Children will often be surprised that the chicken we eat is in fact muscle. They will use observation skills which will give them the opportunity to annotate drawings or label diagrams. Scaffolding of such recording needs to be considered.	**Recording findings using simple scientific language, drawings, labelled diagrams,** keys, bar charts, and tables- recording observations. **(6)**	
		Compare X rays of animals and predict how they moved.	The purpose of this activity is to make predictions based on observations of the type of skeleton each animal has. For example, a skeleton of a tortoise would show their legs out the sides of their bodies and low to the ground which children could predict would mean the animal would move fairly slowly and possibly waddle from side to side.	**Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions (2)**- They record their observation e.g., using photographs, videos, pictures, labelled diagrams or writing. **Using results to draw simple conclusions, <u>make predictions</u> for new values, suggest improvements and raise further questions (3)**	
		Show some video footage of an animal moving and children predict what the skeleton of that animal may be like.	This activity enables the children to **a**pply the substantive knowledge learned during the unit. They should consider what types of bones might be found inside each animal with reference to the vital organs and how the animal moves. If the animal is large and fast, it is more likely to have stronger bones (remember stronger, not necessarily bigger in size)	**Using results to draw simple conclusions, <u>make predictions</u> for new values, suggest improvements and raise further questions (4)-** use evidence to suggest what the skeleton might be like.	

		Make a model arm from pieces of wood, string, Sellotape (provide other materials including elastic, does the opposite of a muscle because it contracts when relaxed.)	The purpose of this activity is to understand the structure of the human arm and how it works. Pose the following question- Contraction of which muscle will raise the forearm?	**Using straightforward scientific evidence to answer questions or to support their findings (3)**	

Year 4- Digestion

Big question	How does the body get nutrients from food into the bloodstream?	**Type of topic**	Building block	7 sessions 3 knowledge blocks

Knowledge Block 1: Food groups

Substantive Knowledge (key ideas)

Animals need a variety of foods to help them grow and survive. The main food groups are:

- **Meat**, **dairy** and pulses provide **protein** for muscles.
- **Grains** and **root vegetables** provide **carbohydrates** for energy.
- **Fat** for **insulation** and energy.
- **Fruit** and **vegetables** for **minerals, vitamins and fibre**. These are essential to keep our bodies working well and protect us from illnesses.

Retrieval Practice: ***Monthly Review***	**Retrieval practice:** ***Weekly Review***	**Suggested problem-solving ideas/ activities**	**Purpose of Practical Activity**	**Disciplinary Knowledge Instructed/Undertaken/Revisited (Working Scientifically)**	**Assessment Opportunities**
Session 1 Review how animals survive KS1- animals need food to survive Session 2: Key vocabulary- **substance, mixture**	First session of the unit will only focus on monthly review to establish prior knowledge and give time to address any gaps in that prior knowledge Session 2: Key vocabulary- **protein, carbohydrates, insulation, minerals, vitamins, fibre**	Provide children with a variety of different foods and they predict what nutrients they provide. Show them the food labels to check their ideas. Children keep a food diary for a day and then check tally up how much of each food group was in their diet. How does this compare with a healthy diet?	The purpose of these activities is to teach the substantive knowledge surrounding the main food groups.	**Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables (2) (13)**	

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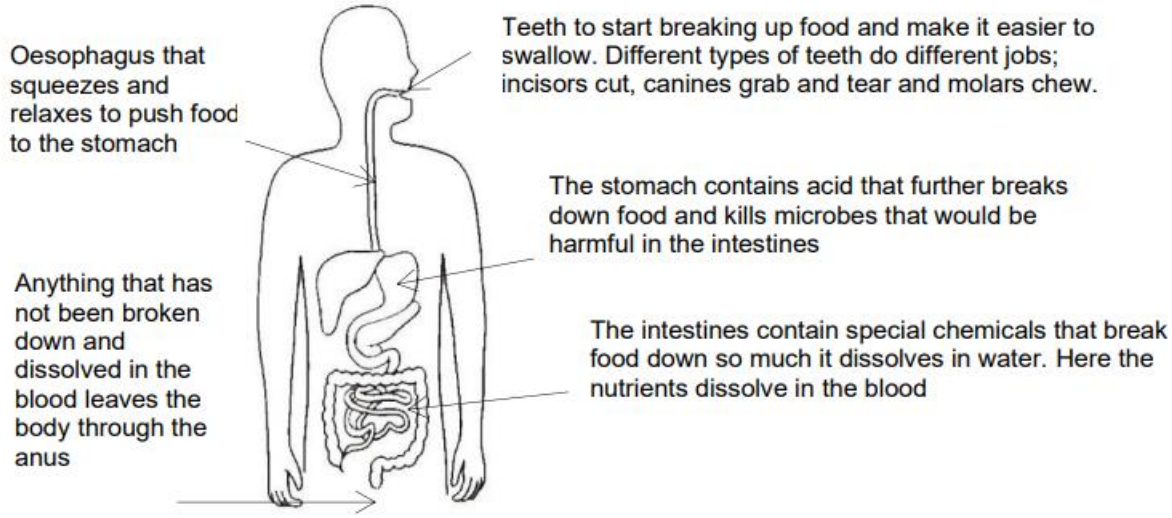
Knowledge Block 2: Variation in animals' diet					
Substantive Knowledge (key ideas) • Different animals require different foods to survive. • Humans require a balanced diet to remain **healthy** but healthy diets vary depending upon the type of activity that humans do.					
Retrieval Practice: ***Monthly Review***	**Retrieval practice:** ***Weekly Review***	**Suggested problem-solving ideas/ activities**	**Purpose of Practical Activity**	**Disciplinary Knowledge Instructed/Undertaken/Revisited (Working Scientifically)**	**Assessment Opportunities**
Session 3: Recalling the difference between a mixture and substance	Session 3: Food groups and their purposes- Meat, dairy, pulses- protein. Grains, root vegetables- carbohydrates	Compare the diets of athletes with different demands e.g., cyclists and sprinters, marathon runners and weightlifters. How are they different and why?	The purpose of this activity is to encourage children to think about the consequences of certain diets/food and the effect on the body.	**Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions (1) (7)**	
Session 4: Key vocabulary- **dissolving, solution**	Session 4: Food groups and their purposes- Fats for insulation and energy.	Give information about the poor diet of someone who is trying to be super skinny, predict the effects on the person's health and body			

Knowledge Block 3: How humans digest food

Substantive Knowledge (key ideas)

The **nutrients** in food have to get to every part of the body. The **blood** transports them.
The role of **digestion** is to get the nutrients in food to dissolve in the blood, if it doesn't dissolve it can't enter the blood and be transported.
Humans achieve this as below:



Retrieval Practice: *Monthly Review*	**Retrieval practice: *Weekly Review***	**Suggested problem-solving ideas/ activities**	**Purpose of Practical Activity**	**Disciplinary Knowledge Instructed/Undertaken/Revisited (Working Scientifically)**	**Assessment Opportunities**
Session 5: Key vocabulary-	Session 5: Review		The purpose of this activity is for children to make predictions	**Using results to draw simple conclusions, make predictions for new values, suggest**	

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substance, mixture Session 6: Recalling separation techniques- **filtration, evaporation** and **sieving** Session 7: Recalling separation techniques- **magnets** and **floating**	understanding of **dissolving** Session 6: Key vocabulary- **nutrients, digestion** Session 7: Review role of **digestion**- main purpose	Children keep a food diary for what they ate the previous day. Provide a large torso outline and ask children to annotate what has happened to the food they ate the previous afternoon and evening.	about what happens to their food OR following instruction of the substantive knowledge for this block, the children draw the process of digestion labelling the processes.	**improvements and raise further questions (2) (14)** **Using straightforward scientific evidence to answer questions or to support their findings. (2) (7)**- Recording processes	
		After washing hands children feel their teeth, describe what they are like, then look in a mirror and draw them. They then eat a variety of foods; identifying which teeth they use and hypothesise which teeth do which job	The purpose of this activity is to understand the function of teeth in animal and human survival.	**Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions (2) (8)**	
		Show pictures or fossils of animals' teeth and jaws, predict what the animal eats.			
		What liquids make teeth rot? (Use marble chips rather than eggshells as they fizz gently in lemon juice and acid). (This is interesting because sugar does not corrode teeth, only acids do. Sugar does result in tooth decay because bacteria in the mouth eat sugar and excrete acid; it is this acid that corrodes teeth).	The purpose of this activity is to continue to practice the skills associated with planning an enquiry. The children should gather data to make generalisations about the effect of different liquids on teeth.	**Setting up simple practical enquiries, comparative and fair tests (2) (21)** **Using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions (3) (15)** **Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers (1) (18)**	
		Construct a food chain from animals' teeth found in the local area (or ones you have bought!	The purpose of this activity is to make a direct link to the substantive knowledge taught through the longitudinal studies.	**Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions (3) (9)**	

				Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables (3) (14)	
		Bread is a carbohydrate and so provides our muscles with energy, but it needs to dissolve in the blood before it can be transported to the muscles. Where in the body does this happen? Does chewing make it dissolve? Does chewing with saliva make it dissolve? Does mixing with acid make it dissolve? They can test all of these things. The point is that one of these things causes bread to dissolve, this happens in the intestines. (They don't need to know how it happens just that this is where it does)	The purpose of this activity is to give the children the opportunity to see the process of digestion modelled through in order to identify at what point the nutrients get into the blood. Application of the substantive knowledge about different things the human body does in order to prepare for digestion.	**Using straightforward scientific evidence to answer questions or to support their findings. (3) (8)**	

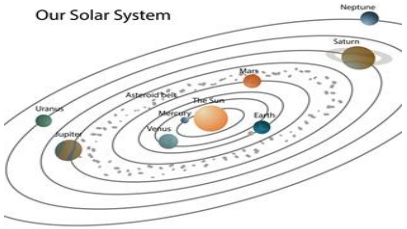
Year 5- Space and Gravity

Big question	What is Earth's address in space?	**Type of topic**	Building block	8 sessions 3 knowledge blocks

Knowledge Block 1: Our Solar system

Substantive Knowledge (key ideas)

- A **Solar system** is a collection of **planets**, which **orbit** (a curved path) a **star**.
- There are huge number of stars in space and therefore a huge number of solar systems
- Our solar system consists of 8 planets, many of those planets have **moons** which orbit around them.
- Our solar system can be represented with a model (see diagram), but it isn't possible to draw it to scale.
- The planets and moons are **rotating** (spinning)
- The time it takes one planet to rotate is called a **day**. On Earth this is 24 hours
- The time it takes a planet to complete one orbit around its star is called a **year**. On Earth this is 356.25 days
- The solar system is with a massive collection of stars called the **galaxy** (called the Milky way)
- The Milky way is one of billions of galaxies in the **Universe**.



Retrieval Practice: ***Monthly Review***	**Retrieval practice:** ***Weekly Review***	**Suggested problem-solving ideas/ activities**	**Purpose of Practical Activity**	**Disciplinary Knowledge Instructed/Undertaken/Revisited (Working Scientifically)**	**Assessment Opportunities**
Session 1: Seasons, types of them Session 2: forces Pushes and pull Session 3: Definition of fossil and formations	Session 1: First session of the topic will only focus on monthly review to establish prior knowledge and give time to address any gaps in that prior knowledge Session 2: Definitions of solar system, planets, orbit and star	Predict and explain how the temperature of each planet may vary. Use data to check and then consider which planets could possibly host life (it must contain liquid water for at least some time) Predict how long each planetary year might be and compare with data. Use the software below to show the solar system on screen. As children to consider why	The purpose of these activities is to apply substantive knowledge to make scientific predictions The purpose of this activity is to identify what evidence has been used to refute ideas. The classification of planets requires three things- 1. It is in orbit around the sun, 2. It is round shaped, 3. It has cleared it orbit. When these new ideas were introduced the evidence from	**Identifying scientific evidence that has been used to support or refute ideas or arguments (3)**	

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	Session 3: Definitions of solar system, planet, orbit and moons.	Pluto was changed from a planet to a dwarf plant in 2006 https://www.solarsystemscope.com/	Pluto meant that it only met two out of the three criteria. (It didn't meet number 3)		

Knowledge Block 2: What else is in the solar system					
Substantive Knowledge (key ideas) ● Stars are huge balls of gas that produce vast amounts of light and heat. ● **Asteroids** are lumps of rock that orbit a star (there are millions in between Mars and Jupiter) ● **Comets** are objects that are made of Ice, which melts when they get closer to the sun leaving a tail.					
Retrieval Practice: ***Monthly Review***	**Retrieval practice:** ***Weekly Review***	**Suggested problem-solving ideas/ activities**	**Purpose of Practical Activity**	**Disciplinary Knowledge Instructed/Undertaken/Revisited (Working Scientifically)**	**Assessment Opportunities**
Session 4: Definitions of transparent, opaque, reflective and translucent Session 5: Definitions of Solid, liquid and gas Session 6: Definition of gravity	Session 4: Definition of moon, solar system, rotating day, orbit and year Session 5: Definitions of orbit, rotating, moon year galaxy Session 6: Definitions of star, moon, planet, galaxy, universe.	How does the distance from a light source affect how much light hits an object? Apply this to the solar system and predict how much light each planet receives. Lux meters (free app from app store) could be used to take accurate measurements of light. Does having more moons result in more light hitting a planet? How could you test this idea? Investigate moon craters. How does the speed / size of a meteorite affect the size of a moon crater formed? Sand trays and balls work well. Craters should be measured purposely, and each size balled repeated	The Purpose of this activity is to take **accurate measurements** during an investigation. In all of these activities the focus should be on taking accurate recording of data using specific instruments. Students should be encouraged to think about **repeating each test and calculating an average value**. You can then discuss with them why this has given them more true value than simply just taking one light reading each time. This data could then be used **produce a scatter graph**. The process of producing a scatter graph would need to be clearly instructed and modelled first using some other data you have put together. Once graphed trends in this data could then be looked at.	**Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate- (1)** During an enquiry, they make decisions e.g., whether they need to: take repeat readings (fair testing); increase the sample size (pattern seeking); adjust the observation period and frequency (observing over time); or check further secondary sources (researching); in order to get accurate data (closer to the true value). **Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs (1)-** scatter graphs introduced during this session. Show how the axis can easily be labelled by extracting word for word from the question, once it is written in the form how does a affect b (just like when using planning mindmap) We are not worried about the technicalities of them but simply how a relationship can be shown	

Knowledge Block 3: Gravity and its effects					
Substantive Knowledge (key ideas) ● **Gravity** is force of attraction between two objects with **mass** (a quantity of matter) ● The bigger the mass the bigger force it exerts ● Gravity works over distance but gets weaker as distance increases ● Stars, planets, moons have a very large amount of mass. They exert a gravitational attraction on each other ● Differences in gravity result in smaller mass objects orbiting around lager mass objects, e.g., planets around stars and moons around planets					
Retrieval Practice: *Monthly Review*	**Retrieval practice: *Weekly Review***	**Suggested problem-solving ideas/ activities**	**Purpose of Practical Activity**	**Disciplinary Knowledge Instructed/Undertaken/Revisited (Working Scientifically)**	**Assessment Opportunities**
Session 7: Definitions of force, attraction, repulsion, Session 8: Definitions of Stigma, stamen, pollen pollination.	Session 7: Definition of galaxy, universe, star, moon Session 8: Definitions of planet, star, universe, galaxy, orbit.	If the moon became heavier as a result of meteorite collisions what would happen to its position relative to the Earth? Imagine that somewhere in the universe is a vast (bigger than the solar system) cloud of dust of varying sized bits and varying distances apart. What might happen to this cloud over many years? (This can be modelled using a handful of pom poms of varying sizes randomly dropped onto a table) Consider a spacecraft travelling from the Earth to the moon. Predict the forces acting on the craft at various stages in its journey. (The mass of the earth is 80 x that of the moon) If the mass of the earth is 80x that of the moon, why is the gravity at the Earth's surface only 6 x greater than that at the surface of the moon?	These are **complex questions** rather than activities and are used to **apply substantive knowledge to develop ideas and models of phenomena.**	**Identifying scientific evidence that has been used to support or refute ideas or arguments (4)**- Children answer questions based on information they have gained from secondary sources. When doing this, they discuss whether other evidence e.g., from other groups, secondary sources and their scientific understanding, supports or refutes their answer.	

Year 6- Classification and Evolution

Big question	How does Evolution happen?	**Type of topic**	Building block	7 sessions 2 knowledge blocks

Knowledge Block 1: Natural selection

Substantive Knowledge (key ideas)

- **Evolution** is the change of physical form in a population over a long-time span
- **Natural selection** is the process which controls that change.
- In any **population** there is **variation** and **competition** for resources (food, water, mates).
- Within that variation, organisms that have features which make them better **adapted** at securing food, water, and mates, are more likely to survive and produce **offspring** which have **inherited** those same successful features. Those that are not well adapted will eventually go **extinct**.
- Over a long enough timeline all organisms in a population will have those successful features.
- This is known as the *Theory of Evolution by Natural Selection* and was developed by **Charles Darwin** in 1859

Retrieval Practice: ***Monthly Review***	**Retrieval practice:** ***Weekly Review***	**Suggested problem-solving ideas/ activities**	**Purpose of Practical Activity**	**Disciplinary Knowledge Instructed/Undertaken/Revisited (Working Scientifically)**	**Assessment Opportunities**
Session 1 Revisit key vocab- evolution, extinct, fossil, palaeontologist Session 2 Draw a diagram to explain what causes friction	First session of the topic will only focus on monthly review to establish prior knowledge and give time to address any gaps in that prior knowledge Session 2 Define Evolution and Natural selection	Children could create a table of characteristics within their own class. Group themselves by height, hair colour, can they roll their tongue, do they have widow's peak, attached earlobes etc. They could then display this information as a poster on the variation within class butterfly etc. Some traits are inherited, and others are not. Children do research to try and work out if the following traits are inherited or not: earlobe attachment, hand clasping (when you link your fingers in a hand clasp which thumb do you place over the other?), cheek dimples, cleft chin, ability to remember random numbers, how far you can stand jump, widows peak, tongue rolling	The purpose of the first two activities is to aid in the **understanding of substantive knowledge** of inherited characteristics and developing the disciplinary knowledge of **displaying data.**	**Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations (1) (6)** **Identifying scientific evidence that has been used to support or refute ideas or arguments (3) (10**	

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Session 3 The parts of a plant and the role of each part Session 4 Draw diagrams of what happens to light rays when they strike transparent. translucent, a mirror and the desk	Session 3 Recall how natural selection works using terms population, variation competition, adapted, offspring, inherited Session 4 define extinction and explain how natural selection can lead to extinction	Show children a picture of the human ancestor "Lucy" *Australopithecus*   *afarensis.* Lucy was the first of our ancestors to walk mostly on two legs. Ask children to develop ideas as to why walking on two legs would be an advantage and be selected for by Natural selection and still be with us today. (Actual answer is that it is more efficient so it saves energy which can be used for more reproduction and keeps population numbers up. But it also led to freeing up hands for tool development and the chest muscles to develop speech and language). Lucy is an example of a transitional fossil showing the evolution from ape to human  Then show pictures of the fossil Archaeopteryx. Ask children to look closely at the features in the fossil. Is it a fossil of a bird or of a dinosaur? draw out the ideas. You could show a photo of a bird skeleton and a dinosaur skeleton to aid this discussion. Points to note are that it has features of both. It is another example of a transitional fossil. Showing how dinosaurs evolved into birds. It has teeth and a tail but also has feathers and a beak.	The purpose of this activity is **to identify scientific evidence that is used to support** the idea of evolution by natural selection		

Knowledge Block 2: How Charles Darwin discovered the process of Evolution by Natural selection					
Substantive Knowledge (key ideas) ● Before Darwin, **Lamarck's** Idea of acquired characteristics was proposed. (Giraffes stretch their necks in life, which made their children have longer necks). ● Darwin as a young man travelled around the world on the **HMS Beagle**. On this 5-year voyage he saw lots of things and recorded down lots of evidence which allowed him to work out how organisms change over time by a different mechanism of Natural selection					
Retrieval Practice: ***Monthly Review***	**Retrieval practice:** ***Weekly Review***	**Suggested problem-solving ideas/ activities**	**Purpose of Practical Activity**	**Disciplinary Knowledge Instructed/Undertaken/Revisited (Working Scientifically)**	**Assessment Opportunities**
Session 5 Definitions of Stigma, stamen, pollen pollination. Session 6 Explain what causes a shadow with an annotated diagram or written explanation	Session 5 Recall who came up with the idea of Evolution by Natural selection Session 6 Recall how Lamarck's idea was different and why Darwin's was a better model	Children research and produce a display/oral presentation and different aspects of Darwin's Life. 1. Before Darwin- Lamarck's idea 2. Darwin's childhood and education 3. Darwin's 5-year voyage on The HMS Beagle 4. Darwin's home in Down and his family 5. Darwin and Alfred Wallace. 6. Darwin's Idea, his book and why it's a better explanation than Lamarck's	The purpose of this activity is to **teach the substantive knowledge** of Lamarck's idea and Darwin's discovery of evolution by natural selection and how it's a superior **model/theory** for the variety of life on Earth. It's also to allow children the opportunity to **orally present** their knowledge to an audience.	**The disciplinary knowledge of models. (1)** **Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations (2) (7)**	