St Catherine's Catholic Primary school 2024-2025

St Catherine's curriculum intent is rooted in our drivers for our pupils to be Amazing Adventurers, Confident Communicators, Ready Readers and Writers, being Happy, Healthy, Spiritual and Secure. Science is taught as a discrete subject.

Our science curriculum provides for all children using core threads to provide learning coherence with the National curriculum. As our starting point we make meaningful connections across subjects to enrich and support knowledge. We review foundational knowledge and skills so that pupils can develop mastery in all subjects through carefully selected vocabulary, sequenced learning and learning that is brought to life through relevant contexts and experiences. Our program in science is drawn together using our science core threads.

Our Science Big Ideas

1. All matter in the Universe is made of very small particles.
2. Objects can affect other objects at a distance.
3. Organisms are organised on a cellular basis and have a finite life span.
4. The total amount of energy in the Universe is always the same but energy can be transformed when things change or are made to happen.
5. The composition of the Earth and its atmosphere and the processes occurring within them shape the Earth's surface and its climate.
6. The solar system is a very small part of one of millions of galaxies in the Universe.
7. Organisms are organised on a cellular basis.
8. Organisms require a supply of energy and materials for which they are often dependent on or in competition with other organisms.
9. Genetic information is passed down from one generation of organisms to another.
10. The diversity of organisms, living and extinct, is the result of evolution.

Core Threads

The learning of science is linked by the interplay of the core threads. Pupils at St Catherine's learn to become scientists linking our core threads of knowledge and skills together.

- Scientific enquiry- methods, technique, equipment, data and evidence.
- Biology
- Chemistry
- Physics.

EYFS – autumn term

	Required prior knowledge	Knowledge to be explicitly taught	Vocab
	Week 1 I have a body and it is made up of different parts. These different parts of my body have names. Week 2 My body parts help me to do different things. My senses help me to explore the world. There are 5 senses. These 5 senses are on different parts of my body. Week 3 I keep my body clean so that I stay healthy. I should brush my teeth twice a day. My grown-ups wash my clothes. I should have a bath or a shower regularly. I sometimes get poorly (runny nose, cough, sick, stomach ache). I eat some fruit and vegetables to keep me healthy.	**Body** **Week1 - Can I identify and name at least 3 parts of the human body?** **(measuring and observing – measure and observe using senses)** • Identify head shoulders, knees and toes through song • I know that my legs help me to walk • I know that my arms and hands help me to pick up, touch, push, pull things. • I know that my head is at the top of my body and that on my face there are: eyes, ears, nose and mouth. • I know that my friend has the same body parts as me e.g. arms, legs and eyes but that the colour, size and look can be different. • I know that we celebrate these differences at school. **Task design – play Simon says to identify and name the body parts (photo evidence)** **Week 2 - Can I name 3 parts of my body that are involved in the senses?** **(measuring and observing – measure and observe using senses)** • My mouth is the body part that helps me taste • My eyes are the body part that help me see (sight) • My hands are the body part that helps me touch • My ears are the body part that help me hear • My nose is the body part that helps me smell **Task design – investigation exploring the senses – mystery smells, what can you hear? Feely boxes, exotic foods** **Week 3 - How do I keep clean?** **(measuring and observing – measure and observe using senses)** • I can manage some of my own basic hygiene and personal needs, including dressing, and going to the toilet. I understand the importance of healthy food choices. • I brush my teeth twice a day to keep my teeth and gums healthy and to keep my breath smelling fresh (tooth brushing activity) • I have a bath/shower to keep my skin clean and to stop me from catching germs and becoming poorly. • I wash my hands before I eat, after I have used the toilet and when I have touched things outside so that I wash away the germs. • I know that my clothes need to be washed to stop germs spreading and to keep me smelling fresh. **Task design – photo images of children keeping clean – brushing teeth, washing hands, washing clothes (outside area) showering dollies and orally explain why it is important to keep clean.** **(To arrange a talk with a school nurse or a dentist)**	Head, Arm, Leg, Hand, Foot, Finger, Toe, Nails, Eye, Ear, Mouth, Skin, hair (e.g. blonde, brown, black, curly, straight) Senses, Touch, Smell, Sight, Hearing, Taste, nose, mouth, ears, hands, eyes Germs, clean, wash, hygiene, healthy, unhealthy, exercise Clean, healthy, rest, sleep, food, wash,

	Week 4 Being healthy helps me to be happy. I eat food every day. I drink every day. I am told some foods are bad for me. I know that fruit and vegetables are healthy. I can name some fruits and vegetables. Week 5 Different things happen at different times of year. I know that every year I have a birthday. I know that Christmas is celebrated every year. Easter, holidays, Halloween and firework night are celebrated each year. I have noticed that the weather is not always the same. These weather changes are called seasons. Week 6 A feature is a part of something e.g. a feature of your body is your arm, a feature of your classroom is a chair. Every season has its own feature. These features change in different seasons. Some trees change their features across the seasons e.g. with some trees their leaves fall in the autumn but are green in the spring.	**Week 4 – Can I name 3 ways to stay healthy?** **(measuring and observing – measure and observe using senses)** • I can make healthy choices about food, drink, activity and toothbrushing. • I know that exercise is good for my body. • I know that some foods are good for me, and some foods are not so good for my body. • I can organise foods into healthy and unhealthy foods. **Task design – create a healthy wheel collage (exercise, sleep, eat, drink, wash) that illustrates all the things we can do to stay healthy.** **Seasons (autumn)** **(Analysing and evaluating - notice patterns in the world around me)** **Week 5- Can I name the 4 seasons?** · • There are 4 seasons in the year, and they have different names. • The names of the seasons are: autumn, spring, summer and winter. • The 4 seasons have different weather patterns in them. • It is often cooler in the autumn, beginning to warm in the spring, hot in the summer and cold in the winter. • Other changes in the seasons include trees, flowers, clothes people wear and food people grow and eat. **Task design – Do an autumn walk around the grounds – record what is noticed. Back in the classroom, look at images linked to summer, autumn, winter, spring and organise images based on observations to categorise into seasons. Use colours to paint 4 different trees to recall the names of the 4 seasons. To have a season display chart so that the children always know which season they are in.** **Week 6 - Can I describe 2 features of each season?** **(Analysing and evaluating - notice patterns in the world around me)** • Autumn falls across the months of September, October and November. • We are in Autumn now. • The leaves are changing colour and some are falling off the trees. • Autumnal colours consist of brown, red, orange and yellow. • Some animals begin gathering food for the winter in autumn. One of these animals is the squirrel. • The weather becomes cooler and we see a lot more wind and rain. • Autumn is the time of year when we have Halloween and bonfire night. • Autumn is the season for crops and harvest. • Autumn is a busy time for farmers • The days become shorter (gets darker quicker) **Task design – Children watch https://www.bbc.co.uk/teach/class-clips-video/articles/z4v77yc#:~:text=Autumn%20is%20a%20busy%20time,there's%20not%20much%20food%20around.** **After watching the short video clip, children discuss signs of autumn (oracy based task) explaining what they can see/do in autumn and how they know it is autumn by looking outside. Ongoing continuous provision of sketching signs of autumn.**	Winter, autumn, spring, summer, seasons Autumn, September, October, November, fall, change

	Week 7/8 The weather changes in the 4 seasons. Different types of weather have different names e.g. rain, fog, sunny, cloudy. The weather can change throughout the day. Week 9/10 Clouds are in the sky. Some days there are more clouds than on other days. I wear a coat to keep me dry and warm. Some coats are better at keeping me dry than others. An umbrella keeps me dry when it is raining. Week 11 Scientists make predictions. This is different from a guess because they use information they already have and think carefully. There are different types of weather.	**Weather** **Week 7 /8- Can I name 3 different types of weather?** **(Analysing and evaluating - notice patterns in the world around me)** • The sun gives us light and heat • Clouds are made up of lots of tiny drops of water • Clouds float in the sky and change shape and size • Rain falls from the clouds • When the drops of water in the clouds become too heavy for the cloud to hold on to, they fall out of the cloud onto the ground. This is called rain. • Rainbows can be seen when it is raining in one part of the sky and sunny in another. • When the sunlight shines through the rain, it is split into the seven colours of the rainbow. • Fog is a cloud that is formed on the ground, this can be thick and hard to see through. • Snow is made from soft, white ice crystals that fall from clouds. Snow can be very cold so we need to wrap up and wear lots of layers to keep our bodies warm. • Wind is moving air, you cannot see it but it moves trees and leaves. **Task design – week 7 – Sketch some clouds in the sky, noticing different shapes and colours. Experiments: rain jars, Week 8 - rainbow crystals, windmills and making snow.** **(photo evidence and recorded oral statement of what they did)** **Week 9/10 - Can I explain 2 ways of keeping myself dry?** **(Analysing and evaluating - notice patterns in the world around me)** • Rain comes from clouds. • Rain can make you very wet and cold. • Rain is needed to help plants grow. • Some materials are waterproof, and some are not. • Waterproof means it does not allow water through. • A waterproof coat helps to keep my body dry and warm. **Task design – week 9 – test a variety of materials to observe if they are waterproof – complete a tick table to show results. week 10 - design and make an umbrella using selective materials which have been tested to determine whether they are waterproof – can you keep the gingerbread man dry?** **Week 11 - Can I predict what the weather will be like this week?** **(Analysing and evaluating - notice patterns in the world around me)** • The weather is not the same everyday • The season and time of year can hint the expected weather • The sky can give a clear idea of what the weather will be like for that day • The weather changes all the time. • There are some places around the world where it never rains e.g. deserts. Our school has lots of green areas as it rains a lot in our country.	rainy, cloudy, snowy, fog, rainbow, sun coat, umbrella, waterproof, wellington boots Waterproof, coat, protect, weather, rain, clouds, wet, cold Predict, weather, rain, sunshine, fog, cloudy, misty, snowy, showers

	People show us the weather on TV and tell us what the weather will be like. Scientists record the weather using special equipment.	**Task design – create a weather report based on knowledge of different weathers. This short clip introduces weather journals to record the weather https://www.youtube.com/watch?v=Uo8lbeVVb4M.** **Oak class to start a weather journal/scrapbook that children can add drawings to or photos throughout the year. This can be divided into 4 sections to reflect on the changes of weather in the 4 seasons.**	

EYFS – Spring term

	Required prior knowledge	Knowledge to be explicitly taught	Vocab
	Different things happen at different times of year. I know that every year I have a birthday. I know that Christmas is celebrated every year. I may know of some other annual occasions (easter, holidays, Halloween, fireworks). I have noticed that the weather is not always the same. I have noticed some trees change across the seasons. **I know that we have already been through the season of Autumn** Things around me change in different seasons. I have noticed some trees change across the seasons. Weather changes in different seasons.	**Seasons (winter)** **Week 1- Can I say the names of the seasons? ·** **(Analysing and evaluating - notice patterns in the world around me)** • I know that there are 4 seasons in the year • I know that winter falls across the months of December, January, February • I know that the 4 seasons can be identified by changes i observe – particularly by looking at plants and trees • I know that the weather changes in the different seasons • I know that the seasons break up our year. **Task design – create a seasonal calendar using sorting images.** **Week 2 - Can I describe some of the things that happen in each season?** **(Analysing and evaluating - notice patterns in the world around me)** • I know that the trees are bare in winter and there is little food for animals • I know the weather becomes colder and the ground freezes when it gets really cold. • I know that chirstmas falls in the season of winter • I know that we don't see many animals in winter because they hibernate	Week 1 Summer, autumn, winter, spring Week 2 Summer, autumn, winter, spring Weather Hibernate Cold frost

		• Hibernation is when animals sleep through the winter as the temperature is too cold for them. • Sometimes in winter the weather becomes so cold it snows – but it doesn't always snow. **Task design – record signs of winter pictorially or recording words – winter thermometers experiment (making their own thermometer in a jar)**	
	There are objects and things all around me. An object is something in my environment. Something that breaths, moves, talks is alive. I am alive. I am a human.	**Animals** **Week 3 - Can I say separate living things from non-living?** **(Analysing and evaluating - notice patterns in the world around me)** • Living things have the same life cycle - birth, growth, reproduction, and death. Living things don't live forever and have a certain life span. • Living things grow and move, though not always in the same way. • Humans will move by walking, running, and all those kinds of things. • Plants move too in order to reach sunlight. • Non-living things are not alive. **Task design – sort living and non-living objects and images into groups and discuss any that they are not sure about (fire, flowers, trees etc).**	Week 3 - Living Non-living Object Breathing Alive movement
	I have animals at home. I can visit a zoo to see different animals. There are animals in my garden. Not all animals are from where I live. I can name animals that I have seen in my environment/ when i have visited zoos. Animals are a part of our wildlife.	**Week 4 - Can I name some animals?** **(Analysing and evaluating - notice patterns in the world around me)** • Animals are living things. • Like plants, animals need food and water to live. • Unlike plants, which make their own food, animals feed themselves by eating plants or other animals. • Animals can also sense what goes on around them. • Their bodies allow them to move in reaction to their surroundings. • There are lots of different animals which can be grouped into different categories (pets, wild, sea, insects, birds, • Animals change over time like humans and grow and change. **Task design – using animal figurines name and identify a variety of different animals. Can children sort them into groups and explain how they have grouped them? Animal sorting game baby-adult.**	Week 4 - Animals Insects Fish Reptiles Dog, cat, rabbit, fish, Zebra, lion, giraffe, hippo, aligator.
	Animals need food to survive. We feed our pets at home. Animals in the wild have to find their own food. Animals do not eat the food I eat (although they may like to).	**Week 5 - Can I say what an animal eats?** **(Analysing and evaluating - notice patterns in the world around me)** • Not all animals eat the same things • Some animals eat plants – these animals are known as herbivores	Week 5

	Some animals eat other animals – that is the circle of life. Living things breathe, move, have babies, and die. We as humans are living things. I am noticing changes outside. The trees have changed since i started school. The weather has changed. I am noticing lots of plants growing around me.	• Some animals eat other animals – these animals are known as carnivores • Some animals eat plants and other animals – these animals are known as omnivores. • Carnivores are animals like wild cats, snakes and sharks. Their diet includes meat and meat alone. They don't eat fruits and vegetables like us! • Herbivores only eat plants. Animals that are in this group include deer,, horses, and even rhinos! A lot of these animals eat mainly grass. • Animals that eat both plants and animals are called omnivores. Humans are omnivores along with bears, dogs and some birds. • **Task design – Sort animal/food images into groups herbivore, carnivore, omnivore.** **<u>Bugs and habitats</u>** Week 6 - Can I say that all living things need food and water to stay alive? • Animals, including humans need certain things in order to stay alive. • To survive means to continue to stay alive. • All animals need food and water to grow, remain healthy and stay alive. • All animals need air so that they can breathe and stay alive. **Task design – make a poster of what an animal needs to survive and what I need to survive. Plant cress to demonstrate how to keep a living thing alive.** Week 7 - Can I say that animals get their food in different ways? • A food chain shows what animals eat and where their food comes from. • Some animals are known as predators (animals who hunt other animals) some animals are known as prey (animals that are hunted by other animals). • Animals needs to search for their food. • Some animals eat plants whilst other animals eat other animals (herbivore and carnivore) • **Task design – children to create a simple 3 step food chain e.g. grass, cow, human or plankton, fish, shark.**	Carnivore Herbivore Omnivore Food Predator prey Week 6 - Animal Alive Basic needs survive Week 7 - Predator Prey Animals Food Food chain Week 8

		Week 8/9/10 - can I give examples of habitats and the living creatures that live there? • A habitat is an animals home. • A habitat provides animals with 3 important things food, shelter and place to raise their young. • There are different types of habitats Woodlands, Ponds, Jungles, Polar regions, Oceans, Coral Reefs, Desert. • Different habitats meet the needs of different animals. • Different animals live in different habitats. **Task design –** **Week 8 – explore polar and ocean habitats – create a small world polar habitat and explain what animals would like there and what animals would not giving reasons for why. Think about food animals would need in such a cold/ warm habitat.** **Week 9 – visit the local woodland behind school and think about what animals may live here. Search for animal dens/homes. Discuss what food is available in the woodland using a picture resource kit.** **Week 10 – Jungle habitat – using the jungle book clips are stimulus children to think about the jungle environment. Children to make a jungle using small world and natural resources describing why the jungle habitat would need this.** Week 11 – what are worms? • There are 4 types of earthworm - they eat slightly different things. • A habitat is where a living thing lives. • The worm's habitat is both under and on the surface. • Earthworms don't have eyes, so they are indifferent to light or dark. • Earthworms are one of the most important organisms as they keep the soil healthy. • They eat rotting leaves and other plant matter and then put all the nutrients back into the soil. **Task design – Children to collect worms from the soil at forest school. Using petri dishes and magnifying glasses explore the worms and describe them. Label the parts of a worm they draw including the tail. Head and body.** **Seasons (spring)** **(Analysing and evaluating - notice patterns in the world around me)**	Ocean Polar Icy Cold Snow Water Animals Food Shelter Week 9 Forest Woodland Animals Plants Dens/homes Shelters Week 10 Jungle Animals Plants Trees Warm Week 11 Earthworm Worms Environment insect

		Week 12 - Can I describe some of the things that happen in each season? • I know that the trees and plants begin to shoot and grow in spring • The weather warms up in spring • We sometimes get lots of rain in spring • Spring falls across March, April, May • Baby animals are seen in the fields • The days begin to become longer (more daylight) **Task design - Children to go on a spring walk and record what they see. What do they notice, what do they hear. Children to create a spring collage and describe what they can see.**	week 12 Spring Flowers Daffodils Regrowth Colourful Lambs Birds Chicks Rain sunshine

EYFS – Summer

	Required prior knowledge	Knowledge to be explicitly taught	Vocab
	Things feel and look different from each other Touch is one of our senses Different objects can feel different to each other	**<u>Materials/Forces</u>** Week 1- Can I name a number of materials? • The term 'materials' is used to describe all the different things - the 'stuff' - that makes up our world. • They include metal, plastic, wood, paper, glass, rock, water, air. • Everything, including the clothes we wear and the food we eat, can be described as materials. **Task design – children write labels for a variety of different materials and objects showing what materials they are made from.** Week 2: Can I describe how a material feels? • Different materials have different properties and behave in different ways - they can be hard, soft, rough, smooth, heavy, light, springy, firm, shiny or dull. **Task design – using labels children to label and sort objects into categories e.g. hard and soft, rough and smooth. Children to label objects with words to describe their properties.**	Wood, plastic, glass, paper, rock, water, air. Hard, soft, rough, smooth, heavy, light, springy, firm, shiny, dull

	We wear different clothes depending on the weather as some let the water through and others protect us from the sun or cold. Distance is the length between two points Width is measurement side to side Length is measurement one end to the other	Week 3: Can I suggest a material for a particular use? • Some materials stop water from coming in • Some materials will let water through or soak in **Task design: link to Jack and the beanstalk – Jack wants to return to the Giant's land at night. He needs a waterproof jacket to avoid the Giant sneezing on him. Children to test different materials to see which would be the best to protect model of Jack. Children to record results using a stem sentence.** Week 4 - Can I say that when I changed the shape of a paper plane, it changed the distance it flew? • The planes must be a broadly similar shape so they can fly. A brick shaped plane couldn't fly! • Changing the width, weight and length of a plane will change how far it flies. • When you change something in an investigation, the result changes too. Here, by changing the width of the plane/weight of the plane, we have changed how far the plane flies. **Task design – children to make a paper aeroplane and test how far they can fly it. Children to think about how they could make their aeroplane travel faster based on their test. Fly from the same starting point.** Week 5 - Can I make suggestions for a suitable material to make a boat? • Things float because they are less dense than water (it is fine for you to use the word 'heavy' even though not strictly correct) • Metals can float if you spread out their weight **Task design: choose a material to make a boat out of can your boat transport a figurine from one side of the water tray to the**	waterproof material absorb paper aeroplane further distance narrow wide

		other. Include some objects such as plastic containers and metal tins. Draw the boat that is most successful and label the material it was made from.	
	Floating is the object resting on the surface of a liquid Different shape objects can float	Week 6- Can I make something move by pushing or pulling? • push is a movement away • pull is a movement towards **Task: children to operate a variety of different objects thinking about which force needs to be applied to make it work/move. Does it require a pushing or pulling force. Children to complete a tick sheet to generate results and group into push and pull motions** Week 7 - Can I make something move without touching it? • When magnets move away from each other a push has happened • When magnets move towards ab object a pull has happened **Task : Put a tray out with different objects on and magnets of different strengths. Children see which objects can be moved by the magnets? Ask the children do they move in the same way with each magnet and what happens when you put two magnets together**	float sink weight load
	Objects can be moved by touching them.	**<u>Plants</u>** Week 8- Do bigger seeds grow bigger plants? Record observations **Task design: Using cress seeds, sunflower seeds, pea seeds, tomato seeds plant pots, soil, water, labels** **Pupils will plant one seed each and each group will have 4 different seeds.**	push Pull away Towards
	A push is a movement away a pull is a movement towards	**2) If you are using Polystyrene cups as plant pots, you will need to poke a drainage hole in the bottom of the cup.**	magnets

	Plants are living things and require water, air, nutrients and light to grow Plants are made up of different parts	**3) Pupils need to arrange the seeds in order of size.** **4) Label the pot with the type of seed planted and place the plant pot where it can get plenty of light.** **5) The plants will need to be watered every day.** **6) After several weeks, decide which plant is the biggest and compare the seed size to the size of the plant** **Discuss 1) Did the biggest seed grow the biggest plant? 2) Do bigger plants make more leaves? 3) Are all leaves the same shape and size?** Week 9 - Can I name some parts of a plant? • Leaves are usually green • Roots are usually underground • Stem is the middle part • Flowers come in all shapes, sizes and colours • Branches grow from the stem • Bark is on the outside of a tree **Task design: Parts of a Plant for kids https://youtu.be/TD60-3rqPXg Using real plants children draw a picture and write the part of the plant. Labels with pics on provided.** Week 10 - Why are plants useful? • Plants give us food • Plants give us clothing e.g. cotton, linen, dyes • Plants give us paper • Plants give us building materials e.g. wood • Plants give us fuel • Plants give us medicine **Task Design: Set up small world stations to show uses of plants – e.g. making clothes for figures out of cotton, building houses out of wood, making little books etc. (pzaz cards)** **Seasons (summer)** **(Analysing and evaluating - notice patterns in the world around me)** Week 11- Can I describe some of the things that happen in each season?	observe record seeds soil leaves roots stem flowers branches Bark

	Plants are helpful they give us fruit and vegetables Autumn, winter Spring are seasons. The weather changes and plants change during the seasons	• I know that the weather is sunnier in summer • I know that the temperature becomes warmer • I know I have to wear suncream/hats to protect me from the sun • I know that the days are longer in summer • I know that summer falls across June, July, August	linen cotton fuel medicine Temperature Sunscreen June, July August

Year 1/2: Across whole year Biology and Physics: The Natural World and Seasonal changes

	Required prior knowledge	Knowledge to be explicitly taught	Vocab

Year 1/2 Autumn : Everyday Materials

	Week 1 - The main different types of weather we have in our country are rainy, cloudy, foggy, sunny, windy. The weather can change rapidly in one day. I dress appropriately for different weathers. The 4 seasons of the UK are: autumn, spring, summer and winter. These seasons have different weather patterns. Climate is the weather found in one place over a long period of time. The UK has a **temperate climate,** with cool, wet winters and warm, wet summers.	Week 1: How do the seasons change across the year? A&P: Scientists look for patterns in the world around them. Record numerical or descriptive observations in a table • In the Uk we have 4 seasons where the weather patterns change and features of living things change e.g. some trees lose leaves, flowers drop. • We will be observing the 4 seasons. • We wear different clothes for different weathers. • The weather changes gradually as we move from season to season. There are different ways to measure and record seasonal features, including weather. • When weather and seasonal features are recorded, patterns can be observed, and statements made. • Different animals can be seen in different seasons. **Task Design – Divide the class into 4 groups. Each group is assigned a different season. Yr 1: Using Pzaz, prepare table/chart for measuring monthly rainfall. Yr 2: Discussions around how these seasonal changes can be recorded. T to suggest an ongoing digital log/ album of photos/rain gauge and chart. T to put ideas into action so that seasonal features are observed and recorded throughout the year.**	VOCAB Season, weather, autumn, spring, summer, winter, climate
	Week 2 - An object is a material thing that can be seen and touched. Materials have different names and different uses. A Caroll diagram is used to group things.	Week 2: What are objects made of? A&P: Scientists group objects or living things based on their properties Sort materials into a Carroll diagram based on their characteristics • An object can be seen and touched and is made from different materials. • The material is what an object is made of. For example, a cup can be made of paper or plastic depending on its main purpose. • Common materials include wood, plastic, brick, paper, metal, glass, water, rock, cardboard. **Task Design - Investigating real materials – go on an objects and materials walk. Observe and name the object that you see e.g. a table. Now record all the materials that it is made from.**	object, properties, material, wood, plastic, glass, metal, water, rock, brick, paper, fabric, elastic, foil, cardboard, rubber, wool, clay, hard, soft, stretchy, stiff, bendy, waterproof, absorbent, tear, rough, smooth, shiny, dull, see through (transparent) , not see through (opaque) Carroll diagram
	Week 3 - I have 5 senses: touch, smell, taste, sight and sound. I can use my senses to understand the physical properties of materials. A venn diagram is used to record information. It has a cross section.	Week 3: Do all materials have the same properties? A&P: Scientists group objects or living things based on their properties • Materials have different physical properties. • Some materials are hard whilst others are soft, some can be described as rough whilst others are smooth, some are dull whereas others are shiny. **Task Design – watch** Exploring materials - KS1 - BBC Bitesize **Activity/Investigation – Pzaz Changing Materials. Complete the table to observe the different properties of each material. Year 2 – Add the different objects to a Venn diagram using hoops on carpet. Photo for evidence for all books.**	Venn diagram

	Week 4- As a scientist I can make a statement at the end of an enquiry if I have findings to share. Malleable means that the material can be hammered or pressed into shape without cracking or breaking. Absorbent means that it is able to hold onto liquid.	Week 4: Do all materials have the same physical properties? A&E: Make simple statements about the results of an enquiry • Materials have different physical properties such as malleable, waterproof, heatproof, windproof and absorbent. • Things around us can be made to change or happen,. We can pull objects behind us or push them across a table. **Task Design - Investigation – which materials to use as costume for superhero Elastigirl? She needs to be able to stretch without breaking.** **Children have hands on experience of the different materials.**	Statement Malleable Investigation
	Week 5 – A solid is firm and stable in shape.	Week 5: Can you change the shape of a solid object? A&E: Make simple statements about the results of an enquiry. • The shape of some solid objects made from some materials can be changed by squashing, bending, twisting or stretching the material **Task Design - Odd one out. Have a range of objects on each table made from different materials (the same for each table). Give chn statements to investigate and thereby try and guess which the object you are thinking of. "I can twist my object".** **https://www.bbc.co.uk/programmes/p013bhgy**	Solid Enquiry
	Week 6 - "Grouping" means putting objects or people in a group where there might be something similar about them e.g. putting all the triangles in one group and all the circles in another group. A tally chart is a used to record data collected – using a tally to represent a number. A Carroll diagram is a way of sorting data into groups.	Week 6: How can I group materials? A&P: Scientists group objects or living things based on their properties • Materials can be grouped in a number of ways based on their physical properties **Task Design - Activity - Walk around school – group materials observed using a tally chart.** **Year 2 – Carroll diagram to sort objects.**	Physical properties Grouping
	Week 7 An investigation is a way of finding an answer to a question. There are different parts to an investigation. A Trebuchet is a type of catapult.	Week 7: What is the best material to make a Trebuchet? A&P: It is important that we keep as much as we can the same, apart from the thing we measure and the one thing we change • physical properties make the materials more suitable for certain uses • A constant is what we keep the same. • A hypothesis is what you think is going to happen in an investigation. • A Variable is the part of the investigation that changes. **Task Design - Activity - Pzaz - Trebuchet investigation**	Trebuchet Constant Variable hypothesis
		Week 8/9: How are different combinations of materials used to create different objects?	

	Week 8 - "Combination" means joining more than one thing.	• Different combinations of materials can be used to create different objects. For example a saucepan or a mop are made from different materials. • Some objects are made from more than one material. **Task Design – Look at play equipment and be given the brief from Mrs Fearn to design some more. Each group to choose a piece of equipment to create by combining materials, giving reasons to include the properties of the materials.**	Combinations
	Week 10 Recycled means that a material or object is being used more than once. Plastic is a material that is commonly used but is not good for the planet. Sustainability means that something can last for a long time.	Week 10: How can I help with sustaining the planet? • Plastic is a popular material because it is cheap, easy to change and can be made in different colours. • Many toys and classroom equipment have plastic in it. • Plastic is not good for our environment. • Plastic is good at being recycled. • Plastic bottles have been used to make fleece jackets and other objects. **Task Design – Children watch:** Explore sustainability and plastics - BBC Bitesize. Children consider ways that, as a school, we can reduce the amount of plastic we are using. This could include monitoring plastic waste, making posters or creating a piece of art from plastic bottles to inform others. Record ideas as a whole class.	Plastic Recycled sustainability
	Week 11 - Tarmac is a dark material that is laid when it is in liquid form. Tarmac is commonly used on roads and pavements.	Week 11: What new material did John McAdam invent and why? Study of scientists of a new material – Find out about people who have developed useful new materials. Focus on John McAdam and tarmac. **Task Design -** Activity - John McAdam. Watch: The invention of tarmac - 1st level Science - BBC Bitesize Discuss - What did he invent? (tarmac) Why did he invent it? (make surfaces smoother). Main focus: What has the impact been of this new material being invented? (roads, travel, transport). Create video.	Invention Impact
	Week 12 - Tyres are circular and come into contact with the ground. Tyres are commonly used on cars and other moving objects.	Week 12: What new material did John Dunlop invent? • Some inventors have had a big impact on the way that we live because of materials created. Study of scientists of a new material – Find out about people who have developed useful new materials. Focus on John Dunlop and tyres **Task Design –** Watch Bing Videos - John Dunlop. Activity: to record how many objects children can recall or observe have tyres on them. Look at categories at home, school, town,	Invention Impact

		Use a tally chart and place on a graph. Children to make a statement about the impact this invention has had on our society.	

Year 1/2 : Spring 1 Biology: Animals

	Required prior knowledge	Knowledge to be explicitly taught	Vocab

	Week 1 A plant is a living thing that usually grows in one place Coniferous plants keep their leaves all year round (e.g. pine, yew, juniper in UK) Deciduous plants lose their leaves in winter (e.g. oak, silver birch, horse chestnut, sycamore, ash) (Week 2: Classification is a word for grouping. Common animals are ones that are more well known. Week 3: A Venn diagram uses circles that overlap to show things in common. Week 4: Carnivores eat meat, herbivores eat only plants, omnivores eat both	Week 1 Ongoing : How do the seasons change across the year? A&P: Scientists look for patterns in the world around them. • Different animals live in different environments. • Some animals hibernate during the winter season. • Seeds are often planted in the spring. **Task design: To plant seeds for children to observe and record.** Core thread: Care for the natural world and living things. Week 2: Can I name a variety of common animals? • Name some fish, amphibians, reptiles, birds and animals **Task Design: Teacher to define groups (MR FAB) and what characteristic they might have (e.g., mammals have fur or hair and nurse their young; birds have feathers and lay eggs). Children to sort animals into groups on a poster and give titles to their classifications (adding extra animals if they wish). Children to present their poster and explain reasons for their choices.** Week 3: How can we group animals? R&P: Use a Venn diagram to classify items into two or three sets based on properties • Animals can be grouped into fish, amphibians, reptiles, birds and mammals (name common examples) • Describe and compare the different features of animals, including fins, wings, scales, legs, feathers, claws, paws etc. **Task Design: Distribute animal images (such as a dog, cat, eagle, bat, and penguin) to small groups of students. Ask each group to discuss and sort their animals using a blank Venn diagram drawn on large paper, labelling one circle "Has fur" and another circle "Can fly".** Week 4: Can you group animals by what they eat? • Animals can be placed into different groups (carnivores, herbivores and omnivores) based the foods they eat. • The arrows in a food chain show where the energy is being transferred from and to. -Research different animals and use images and text to classify the animals as herbivores, carnivores or omnivores, and based on their physical characteristics **Task Design**	tail, wing, claw, fin, scales, feathers, fur, beak, fish, amphibians, reptiles, birds, mammals, carnivores, herbivores and omnivores

	Week 5: Offspring is the young or a child of an animal Week 6:	**Pzaz – teeth** **Pupils match the teeth with their function.** **Pupils then decide which type of teeth a carnivore, herbivore of omnivore have. (Canines and incisors long and sharp for tearing and slicing meat. Pre-molars and molars are flat for chewing tough plant matter. Carnivores have canines and incisors, and herbivores have pre-molars and molars. Omnivores have all types of teeth)** Week 5: How do living things grow? • Animals, including humans, reproduce. This means they have offspring that grow into adults. As animals grow they get bigger. • All living things need food to give them energy. • Some animals change during their life cycle as the mature (e.g. tadpole to frog) There is a wide variety of living things, including plants and animals **Task Design** **Pzaz – animal life cycle cards. Order the cards together to show the life cycle of a bird, mammal, reptile, amphibian, fish, butterfly and dragonfly. Reflect different species have different life cycles. What they have in common is that all animals are born or hatched then grow to adulthood. Adulthood allows species to make copies of themselves in the form of offspring and the cycle begins again.** Week 6: What do animals need to survive? • Animals, including humans, need water, food, air, and the right temperature to survive. **Task Design: Divide the class into partners and give them an animal (e.g., cow, lion, rabbit). Partners create a poster illustrating what their assigned animal needs to survive. They should include food, water, air, and shelter, using images and labels. Circulate amongst the groups to provide support and ask probing questions:"What does your animal eat?" "Where does it get its water from?" "What kind of shelter does it have?"** **Pairs join into 4s and share poster.**	offspring, life cycle water, food, air, temperature

Year1 /Year 2 : Spring 2 **Biology: Humans.**

	Required prior knowledge	Knowledge to be explicitly taught	Vocab

Substantive knowledge	Week 1: There are more parts to my body than shoulders knees and toes Different parts of our body help us to do different things. Week 3: some animals only eat meat, some plants and some both Week 4: What we eat impacts our health Week 5: Hygiene is keeping your body clean and helping it to be healthy. Exercise is physical activity which increases your heart rate and helps you to be healthy	Week 1: What are the different parts of the human body? • Humans are made of many different body parts including head, neck, back, ears, eyes, nose, mouth, arms, shoulders, elbows, hands, fingers, legs, knees, feet, toes, face, ears, eyes, nose, mouth, arms, legs, hands, feet, toes. Draw a scientific diagram, labelling key human body parts **Task Design: Divide children into small groups and provide each group with pictures of people, scissors, glue, and large sheets of paper. Children to search for pictures of things that represent various body parts (e.g., a hand from a picture of someone waving) and create a collage and label each body part** Week 2: What body parts are associated to the five senses? • Humans have five senses, smell, taste, touch, sight and hearing. Core thread:: Living things, including humans, react to their surroundings with their senses **Task design. In groups children have different sensory items to choose from e.g cotton wool, fragrant flower, strawberry. They decide which sense would be best for that sensory item and put a label e.g. smell – nose, touch –hand next to the item. Each group swaps and tries out an activity.** Week 3 What food do humans need to stay healthy? • Humans need to eat a healthy and balanced diet. • The main food groups are carbohydrates (starch and sugars), proteins, fats, dairy, fruit and vegetables. • Vitamins, minerals and fibre are needed and being deficient in these cause diseases. • Different animals have different nutritional needs. **Task Design: in pairs sort foods into the main food groups, proteins, fats, dairy etc. Choose some of those foods to make a balanced plate of food.** Week 4 Pzaz – Investigation (yr2): Why are some foods gassy? R & P Record numerical or observations in a table Week 5 & 6: What exercise and hygiene practices do humans need to stay healthy? • Humans need exercise to stay healthy. • Humans need to practice hygiene to stay healthy.	Body, head, neck, arms, elbows, legs, knees, face, ears, eyes, eyebrows, eyelashes, nose, hair, mouth, teeth, tongue, feet, toes, fingers, nails, ankle, calf, thigh, hips, waist, trunk, chest, shoulders, back, hands, wrist, smelling, tasting, smooth, bright, dim, loud, quiet, high, low, senses, hearing, seeing, touching, carbohydrates (starch and sugars), proteins, fats, dairy, fruit and vegetables vitamins, minerals and fibre hygiene

		Task Design children create different scenes depicting a hygiene or exercise activity. Children create props for their scenes. Put photos together to make a 'Healthy exercise and hygiene' book. Look at Pzaz - What's the difference body builder and runner to consider different shape bodies can be healthy.	

Year 1/2 : Summer Biology: Plants

	Required prior knowledge	Knowledge to be explicitly taught	Vocab

	• Recognise changes between winter and spring.	Week 1 Ongoing: How do the seasons change across the year? A&P: Scientists look for patterns in the world around them. • It is not safe to look directly at the sun even when wearing dark glasses • Plants often bloom in the summer • Daytime and nighttime change throughout the year. • In the summer there are more hours of daylight and in the winter there are fewer hours of daylight. **Task design:** **Watch https://www.bbc.co.uk/bitesize/articles/zdd9r2p#zg6923** **Listen to backing track sing up rap des couleurs. Write a class rap call and response about the changes in summer e.g.** **Here comes the summer** **Got my sun glasses on** **Here comes summer** **Summer days so long**	
	Week 2: Certain plants grow in certain places/climates Different plants and trees have different names	Week 2: What plants and trees grow in our environment? • Identify and name a variety of common wild and garden plants and trees. Core thread: There is a wide variety of living things **Task Design: Use pictures of common plants (e.g., daisies, dandelions, rose bushes) and trees (e.g., oak, maple, pine) to help them recognise what is in the school grounds. Highlight distinguishing features such as leaf shapes, flower colours, and fruit types. Children go on a walk and identify three types of wild and garden plants. Draw and label three plants in a guide to our grounds.**	Names of wild plants, garden pants,
	Week 3: Not all trees are the same and can be grouped like animals	Week 3: What makes a plant evergreen or deciduous? • evergreen plants keep their leaves all year round (e.g., pine, yew, juniper in UK) • Deciduous plants lose their leaves in winter (e.g., oak, silver birch, horse chestnut, sycamore, ash) Classify trees as deciduous or evergreen using images of them at different times in the year. **Task Design: Children use chart (picture and descriptors) to match pictures of trees(throughout seasons) to type and place in chart as evergreen or deciduous. Trip to Washingpool farm.**	evergreen, deciduous,

	Week 4: plants have different parts within them Week 5 and 6 - Different things can be alive. They don't all look the same. Animals need shelter, air, water and food to survive	Week 4: What are the parts of a flowering plant? • The basic parts of a plant are leaves, flowers, roots, stem/trunk/branch. • Trees are a type of plant that have a tall stem made of wood. Draw and label a scientific diagram of a plant. Core thread: Plants grow in soil **Task Design: Children label a blank diagram of a flower and a tree and label it. Year 2: Write a caption about what those parts do.** Week 5 & 6 How can I identify if something is alive? • Everything in the world can be categorised as either alive, used to be alive or has never been alive. • Living things are called organisms. • Living things grow, need air and nutrients, react to their surroundings, move, get rid of their waste, reproduce. • Animals move from place to place, while plants move on the spot. Mrs Gren **Task Design:** **5 - Using Mrs Gren children categorise pictures into alive, used to be alive or never been alive.** **6 - Set up Pzaz Investigation: Water, light and correct temperature cress and pea seeds growth.** Week 7 & 8 What is a habitat and what does it provide? • Habitats are the places that living things live, a very small habitat is called a micro-habitat, these can be found within larger habitats. • Animals and plants in a habitat depend on each other e.g., for food or shelter. R&P: Record results in a table. **Task Design: https://youtu.be/byvf7jwdvOI Discuss different types of habitats. Match animals and plants to the correct habitat** **Task Design: Pupils design and make their own microhabitat to place around the school grounds. (video on pzaz)** **The most important thing in this task is making the microhabitat waterproof. Using a table record what animals are in the micro-habitat**	flowering plants, trees, leaf, flower, blossom, petal, fruit, berry, root, bulb, seed, trunk, branch, stem, bark, stalk, vegetable alive nutrients excrete grow reproduce habitat marine rainforest Desert

	Living things need nutrients/food to survive	Week 9: What is a food chain? • Most plants produce their own food and are called producers. • In a food chain, the arrows show where the energy is being transferred from and to. **Task design: Read poem** **Who eats what?** **Who eats who?** **Who eats me?** **Who eats you?** **Food chains show** **What all things eat,** **But what eats plants,** **And what eats meat?** **Now cows eat grass** **And sheep do too,** **Herbivores both** **Lunch to me and you.** **Wolves eat sheep They have sharp teeth They don't eat you To your relief! Omnivores 're not fussy, So everything goes, Meat or Plants They won't turn up their nose. Food chains say Who eats who, Who eats me, and who eats you!** **In pairs children draw on A3 who they think eats what. Put mixed up food chains into order and children record one in book.**	food chain producers consumers
	Different animals are found in different habitats	Week 10 & 11: How do animals adapt? • Living things are adapted to their environment. This means they may not be able to survive in other habitats. • Some animals and plants have adapted to life in a hot desert: camels and cacti. Some animals and plants have adapted to life in a cold desert: Arctic fox and shrubs. **Task design: Create shoebox diorama to show a habitat and an animal which has adapted to it. e.g. camel/cacti**	adapt habitat survive

		Possible Axe Valley zoo visit- adaptation and habitats.	

Year 3/4: Autumn Term 1 Physics: Forces- friction, magnetism and sound.

	Required prior knowledge	Knowledge to be explicitly taught	Vocabulary

	Week 1: Push, pull or a twist moves an object	Week 1: What is a force? (A&E) Children consider prior knowledge when asking questions • Forces are pushes or pulls or twists. • Forces can cause a change in speed, direction or shape of an object. • Forces act in particular directions. **Task Design: Some short clips on forces** Forces - KS2 The World Around Us - BBC Bitesize **Children use equipment to prove/disprove statements . Statements are recorded.**	Push pull twist force
	Week 2: Equal is the same amount Week 3 There are different types of forces. Week 4 Surface is the outside part of something. Week 5 A force is a push or a pull. A magnet pushes and pulls Pulling together: attract Pull apart: repel The North Pole and the South Pole are at the top and bottom of the Earth Objects can have an affect on other objects even when they are not in contact with them.	Week 2: What happens when forces are balanced or unbalanced? • When the forces acting in the opposite directions are not equal this can cause the object they are acting on to move at a different speed, in a different direction or to change shape. • Forces that are equal and act in opposite directions are described as balanced forces, they 'cancel each other out'. **Task Design: Children watch:** Balanced and unbalanced forces - Forces, motion and energy - National 4 Physics Revision - BBC Bitesize. Children record a statement to explain what happens when forces are balanced or unbalanced. Yr 4 to add an example. Week 3 What is a contact force? • Contact forces require contact between two objects (e.g. friction). • Friction is a force between two surfaces that are sliding or trying to slide over each other. • Friction is a contact force because it requires the two objects to be touching. • **Task Design: Children to watch** What is friction and how does it work? - BBC Bitesize **Children to test if the following is true or false:** The bumpier or rougher the surfaces, the more friction there will be. T to model how to set up the investigation. Children record an explanation of what a contact force is. Yr 4 to give an example. Week 4: How does the surface type affect how an object moves? (A&P) Set a hypothesis to test R & R Draw a diagram of the investigation. • Compare how things move on different surfaces. **Task Design –** Pzaz - investigation object rolling down different surfaces. T to take photos of the investigation. Each child has a photo in their book. For tomorrow's early bird, children write a caption underneath to explain how a surface type affects how an object moves. Week 5: Can you explain if magnetism is a force? A&E: Use scientific understanding to explain their findings. • Non-contact forces can affect an object at a distance (e.g., magnetism) • Magnetism is an invisible *force* that affects materials such as iron, steel, nickel and cobalt. • Magnets have a north and a south pole.	Balanced Unbalanced equilibrium hypothesis Magnetism Non contact force Magnetic force

	Week 6 A magnet is a rock or a piece of metal that can pull certain types of metal toward itself.	• If opposite poles are facing the magnets will be attracted to one another (the magnets pull towards each other). If the same poles are facing the magnets will repel (the magnets will push away from each other). • Magnets attract magnetic objects. The non-contact force of magnetism mean magnets can attract or repel other magnets • Magnets can exert a force at a distance. • A *compass* can be used to detect both the Earth's *magnetic field* and the field around other magnets. **Task Design – Recap on magnets and introduce magnetic forces by making a magnetic compass :** KS2 Science: Magnetic forces - BBC Teach How to make a magnetic compass guide for KS3 physics students - BBC Bitesize T to take a photo of one magnetic compass. Photo goes in the book. Children for tomorrow's early bird write a caption to explain if magnetism is a force. Week 6: Are all materials attracted to magnets? A&E: Use findings of an investigation to make further predictions Test which materials are magnetic, and use this knowledge to make predictions about which objects will be magnetic M&O: Taking multiple readings allows you to see if your data is repeatable, helps identify outliers and allows a mean to be calculated. • Some metals are magnetic but not all are. Plastics, wood, fabric, glass are all non-magnetic • The stronger the magnet, the heavier the object it can attract or the further away it can attract the object from **Task Design –** Children investigate this question with a hypothesise, method, collection and recording of data. They finish with a conclusive statement. Yr 4 to add an example of a material that is not attracted to a magnet and one that is. GD children to explain how this impacts on materials used for certain objects i.e. how the knowledge is used in everyday life.	Prediction Investigation magnetic force, magnet, strength, magnets, attract, repel, magnetic material, metal, iron, steel, non-magnetic, poles

Year 3/4 : Autumn Term 2 Physics -Forces and Motion/ states of matter

	Required prior knowledge	Knowledge to be explicitly taught	How knowledge will be built upon

Prior knowledge	Week 1 Solids do not change their shape unless a force is put on it. They will change their shape if you cut or squash them Week 2 Materials melt when it is hot and freeze when it is cold Week 3: The four main types of precipitation are rain, snow, sleet, and hail.	Week 1: How do particles differ in a solid, liquid and gas? • The different substances in their different forms (solids, liquids and gases) are all made of particles. • The particles in the different states of matter are arranged differently • In a solid the particles are packed tightly together; they vibrate slowly and are unable to move away from their neighbours. • In a liquid the particles are close together, but they can slide past each other • In a gas the particles are spread out and can move freely. **Task design: watch Solid, liquid and gases - BBC Bitesize use clay/playdough to show how particles are i.e. packed tightly for a solid, further apart for liquid. put gas particles in a box and show how go to the edge of the container. Take photo as evidence** Week 2: Can substances change their state of matter? • Substances can change from one state of matter to another. Solids can change to become a liquid, liquids can change to become a gas, gases can change to become liquids and liquids can change to become a solid • The process that changes a solid to a liquid is called melting. • When you heat a solid it becomes a liquid. Different substances melt at different temperatures, this is called the melting point. • The process that changes a liquid to a solid is called freezing. • Different substances are different states at room temperature. • Substances change state at different temperatures, i.e., they have different melting and boiling points. **Task design: Match pictures of the change before and after and the name of it. Demonstrate trying to melt a solid into a liquid. Children to try to melt a piece of chocolate and ice cube in their hands. Understand that different substances have different melting points.** Week 3: Can I describe the processes of evaporation and condensation? • The process that changes a liquid to a gas is called evaporating. • Evaporation happens when a liquid is heated. This is called the boiling point. • The process that changes a gas to a liquid is called condensing. • The water cycle relies on evaporation and condensation. Water is collected in the oceans from rivers; it evaporates and then condenses to form clouds; it then precipitates and the cycle begins again. **Task design: https://youtu.be/gBbFxl6Oy94** **Water cycle in a bag investigation. Children observe changes and record water cycle diagram.** Week 4: How are sounds made?	States of matter, solid, liquid, gas, air, oxygen, ice/water/steam, water vapour, heating, cooling, temperature, degrees Celsius, melt, freeze, solidify, melting point, boil, boiling point, evaporation, condensation, water cycle, precipitation, transpiration

	Week 4: A vibration is when a particle moves back and forth. Week 5: A solid is a firm or stable shape Week 6. Volume is how loud a sound is. Pitch is how high or low the sound is.	• Sounds are made when objects vibrate. These vibrations cause the air particles surrounding them to vibrate and collide, causing the vibrations to pass between particles. • Vibrations travel through a medium (e.g., air, water) to the ear. • Vibrations enter the ear, our inner ear vibrates, and we hear them as sound. **Task design: https://youtu.be/gBbFxl6Oy94. Children make different instruments. Children demonstrate explain to each other how the action causes the vibrations and makes the sound.** Week 5: Why do sounds travels through solids much better than other states of matter? • Vibrations are passed on from one particle to the next, and so it travels more easily when particles are closer together (solids and liquids) • Sound cannot travel in a vacuum. • Sounds get fainter as distance from source increases. **Task Design: Strike a tuning fork and place it against a solid surface (like a table). Have students place their hands on the surface to feel the vibrations. Ask students why they think they can feel the sound through the solid. Inflate a balloon and hold it against your ear. Have a partner tap the balloon while you listen. Talk about how sound travels through the air (a gas) and how it is different from solids and liquids. Discuss with children when swimming if they can hear something when someone talks.** **Write comparative statements the closer the particles the easier the vibrations pass.** Week 6: How does the volume and pitch of sound change A&E: Draw conclusions (e.g., 'the greater the… the greater the…' • M&O: Data is repeatable if the same person repeats the investigation and gets the same results; data is reproducible if the investigation is repeated by a different person and the results are the same • The volume and pitch of sound can change **Task design: Pzaz Investigation – straw panpipes.**	

Year 3/4 Spring 1 Physics: Light and electricity.

	Required prior knowledge	Knowledge to be explicitly taught	Vocab

	Week 1: component means one part	Week 1: What are the components in a circuit? • Components include wire, lamp, buzzer, motor or switch. **Task Design: Children match real components to the names and their symbols. Create a pairs game to play with partner.**	components, cell, battery, positive/negative, wire, crocodile clip, bulb, switch, buzzer, circuit symbol, circuit diagram
	Week 2: electricity can come through the mains or from a battery	Week 2: What does a circuit need to be complete? • Appliances use electricity to serve a purpose (e.g., toaster, kettle, fan, phone, game) A lamp in a circuit will only light if there is a complete circuit. • A simple series circuit must have a power source (cell/batteries) and have all the components connected in a loop. If it is missing any of these things it is an incomplete circuit **Task Design: Give children in 2/3s basic circuit materials (batteries, wires, bulbs, and switch and instruct them to construct a simple circuit, ensuring they discuss each component's role as they work. Children label the circuit as a series circuit. Draw series circuit.**	Electricity, appliance, device, mains, plug, electrical circuit,
	Week 3: a switch can turn on or off or make something brighter or dimmer	Week 3: How does a switch work? • A switch opens and closes a circuit, and this turns a lamp light on and off. Core Thread: 4: Things around us can be made to change or happen. We can turn on a light bulb and make it brighter or dimmer **Task Design: Ask the children to consider how to adapt their circuit using a switch. Children consider if a switch works the same with a buzzer. Children use equipment to create a circuit with a switch. Draw circuit including switch.**	bright/dim, switch, buzzer, motor,
	Week 4/5 The material that we choose to make an object from depends on its purpose (e.g., no chocolate kettle)	Week 4/5 What materials make a good conductor or insulator? • Materials that allow electricity to pass through them easily are called electrical conductors. • Metals and water are good conductors of electricity. • Materials that do not allow electricity to pass through them easily are called electrical insulators. • Plastic, rubber, wood, glass, paper and fabric are electrical insulators **Task Design:** **Investigation: Which materials are electrical conductors and which are electrical insulators? (pzaz)**	conductor, insulator, metal/nonmetal

		A&P: A dependent variable is what you measure; an independent variable is what you change; controlled variables are things that stay the same • A&P: Recognise risk and build a plan to minimise them Week 6 A&P: Write an appropriate method • A&P: Draw diagram of the investigation **Task Design: Children write method from investigation and draw a diagram.**	method

Spring 2 Year 3/4 Chemistry: Rocks and properties of materials

	Required prior knowledge	Knowledge to be explicitly taught	Vocab

	Week 1 The shape of some solid objects made from some materials can be changed by squashing, bending, twisting, or stretching the material	Week 1 & 2 How are rocks formed? • Natural rocks are either igneous, sedimentary or metamorphic. • Man-made rocks, like concrete, are called anthropic rocks. • Igneous rock is formed when magma cools down. • Sedimentary rock is formed when layers of small sediments are compressed over a long period of time. • Metamorphic rock is formed when igneous or sedimentary rock is put under lots of pressure. **Task Design: Have different rock samples out and have magnifying glasses out. Explain about the different types of rock Watch videos like https://youtu.be/Vp_S3BDiR-I and https://youtu.be/CeuYx-AbZdo Children create a google slide show showing the three types of rock and how they are made. Use pictures/sound.**	VOCAB Rock, stone, sedimentary, igneous, metamorphic
	Week 3: Materials have physical properties that make them better or worse for certain uses, such as waterproof, absorbent, windproof, heatproof, malleable	Week 3 Can you group rocks by their properties? • Different rocks have different properties, including permeable/impermeable. Properties: Features or qualities of something. • Texture: How the surface of the rock feels. • Hardness: How easily a rock can be scratched. • Permeability: Whether water can pass through the rock. • Grain: The size of the particles that make up the rock. *Make observations about rocks using senses and magnifying glass and classify them in a venn diagram/pair of axes.* **Task Design: Have different rock samples out and have magnifying glasses out. Show some rocks that have been sorted into two groups children work out and explain how they have been sorted. Children sort rocks into own groupings using a venn an carroll diagram. An example shttps://s3-eu-west-1.amazonaws.com/sh-annielennard-sandwell-sch-uk/media/downloads/MONDAY%20Science%20PowerPoint.pdf**	permeable, impermeable, texture, hardness, grain
	Week 4 Soil is what we know as earth. Not all soils are the same.	Week 4 What is soil? • Soil is a mixture of tiny pieces of rock, dead plants and animals, air and water. Different soils have different properties.	sandy soil, clay soil, chalky soil, peat,

	Week 5 Fossils are from pre-historic history 10,000 years ago Fossils were living organisms	*Set out a comparative test. Record findings using simple scientific language in tables* **Task Design. Children investigation soil drainage (PZAZ). Take different soil samples examine and describe their colour, texture and other properties.** • **Measure 10mls of water into the cup and then mark the water level. Repeat until you have 5 marks.** • **Pour out all the water from the cup.** • **Measure 40mls of water into the measuring cylinder.** • **Fold the filter paper into quarters and place into the funnel.** • • **Add some soil into the funnel up to 2cm from the top.** • **Place the funnel into the cup.** • **Add the water and start the stopwatch.** • **Every 30 seconds, record the amount of water in the cup.** • **Once the water has been collected, use the pH indicator paper to record the pH of the water.** **Children record results in a table. Discuss which soil drained the quickest and what that might mean for us for housing, farming etc** Week 5 & 6 • A fossil is physical evidence of an ancient plant or animal, this could be their preserved remains or other traces that they made when they were alive. • Trace fossils are not physical remains of living things they are indirect evidence of life, examples include imprints of, or a mark left by an organism such as a footprint, imprint of a feather or poo. • Fossils are formed when a living thing or trace is buried under sediment. The remains break down slowly and as layers of sediment build up the layers are squashed, turning them into sedimentary rock. **Task design: https://www.youtube.com/watch?v=RNSrNT-nIDE In pairs make a poster/song to show the stages of how a fossil is formed.**	organic matter, fossil, evidence

		Children make own fossil and role play being a palaeontologist describing the dinosaur and what we can tell about it from the fossil. • **Measure out a cup of flour and put it into the bowl.** • **Measure out half a cup of salt and add to the flour.** • **Mix the salt and flour well.** • **Add half a cup of water and stir until a sticky dough is formed.** • **Add some more flour and mix so that the dough dries until the mix is no longer sticky.** • **Split the dough between group members and allow them to make their own dinosaur fossil with the twigs and pebbles.** • **Carefully remove the twigs and pebbles from the dough.** • **Bake for 20 minutes at 200°C.**	

Year 3/4 Summer Term 1 Biology: plants

	Required prior knowledge	Knowledge to be explicitly taught	Vocab

Substantive knowledge	Week 1 Plants are classed as living things because they grow, move, reproduce, and need nutrition. Animals can be grouped into fish, amphibians, reptiles, birds and mammals	Week 1: How can living things be grouped? • Classification refers to a method used to place all living things into groups. • Fish, amphibians, reptiles, birds and mammals are all vertebrates. • Vertebrates have endoskeletons. • Vertebrates can be grouped in several ways based on their characteristics, e.g., warm/cold blooded; or physical features like fur, beak, wings etc. • Invertebrates can be grouped based on their characteristics as snails and slugs; worms; spiders and insects. • Invertebrates can be placed into groups based on their skeletons; endoskeletons, exoskeletons, or hydrostatic skeletons. **Task Design: Use a classification key to leaves and animals (using a magnifying glass)** **Year 4 GD make own key**	VOCAB Classification keys, environment, fish, amphibians, reptiles, birds, mammals, vertebrates, invertebrates
	Week 2: plants are living things and need different things to survive	Week 2: What do plants need to grow and are all requirements the same? • Plants can be grouped into flowering and non-flowering plants. • Oxygen and carbon dioxide are found in the air. • Plants need air (oxygen and carbon dioxide), water, light, nutrients from the soil, space, and a suitable temperature to grow. • Requirements for life vary from plant to plant and they adapt to their environment. Plants can be grouped into categories such as flowering plants (including grasses) and non-flowering plants, such as ferns and mosses. *A&P: Identify scientific evidence that has been used to support or refute idea* **Task design: Plant growth investigation – Pzaz** **Focus on nutrients and space. Use a table to record and write conclusion** Does plant food changes how tall the plants grow? Which plant food produced the highest growth rate? Which produced the lowest growth rate?	Nutrients, oxygen, carbon dioxide
	Week 3: The basic parts of a plant are leaves, flowers, roots, stem/trunk/branch	Week 3: What are the functions of the parts of a plant? • Roots absorb nutrients from the soil and help anchor the plant. • The stem/trunk supports the plant and transports water up the plant. The xylem transports water and nutrients from the roots, and the phloem transports food from the leaves to all parts of the plant • Leaves use sunlight, carbon dioxide from the air and water to make their own food.	Xylem, transports

	Week 4: Seeds grow into plants in stages Week 5 Animals and plants depend on each other in their habitats Living things have adapted to their environment. This means they may not be able to survive in other habitats	**Task design: In small groups write statements to describe the function to match with the term in a flap book style to put on group A3 poster. Take photos for books.** Week 4: What are the stages of a plant's life cycle? • The four main stages of the plant's life cycle include germination, pollination, fertilisation and seed dispersal. • Coniferous trees transport their seeds in cones; deciduous trees use seeds and flowers/fruit. • Pollination and fertilisation usually take place in flowers. Dispersal is important to make sure there is enough space for seeds to germinate and plants to grow. • Seeds can be dispersed by wind (e.g., sycamore), by animals in their droppings (e.g. things that are eaten, like a raspberry), attached to animal fur (e.g. goosegrass), or seeds can be self-propelled (pea pod) T**ask Design** **KS1 / KS2 Science: What is pollination and how does it work? - BBC Teach** **In groups make seed dispersal demonstration – using a range of materials and ping pong balls as seeds, felt with velcro, fan moving. Take photos to put in books.** **e.g.**  Week 5: How can a change in environment pose a danger to living things? • Buildings and new developments have destroyed many habitats. This means number and types of organisms in these areas has gone down. • Creating nature reserves is one way to prevent the loss of habitat. Setting aside land that cannot be used for building (greenbelt) helps keep habitats intact. **Task Design: Use forest school area to zone a nature area and record wildlife to create a class guide to local living things**	life cycle germination, pollination, fertilisation and seed dispersal human impact, positive, negative

3/4 Summer Term 2 Living things. Animals and Humans

	Required prior knowledge	Knowledge to be explicitly taught	Vocab

	Week 1 A balanced diet has a mix of vegetables, protein, carbohydrates, dairy, fats and oils.	Week 1: What types of nutrition do animals including humans need? • Animals including humans cannot make their own food. • The main food groups are carbohydrates (starch and sugars), proteins, fats, dairy, fruit and vegetables. • Humans need a balanced diet which is made of main food groups. • Vitamins, minerals and fibre are needed and being deficient in these causes diseases. **Task design – discuss the different nutrient groups found in foods. Complete a table show the nutrient what it does and where you would find it. Look at three types of milk and discuss which is the healthiest?** **Whole milk, semi-skimmed and chocolate**	Vitamins Fibres Water Carbohydrates Proteins
	Humans are made of many different body parts including head, neck, back, ears, eyes, nose, mouth, arms	Week 2: What is the human body made up of? • Our skeleton is made up of bones that grow as we grow. • Humans and some other animals have skeletons. • Organs are parts of the body that do a particular job, the heart pumps blood around the body and the lungs are used for breathing which gets air into your body. • The skeleton protects organs, e.g., the skull protects the brain; and the ribcage protects the lungs, heart and other important organs • The skeleton supports the body, e.g. the spine helps the body stand • The skeleton helps the body move, e.g. pelvis and knee joints *Label the main bones on a diagram of a human skeleton, give the function of each bone* **Task design – Children make their own moving skeleton using split pin (on pzaz). Label the main bones and explain how the joints work.**	skeleton muscles support protection movement organs joints
	The body is made up of different parts	Week 3: What are the functions of muscles? • The muscles and skeleton are required to help the body move. When muscles contract they pull the bone *R&P: Draw a diagram, a simple scientific drawing that explains or informs* **Task design** How do your muscles work? - BBC Bitesize **in groups children roll up their sleeves as far as possible.** **2) Stretch your arm out – can you identify where the muscles are in your arm?** **3) Now slowly curl your arm so your hand moves towards your face – what changes happen in your arm?**	muscles contract

	Some animals are vertebrates and some are invertebrates	**4) Now take a chair and carefully lift it up, and once again curl your arm slowly towards you – are there any differences? (If a chair is too heavy use another mass, such as a water filled 2l bottle.** **Draw a diagram to show muscle contacting in arm.** Week 4: Are all skeletons on the inside of organisms? • Some organisms have endoskeletons, some have exoskeletons, and some have neither • Endoskeletons grow with the organisms, exoskeletons do not so need to be shed and replaced **Task design. Look at x-rays of animals. Sort animals into a table. Headings exoskeleton and endoskeletons**	Endoskeleton Exoskeleton
	Animals get their food from plants and other animals, this food provides the energy animals need Most plants produce their own food and are called producers In a food chain, the arrows show where the energy is being transferred from	Week 5 What are the parts of a food chains • A food chain starts with a producer (usually a plant) who can produce its own food. Organisms that eat producers are called consumers (primary and secondary) • A predator hunts prey to eat **Task design: Pupils design an imaginary predator. Initially they define the habitat in which the creature lives. They then draw and label their creature. They should then write explanations of how the predator is adapted to its habitat and how it can catch and eat its prey. Draw and label the food chain.**	producer, consumer, predator, prey, food chain
	Different animals have different nutritional needs	Week 6 What are the different types of teeth and their purpose? • There are four main types of teeth: incisors, canines, pre-molars and molars. They each have a different purpose. • Herbivores, carnivores and omnivores have these types of teeth in different proportions **Task Design:** What are the types of teeth? - BBC Bitesize **Make a matching pairs game. Types of tooth and their function.**	teeth, canine, incisor, molar, pre-molar, saliva, tongue, rip, tear, chew, grind, cut

Year 5 Autumn Term 1 Physics- Forces

	Required prior knowledge	Knowledge to be explicitly taught	Vocabulary

	Week 1 The non-contact force of gravity makes things fall to Earth •Forces that act in opposite directions are called opposing forces •Forces that are equal and act in opposite directions are described as balanced forces. They 'cancel each other out' •When forces are balanced, an object will move at a constant speed in the same direction. This includes being stationary •Contact forces require contact between two objects (e.g. friction). Non-contact forces can affect an object at a distance (e.g. magnetism) There is gravitational force between all objects, but it is only felt when one or more of the objects has a very large mass Week 2 •Friction is a force between two surfaces that are sliding or trying to slide over each other •Friction is a contact force because it requires the two objects to be touching Objects can have an affect on other objects even when they are not in contact with them: light , magnetism , sound •The bumpier or rougher the surfaces, the more friction there will be. • Mass is the weight of an object. • Understand difference between discrete and continuous data	For T a good resource for upskilling about forces: https://www.bbc.co.uk/bitesize/articles/zwbqwnb#z9rrg7h Week 1: What stops us from floating away? Scientific attitudes and planning: physics is the study of energy. Forces are a type of energy. Scientific skills used: prediction, planning, measurement, observation, recording, using scientific language to draw conclusions. Measure force using a newtonmeter. • Gravity is a very useful force – it holds everything together. It keeps us on the Earth, and keeps the Earth and the other planets revolving around the Sun. Without it everything would float around. That is why it has been described as 'The Universal Glue'. Gravity is a non-contact force. Every object in the world has this pulling force of gravity – the bigger the object the greater the force. Earth is so big and heavy that its force of gravity is very great. The nearer things are to each other the greater the force of gravity between them. Isaac Newton discovered gravity and influenced the way we view the universe. • Force is measured in newtons (N) • The greater the mass of the object, the greater the gravitational pull around it. Gravity is most commonly experienced as the pull of the Earth (and all objects on it) towards each other • The Earth's gravitational pull is so large that all objects - regardless of how heavy they are - are pulled towards Earth at the same rate **Task design –** Every object in the world has this pulling force of gravity – the bigger the object the greater the force **Is this statement true?** Children investigate. T to use this to design the session: https://www.sfi.ie/site-files/primary-science/media/pdfs/col/gravity_activity.pdf Week 2: What makes a good parachute and why? Physics is the study of energy. Forces are a type of energy and air resistance is a type of force. Scientific skills used: prediction, measurement, observation, recording, using scientific language to draw conclusions. Scientists must work out if the factor is the cause of the outcome in a correlation. (surface area affects speed of the falling object).	**Vocabulary** **Week 1** Gravity, force, contact force, non contact force, magnetism, friction gravitational pull Week 2 Air resistance, energy, frictional force, mass, conclusion

	Week 3 Friction happens when objects move through air or water. There are dependent, independent and control variables Scientists identify factors in an investigation that should be controlled, and try to find ways to control them Week 4 Increase is to become greater/bigger Data is repeatable if the same person repeats the investigation and gets the same results; data is reproducible if the investigation is repeated by a different person and the results are the same Week 5	• Air resistance is a frictional force that acts between air and a moving object to slow it down • Cross-sectional area is the area that is facing the direction the object is travelling in. The larger the cross-sectional area of an object, the greater the air resistance. **Task design –** T to look at and resource investigation of "What makes a good parachute?": **https://www.bbc.co.uk/teach/class-clips-video/articles/zjps382** Children have a photo placed in their book of the investigation. In their early bird activity tomorrow, they write a caption underneath to explain how air resistance impacts speed. Week 3: What is water resistance? Forces are a type of energy and water resistance is a type of force. Scientific skills used: prediction, planning, measurement, observation, recording, using scientific language to draw conclusions. Scientists must work out if the factor (streamlined/hydrodynamic shape) is the cause of the outcome in a correlation. Water resistance is a frictional force that acts between water and a moving object to slow it down Line graphs can be used when data is continuous; bar charts can be used when data is discrete • **Task design: Children watch**: What are water and air resistance? - BBC Bitesize . Children explore water resistance by varying the shape of playdough and the shape of aluminium foil wrapped around it or different shaped stones to make it fall faster or slower through the water. Children make a prediction first, then conduct the experiment (in pairs or small groups with one timing and one recording findings) and make a conclusive statement with their findings. GD: How does this knowledge help in every day life? For T, experiment shown on : https://www.youtube.com/watch?v=yhcbqQGGQc4 Week 4: Is it possible to increase a force? Scientific attitudes and planning: physics is the study of energy. Forces are a type of energy. Scientists must work out if the factor (size of gears/ cogs) is the cause of the outcome in a correlation.	Water resistant, force, prediction, measure Increase Energy Gears, cogs, levers

		• Levers, pulleys and gears allow a smaller force to have a greater effect. Examples of levers, pulleys and gears include wheelbarrows, lifts, bicycle gears, in construction • Levers consist of a beam and a fulcrum (pivot). Effort lifts a load • **Task design: To plan an investigation to answer the question – to have a fair test.** Week 5: Is there a link between components of levers and their order? Scientists look for patterns in data to try to identify correlations. A&P: Scientists must work out if the factor is the cause of the outcome in a correlation • The components of levers can be arranged in different orders: effort fulcrum-load (e.g. see saw, neck joint); effort-load-fulcrum (e.g. wheelbarrow, calf muscle); load-effort-fulcrum (e.g. tweezers, bicep) • The greater the distance from the effort to the fulcrum, the less effort is required to move the load **Task design:** investigate how the distance between the load and the fulcrum effects the force required to lift it	
		Week 6: Assessment week	

Year 5 Autumn Term 2 Physics Earth and space.

	Required prior knowledge	Knowledge to be explicitly taught	Vocab

	Week 1: We live on the Earth The greater the mass of the object, the greater the gravitational pull around it	Week 1: • The universe is made up of many galaxies. Our galaxy is called the Milky Way • The Milky Way is made up of lots of solar systems • Our solar system consists of a star (Sun), planets (which orbit a star), satellites (which orbit planets), and other bodies including asteroids, meteoroids, meteors and meteorites • The sun, planets and moons are approximately spherical bodies • Bodies are held in their orbit by gravity What is the universe made up of? **Task Design:** **Divide the class into small groups. Each group creates a poster that illustrates the solar system, including labels for each planet and brief facts about them. They can be creative by letting them add drawings or descriptions. Each group to present their poster to the class.**	Earth Planets Milky way Solar System Celestial body
		Week 2: • The Sun is at the centre of the solar system - the heliocentric model • Planets orbit the Sun in the same plane; moons orbit planets • The Earth takes 365.25 days to orbit the sun (one year). Every four years our Earth year is one day longer, this is called a leap year, this year accounts for the four 0.25 days A&E: Science is never 'complete' and scientists are always working to make models more accurate or to discover new explanation How did scientists' model of the universe change? **Task Design: Children role play being a scientist (Copernicus, Galileo, Newton) and an interviewer. The interviewer gives the scientist's name, a brief biography. The scientist/s gives their main contribution to the model of the universe and give a visual representation of their model.**	heliocentric geocentric orbit rotation spin Axis
	Week 3: Daytime is when the Earth is facing the sun; nighttime is when the Earth is facing away from the sun	Week 3:	

	• The Moon is more visible at night Light travels in a straight line • Shadows form behind an opaque object when light from a source is blocked. Week 6	• The Earth rotates on its axis once every 24 hours, so only half of the Earth is facing the Sun at any one time; this creates night and day • The Earth's rotation means that the sun 'rises' in the east and 'sets' in the west, and that the Sun is highest in the sky at midday, this explains why the sun appears to move across the sky. How does the Earth's rotation affect day and night? **Task Design: Children work in pairs to create a simple model using a playdough ball (earth) and a torch (sun) They set the torch on the table and rotate the ball discussing where the light and dark appears. Children can add a small figure to the top of the earth and look how the shadow changes. Time how long it takes the ball to rotate. Take photos for evidence.** Week 4: • The time taken for the Moon to orbit the Earth is 28 days and, during this time, the sun shines on different parts of the Moon • The phases of the Moon include new moon, crescent, quarter moon, gibbous moon and full moon • The Earth's Moon is smaller than the Earth and has less mass so its gravitational force is less Can I describe the orbit of the moon and its phases? **Task Design: Children use paper plates to show different phases of the moon. In books children match pictures of the moon to the name of the phase.** Week 5: • There are eight planets (M, V, E, M, J, S, U and N). Each planet has different characteristics, e.g. temperature; time taken to orbit the sun; number of moons; size. *A&P Look for patterns between a planet's distance from the Sun and it's temperature and size* Can I identify and compare the eight planets in our solar system? **Task Design:** **Use a table comparing the planets – children create questions to ask each other which demonstrates that they recognise the similarities and differences between the planets.** **Give the children a table with completed information about the planets. Create questions together such as what is the relationship between distance from the Sun and the surface temperature of the**	new moon, crescent, quarter moon, gibbous moon and full moon vacuum

	• Sound travels through a medium	**planet? What is the hottest planet? Children answer each others questions using information from their table.** <u>Week 6:</u> • Space is a vacuum, which means there are no air particles Can you hear in space? **Explain that in space, the absence of air means there are no particles to carry sound waves, thus making it impossible to hear anything. Divide children into small groups and provide each with materials (e.g., rubber bands, cardboard tubes, balloons, and water). Each group will create a model to demonstrate how sound travels e.g. Rubber Band Model: Stretch a rubber band between two objects and pluck it to demonstrate vibrations. Water Cup Telephone: Create cups connected with string to illustrate sound passing from one cup (medium) to another. Children then to present and explain why this doesn't occur in space.**	

Year 5 Spring 1 Chemistry: Separating materials

	Required prior knowledge	Knowledge to be explicitly taught	Vocab

	Week 1: All materials are made of a single substance or a mixture of substances Each substance in its state of matter is made up of parts that are too small to see without magnification	Week 1: Compare and group materials together according to whether they're solids, liquids and gases. • A pure substance is one that contains only one substance and only type of particle, e.g. oxygen, iron, pure water How can materials be classified? **Task Design in small groups and receive a variety of materials (e.g. sugar cubes, juice, carbonated drink, balloons filled with air, cooking oil). They will sort the materials into three groups based on their state. Record properties of each material and discuss within their groups why they classified each item in that way. Take photos as evidence**	Solid, liquid, gas
	Week 2 Dissolves means a solid is incorporated into a liquid. A particle is a basic amount of matter The amount of material does not change when a solid melts or a liquid evaporates	Week 2: What is dissolving? • A solvent is a liquid that is used to dissolve other substances. • A soluble substance that dissolves in a solvent is a called a solute • An insoluble substance is one that will not dissolve in a solvent • When a solute dissolves in a solvent, a solution is formed. A solution is a mixture • When no more solute can dissolve in the solvent, the solution is saturated • solutes dissolve more quickly when the particles have more energy (i.e. when heated or stirred) *Recording data in a table* **Task Design: Making a solution Investigation – Each pupil in the group will have their own cup and solid.** • **Half fill the cup with water.** • **Add one teaspoon of the solid to the water.** • **If the solid disappears, a solution has been made.** • **Each member of the group shares their results to complete a table** **Discuss: Did the soluble solids have anything in common? Did they differ in any way from the insoluble solids? Children to have sentence/phrase prompts with vocab**	Solvent, soluble, solute, mixture, dissolves
	Week 3 Particles are not in a material, they are the material Materials can be changed by heating and cooling	Week 3: How can mixtures be separated? • A mixture is two or more different substances, e.g. air, steel • Mixtures can be made of two gases (e.g. air), two solids (e.g. steel), two liquids (e.g. squash and water), or a liquid and a solid (e.g. salt water) • Two solids can be separated by using magnets or filters (e.g. sieve) *Plan to improve a successful separation including recognising and controlling variables*	Mixture, particles

	Week 4; Materials are different states at room temperature	**Task design: Watch www.bbc.co.uk/bitesize/articles/zw7tv9q Sieving and filtering investigation. Divide class into two halves. One half carry out sieving investigation and other** **Sieving** • **Examine the colander and the sieve. Note list their similarities and differences in terms of the material form which they're made, size of holes, if they have holes and 'slashes' etc.** • **Now put the marbles, rice and water into the jug – the amount of water should cover the rice and marbles.** • **Now discuss how you could separate the 3 substances using the colander and sieve. You must have 3 separate piles of the 3 things for it to be a successful separation. Record how the sieve and colander were similar and different and how you could improve separating the three substances** **Magnets** • **Mix up magnetic material and non-magnetic materials in the bowl.** • **Using one of the magnets, try to separate the magnetic materials from the non-magnetic.** • **When materials stick to the magnet, remove them and move to one side.** **Discuss and record how easy it was to separate the materials and how it could be improved. Mix up groups and children discuss their investigations and findings.** Week 4: Are all changes reversible? • A solid and a liquid can be separated by using filtration (if the solid is insoluble) or evaporation (if the solid is soluble) • Identify the part played by evaporation in condensation in the water cycle; associate the temperature which this happens. • -observe that some materials change state when heated or cooled *Record and present findings* **Task Design: Evaporation: Heating a solution (like salty water) causes the water to evaporate, leaving the salt behind. Children make a salty solution and leave some in a shallow dish. Using a diagram record the mixture before the results of the separation.**	Reversible change

	Week 5 Materials are different states at room temperature you can change some and then get them back to the same state	Week 5: Are some changes irreversible? • A reversible change is a change that can be undone, where the original substances can be recovered. • An irreversible change is a change that cannot be undone, where the original substances cannot be recovered **Task Design: https://www.bbc.co.uk/bitesize/articles/z9brcwx Discuss changes. make a class batch of cupcakes. Discuss the ingredients and their states of matter. Once cooked ask the children if it is possible to reverse the changes?** **Children make a poster to show examples of irreversible changes. Burning: When paper burns, it turns into ash and smoke, and it cannot become paper again. Cooking: When you bake a cake, the ingredients combine and change permanently into a new product. Rusting: When iron rusts, it forms a new material (iron oxide) and cannot revert to pure iron.** Week 6: Plan different types of scientific enquiries to separate materials, including recognising and controlling variables where necessary **Task Design: In pairs children plan an investigation to separate a mixture which could include coarse sand, water, salt and lumps of a magnetic material. – Investigation**	Irreversible change

Year 5 Spring Term 2- Biology: Human development.

	Required prior knowledge	Knowledge to be explicitly taught	Vocabulary

	Week 1 Viviparous animals are born. Oviparous animals hatch from eggs, plant seeds germinate Week 2 Gestation is the period from conception to birth Scatter graphs are used to show the relationship between the variables	Week 1: Can I compare the stages of human and animal life cycle? • The human life cycle goes through the same stages as those for other animals: fertilisation, gestation, growth • The human life cycle: embryo, foetus, infant, child, adolescent, adult, senior **Task design: Children draw and label cards with parts of the life cycle of an animal and human. Swap with a partner to rearrange. Discuss any similarities/differences. Why are life cycles important for all living things?** Week 2: Are all humans and animal's gestation periods the same? • Humans are viviparous and a foetus develops inside the mother (or surrogate mother) • A human embryo is considered a foetus at the end of the 10th week of pregnancy • The gestation period for humans is 40 weeks • The bigger the animal, the longer the gestation period • A foetus is considered a baby when it is born *Record using a scatter graph* **Task design: Make a chart or timeline of different animals and their gestation periods. Let the students compare and discuss why they think some animals have longer or shorter times.** **In groups draw a scatter graph to suggest whether there is a relationship between animal size and length of gestation period. Write the conclusions from scatter graph the bigger the animal....** **Examples include:** **Elephants** • Around **22 months** (almost 2 years!) • Elephants have the longest gestation period of any land animal. **Dogs** • Around **2 months** (about 58–68 days) • This is much shorter than a human's. **Cats** • Around **2 months** (about 58–67 days), similar to dogs. **Mice** • Only about **3 weeks** (around 19–21 days) • Mice have one of the shortest gestation periods among mammals. **Horses**	embryo, foetus, infant, child, adolescent, adult, senior gestation, viviparous

	Week 3 Our bodies and minds change as we grow older. We can do different things at different stages of our lives. Week 4 Things around us and how we live our lives changes our bodies and minds. Week 5	• Around **11 months** (about 340 days) • **Giraffes** • About **15 months** (around 450 days) Week 3 : How do our bodies change with age? • Cognitive, physical and social and emotional development takes place at the greatest rate during infancy • During puberty, adolescents' bodies change, e.g. pubic hair, voice deepen, hips widen • Primary aging of adults occurs naturally as our bodies get older (e.g. slower reaction time, reduced hearing) • There are ages where humans at their peak for different things (e.g. reproduction, running etc.) **Design Task: Children make a multiple-choice quiz about stage of life and what happens e.g, during puberty our bodies a) get slower b) voice deepens c) our hearing reduces** Week 4 Investigation – Eyesight as we age – pzaz *Bar charts can be used when data is discrete* Week 5: What factors affect our development? • Secondary ageing relates to environmental factors, like poor diet, not enough exercise, smoking etc. **Task Design: www.bbc.co.uk/bitesize/articles/zk784xs#zymccmn. Discuss and include other environmental factors such as air quality. Children draw a tree of growth. On the leaves write factors which affect our development.** Week 6: How can science help us stay healthy as we age? • Science and habits can help people stay healthy e.g. medicines, vitamins health check-ups, healthy eating, gentle exercise, technology like hearing aids, laser eye treatment • Not all cultures view the aging process in the same way Task design -	Puberty adolescent, cognitive Diet, exercise, environment

Year 5 Summer Term Biology- Life cycles.

	Required prior knowledge	Knowledge to be explicitly taught	Vocab

	Animals, including humans, reproduce. This means they have offspring that grow into adults A species is a group of one type of organism, individuals in this group can breed with each other to produce offspring that can go on to breed	Week 1: What are the stages of a mammal life cycle? • Plants and animals look similar to their parents in many features because information is passed from one generation to the next. This information comes from the parents' genome. • internal fertilisation **Task Design: Children research a mammal's life cycle from our local environment e.g. a hedgehog: internal fertilisation, gestation, hoglet, adult, senior. Present information as a cycle including diagrams and captions. Include information about habitat.**	genome fertilisation life cycle Mammal
	As animals grow they get bigger, some animals change during their life cycle as the mature (e.g. tadpole to frog)	Week 2: What are the stages of a life cycle of an amphibian? frog: external fertilisation, frogspawn, tadpole, tadpole with legs, adult frog (metamorphosis) **Task design: In pairs use 3d materials to create a model to show the stages of an amphibian from the local habitat and compare with an amphibian from around the word. Take photos for books.**	amphibian external fertilisation Metamorphosis
	A species can make small changes to their life cycles according to the conditions of the habitat around them	Week 3: Can I investigate metamorphosis in insects? • internal fertilisation, • ladybird: eggs hatch, larva, pupa, adult **Task design: Case study on butterflies' metamorphosis in insects (Butterfly Garden Collect evidence in class book. Using scientific drawings, photos and labels to document changes e.g. length of time between changes Order and add descriptions to parts of a ladybird's life cycle** Week 4: What are the stages in an avian's life cycle? • internal fertilisation, embryo is incubated in eggs, hatchling, nestling, fledgling, adult, senior **Task design: study bird life cycles through videos and case studies. Discuss how nesting, egg-laying, and chick rearing differ among species. Groups will research different bird species, their unique life cycles and adaptations. A3 posters to present the life cycle.**	hatch larva pupa Internal fertilisation avian nesting adaption
	Look for similarities and differences in the way the different animals grow and change		

		Week 5 Can you compare in life cycles between a mammal, an insect, an amphibian, and a bird? • Life cycle of mammal internal fertilisation, young, adult, senior • birds: embryo is incubated in eggs, hatchling, nestling, fledgling, adult, senior • amphibian: external fertilisation, spawn, young, adult • insect internal fertilisation, eggs hatch, larva, pupa, adult **Task design** **Present similarities/differences of life cycles of animals in groups to the rest of the class. Children can focus on one element e.g internal/external fertilisation. Include information from local and animals around the world and any adaptions to their environment.**	
	The four main stages of the plant's life cycle include germination, pollination, fertilisation and seed dispersal Pollination and fertilisation usually takes place in flowers. Dispersal is important to make sure there is enough space for seeds to germinate and plants to grow	Summer 2 Week 6 -Do you need a seed to grow a plant? • Plants can be grown without seed formation. • Organisms that reproduce asexually produce offspring that are identical to the parent organism. A & P Children independently ask scientific questions; stimulated by experience **Task design: Children try to grow new plants from different parts of the parent plant, for example, seeds, stem and root cuttings, tubers, bulbs. Record progress as a class** Week 7 Can you identify the male and female parts of a plant? • The male part of the plant is called the stamen, made up of the anther and filament, and the anther produces pollen grains. • The female parts of the plant are the ovary (which produces the female sex cells which are contained in the ovule) and the stigma which collects pollen	asexual reproduction tubers root cuttings Bulbs anther filament stamen pollen grains

	Offspring are li their parents Scientists make discoveries all the time Scientists base their work on scientists before them	**Task design: In pairs children dissect flowers and write labels on an A3 sheet Take photo for books.** Week 8 and 9: • Can I explain the differences between sexual and asexual reproduction? • Asexual reproduction does not involve sex cells or fertilisation. Only one parent is needed, and offspring are (genetically) identical to the parent and each other. • • Potatoes develop tubers and daffodils have bulbs, which will grow to be identical copies of the plan - **Task design: children write a report explaining the differences including scientific drawing.** Week 10 Who is David Attenborough? Week 11 How are scientists using plants to improve conditions on earth? A&P: Scientists conduct secondary research to learn from what other scientists have already learned Task design: Research David Attenborough and work as a naturalist. Create a profile. Work in pairs to investigate an earthshot prize entry based on plants e.g. Changing the plate: How alternative proteins can create a healthier planet - The Earthshot Prize. . Present information to the class in their own chosen format.	fertilisation identical naturalist secondary research

Year 6 Autumn Term 1 Physics: Electricity.

	Required prior knowledge	Knowledge to be explicitly taught	Vocabulary

	Week 1: •Electricity (energy) is stored in a battery and for electricity to flow, the circuit must be complete. • A complete circuit must have a power source (cell/batteries) and have all the components connected in a loop. If it is missing any of these things it is an incomplete circuit • A short circuit is the easiest route for electricity to travel and can be created by accident by connecting just the wire to the cell in a circuit. They can be dangerous • In a circuit that has a battery, the battery is a chemical store of energy. Energy is transferred electrically to the device in the circuit, but the device does not store energy. Instead, it changes the way that it is transferred Week 2: • Components include wire, lamp, buzzer, motor or switch • Materials that allow electricity to flow through them easily are called electrical conductors; materials that do not are called electrical insulators • Appliances use electricity to serve a purpose (e.g. toaster, kettle etc.) • Fossil fuels, batteries and the Sun are all examples of chemical energy stores Week 3: • Not all bulbs have the same brightness. • Circuits can be turned on or off using a switch	Week 1: Can I link how components work to the voltage of cells in a circuit? • Taking multiple readings allows you to see if your data is repeatable, helps identify outliers and allows a mean to be calculated. • As long as batteries have the same voltage, the size of the battery does not affect the brightness of the lamp/loudness of the buzzer (though the smaller batteries will not last as long as the larger ones) • Adding more cells in the circuit increases the voltage. Increasing the voltage in a circuit makes the lamp in the circuit get brighter or the buzzer get louder. • Many processes and phenomena are explained in terms of energy exchanges. • **Task design: building circuits and recording findings as a class to see if data is repeatable. Make a conclusive statement to answer the lesson's question.** Week 2: Can I represent a simple circuit in a diagram? • Systematically identifying the effect of changing one component at a time in a circuit • There are recognised symbols for cell, lamp, buzzer, motor, and switch. Wires are represented with straight lines. • **Task design: children to draw simple series circuits using given components. GD: to label. All to make a statement about the series circuit they have drawn.** Week 3: Can I give reasons for variations in component functions? • Taking multiple readings allows you to see if your data is repeatable, helps identify outliers and allows a mean to be calculated. • Draw conclusions • Brightness of bulbs • Loudness of buzzers • On/off position of switches • **Task design: Children to create different circuits including number of batteries to discover variations. Class discussion/share about their findings. Chn to create –er – er rules for their findings. T to scribe key outcomes of the discussion and a copy of these statements are placed in the children's books to refer to throughout the unit.** Week 4: Can I design and make a useful circuit? • Children select a range of practical resources to gather evidence to answer their questions.	VOCAB Series circuit, , components, , terminal, connection, short circuit, conductor, insulator, voltage, current. Symbol, cell, lamp, buzzer, motor and switch Variations Conclusions

	Week 4/5: • How traffic lights look - vertical Week 6: • Voltage is force at which electricity gets 'pushed'.	• Children to devise own circuit e.g. traffic lights, burglar alarm. • Across the world, the demand for energy increases as human populations grow and modern lifestyles require more energy, particularly electrical energy. • **Task Design: Children to design own circuit e.g. traffic lights, burglar alarm. By drawing accurate diagram using symbols and straight lines for wires. Children consider how knowledge about circuits is fed into everyday living. Introduce the concept of eco batteries and why these are useful.** Week 5: Can I design and make a useful circuit? • Children select a range of practical resources to gather evidence to answer their questions. • Children to devise own circuit e.g. traffic lights, burglar alarm. • **Task design: Children to make their own circuit e.g. traffic lights, burglar alarm. Using designs from last week. Photos for science books for children to use to evaluate and make conclusive statements.** Week 6: Can I evaluate and suggest changes to an investigation? (Assessment week) • Systematically identifying the effect of changing one component at a time in a circuit • Consider changing voltage of cells. • **Task design: children to evaluate their circuits from last time and use them to investigate what happens when they add extra components inc. Cells.**	

Year 6 Autumn Term 2 Physics and light.

	Required prior knowledge	Knowledge to be explicitly taught	Vocab

	Week 1/2: • Light travels in straight lines • We see when light enters our eyes • Darkness is the absence of light • An object which gives out light is acalled a source. Week 3: • Sources of light emit their own light, and others reflect light; both occur in nature as well as man-made objects • Light travels from the Sun to the Earth Week 4: • Sources of light emit their own light, and others reflect light; both occur in nature as well as man-made objects • Light from the sun can be dangerous and there are ways to protect our eyes	Week 1: How does light travel? • Children independently ask scientific questions; stimulated by experience or to develop understanding following an enquiry; children decide how to record and present evidence including labelled scientific diagrams and writing. • In ray diagrams, straight lines with arrows show where the energy is being transferred from and to by light • Light appears to travel in straight lines **Task design: Drawing diagrams to show how light travels in straight lines. Chn to explain how light travels underneath their diagram.** Week 2: How does light travel? • Children independently ask scientific questions; stimulated by experience or to develop understanding following an enquiry. • In ray diagrams, straight lines with arrows show where the energy is being transferred from and to by light • Light appears to travel in straight lines **Task design: making periscopes; using this to explain/investigate how light travels in straight lines** Week 3: Do all objects emit light? • Children independently ask scientific questions; stimulated by experience or to develop understanding following an enquiry; children decide how to record and present evidence including labelled scientific diagrams and writing. • Objects would be invisible if they did not reflect light. • Objects emit (give out) or reflect light into the eye. We see things because light travels from light sources to our eyes, or from light **Task design: drawing a diagram to show reflection and light travelling in straight lines and a diagram to show objects that do not emit light.** Week 4: How do we see things? • Children independently ask scientific questions; stimulated by experience or to develop understanding following an enquiry; children decide how to record and present evidence including labelled scientific diagrams and writing. • We see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes **Task design: Pzaz – our eyesight activity**	ray diagram, transfer Emit reflection

	Week 5: • Opaque, translucent and transparent materials allow no, some or all light to pass through them • Shadows form behind an opaque object when light from a source is blocked	Week 5: What affects shadow shape and size? • Given a wide range of resources, children decide how to gather evidence to answer a scientific question. They choose a type of enquiry to carry out and justify their choice. • The size and shape of shadows behind an opaque object can be explained using ray diagrams • Shadows have the same shape as the objects that cast them because light travels in straight lines T**ask design: Use a variety of cut-out shapes, objects and a torch to make shadows on a piece of paper or the wall. Children should explore the idea that as light travels in straight lines an opaque object blocks the light and forms a shadow the same shape as the object.**	
	Week 6: •	Week 6: Investigate relationship between light sources, objects and shadows? e.g. Rainbows, colours on soap bubbles, objects looking bent in water • Communicate their findings to an audience using relevant scientific language; use scientific knowledge gained from enquiry work to make predictions they can investigate. **Task design: Investigate: pencil in a glass of water and how its appearance changes, arrow on a piece of paper and fill a glass with water; observe what happens, pass light through plastic and not what happens. (Oracy) Children to have class discussion about their findings. Photos for books.**	visible spectrum

Spring Biology -Evolution.

	Required prior knowledge	Knowledge to be explicitly taught	Vocab

	Week 1 Living things have adapted to their environment. This means they may not be able to survive in other habitats A fossil is physical evidence of an ancient plant or animal, this could be their preserved remains or other traces that they made when they were alive. Trace fossils are not physical remains of living things they are indirect evidence of life	Week 1: How have living things evolved over time? • Talk about how new discoveries change scientific understanding • Over many generations, living things evolve so that all organisms adapt / have an advantageous trait. • Fossils provide evidence for evolution because they show how organisms have changed over time. **Task design: Children to create salt dough ammonites (take pictures for books).**	VOCAB Generation, evolution, inheritance
	Week 2/3 Palaeontologists study the history of life through fossils Evolution is the way living things change through time. There were scientists in the past who made important discoveries	Week 2: How have living things evolved over time? • Talk about how new discoveries change scientific understanding • Over many generations, living things evolve so that all organisms adapt / have an advantageous trait. • Fossils provide evidence for evolution because they show how organisms have changed over time. Task design: **Chn to write about how fossils prove organisms have changed over time using horses as the example.**	palaeontologists, evolution, adaption
	Week 4 Genetic variation means the differences the sequences of genes	Week 3: Who were the palaeontologists and scientists who developed ideas on evolution? Children answer their own and others' questions based on information they have gained from secondary sources. A&P: Science is never 'complete' and scientists are always working to make models more accurate or to discover new explanations • Scientists who are involved in the development of evolutionary biology include Al-Jahiz, Charles Darwin, Alfred Wallace, Mary Anning and Dr Danielle Lee **Task design: in pairs, children to research their scientist and present their findings to the class (oracy) .**	genetics, variations, adaption,
	Week 5 A trait is a specific characteristic. Different species have different characteristics	Week 4 How does genetic variation occur? • Children to identify causal relationships and patterns in the natural world. • Variation occurs within and between species. • Variation can be environmental or genetic, or a mixture of both. • Genetic variation happens randomly through the mixing of genomes in sexual reproduction.	traits, physiological, structural and behavioural

		Task design: Pzaz – Children of Mr Men and Little Miss – evolution and inheritance Week 5: What makes a species more likely to survive? • Children answer own and others' questions based on information gained; talk about how new discoveries change scientific understanding. • An organism with advantageous traits is more likely to survive and reproduce, passing those traits to the next generation. This is called natural selection. • These advantageous traits - adaptations - can be physiological, structural and behavioural. **Task design: Children to have pictures of various animals and research how they have adapted. Children to write notes on the adaptations for each animal.** Week 6: Investigation **Pzaz – Darwin's mockingbirds – evolution and inheritance** **Children record attempts in a table and observations. Discuss with the children: Which beak was the most successful at gathering worms?** **Which beak could result in the individual bird not surviving to pass on its adaptions?** **As the best beak will be passed on to future generations, what would you expect to see if you went back to the Galapagos Islands to observe the Mockingbirds?** Spring 2 <u>Project Based</u> • Timeline of evolution Over many generations, living things evolve so that all organisms adapt / have an advantageous trait • Family tree Genetic variation happens randomly through the mixing of genomes in sexual reproduction. Sort characteristics of humans into groups of 'inherited characteristics' and 'acquired characteristics'	

		• Stem career based on inheritance and evolution Study/career fair Pupils might find out about the significance of the work of scientists such as Carl Linnaeus, a pioneer of classification. Scientist work today,	

Year 6 Summer 1 Biology Further classification

	Required prior knowledge	Knowledge to be explicitly taught	Vocab

	Invertebrates do not have a backbone Invertebrates can be grouped based on their skeletons; endoskeletons, exoskeletons, or hydrostatic skeletons Classification refers to a method used to place all living things into groups. Organisms can be classified in a number of ways Plants can be grouped into flowering and non-flowering plants Plants make their own food A symbiotic relationship is where plants and animals live along and rely on one another	Week 1: How can invertebrates be classified? • Children to decide how to record and present evidence including classification keys, Venn diagrams and Carroll diagrams. • Invertebrates can be grouped based on their characteristics: insects, spiders, snails, worms **Task design: children to create classification keys on invertebrates.** Week 2: Can plants be grouped in different ways? • Children to decide how to record and present evidence including classification keys, Venn diagrams and Carroll diagrams. • Plants can be grouped into moss, ferns, conifers and flowering plants. **Task design: Children to create information posters about different types of plants and their differences/similarities.** Week 3: How are fungi different to plants and animals? • Children to decide how to record and present evidence including classification keys, Venn diagrams and Carroll diagrams. • Fungi are different to plants and animals. They cannot make their own food (like animals) but do not move (like plants) • Micro-organisms are organisms that are so small that we cannot see them with our eyes alone. • Some fungi are microorganisms (e.g. yeast), but not all are (e.g. mushrooms) **Task design: Children to create classification tables (Venn Diagrams) (Carroll diagrams) to show differences between plants and animals.** Week 4: What is bacteria? • Bacteria are microorganisms. Some bacteria can cause disease in other organisms. • Some bacteria are helpful for other organisms (e.g. those that help break down food in our digestive system) and those that form part of a symbiotic relationship **Task design: Research the harmful and helpful effects that bacteria can have on humans and other organisms, and present this information in a written formal** Week 5 :Pzaz – Microbial growth investigation	invertebrates classification characteristics moss Ferns conifers micro-organism fungi bacteria Symbiotic

	In investigations you keep some things the same and vary others to help form a conclusion	Scientists identify factors in an investigation that should be controlled and find ways to control them. **Task: Present conclusions and explain controls in the investigation**	microbial

Summer Term 2 Year 6 Biology Functions of the human body.

	Required prior knowledge	Knowledge to be explicitly taught	Vocab

	Humans are made of many different body parts Humans need exercise to stay healthy Organs are parts of the body that do a particular job, the heart pumps blood around the body and the lungs are used for breathing which gets air into your body. The muscles and skeleton are required to help the body move. When muscles contract they pull the bone Oxygen and carbon dioxide are found in the air Parts of the body have particular jobs , the heart pumps blood	Week 1: What do muscles and organs in the human body need? • Each organ and muscle in the human body needs oxygen and nutrients (from breathing in and eating/digesting). Each organ and muscle releases carbon dioxide, which needs to be removed (and breathed out) • Blood carries oxygen, nutrients and carbon dioxide around the body **Task design:**How do the heart and circulatory system work? - BBC Bitesize Operation Ouch - Red Blood Cells | Biology Facts for Kids Children make a film clip to explain the job of blood. Week 2: How does blood flow around the body? Gather information using a data logger (e.g heart rate) • The heart is a muscle that pumps the blood through the blood vessels. Blood is pumped at a high pressure. • The heart pumps deoxygenated blood to the lungs, where oxygen is transferred to it and it flows back to the heart. The heart pumps oxygenated blood to the rest of the body, where the oxygen is transferred to the organs/muscles and carbon dioxide is transferred to the blood. • Deoxygenated blood then travels back to the heart to begin the process again. **Task design: -Pzaz – Making a heart model. Complete table with findings.** Week 3: How do arteries and veins differ? • Arteries carry blood away from the heart. Arteries have thick walls because they carry blood from the heart which is at a high pressure. blood is being pumped through very quickly. They mostly carry oxygenated blood. • Veins carry blood back to the heart. They mostly carry deoxygenated blood. **Task design: draw a diagram of the heart and arteries using blue and red to show oxygenated and deoxygenated blood.** Week 4 Can I describe ways in which water and nutrients are transported around animals including humans? • Nutrients are absorbed by the blood along the small intestine,and transported to other organs in the body. Water is absorbed by the blood	nutrients organs carbon dioxide blood vessels oxygenated Deoxygenated arteries

	Water is absorbed in the large intestine, leaving behind the waste products Diet and exercise impacts your health.	along the small and large intestines, and transported to other organs in the body • Arteries branch into smaller blood vessels called capillaries, capillaries are very small and supply our organs (and tissues) with oxygen and nutrients. The capillaries also remove carbon dioxide. **Task design: create a mulitple choice quiz. e.g. what are capillaries supply our organs? A) carbon dioxide B) blood c) oxygen** Week5 & 6: What is the impact of exercise, drugs and lifestyle on a body? • The heart rate is how quickly the heart pumps. It is usually measured in beats/min. • Muscles need more oxygen when they are being used in exercise, so the heart rate increases. • Smoking can damage the lungs, reducing the amount of oxygen that can enter the capillaries; this makes exercise harder. Smoke contains many chemicals, some of which are also absorbed by the blood and transported around the body. These can causes diseases. M&O: Planning to take multiple readings allows anomalous data to be identified and enables a mean to be calculated. Repeats show if our data is repeatable. **Task design – heart rate and exercise Pzaz complete table and write conclusions**	veins Small intestines Large intestines Vessells capillaries heart rate bpm

Core Threads for Science. The Big Ideas of Science.

	1. All material in the universe is made of very small particles	2. Objects can affect each other at a distance	3. Changing the movement of an object requires a net force to be acting on it
Y1			
Y2	• All the 'stuff' encountered in everyday life, including air, water and different kinds of solid substances is called matter • Different materials are recognisable by their properties		
Y3		• Objects can have an affect on other objects even when they are not in contact with them. Light reaches our eyes, even though the light source may be far away • The non-contact force of magnetism mean magnets can attract or repel other magnets	• Forces can push, pull or twist objects, making them change shape or motion • Things can only change their motion if there is a net force acting on them • When forces acting on an object are not equal and opposite in direction, they are unbalanced and will change an object's speed, direction or shape
Y4	• The amount of material does not change when a solid melts or a liquid evaporates • If a material could be divided into smaller and smaller pieces it would be found to be made of pieces, particles, smaller than can be seen even with a microscope. These particles are not in a material; they are the material.	• Sound comes from things that vibrate and can be detected at a distance from the source because the air or other material around is made to vibrate. Sounds are heard when the vibrations in the air reach our ears	
Y5	• When some materials combine, they do not change permanently and can be separated again • Materials can be changed by heating and cooling	• The non-contact force of gravity makes things fall to Earth • There is gravitational force between all objects, but it is only felt when one or more of the objects has a very large mass	• An object on Earth pulls the Earth as much as the Earth pulls the object, but because the Earth's mass is much bigger, we observe the motion of the object • The downward force of gravity on an object on the Moon is less than that on Earth because the Moon has less mass on Earth
Y6	• When some materials are combined, they form a new material with different properties to the original materials		
KS3	• The smallest piece of a material is called an atom. All materials, anywhere in the universe, living and non--living, are made of a very large numbers of these basic 'building blocks' of which there are about 100 different kind	• There is attraction and repulsion between objects that are electrically charged • Visible light and other forms of radiation can travel through any empty space	• How quickly an object's motion is changed depends on the force acting and the object's mass. The greater the mass of the object, the longer it takes to speed it up or slow it down (inertia)

	4. The total amount of energy in the Universe is always the same, but energy can be transformed when things change or are made to happen	5. The composition of the Earth and its atmosphere and the processes occurring within them shape the Earth's surface and its climate
Y1	• Things around us can be made to change or happen. We can pull objects behind us or push them across the table	• Plants grow in soil • The weather can change rapidly. Different seasons have different weather patterns
Y2	• All living things need food to give them energy • The arrows in a food chain show where energy is being transferred from and to	• There is air all around us on Earth
Y3		• Much of the solid surface of the Earth is covered in soil, which is a mixture of pieces of rock of various sizes and the remains of organisms. Some soil also contains air, water and some nutrients. • There are many different kinds of rock with different composition and properties. • Beneath the Earth's solid crust is a hot layer called the mantle. The Earth's crust consists of a number of solid plates which move relative to each other, carried along by movements of the mantle. The formation of mountains, earthquakes and volcanic activity are likely to occur at these cracks (see **Geography Year 3 Spring: Mountains and Volcanoes and Year 4 Summer: Earthquakes**)
Y4	• The arrows in a food web show where energy is being transferred from and to • Things around us can be made to change or happen. We can turn on a light bulb and make it brighter or dimmer.	
Y5	• Many processes and phenomena are explained in terms of energy exchanges • Energy cannot be created or destroyed. When energy is transferred from one object to others, the total amount of energy in the universe remains the same; the amount that one object loses is the same as the other objects gain	• There is less and less air further away from the Earth's surface; space is a vacuum • The action of water wears down rock gradually into smaller pieces (see **Geography, Year 5 Spring: Investigating water**) • Light from the Sun warms the Earth's surface and the heat is trapped by the Earth's air. This is known as the greenhouse effect (see **Geography, Year 5 Summer: Climate across the world**)
Y6	• Across the world, the demand for energy increases as human populations grow and modern lifestyles require more energy, particularly electrical energy.	
KS3	• Objects have energy because of their chemical composition, their movement, their temperature, their position in a gravitational or other field, or because of compression or distortion of an elastic material.	• Weather is determined by conditions of the air. The temperature, pressure, direction and speed of the movement and the amount of water vapour in the air combine to create the weather. • Radioactive decay of material inside the Earth since it was formed is its internal source of energy.

	6. Our solar system is a very small part of one of millions of galaxies in our universe	7. Organisms are organised on a cellular basis	8. Organisms require a supply of energy and materials for which they are often dependent on or in competition with other organisms
Y1	• Daytime is when the Earth is facing the Sun; nighttime is when the Earth is facing away from the Sun.	• Living things, including humans, react to their surroundings with their senses	• There is a wide variety of living things, including plants and animals
Y2		• Living things grow, need, water, air and food, react to their surroundings, move, get rid of their waste, reproduce	• All living things need energy for food, as well as air, water and certain temperature conditions. • Most plants make their own food • Animals need food, which comes by eating plants (herbivores) or by eating animals (carnivores), which have eaten plants or other animals. • Plants and animals are dependent on each other. • Organisms are adapted to their environment. If conditions in a habitat change, organisms may not be able to survive.
Y3	• The Moon reflects light from the Sun.	• Living things need water, air, food, a way of getting rid of water and an environment that stays within a particular temperature range.	• Plants make their own food using sunlight, carbon dioxide and water
Y4			• Animals are ultimately dependent on plants for their survival. • The relationships among organisms can be represented as food chains and food webs.
Y5	• Our Sun is one of many stars that make up the Universe. • The distances between us and the bodies in solar system is huge, and even bigger in the Universe		
Y6		• Micro-organisms are organisms that are so small that we cannot see them with our eyes alone	• In any given ecosystem there is competition among species for the energy and materials they need to live.
KS3	• The tilt of the Earth's axis gives rise to seasons. • The movements of galaxies suggest that the Universe is expanding from a past state called the 'big bang', towards a future that is still unclear	• All living organisms are made of one or more cells, which can only be seen through a microscope • All the basic functions of life – growth, reproduction, extracting energy from food – are the results of what happens inside cells • Cells are often aggregated into tissues, tissues into organs, and organs into organ systems	• Decomposers are essential (alongside producers and consumers) for a stable ecosystem.

	9. Genetic information is passed down from one generation of organisms to another	10. Diversity of organisms, living and extinct, is the result of evolution
Y1		• There are many different kinds of plants and animals in the world today.
Y2	• Plants and animals reproduce (have offspring)	
Y3		• Fossils are the preserved remains or traces of living things.
Y4		
Y5	• Organisms produce offspring of the same kind, but in many cases offspring are not identical with each other or with their parents. • Plants and animals, including humans, resemble their parents in many features because information is passed from one generation to the next. • Not all information is passed on from one generation to the other in the same way; some skills and behaviour have to be learned	• Although organisms of the same species are very similar, they vary a little from each other.
Y6		• There are many kinds of organisms that were once alive but are now extinct. • We know about extinct animals from fossils. • Living things are found in certain environments because they have the features that enable them to survive there. This adaptation to their environment has come about because of the small differences that occur during reproduction, resulting in some individuals being better suited to the environment than others. In the competition for materials and energy, those that are better adapted will survive and are more likely to pass on their adapted feature to their offspring.
KS3	• In a human body, most cells contain 23 pairs of chromosomes. These provide information that is needed to make more cells in growth and reproduction.	• The natural selection of organisms has been going since the first form of life appeared on Earth 3.5 billion years ago. • Multi-cellular organisms evolved around 2 billion years ago

Disciplinary knowledge (KS1)

The below tables outlines where disciplinary knowledge – the working scientifically elements – is **first taught** and deliberately practised in KS1 or KS2. The curriculum has been sequenced so that the content is also reviewed in subsequent units (and may also be reviewed in other subject areas like geography and history), but to keep the table readable, we have only set out where it is first taught. The Mathematics Programmes of Study have been considered so that pupils never need to apply mathematical skills (e.g. calculating mean, rounding to an appropriate degree, constructing graphs) until they have first been taught in mathematics lessons.

	Scientific Attitudes & Planning (A&P)	Measuring & Observing (M&O)	Recording & Presenting (R&P)	Analysing & Evaluating (A&E)
R		• Measure/observe using senses		• Notice patterns in the world me
Y1	• Scientists look for patterns in the world around them • Scientists group objects or living things based on their properties • It is important that we keep as much as we can the same, apart from the one thing we measure and the one thing we change • Scientists conduct secondary research to learn from what other scientists have already learned	• Gather information from text/ books/ images	• Record numerical or descriptive observations in a table • Draw a diagram, a simple scientific drawing that explains or informs • Use a table to classify items based on properties • Use a Carroll diagram to classify items based on properties • Use a Venn diagram to classify items into two or three sets based on properties	• Make simple statements about the results of an enquiry
Y2	• Make a prediction based on substantive knowledge • There are four main stages of enquiry (A&P, M&O, R&P, A&E) • Scientists identify potential hazards in their experiments and plan ways to reduce them • Scientists conduct investigations to identify whether a pattern they think they've seen is really there	• Make systematic observations of an object • Observe using a magnifying glass safely	• Use a pair of axes to classify items based on the extent it displays two properties	• Ask further questions that could be explored to extend findings

Disciplinary knowledge (KS2)

	Scientific Attitudes & Planning (A&P)	Measuring & Observing (M&O)	Recording & Presenting (R&P)	Analysing & Evaluating (A&E)
Y3	• Select most appropriate equipment to measure (the variables) that will give you the best chance of an accurate result • A dependent variable is what you measure; an independent variable is what you change; controlled variables are things that stay the same • Scientists identify factors in an investigation that should be controlled, and try to find ways to control them • Write an appropriate method • Science is studied as three disciplines: biology (study of living organisms), chemistry (study of materials) and physics (study of energy)	• Gather information from the internet • Anomalous results should be discarded and rerecorded • Data is repeatable if the same person repeats the investigation and gets the same results; data is reproducible if the investigation is repeated by a different person and the results are the same • Taking multiple readings allows you to see if your data is repeatable, and helps identify outliers	• Design a table to collect data with the appropriate number of rows and columns and correct headings	• Draw conclusions (e.g. 'the greater the… , the greater the…') • Use scientific understanding to explain their findings • Suggest ways to improve practical procedures to obtain more accurate measurements • Use findings of investigation to make further predictions
Y4	• Set a hypothesis to test • Draw diagram of the investigation • Scientists use models to help explain their ideas	• Gather information using a data logger (e.g. sound meter app; heart rate app)	• Use a classification key to identify an object • Draw a dichotomous classification key to help others identify an object • Present information orally using a prop or demonstration • Present information in a written format	• Identify scientific evidence that has been used to support or refute ideas
Y5	• Science is studied as three disciplines: biology (study of living organisms), chemistry (study of properties of matter and how it interacts with energy) and physics (study of energy) • Scientists look for patterns in data to try to identify correlations • Scientists must work out if the factor is the cause of the outcome in a correlation	• Measure force using a Newtonmeter	• Scatter graphs can help you decide if there is a relationship between two variables • Interpret and construct climate graph • Line graphs can be used when data is continuous; bar charts can be used when data is discrete	• Make judgements on the reliability of the data • Some people may agree or disagree with the use of some scientific discoveries • Science is never 'complete' and scientists are always working to make models more accurate or to discover new explanations
Y6		• Taking multiple readings allows you to see if your data is repeatable, helps identify outliers and allows a mean to be calculated	• Decide which graph is most appropriate for the enquiry	• Calculating the mean can be used as a method of analysing data
KS3	• Evaluate risks	• Pay attention to objectivity and concern for accuracy, precision, repeatability and reproducibility • Use a wider range of apparatus and techniques • Apply sampling techniques • Evaluate data, showing awareness of potential sources of random and systematic error	• Use a range of graph types to display data, including pie charts, scatter graphs and line graphs	• The difference between correlation and causation, and suggesting ways to test for both • Understand that scientific methods and theories develop as earlier explanations are modified to take account of new evidence and ideas, together with the importance of publishing results and peer review

Alignment to the National Curriculum

Substantive knowledge (knowledge of the 3 subject disciplines that represent Science) have been aligned across year groups to ensure that pupils are exposed to a balance of disciplines and substantive knowledge across Key stages. Additional units have been purposefully added to take pupils beyond the National curriculum. In Year 2: Solids, liquids and gases. This introduces pupils to the idea that familiar substances (like water or chocolate) can exist as solids, liquids or gases. It will support understanding of states of matter and the particle model in Year 4, and pre-empts the misconception that substances only ever exist in one state. Later in Year 5: Energy. This introduces pupils to energy stores and transfers at a very basic level, and has been designed to pre-empt misconceptions that need to be unpicked at secondary. It also allows pupils to review content from previous topics across biology, chemistry and physics (like food webs, electricity, and states of matter), and consider them through the lens of energy. Finally in Year 6: Physical & chemical changes. This unit gives pupils the opportunity to run more sophisticated practical investigations. It provides a good transition to Year 7

Disciplinary knowledge (working scientifically) As specified in the National Curriculum, disciplinary knowledge is not taught as a separate strand. Instead, very specific aspects of disciplinary knowledge (for example, recognising and managing risk; or measuring using a Newton meter) are explicitly taught as part of the units set out here. They are deliberately practiced in the context of relevant and appropriate experiments, and then reviewed at regularly intervals across the key stages.

Assessment

Assessing impact is assessing how well pupils have learned the required knowledge from the implemented curriculum.

This can be done through:

Formative assessment in lessons

There are formative opportunities for formative assessment in the lesson through questioning, feedback and discussion. Teachers should continually adapt their lesson delivery to address misconceptions and ensure that pupils are keeping up with the content.

Summative assessment

Teachers use an assessment exception sheet identifying which children need more support and which children have exceeded expectations. The aim is to assess whether pupils have learned the core knowledge for that unit. These should be used formatively, and teacher should plan to fill gaps and address misconceptions.

Books and pupil conference

Talking to pupils about their books allows you to assess how much of the curriculum content is secure. These conversations are used most effectively to determine whether pupils have a good understanding of the vertical concept, and if they can link recently taught content to learning from previous units. (They should not be used to assess whether pupils can recall information, as low-stake quizzes can gather this information more efficiently)