











## Itchen Abbas Primary School Scheme of Work for Science





Thresholds Concepts – These need to be explicitly taught and explained each time they are covered. The symbol in the planning will inform you which concept is being taught. Retrieval – you must refer to previous examples of when the threshold concept was taught when you teach new knowledge to support children in developing their concept schemas and make links in their learning.

Threshold concept symbol	Threshold concept title and descriptor	NC aim it links to
	<b>Biology</b> This concept involves becoming familiar with different types of plants, their structure and reproduction; with insects and understanding life processes; that organisms come into existence, adapt, change and evolve and become extinct.	<ul style="list-style-type: none"> <li>develop <b>scientific knowledge and conceptual understanding</b> through the specific disciplines of biology, chemistry and physics</li> <li>develop understanding of the <b>nature, processes and methods of science</b> through different types of science enquiries that help them to answer scientific questions about the world around them</li> <li>are equipped with the scientific knowledge required to understand the <b>uses and implications</b> of science, today and for the future.</li> </ul>
	<b>Chemistry</b> This concept involves becoming familiar with a range of materials, their properties, uses and how they may be altered or changed.	
	<b>Physics</b> This concept involves understanding what causes motion; how light and reflection affect sight; how sound is produced and how it travels and how it is heard; circuits and their role in electrical applications and understanding what causes seasonal changes, day and night.	
	<b>Working Scientifically</b> This concept involves learning the methodologies of the discipline of science.	



**In our school, PSHE and RSE is embedded throughout our wider curriculum. These are the Threshold Concepts.**

Threshold concept symbol	Threshold concept title and descriptor
	<b>Keeping myself safe</b> This concept involves knowing the importance of and how to stay safe both online and with personal safety. It includes understanding who to talk to and when.
	<b>Making and maintaining healthy relationships</b> This concept is about understanding how to be a friend and what skills and qualities friends need to have and demonstrate over time. It involves understanding what a healthy relationship is and how to respond and protect yourself and others when a relationship is healthy. It is also about having a healthy relationship with yourself.
	<b>Health and wellbeing</b> This concept is about understanding and maintaining good physical and mental health. It includes understanding the positive impact of physical and wellbeing activities have on the body and mind.
	<b>Living in the wider world</b> To learn to be tolerant and show acceptance towards others. To understand the importance of living in an inclusive society and the responsible role we all play within it. To know how to show good citizenship towards others.



Itchen Abbas Primary School Scheme of Work for Science



Squirrels Cycle A (Yr. R & 1)	Unit of Work Title	Threshold Concept	End Point - Key concepts, knowledge / skills specific to this unit/	Retrieval of Previous Learning	Key vocabulary
Autumn	Animals Including Humans	 	<p>Key concepts covered:</p> <ul style="list-style-type: none"> <li>Animals have senses to help individuals survive. When animals sense things they are able to respond</li> <li>There are many different animals with different characteristics</li> <li>Animals need food to survive</li> <li>Animals move in order to survive</li> </ul> <p>Possible lessons: (more of a focus on animals)</p> <ul style="list-style-type: none"> <li>Children imagine being a particular predator or prey and predict the sense they would need to have to help them survive.</li> <li>Why do woodlice curl up? Do they all behave in the same way?</li> <li>Look for camouflaged animals and hypothesise what different animals' habitat might be like based on their colour. Make camouflage jackets for teddies for the local environment and then see if they survive the great teddy monster (it eats teddies!).</li> <li>Go on a blindfolded sensory walk. What could you do to sense danger? Show nocturnal animals and predict how they sense danger. How would you survive if you lost your sight? You could get a blind person to visit children with their guide dog to share their experiences.</li> <li>Look for similarities and differences between birds and ask questions about the differences.</li> <li>Survey how many limbs different animals have and try to categorise them. Reach the point where if you know an animal has four limbs what else can you say about it?</li> </ul>	<p>Do you remember your different senses? What are they? What might you smell? See? Touch? Taste? Hear?</p> <p>What animals do you already know? What animals do different children in the class have at home? What animals might you visit in a zoo?</p> <p>Last Autumn, we learnt that animals use their senses to find food and survive.</p>	<p>Senses, animal, survive, movement, characteristic, predator, prey, classify, category, similarities, differences.</p>

**Itchen Abbas Primary School Scheme of Work for Science**


Spring	Everyday Materials		<p>Key concepts:</p> <ul style="list-style-type: none"> <li>• Materials have describable properties</li> <li>• Different materials have different properties</li> <li>• There are different materials</li> </ul> <p>Possible lessons:</p> <ul style="list-style-type: none"> <li>• What materials can you find around the school?</li> <li>• Slow reveal: what label can we give this group? What else could we put in? Give children an object and ask them where should it go?</li> <li>• I will be redecorating and replacing my kitchen. I would like to replace the worktops with a material which will be durable and smooth, as well as decorative. Suggest the best/worst rock type, explaining your reasons.</li> <li>• Which material is the best for wrapping a Christmas present?</li> <li>• What is the best material to make a cloche for your plant and why?</li> <li>• What is the best material for a nursery blind (curtain) so a baby can sleep during the day?</li> <li>• What material would be suitable for a floor covering in a house? What do you need to consider (requirements)?</li> </ul>	<p>What sort of things can you describe in the classroom? Or have a bag of objects. How would you describe them? We use different words to describe objects to explain how feel/work.</p> <p>Last Autumn, we learnt what different materials might be used for and why some might be better for different jobs.</p>	<p>Material, waterproof, colour, hardness, runniness, opaqueness, flexibility, strength, absorb, durable, smooth.</p>
Summer	Plants		<p>Key concepts covered:</p> <ul style="list-style-type: none"> <li>• Plants usually grow from seed and bulbs</li> <li>• Flowering plants make seeds to reproduce and make more plants. Some plants die after producing seeds and others live for many generations (starting to understand this).</li> </ul> <p>Possible lessons:</p> <ul style="list-style-type: none"> <li>• Ask children to find seeds from the garden and local area (best done with parental supervision). They photograph the plant, identify it and then plant the seed to see if it grows.</li> <li>• Does it matter which part of an apple or a sunflower you plant if you want to make a new plant?</li> </ul>	<p>What flowers and plants have you seen before? Can you name of them? What do plants need to stay alive? Where do you often see plants growing?</p> <p>Last Autumn, we learnt that most plants grow from bulbs or seeds.</p>	<p>Flower, petal, stem, leaves, reproduce, growth, seed/bulb, conditions, life cycle, repair, energy.</p>

**Itchen Abbas Primary School Scheme of Work for Science**





			<ul style="list-style-type: none"> <li>• Look at an area of the school grounds over a school year. What happens? Do new plants come back?</li> <li>• Meadow planting (seeds – plant – die – seeds).</li> <li>• Buy dying plants from a garden centre: give the children the opportunity to be <i>plant doctors</i>.</li> <li>• We are growing vegetables! What are the best conditions for growing the best vegetables?</li> <li>• Can a plant have too much water?</li> <li>• Observe a tree in the school grounds over the school year. How do the seasons affect its growth?</li> </ul>		
Through out the year	Seasonal Change	 	<p>Key concepts: Children need to learn about how a number of things change with the seasons, including the weather, the temperature and the number of daylight hours. They do not need to know why these things change. It would be best to teach these phenomena through exploring the local environment rather than on topics to do with <i>Earth and space</i>.</p>	When do you need a coat? Why don't you need one in the summer? When did you last see snow? Is it ever light when you go to bed, but sometimes it's dark?	Winter, Autumn, Spring, Summer, temperature, daylight, seasons, environment.

Squirrels Cycle B (Yr. R & 1)	Unit of Work Title	Threshold Concept	End Point - Key concepts, knowledge / skills specific to this unit/	Retrieval of Previous Learning	Key vocabulary
Autumn	Animals Including Humans	 	<p>Key concepts covered:</p> <ul style="list-style-type: none"> <li>• Animals have senses to help individuals survive. When animals sense things they are able to respond</li> <li>• There are many different animals with different characteristics</li> <li>• Animals need food to survive</li> <li>• Animals move in order to survive</li> </ul> <p>Possible lessons: (more of a focus on humans)</p>	<p>Do you remember your different senses? What are they? What might you smell? See? Touch? Taste? Hear?</p> <p>What animals do you already know? What animals do different children in the class have at home? What animals might you visit in a zoo?</p> <p>Last Autumn, we learnt that animals use their senses to find food and survive.</p>	Body parts/ some organs – eyes, ears, mouth... brain, stomach etc, senses, variation, characteristic, healthy, unhealthy.

**Itchen Abbas Primary School Scheme of Work for Science**



			<ul style="list-style-type: none"> <li>• Do all animals use their tails? How do they use them? Who chopped mine off?</li> <li>• How far away can we smell things? Can animals smell further or less (same with how smelly).</li> <li>• Can we fool our senses? (Which is the orange jelly from coloured jellies with no flavour just sugar? Can you tell the yellow Skittle from its flavour only? Put mystery foods and smelly things in tins with holes in the lid. Do we all have equally good senses of smell and taste?)</li> <li>• Taste test of exotic fruits. Do we all agree on sweetness? (About constantly hitting the idea that we are different, ie there is variation amongst us.) Are any fruits so sweet they are unhealthy?</li> </ul>		
Spring	Everyday Materials		<p>Key concepts:</p> <ul style="list-style-type: none"> <li>• Materials have describable properties</li> <li>• Different materials have different properties</li> <li>• There are different materials</li> </ul> <p>Possible lessons:</p> <ul style="list-style-type: none"> <li>• Make an outfit for a super hero. Wash, then freeze it. Consider how materials change. Defrost the outfit and discuss the changes. Investigate the best place to dry the outfit. Where does the water go?</li> <li>• As part of a topic on homes, a problem was posed: the tiles for the roof had not been delivered (letter from a builder). He needed to find the best material to cover the building to protect it until the roof tiles were delivered.</li> <li>• What would be the best materials to build the three little pigs' houses? Make a poster advertising it.</li> <li>• Make play dough and encourage children to describe and compare accurately how the materials change at the various stages.</li> </ul>	<p>What sort of things can you describe in the classroom? Or have a bag of objects. How would you describe them? We use different words to describe objects to explain how feel/work.</p> <p>Last Autumn, we learnt what different materials might be used for and why some might be better for different jobs.</p>	<p>Material, waterproof, colour, hardness, runniness, opaqueness, flexibility, strength, absorb, durable, smooth.</p>

**Itchen Abbas Primary School Scheme of Work for Science**

			<ul style="list-style-type: none"> <li>• What materials are best for making a boat for Gingerbread Man to cross the stream?</li> <li>• Design, make and test a bag that will carry four tins of beans across the playground.</li> </ul>		
Summer	Plants	 	<p>Key concepts covered:</p> <ul style="list-style-type: none"> <li>• Plants usually grow from seed and bulbs</li> <li>• Flowering plants make seeds to reproduce and make more plants. Some plants die after producing seeds and others live for many generations (starting to understand this).</li> </ul> <p>Possible lessons:</p> <ul style="list-style-type: none"> <li>• The upside-down seed.</li> <li>• Mystery seed/bulb: how do we make it grow?</li> <li>• Once they have flowered, how long do different flowers last?</li> <li>• Do bigger seeds grow bigger plants?</li> <li>• Provide a wide variety of seeds and beans and things that look like seeds and beans: pupils predict which are real and then test to see which grow.</li> <li>• Find out what the best conditions are to grow cress and then turn these into instructions for the seed packet.</li> <li>• An alien visitor wants to grow plants for food but does not believe that plants need light, warmth and water. How can we prove to him that this is true?</li> <li>• Do plants always need soil to grow?</li> <li>• The plants in the headteacher's <i>secret garden</i> are looking unhealthy. Can you help her?</li> </ul>	<p>What flowers and plants have you seen before? Can you name of them? What do plants need to stay alive? Where do you often see plants growing?</p> <p>Last Autumn, we learnt that most plants grow from bulbs or seeds.</p>	<p>Flower, petal, stem, leaves, reproduce, growth, seed/bulb, conditions, life cycle, repair, energy.</p>
Through out the year	Seasonal Change	 	<p>Key concepts:</p> <p>Children need to learn about how a number of things change with the seasons, including the weather, the temperature and the number of daylight hours. They do not need to know why these things change. It would be</p>	<p>When do you need a coat? Why don't you need one in the summer? When did you last see snow? Is it ever light when you go to bed, but sometimes it's dark?</p>	<p>Winter, Autumn, Spring, Summer, temperature,</p>

**Itchen Abbas Primary School Scheme of Work for Science**

			best to teach these phenomena through exploring the local environment rather than on topics to do with <i>Earth and space</i> .		daylight, seasons, environment.
--	--	--	---	--	---------------------------------




Hedgehogs Cycle A (Yr. 2 & 3)	Unit of Work Title	Threshold Concept	End Point - Key concepts, knowledge / skills specific to this unit/	Retrieval of Previous Learning	Key vocabulary
Autumn	Light	 	<p>Key concepts:</p> <ul style="list-style-type: none"> <li>• Light comes from a source</li> <li>• Shiny materials reflect light beams better than non-shiny materials</li> <li>• There must be light for us to see. Without light it is dark</li> <li>• Beams of light bounce off some materials (reflection)</li> <li>• We need light to see things, even shiny things</li> <li>• Transparent materials let light through them and opaque materials do not let light through</li> </ul> <p>Possible lessons:</p> <ul style="list-style-type: none"> <li>• A school hunt for light sources. Divide into natural and artificial.</li> <li>• Use data loggers to measure the amount of light in different places (this may be better linked to questions where the level of light might affect something else, eg the temperature, the number of plants, how long puddles last, etc).</li> <li>• Use data loggers to measure the amount of light over the course of 24 hours. Construct a bar chart and discuss the pattern. How do children think the chart would be different in different places or at different times of year?</li> </ul>	<p>What do you use to see? What about when it's dark? Have you ever used a torch before? What about outside – where does the light come from? Can we see when it is dark outside?</p> <p>Last year, you learnt about animals, such as owls. How do they see at night?</p>	<p>Light, opaque, translucent, transparent, reflection, light beams, measure, prediction, colours, material.</p>

**Itchen Abbas Primary School Scheme of Work for Science**

- Cats can see in the dark because their eyes shine. True or false?
- Pupils make their own blackout box: discuss and improve, and explain why it works.
- Show pupils a photograph of what is in a dark room/tent and ask them to identify what they think they will be able to see and why. Take them inside and compare.
- How much light do we need to be able to begin to see things? (Test using blackout boxes and put an increasing number of pin pricks in it.)
- Paint some objects with phosphorescent paint and put them in a dark room. Remove an object and shine a light on it, then replace in the dark room. Is the object a light source?
- Find different objects (shiny, non-shiny, dark and pale) in dark places. Will children need a torch or not?
- Sitting in a dark tent/room; what can you see and what happens as we get used to the dark? How long would it take to get used to the light if it were pitch black? Try and test it.
- Does being in a dark place improve your other senses?
- Roll up a piece of black sugar paper, place it over some writing and ask if the children can read it. Make a small hole near the top and repeat. Make holes closer to the bottom and repeat.
- A ball has been lost under a bed; you need a bright torch to look for it. Which torch is brightest? (test) and then use to find the ball.
- Explore the best material to make a safety jacket for walking to school (many similar scenarios).
- What would be the best material to make a shield from if you want to blind your enemy? You could relate to materials and smooth surfaces being better reflectors.





**Itchen Abbas Primary School Scheme of Work for Science**

			<ul style="list-style-type: none"> <li>• <i>Can't you sleep, little bear?</i> Which material would make the best curtains to reduce the light?</li> </ul>		
Spring	Animals Including Humans	  	<p>Key concepts:</p> <ul style="list-style-type: none"> <li>• Animals need a variety of food to help them grow, repair their bodies, be active and stay healthy</li> <li>• Different animals move in different ways to help them survive</li> <li>• Animals grow until they reach maturity and then do not grow any larger</li> <li>• Animals reproduce new animals when they reach maturity</li> <li>• All animals eventually die</li> <li>• Exercise keeps animals' bodies in good condition and increases survival chances</li> </ul> <p>Possible lessons:</p> <ul style="list-style-type: none"> <li>• What happens to our bodies when we exercise? Can we measure these changes? (Breathing, temperature, sweatiness, pulse rate, tiredness.)</li> <li>• Which exercises make us most tired? How could we check if it is true?</li> <li>• Why do wild animals not go to the animal gym?</li> <li>• Vet role-play: "My dog is so fat he can't walk to the park, what should I do?"</li> <li>• Why do wild animals not get fat or do they?</li> <li>• Construct a timeline based on family pets. Could start to add in other animals and how old they are when they reproduce. Extrapolate the timeline for animals like tortoises and parrots.</li> <li>• Find another animal that lives for as long as a human. What other similarities and differences</li> </ul>	In Squirrels, you explored how different animals have senses to help them survive. You also learnt that different animals with different characteristics, animals need food to survive and they also move in order to survive.	Exercise, muscles, bones, movement, survival, condition, mature, measure, temperature, timeline, compare.

Itchen Abbas Primary School Scheme of Work for Science



		<p>are there?</p> <ul style="list-style-type: none"><li>• Measure the height or weight of animals as they grow over a period of a year or two to establish that they do not grow forever.</li><li>• Construct a timeline based on family pets. Could start to add in other animals and how old they are when they reproduce. Extrapolate the timeline for animals like tortoises and parrots.</li><li>• Find another animal that lives for as long as a human. What other similarities and differences are there?</li><li>• Construct a simple lifeline for chickens, frogs and butterflies, and look for similarities and differences.</li><li>• Measure the height or weight of animals as they grow over a period of a year or two to establish that they do not grow forever.</li><li>• Ask children to bring in records (weight and height) and photographs of themselves from when they were young to now, put on a timeline and then add similar ones for a pet. What are the similarities and differences? You could put up teachers information on the same timeline and see if children can spot how growing stops when adult.</li><li>• Dinosaur dig! Look at individual bones and predict what part of the body they came from and how the animal moved.</li><li>• Explore through videos the many ways in which animals move. Develop the descriptive language, act out the movement types, show unusual animals and get to predict how they move. Lead into discussions about how slow animals survive;</li></ul>		
--	--	---	--	--

Itchen Abbas Primary School Scheme of Work for Science


			maybe they have super senses like smell. How do you know if snails can smell? Investigate.		
Summer	Plants	 	<p>Key concepts:</p> <ul style="list-style-type: none"> <li>• Plants make their own food in their leaves to provide them with energy, grow, repair and</li> <li>• Leaves absorb sunlight and carbon dioxide</li> <li>• Plants have roots to provide support and to draw moisture from the soil, through stems to take water to the rest of the plant</li> <li>• The plant makes its food from water and carbon dioxide, using sunlight as energy, in the green parts of plants (mainly leaves)</li> <li>• Flowering plants have evolved specific parts to carry out pollination, fertilisation</li> <li>• Seed dispersal improves chances of enough seeds germinating and growing to mature</li> <li>• Seeds and bulbs need the right conditions to germinate. They contain a food store for the first stages of growth</li> </ul> <p>Possible lessons:</p> <ul style="list-style-type: none"> <li>• What are the best conditions for germinating grass seed?</li> <li>• What happens to a seed as it germinates and starts to grow? (Look at a wide variety of seeds, including those used in food production.)</li> <li>• Identify the best conditions for specific seeds to germinate and then write instructions for the seed packet.</li> <li>• Research into seeds with unusual conditions for germination, eg forest fire.</li> </ul>	<p>Last time you learnt about plants, you found out that plants usually grow from a seed or bulbs and that flowering plants make seeds to reproduce and make more plants. Some plants die after producing seeds and others live for many generations.</p>	<p>Roots, root hairs, stem, leaves, flower, seed dispersal, pollination, fertilisation, conditions, transportation of water, conditions, variables, germination, energy, absorb.</p>

**Itchen Abbas Primary School Scheme of Work for Science**





			<ul style="list-style-type: none"> <li>• Do seeds with <i>helicopter blades</i> move further from a parent tree than those that drop and roll? • How do dandelions and poppies disperse their seeds? (Maybe compare with the results from above.)</li> <li>• Design a seed that would be effectively dispersed by wind, water, mammals, birds. (Application of knowledge.)</li> <li>• Collect seeds in the school grounds and identify means of dispersal.</li> <li>• Design a shoe box maze for plants to go through. (Plants will grow towards the light.)</li> <li>• Are roots essential for a plant to grow?</li> <li>• Place celery in black ink and daffodils (or other flowers) in coloured water. What happens over a period of a few days?</li> <li>• How many different types of roots can you find in the school grounds?</li> </ul>		
--	--	--	---	--	--

Hedgehogs Cycle B (Yr. 2 & 3)	Unit of Work Title	Threshold Concept	End Point - Key concepts, knowledge / skills specific to this unit/	Retrieval of Previous Learning	Key vocabulary
Autumn	Living Things in their Habitats	 	Key concepts: <ul style="list-style-type: none"> <li>• Some things are living, some were once living but now dead and some things have never lived.</li> <li>• There is variation between all living things and living things are adapted to survive in different habitats.</li> <li>• Different animals and plants live in different places and environmental change can affect plants and animals that live there.</li> </ul>	In Squirrels, you learnt about different plants and how they grow. You also thought about different animals and how they move and survive.	Variation, habitat, adaption, microhabitat, living thing, producer, consumer, predator, prey, environment, suited, carnivore,

**Itchen Abbas Primary School Scheme of Work for Science**

			<p>Possible lessons:</p> <ul style="list-style-type: none"> <li>• Sort objects into living, dead, never lived.</li> <li>• Make a food chain in your school groups.</li> <li>• Design and make a microhabitat.</li> <li>• Produce a leaflet/ book about a living thing and include how it has adapted to their environment and where they are in their food chain.</li> </ul>		herbivore, omnivore.
Spring 1	Everyday Materials		<p>Materials</p> <p>Key concepts:</p> <ul style="list-style-type: none"> <li>• Materials have describable properties</li> <li>• Different materials have different properties</li> <li>• Materials can be changed by physical force (twisting, bending, squashing)</li> </ul> <p>Possible lessons:</p> <ul style="list-style-type: none"> <li>• Rapunzel is back in the tower. The prince would like to rescue her but she cannot climb out of the tower. Make her a rope, but all the prince can find is a box of tights.</li> <li>• Give children a wooden block that is quite heavy (or box of stuff) and lots of thin paper strips. Their challenge is to lift the box with the paper strips. They are allowed to do anything with the paper strips, but they have to say what they have done and what effect it had (could try twisting, plaiting, layering, etc).</li> <li>• Real-life object property classification through play. Explore bend/twist/ stretch and use a Venn diagram to sort.</li> <li>• Which elastic band is the most stretchy? What do you think and how could you find out?</li> <li>• What is similar and different about elastic and Silly Putty? Could you make a bungee cord from Silly Putty?</li> <li>• B&amp;Q is developing a new type of roof tile and has sent</li> </ul>	Last time you looked at different materials, you found out that materials have describable properties and different materials have different properties.	Material, waterproof, colour, hardness, runniness, opaqueness, flexibility, strength, absorb, durable, smooth, stretchy, weight, classify, bend, twist, squashing, stretch.

**Itchen Abbas Primary School Scheme of Work for Science**



			<p>some sample (bricks) to be tested. You must test each material and reply to them with your recommendation and why.</p> <ul style="list-style-type: none"> <li>• Which materials could be used to make a super mop for Cinderella?</li> <li>• How can we protect the toys (cuddly) so we can keep them outside?</li> </ul>		
Spring 2	Rocks	 	<p>Key Concepts:</p> <ul style="list-style-type: none"> <li>• Fossils form when once living things become trapped within sand and clay that hardens into rock over millions of years.</li> <li>• To use understand the different properties of rocks and compare them.</li> <li>• To recognise that soils are made from rocks and organic matter.</li> </ul>	Where do you find rocks? What are they used for? How would you describe them? You looked at plants last year, how might some of them use rocks?	Rocks, properties, soluble, organic matter, classify, fossils, crystals, compare, grains,
Summer	Forces & Magnets	 	<p>Key concepts:</p> <ul style="list-style-type: none"> <li>• Pushing and pulling can change the shape of things</li> <li>• Bigger pushes and pulls have bigger effects</li> <li>• Things can move in different ways</li> <li>• Larger masses take bigger pushes and pulls to move or stop them</li> <li>• Pushing and pulling can make things move or stop</li> <li>• Pushing and pulling can make things move faster or slower</li> <li>• Magnets exert attractive and repulsive forces on each other</li> <li>• Magnets exert attractive forces on some materials</li> <li>• Magnets exert <b>non-contact</b> forces, which work through some materials</li> <li>• Magnetic forces are affected by: magnet strength object mass and distance from object</li> </ul>	What happens when you push something? Remember in PE when you kick a push a ball. What happened to it? How would you make it move faster? Slower? What about if someone had the ball and you wanted it, what might someone do to get the ball?	Magnet, force, attract, repel, push, pull, friction, effect, mass, strength, contact, exert.

Itchen Abbas Primary School Scheme of Work for Science

Possible lessons:



- Simply ask the question:, *“Do magnets work through all materials, and which materials are the most effective at blocking the magnetic force?”*.
- Does covering a magnetic material in paint, plastic or paper make the attraction weaker?
- Do the magnets that attract materials the strongest also repel each other the hardest?
- Show a cartoon of a magnet attracting something over a long distance and then ask how far do magnets work?
- Ring magnets can be stacked to create a variety of
- What could I put in my paper boat that would allow me to use a magnet to drive my boat by both pushing and pulling it?
- Spend 15 minutes testing as many materials as possible to see which are attracted to a magnet and which not. Can the children see any patterns? Are all metals magnetic?
- I want to make a cardboard car move on a thin board by using a magnet under the board. What is the best material to stick under the car?

Itchen Abbas Primary School Scheme of Work for Science


Otters Cycle A (Yr. 4 & 5)	Unit of Work Title	Thresh old Conce	End Point - Key concepts, knowledge / skills specific to this unit/	Retrieval of Previous Learning	Key vocabulary
Autumn	Sound	 	<p>Key concepts:</p> <ul style="list-style-type: none"> <li>• Sound travels from its source in all directions and we hear it when it travels to our ears</li> <li>• Sound spreads out as it travels</li> <li>• Sound travel can be blocked</li> <li>• Changing the shape, size and material of an object will change the sound it produces</li> <li>• Sound is produced when an object vibrates</li> <li>• Sound moves through all materials by making them vibrate</li> <li>• Changing the way an object vibrates changes its sound</li> <li>• Faster vibrations (higher frequencies) produce higher pitched sounds</li> <li>• Bigger vibrations produce louder sounds and smaller vibrations produce quieter sounds</li> </ul> <p>Possible lessons:</p> <ul style="list-style-type: none"> <li>• Twang a ruler on the edge of a desk and look for the relationship between how it vibrates and the pitch.</li> <li>• Make a guitar with elastic and a box so that it makes four different notes. Children have to explain what they did to change the vibration and how it changed the vibration.</li> </ul>	<p>Last time you explored physics, you learnt about forces, magnets and light. How might this link to sound? How did light travel? How do you make sounds quieter and louder?</p>	<p>Sound, noise, vibration, pitch, volume, change, travel, louder, quieter, frequency.</p>



**Itchen Abbas Primary School Scheme of Work for Science**

			<ul style="list-style-type: none"> <li>• Place a wind-up music box on different surfaces and try and explain why the sound is a different volume.</li> <li>• Make a soundproof box for a buzzer or alarm clock, but apply the children’s ideas of vibrations to predict the best material.</li> <li>• Place objects that vibrate in water to see how the object makes the water vibrate (tuning forks work well).</li> <li>• Make a string telephone (given a range of wires and strings and cups) to make the clearest and loudest signal.</li> <li>• Use an old speaker to show how the speaker makes the air in front of it vibrate by placing a candle in front of the speaker.</li> <li>• Given a pile of junk, make as many different sounds as possible. Describe each sound using the terms <i>high, low, loud</i> and <i>soft</i>.</li> <li>• Hang ping pong balls from string and touch with a tuning fork.</li> <li>• Get children to feel their throat when making a sound. Show videos of vocal chords vibrating.</li> <li>• Given a pile of junk, make as many different sounds as possible. Describe each sound using the terms <i>high, low, loud</i> and <i>soft</i>.</li> <li>• Blow over a narrow pipe to make a flutey noise and then ask pupils to find out why some pipes have different pitches than others.</li> <li>• Do a similar thing with a bottle containing water.</li> <li>• Investigate how children can change the sound of homemade thunder tubes.</li> </ul>		
Spring	Living Things in their Habitats	 	<p>Key concepts:</p> <ul style="list-style-type: none"> <li>• Living things can be divided into groups based upon their characteristics</li> <li>• Environmental change affects different habitats differently</li> </ul>	<p>In Hedgehogs, you learnt some things are living, some were once living but now dead and some things have never lived. You also explored that different animals and plants live in different places and environmental change can affect plants and animals that live there.</p>	<p>Living thing, organism, food chain, food web, environmental change, producer,</p>

**Itchen Abbas Primary School Scheme of Work for Science**

			<ul style="list-style-type: none"> <li>• Different food chains occur in different habitats</li> <li>• Different organisms are affected differently by environmental change</li> <li>• Human activity significantly affects the environment</li> <li>• Nutrients produced by plants move to primary consumers then to secondary consumers through food chains</li> <li>• Possible lessons:             <ul style="list-style-type: none"> <li>• Creature hunt – classify living things they find.</li> <li>• Guess who – living things game.</li> <li>• Dissect a plant and identify what the parts are for.</li> <li>• Explore life cycles of creatures from around the world.</li> <li>• Tree identification on a nature walk.</li> <li>• Pond dipping in the River Itchen.</li> <li>• Construct a whole-class food web of an ecosystem. Children identify the organisms and research what they eat and what eats them.</li> </ul> </li> </ul>		<p>primary consumer, secondary consumer, tertiary consumer, life cycle, carnivore, herbivore, omnivore.</p>
Summer	Materials Including States of Matter		<p>Key concepts:</p> <ul style="list-style-type: none"> <li>• Materials can be divided into solids, liquids and gases and they can be described as observable.</li> <li>• The temperatures at which given substances change, cooling causes gases to condense to liquids and liquids to freeze to solids, heating causes solids to melt into liquids and liquids to evaporate into gases.</li> <li>• Materials change state by heating and cooling, some changes can be reversed and some cannot, when two or more substances are mixed and remain present the mixture.</li> <li>• All matter has mass.</li> <li>• Heating can sometimes cause materials to change permanently. When this happens a new substance is made.</li> </ul>	<p>In Hedgehogs, you learnt that materials have describable properties, different materials have different properties and that materials can be changed by physical force (twisting, bending, squashing).</p>	<p>Material, liquid, solid, gas, cooling, heating, condense, evaporate, freezing, temperature, observe, dissolve, matter, mass, mixing,</p>

Itchen Abbas Primary School Scheme of Work for Science

- Sometimes mixed substances react to make a new substance.

Possible lessons:

- Have we made something new? How can you prove it? (Key question: can I get the original materials back?)

- vitamin tablet in water

- Steradent and water

- baking powder and vinegar

- plaster of Paris and water

- Andrews Salts and water

- Invisible ink experiments: can the ink be made invisible again?

- Bake sale. Children create cakes, biscuits, lollies, etc to sell. If they make a mistake, which ones can they start again with and why?






- Take some wet clay and dry it; take the dried clay and fire it. Has a new substance been made at each stage and how could you find out?

- Half fill a one litre Coke bottle with polystyrene beads (used for packaging) then, whilst pumping some air into the bottle, ask the children what might happen inside the bottle. Let them explain what happens next

- Does lemonade weigh more when it is fizzy or flat? Why?

- Explore that air is made of stuff by running with large pieces of card in front and to the sides. So if air is made of stuff would it weigh anything?




**Itchen Abbas Primary School Scheme of Work for Science**

Otters Cycle B (Yr. 4 & 5)	Unit of Work Title	Thresh old Conce	End Point - Key concepts, knowledge / skills specific to this unit/	Retrieval of Previous Learning	Key vocabulary
Autumn	Earth and Space	 	<p>Key concepts:</p> <ul style="list-style-type: none"> <li>• Stars, planets and moons have so much mass they attract other things, including each other, due to a force called gravity. Gravity works over distance.</li> <li>• Objects with larger masses exert bigger gravitational forces.</li> <li>• Objects like planets, moons and stars spin.</li> <li>• Smaller mass objects like planets orbit large mass objects like stars.</li> <li>• Stars produce vast amounts of heat and light. All other objects are lumps of rock, metal or ice and can be seen because they reflect the stars.</li> </ul> <p>Possible lessons:</p> <ul style="list-style-type: none"> <li>•Do heavy objects fall faster than light objects?</li> <li>•Create a scale model of the solar system.</li> <li>•Look at a diagram of our solar system. Which planet do you think will be the hottest? coolest?</li> <li>•What things on Earth might change if the moon disappeared?</li> <li>•Record the changing phases of the moon over a month.</li> <li>•Examine data on the mass of planets and the number of moons they have orbiting them. Does a pattern emerge?</li> </ul>	<p>In Hedgehogs you learnt about rocks and how they fall to the ground. In Otters, you learnt about magnets and forces and how objects push and pull towards each other.</p>	<p>Mass, Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune, Pluto, planers, solar system, daylight hours, seasons, matter, gravity, air resistance, phases of the moon, orbit.</p>
Spring	Electricity	  	<p>Key concepts:</p> <ul style="list-style-type: none"> <li>• Electricity powers many common appliances</li> <li>• A source of electricity (mains or battery) is needed for electrical devices to work</li> <li>• Electricity sources push electricity round a circuit</li> <li>• More batteries will push the electricity round the circuit faster</li> </ul>	<p>How do your parents charge their phones? How does it work? Why doesn't it just stop working when it's unplugged? In Hedgehogs, you learnt about how materials have different properties and that some objects get hot and change shape and some do not.</p>	<p>Circuit, conductor, insulator, switch, power, battery, bulb, motor, buzzer, electricity flow,</p>

Itchen Abbas Primary School Scheme of Work for Science



		<ul style="list-style-type: none"><li>• Devices work harder when more electricity goes through them</li><li>• A complete circuit is needed for electricity to flow and devices to work</li><li>• Some materials allow electricity to flow easily and these are called conductors. Materials that do not allow electricity to flow easily are called insulators</li></ul> <p>Possible lessons:</p> <ul style="list-style-type: none"><li>• Look at a range of circuits that do not work: how can we make them work?<ul style="list-style-type: none"><li>• Build a burglar alarm (using a pressure pad and buzzer).</li><li>• Make a buzzer maze game.</li><li>• Make steady hand testers.</li><li>• Create a multiple choice quiz game that lights up when you get the right answer.</li><li>• Make circuits with aluminium kitchen foil.</li><li>• Give each child a bulb. Set the challenge: "I am going to allow you to collect one piece of apparatus at a time, let's see who can light their bulb with the smallest number of components."</li><li>• What happens to the bulb in a circuit if we use a really old battery? (Or allow the battery to fade over a period of days.)</li><li>• Investigate a range of different batteries, including those made from lemons, potatoes. Which will light a bulb? Which will turn a motor? (This could be linked to a shipwrecked scenario: we have got the radio, but no battery.)</li><li>• Explore a range of moving toys, including some battery powered toys. Which toys use electricity? How many batteries do they need? Does it matter which way round the battery is put in?</li><li>• Test different materials using a simple circuit.</li><li>• Shipwrecked scenario: we found some batteries and the radio, but how can we connect them?</li></ul></li></ul>		device, input, output.
--	--	--	--	------------------------

**Itchen Abbas Primary School Scheme of Work for Science**

			<ul style="list-style-type: none"> <li>• Crazy circuits: make some electric circuits using unusual conductors.</li> </ul>		
Summer	Animals Including Humans	  	<p>Key concepts:</p> <ul style="list-style-type: none"> <li>• Different animals are adapted to eat different foods</li> <li>• Animals have teeth to help them eat. Different types of teeth do different jobs</li> <li>• Food is broken down by the teeth and further in the stomach and intestines where nutrients go into the blood. The blood takes nutrients around the body</li> <li>• Many animals have skeletons to support their bodies and protect vital organs</li> <li>• Muscles are connected to bones and move them when they contract</li> <li>• Movable joints connect bones</li> </ul> <p>Possible lessons:</p> <ul style="list-style-type: none"> <li>• Pupils describe what happens to muscles and bones when a person rides a bike. Use iPads to explore movement in slow motion.</li> <li>• Investigate the effect of making bones bigger in diameter on their strength.</li> <li>• Predict the skeleton of an animal and really apply the ideas opposite to do so. Show the real skeleton and explain the differences.</li> <li>• Give them a bone or two found somewhere. What do they think they can say about the animal from the bone? • If an animal has a skeleton what else can we say about it? Predict and test through research.</li> <li>• Use drama to model the role of teeth, stomach and intestines.</li> <li>• Provide a large empty torso and ask them to draw what they think happened to the meal they ate last night.</li> </ul>	<p>In Squirrels and Hedgehogs, you learnt that animals need a variety of food to help them grow, repair their bodies, be active and stay healthy. You also found out that different animals move in different ways to help them survive, animals grow until they reach maturity and then do not grow any larger and animals reproduce new animals when they reach maturity.</p>	<p>Teeth, molars, incisors, canines, plague/rotting, nutrients, digestive system, bones, skeleton, muscles, body parts (intestines, bladder, kidneys etc).</p>

**Itchen Abbas Primary School Scheme of Work for Science**

		<ul style="list-style-type: none"> <li>• Someone has lost a tooth. Will it affect what they can eat? Model teeth with knives, nails and crushing implements and investigate their effects on different foods.</li> <li>• Investigate what makes teeth rot by looking at the effect of different liquids on small marble chips (which work better than egg shells and fizz slightly in lemon juice; even better if you use powdered calcium carbonate).</li> <li>• Use disclosing tablets and compare the effectiveness of manual versus electric toothbrushes, brushing techniques and even different toothpastes.</li> <li>• The tiger who came to tea; what if it was not a tiger but an animal you have never seen before? What would it eat? Provide children with snippets of information for them to predict what they should feed the animal.</li> <li>• • Dissect owl pellets (cheap to buy) to identify what their diets are. What do they not use and why?</li> </ul>		
--	--	---	--	--



Foxes Cycle A & B (Yr. 6)	Unit of Work Title	Threshold Concepts	End Point - Key concepts, knowledge / skills specific to this unit/	Retrieval of Previous Learning	Key vocabulary
Autumn	Electricity	  	<p>Key concepts:</p> <ul style="list-style-type: none"> <li>• Batteries are a store of energy which pushes electricity round the circuit, when the battery's energy is gone it stops pushing.</li> <li>• Current is how much electricity is flowing round a circuit.</li> <li>• The greater the current flowing through a device the harder it.</li> </ul>	<p>In Otters you explored different types of circuits, what happened if you didn't include a battery in your circuit?</p> <p>When you created your games in Otters for DT you used electrical circuits, what materials did you need?</p>	<p>Current, light source, circuit, energy, flow, components, symbols, voltage, parallel, conductor, insulator, generator, fuse.</p>

Itchen Abbas Primary School Scheme of Work for Science





- |  |  |  |  |  |
|--|--|--|--|--|
|  |  | <ul style="list-style-type: none"><li>• When current flows through wires heat is released. The greater the current the more heat is released.</li></ul> <p>Possible lessons:</p> <ul style="list-style-type: none"><li>• Are Duracell batteries really the best?</li><li>• Compare the lifespan of batteries in a range of different toys.</li><li>• If a battery is powering two bulbs will it last longer, the same or less time than when powering one bulb.<ul style="list-style-type: none"><li>• “So, if I want my electric powered car to go faster, I just need to load on lots more batteries!” Investigate.</li></ul></li><li>• Are some wires better than others in circuits where we need the brightest possible light?<ul style="list-style-type: none"><li>• Wonderwall: show the children a selection of wires of different thickness and ask them what they want to find out. The greater the current flowing through a device the harder it works.</li><li>• How can we make an electric motor turn faster?</li><li>• Where is the best place to be in a lightning storm?</li><li>• What happens to the bulb, buzzer or motor as we add more batteries?</li><li>• Design a motor-powered device to pull a load (say a car) up a ramp: how could you make it faster?</li><li>• Who can make the fastest fairground ride?</li><li>• • How do electric heaters work?</li></ul></li></ul> |  |  |
|--|--|--|--|--|



Itchen Abbas Primary School Scheme of Work for Science

Autumn	Light	 	<p>Key concepts:</p> <ul style="list-style-type: none"><li>• Animals see light sources when light travels from the source into their eyes</li><li>• Animals see objects when light is reflected off that object and enters their eyes</li><li>• Light reflects off all objects (unless they are black). Non-shiny surfaces scatter the light so we do not see a single beam</li><li>• Light travels in straight lines</li></ul> <p>Possible lessons:</p> <p>Explore the effect of changing light conditions on pupil dilation.</p> <ul style="list-style-type: none"><li>• Research eye defects that might affect how much light can enter the eye.</li><li>• Compare the similarities and differences between a camera and children's eyes (keep it simple!). They then take a picture in a dark room (with flash) and explain how the camera can see in a dark room but we cannot.</li><li>• If you were to use a torch rather than a flash to take a photograph in the dark, where should you point the torch and why?</li><li>• Compare reflections from polished and tarnished metals, smooth and crunched aluminium foil. Describe and explain the differences. Extension: does white paper reflect light? If so, how come we cannot see reflections in it?</li><li>• Explore how and hypothesise why different curved mirrors give different images.</li><li>• Make shadow puppets. How could we make it appear as though the puppet was moving towards us (getting bigger)?</li></ul>		
--------	-------	--	---	--	--

Itchen Abbas Primary School Scheme of Work for Science

			<ul style="list-style-type: none"> <li>• Could we make a shadow puppet play with different characters using only one puppet?</li> <li>• What would happen during a solar eclipse if the moon were bigger or smaller?</li> </ul>		
Spring	Living things and their Habitats	 	<p>Key concepts:</p> <ul style="list-style-type: none"> <li>• Life cycles have evolved to help organisms survive to adulthood</li> <li>• Different types of organism have different life cycles</li> </ul> <p>Possible lessons: Explore life cycles of different living things and compare.</p> <ul style="list-style-type: none"> <li>• Explore living creatures and create a classification key.</li> </ul>	In Hedgehogs you explored life cycles of different creatures (such as chickens and frogs). How did they slowly adapt to their habitat?	Classify, living things, organism, life cycle, categorise, linnean classification, species, identification, arthropods, mollusc, crustaceans, vertebrates, invertebrates, characteristics.
Spring	Forces	 	<p>Key concepts:</p> <ul style="list-style-type: none"> <li>• Air resistance and water resistance are forces against motion caused by objects having to move air and water out of the way.</li> <li>• Friction is a force against a motion caused by two surfaces rubbing against each other.</li> <li>• Some objects require large forces to make them move; gears, pulley and levers can reduce the force needed to make things move.</li> </ul> <p>Possible lessons:</p> <ul style="list-style-type: none"> <li>• Challenge children to balance a heavy mass with a light one on a seesaw/ balanced ruler.</li> </ul>		

**Itchen Abbas Primary School Scheme of Work for Science**

		<ul style="list-style-type: none"> <li>• Make a trebuchet that uses a mass on a lever to launch a projectile. What is the effect of changing the length of the lever on how far the projectile goes?</li> <li>• Provide pupils with lots of ropes and planks (pulleys perhaps). Challenge them to lift a heavy bag using just their little finger.</li> <li>• Which tyre produces the most grip? (Get lots of old tyres and cut them up; children can stick them to the bottom of blocks of wood.)</li> <li>• Ancient Greeks were lazier than ancient Britains because they made palaces from marble rather than sandstone because it is easier to drag. Is this true?</li> <li>• Which material would give the fastest ride down a helter skelter.</li> <li>• Do surfaces that have a lot of friction also affect how quickly balls roll down them? (Remember that rolling is not the same as sliding or skidding!)</li> <li>• Are bananas really the slippiest fruit?</li> <li>• What shape submarines travel the quickest?</li> <li>• Why are fish the shape they are?             <ul style="list-style-type: none"> <li>• Paper helicopters: what is the optimum wing length/width?</li> </ul> </li> <li>• Do heavier objects fall more quickly?</li> </ul>		
Summer		<ul style="list-style-type: none"> <li>•</li> </ul>		