Crayke Church of England Primary School
Curriculum Long Term Plan and Progression Overview - SCIENCE

"The important thing is to never stop questioning."
Albert Einstein

Contents	
Item	**Page**

FOLLOW YOUR PATHWAY AND WE GROW TOGETHER WITH CONFIDENCE

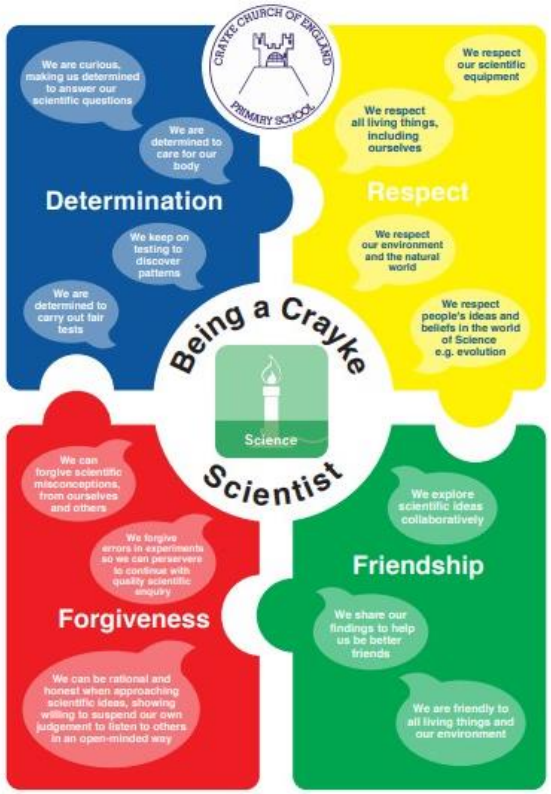
*You did not choose me, I chose you that you might **go and bear fruit, fruit that will last** so that whatever you ask in my name the Father will give you.* John 15:16

Friendship Forgiveness Respect Determination

Crayke Church of England Primary School
Curriculum Long Term Plan and Progression Overview - SCIENCE

What does it mean to be a Crayke Scientist?

***"The important thing is to never stop questioning."* Albert Einstein**



Using a thematic approach, we ensure that there is appropriate **coverage** of the requirements of the National Curriculum, within the bounds of our two-year rolling programme due to our mixed-age classes.

We use Chris Quigley Essentials' Threshold Concepts in order to develop children's scientific knowledge, skills and concepts:

- Work scientifically
- Understand plants
- Understand animals and humans
- Investigate living things
- Understand evolution and inheritance
- Investigate materials
- Understand movement, forces and magnets
- Understand light and seeing
- Investigate sound and hearing
- Understand electrical circuits
- Understand the Earth's movement in space

Themes in science provide the opportunity for pupils to answer "**Enquiry Questions**" which underpin both the scientific content and skills we want the children to learn over the course of a unit of learning.

Crayke Church of England Primary School
Curriculum Long Term Plan and Progression Overview - SCIENCE

Subject Leader	Lois Dobson
Link Governor	Lucy Wilshaw
CPD	Chris Quigley Essentials Curriculum/Carousel/Primary Science Teaching Trust/Twinkl

Progression in Science at Crayke Primary

Our Curriculum – how does it progress from Early Years to Key Stage 3?

- In EYFS, children explore the natural world around them, make observations, draw pictures and explore similarities and differences between contrasting environments. The pupils will begin to learn vocabulary associated with the natural world. The Early Years curriculum map which is detailed in the section below has been devised to feed into the Key Stage 1 curriculum.
- Key Stage 1 units have been planned to ensure each focus area is covered at least once, with the element of working scientifically interwoven throughout.
- Our Key Stage 2 units have been arranged with opportunities to provide children with a clear understanding of the different aspects of science.
- Units of work have been built around a central enquiry question and use the Chris Quigley Essentials milestone statements alongside the National Curriculum objectives. Key vocabulary has been agreed to thread through all topics in the school.
- As they move into Key Stage 3, the national curriculum for science aims to ensure that all pupils:
  - develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics
  - develop understanding of the nature, processes and methods of science through different types of science enquiries that help them to answer scientific questions about the world around them
  - are equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future.

Crayke Church of England Primary School
Curriculum Long Term Plan and Progression Overview - SCIENCE

EYFS

Below shows the progression of skills that demonstrate the development of the education programme.

Education Programme
Statutory Guidance from the EYFS Framework for Understanding the World - Understanding the world involves guiding children to make sense of their physical world and their community. The frequency and range f children's personal experiences increases their knowledge and sense of the world around them - from visiting parks, libraries and museums to meeting important members of society such as police officers, nurses and firefighters. In addition, listening to a broad selection of stories, non-fiction, rhymes and poems will foster their understanding of our culturally, socially, technologically and ecologically diverse world. As well as building important knowledge, this extends their familiarity with words that support understanding across domains. Enriching and widening children's vocabulary will support later reading comprehension.
Science
The Natural World
Autumn Provision – Incredible Me and Fabulous Farming
Begin to learn about human and animal lifecycles – Babies, generations Learn about how to be healthy – including oral health Learn about what crops farmers grow in the fields around us Begin to learn what crops need to help them grow Begin to learn what animals need to keep them healthy and alive Begin to learn about the jobs people do in our school community Begin to talk about the weather and seasons
Check Point 1 December
I can draw my family I can tell you about them from my drawing I can answer questions about my family life

Crayke Church of England Primary School
Curriculum Long Term Plan and Progression Overview - SCIENCE

I know the name of the head teacher, what they do . I know the school secretary and what they do. I can tell three members of staff from school and their roles. I can tell you what people in our community do to help us I am beginning to learn about the seasons

Crayke Church of England Primary School
Curriculum Long Term Plan and Progression Overview - SCIENCE

Spring Provision – Dinosaurs Rock and Once Upon a Time
To develop their knowledge of life cycles by introducing plant life cycles – Jack and the beanstalk To learn about what different dinosaurs ate To develop our knowledge about dinosaurs To develop their ideas for sorting (herbivores, omnivores, carnivores) To learn about to different habitats To learn about different materials and their strength
Check Point 2 March
I can tell you if a character in a story is old. I can tell you about Spring I can show you features (in our environment and on a map)
Summer Provision – Ready, Steady, Grow and Up, Up and Away
To develop their knowledge about what plants/flowers need to grow. To learn how to classify different plants/flowers To learn about different life cycles: sunflowers/pumpkins/carrots To go on a walk around the village to see how the fields and trees have changed To go to Elvington Air Museum
Check Point 3 July
I can explore my outdoor environment I can explore my outdoor to experience changes, weather and physical challenges I can identify a plant I can identify an animal I can use my senses to explore the natural world I can tell you familiar plants and name them. I can tell the difference between bushes and trees.

Crayke Church of England Primary School
Curriculum Long Term Plan and Progression Overview - SCIENCE

I can say bird names familiar to my outdoors
ELG
• Explore the natural world around them, making observations and drawing pictures of plants and animals. • Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class. • Understand some important processes and changes in the natural world, including the seasons and changing states of matter.

Crayke Church of England Primary School
Curriculum Long Term Plan and Progression Overview - SCIENCE

Bridging EYFS and Key Stage 1 – Science

Organisation of Knowledge	Working scientifically	Plants	Animals including humans	Everyday materials	Seasonal change
Relevant ELG	**ELG: Listening, Attention and Understanding** - Make comments about what they have heard and ask questions to clarify their understanding. **ELG: Fine motor skills** - Use a range of small tools, including scissors, paint brushes and cutlery. **ELG: Building Relationships** - Work and play cooperatively and take turns with others.	**ELG: The Natural World** - Explore the natural world around them, making observations and drawing pictures of plants and animals. - Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class. **ELG: Speaking** - Participate in small group, class and one-to-one discussions, offering their own ideas, using recently introduced vocabulary.		**ELG: The Natural World** - Understand some important processes and changes in the natural world, including the seasons and changing states of matter. **ELG: Speaking** - Participate in small group, class and one-to-one discussions, offering their own ideas, using recently introduced vocabulary.	
KS1 readiness objectives	To feel confident to answer simple questions about observable properties of objects and people, animals and plants around them To compare objects in their environment and talk about similarities and differences To ask questions about the world around them, and seek to find their own answers	To know what a plant is To know what a flower is To know where you see plants To describe different plants and flowers	To know what an animal is To recognise and name a variety of different animals To know the names of different body parts of humans and animals they have experience of	To recognise that different everyday objects are made from different materials To describe how different objects look and feel	To know about different types of weather To observe changes in trees and plants as the seasons progress

Crayke Church of England Primary School
Curriculum Long Term Plan and Progression Overview - SCIENCE

Key Stage 1

Year 1/2 (A) 2024-2025			
	Autumn	**Spring**	**Summer**
Theme	Shiver Me Timbers	Growing, Growing, Grown	Animal Explorers
National Curriculum Area of Study	Seasonal Changes		
	Uses of everyday materials	Plants	Living things and their habitats
Enquiry Question	What is it like in Winter, Spring, Summer and Autumn?		
	Can we change materials?	What should I do to grow a healthy plant?	Why do different animals live in different places?
Form of Enquiry	Pattern Seeking 		
	Comparative Tests  Identify & Classify 	Observation over time  Pattern Seeking 	Identify & Classify  Research 
Progression of procedural knowledge (Chris Quigley Milestones)	**WS:** B1, B2, B3, B4, B5 **UP:** **UAH:** **ILT:** **UEI:** **IM:** B23, B24, B25, B26, B27, B28 **UMFM:** **ULS:** **ISH:** **UEC:** **UEMS:** B35, B36	**WS:** B1, B2, B3, B4, B5, B6 **UP:** B8, B9, B10 **UAH:** **ILT:** **UEI:** **IM:** **UMFM:** **ULS:** **ISH:** **UEC:** **UEMS:** B35, B36	**WS:** B1, B2, B3, B4, B5 **UP:** **UAH:** **ILT:** B18, B19, B20, B21, B22 **UEI:** **IM:** **UMFM:** **ULS:** **ISH:** **UEC:** **UEMS:** B35, B36

Crayke Church of England Primary School
Curriculum Long Term Plan and Progression Overview - SCIENCE

Year 1/2 (B) 2025 - 2026			
	Autumn	**Spring**	**Summer**
Theme	Happily Ever After	Oh, I do like to be beside the seaside	Step into Summer
National Curriculum Area of Study	Seasonal Changes		
	Everyday materials	Animals including humans	Plants
Enquiry Question	What is it like in Winter, Spring, Summer and Autumn?		
	What are the things I use made from?	What are animals like? Do living things change or stay the same?	How many types of plants are there?
Form of Enquiry		Comparative Tests 	
	Comparative Tests  Identify & Classify  Pattern Seeking 	Comparative Tests  Identify & Classify  Research 	Identify & Classify  Observation over time 
Progression of procedural knowledge (Chris Quigley Milestones)	**WS:** B1, B2, B3, B4, B5 **UP:** **UAH:** **ILT:** **UEI:** **IM:** B23, B24, B25, B26, **UMFM:** **ULS:** **ISH:** **UEC:** **UEMS:** B35, B36	**WS:** B1, B2, B3, B4, B5, B6 **UP:** **UAH:** B11, B12, B13, B14, B15, B16, B17 **ILT:** **UEI:** B22 **IM:** **UMFM:** **ULS:** **ISH:** **UEC:** **UEMS:** B35, B36	**WS:** B1, B2, B3, B4, B5, B6 **UP:** B7, B8, B9 **UAH:** **ILT:** **UEI:** **IM:** **UMFM:** **ULS:** **ISH:** **UEC:** **UEMS:** B35, B36

Crayke Church of England Primary School
Curriculum Long Term Plan and Progression Overview - SCIENCE

Year 1 – (ENERGY) Seasons and How they Change

National Curriculum Objectives	Sticky Knowledge	Vocabulary
• **Observe changes across the four seasons** • **Observe and describe weather associated with the seasons and how day length varies.**	• Weather can change • There are lots of different types of weather: Rain, Sun, Cloud, Wind, Snow, etc • Days are longer and hotter in the summer • Days are shorter and colder in the winter • There are four seasons: Spring, Summer, Autumn, Winter	Seasons, spring, summer, autumn, winter, windy, sunny, overcast, snow, rain, temperature Key Scientists: Dr Steve Lyons (Extreme Weather); Holly Green (Meteorologist) Linked Texts: Tree: Seasons Come, Seasons Go (Patricia Hegarty and Britta Teckentrup); One Year with Kipper (Mick Inkpen); After the Storm (Nick Butterworth)

Prior Learning	Key Question(s):	Future Learning
In Early Years children should: • **Developing an understanding of change.** • **Observe and explain why certain things may occur (e.g. leaves falling off trees, weather changes).** • **Look closely at similarities, differences, patterns and change.** • **Comments and questions about the place they live or the natural world.**	• Why do more frequent days of rain saturate the ground? • How long does it take for the ground to dry after it has been raining? • Does more rain take longer to dry? • Do countries with higher temperatures have less rain? • How does rainfall and temperature change over time in our school grounds? • Which leaf is the strongest/best shade cover/best at directing water? • What do you notice about different leaves? • What purpose to leaves serve for a tree? • Why do you think leaves turn brown in Winter? • What colours can we find outside? Does this change across the seasons? • What effect does rain have on the environment? • What would happen if there was too much rain? • What would happen if there wasn't enough rain?	In Year 3 children will: • Recognise that they need light in order to see things and that dark is the absence of light. • Notice that light is reflected from surfaces. • Recognise that light from the sun can be dangerous and that there are ways to protect their eyes. • Recognise that shadows are formed when the light from a light source is blocked by a solid object. • Find patterns in the way that the sizes of shadows change.

Teaching Ideas

Comparative tests	Identify & Classify	Observation over time	Pattern Seeking	Research	BIG Question – Assessment Opportunity
In which season does it rain the most?	How could you organise all the objects in the solar system into groups?	How does the colour of a UV bead change over the day?	Does the wind always blow the same way?	Are there plants that are in flower in every season? What are they?	What is it like in Winter, Spring, Summer and Autumn?

Crayke Church of England Primary School
Curriculum Long Term Plan and Progression Overview - SCIENCE

Year 2 – Materials

National Curriculum Objectives

- **Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses.**
- **Find out how shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.**

Sticky Knowledge

- Materials can be changed by physical force (twisting, bending, squashing and stretching)

Vocabulary

Waterproof, fabric, rubber, cars, rock, paper, cardboard, wood, metal, plastic, glass, brick, twisting, squashing, bending, matches, cans, spoons,

Key Scientists	Linked Texts
William Addis (Toothbrush Inventor)	***The Tin Forest*** *(Helen Ward)*
Charles Mackintosh (Waterproof coat)	***Traction Man*** *(Mini Grey)*
John McAdam (roads)	***Three Little Pigs*** *(Lesley Sims)*

Prior Learning

In Year 1 children should:

- **Distinguish between and object and the material from which it is made.**
- **Identify and name a variety of everyday materials, including wood, metal, plastic, glass, water and rock,**
- **Describe the simple physical properties of a variety of everyday materials.**
- **Compare and group together a variety of everyday materials based on their simple properties.**

Key Question(s):

It is recommended that materials be taught three times through KS1. Give a theme for each topic e.g. buildings, exploration, toys, the seaside. Plan to investigate a couple of classes of materials and properties in each topic so children get a depth of experience each topic and cover all the classes of materials over the key stage

Buildings

- Which rocks are the least crumbly?
- Which materials absorb the most water?
- Which type of brick would be the easiest to drag to make a pyramid?
- Which material would be the strongest to use as a floor tile?

Toys & Nice things

- Which fabric would make the softest blanket?
- The baby has spilt her drink, which material would absorb the drink the best?
- We want to make a really slippery slide; which liquid would be best to use?
- Which chocolate will melt the fastest on a warm plate (a model of a warm hand)
- Which wrapping papers are strong enough to wrap and send a present?

Clothing & Materials

- Which material could be used to make a waterproof hat for the teacher when she is on the playground at playtime?
- Which plastic would be flexible enough to make a belt?
- Which material could I wrap my ice egg / snowman in to stop it melting, or would it make it melt quicker?
- What could I wrap a chicken egg in to keep it warm when it is waiting to hatch?
- What could you paint on the runaway gingerbread man that would allow him to swim the river and get away from the fox and not turn to mush?

Future Learning

In Year 3 children will:

- Compare and group together different kinds of rocks based on their appearance and simple physical properties
- Describe in simple terms how fossils are formed when things that have lived are trapped within rock
- Recognise that soils are made from rocks and organic matter.

Teaching Ideas

Comparative tests	Identify & Classify	Observation over time	Pattern Seeking	Research	BIG Question – Assessment Opportunity
Which shapes make the strongest paper bridge? **Which material would be best for the roof of the little pig's house?**	Which materials will float and which will sink? Which materials will let electricity go through them, and which will not? Which materials are shiny and which are dull?	How long do bubble bath bubbles last for? What will happen to our snowman?	How do materials change with heat? *leave outside in sunshine/windowsill/radiator* How does amount of water affect the strength of a kitchen towel?	How have the materials we use changed over time? How are plastics made?	Can we change materials? How do we choose the best material?

Crayke Church of England Primary School
Curriculum Long Term Plan and Progression Overview - SCIENCE

Year 2 – Plants

National Curriculum Objectives	Sticky Knowledge	Vocabulary
• **Observe and describe how seeds and bulbs grow into mature plants.** • **Find out and describe how plants need water, light and warmth to grow and stay healthy.**	• Plants grow from seeds/bulbs • Plants need light, water and warmth to grow and survive • Flowers make seeds to make more plants (reproduce) • Plants are important • We need plants to survive (to clean air, to eat) • We can eat different parts of the plants (leaves, stems, roots, seeds, fruit)	Leaves, trunk, branch, root, seed, bulb, flower, stem, wild, garden, deciduous, evergreen, observe, grow, compare, record, temperature, predict, measure, diagram, germinate, warmth, sunlight. Key Scientists Agnes Arber (Botanist) Alan Titchmarsh (Botanist & Gardener) Linked Texts ***The Tin Forest*** *(Helen Ward)* ***Jack and the Beanstalk*** *(Richard Walker)* ***Ten Seeds*** *(Ruth Brown)* **A Seed Is Sleepy** (Dianna Aston)
Prior Learning	**Key Question(s):**	**Future Learning**
In Year 1 Children should: • **Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees.** • **Identify and describe the basic structure of a variety of common flowering plants.** • **Identify and name the roots, trunk, branches and leaves of trees.**	• Do cress produce seeds, how could we find out? • Do all plants produce flowers and seeds? • What is different between freshly cut and planted flowers? • Do plants flower all year round? • What are flowers for? • What happens to a plant after it has produced seeds?	In Year 3 Children will: • Identify and describe the functions of different parts of the flowering plant: roots, stem/trunk/leaves and flowers • Explore the part flowers play in a flowering plant's life cycle, including pollination, seed formation and seed dispersal • Explain the requirements of plants for life and growth (air, light, water, nutrients from soil, room to grow) and how they vary between plants • Know the way in which water is transported between plants

Teaching Ideas

Comparative tests	Identify & Classify	Observation over time	Pattern Seeking	Research	BIG Question – Assessment Opportunity
Do cress seeds grow quicker inside or outside?	How can we identify the trees that we observed on our tree hunt?	What happens to my bean after I have planted it?	Do bigger seeds grow into bigger plants?	How does a cactus survive in a desert with no water?	What should I do to grow a healthy plant?

Crayke Church of England Primary School
Curriculum Long Term Plan and Progression Overview - SCIENCE

Year 2 – Living Things & their Habitats

National Curriculum Objectives

- **Explore and compare the difference between things that are living, dead and things that have never been alive.**
- **Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other.**
- **Identify and name a variety of plants and animals in their habitats, including micro habitats.**
- **Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name the different sources of food.**

Sticky Knowledge

- Some things are living, some were once living but now dead and some things never lived.
- There is variation between living things.
- Different animals and plants live in different places. Living things are adapted to survive in different habitats.
- Environmental change can affect plants and animals that live there.

Vocabulary

Living, dead, never alive, habitats, micro-habitats, food, food chain, leaf litter, shelter, seashore, woodland, ocean, rainforest, conditions, desert, damp, shade,

Key Scientists	Linked Texts
Terry Nutkins (TV Presenter) Liz Bonnin (Conservationist)	***The Gruffalo*** *(Julia Donaldson)* ***Meerkat Mail*** *(Emily Gravett)* ***No Place Like Home*** *(Jonathon Emmett)*

Prior Learning

In Early Years children should:

- **Comments and questions about the place they live or the natural world.**
- **Shows care and concern for living things and the environment.**
- **Can talk about things they have observed such as plants and animals.**
- **Notices features of objects in their environment.**
- **Comments and asks questions about their familiar world.**

Key Question(s)

- How to animals eat?
- Do all animals eat the same thing?
- Which animals hunt, and which animals are hunted? Why?
- What animals live in our school environment?
- How are animals and plants 'adapted' to live in their habitats
- Why do animals and plants like to live in different places?
- How do seasons affect our animals and plants?
- Which animals hibernate and why?
- Why do snails hibernate, but slugs do not?
- How to habitats change over our school year?

Future Learning

In Year 4 children will:

- Recognise that living things can be grouped in a variety of ways.
- Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment.
- Know and label the features of a river
- Recognise that environments can change and that this can sometimes pose danger to living things.

Teaching Ideas

Comparative tests	Identify & Classify	Observation over time	Pattern Seeking	Research	BIG Question – Assessment Opportunity
Which pets are the easiest to look after? **Is there the same level of light in the evergreen wood compared with the deciduous wood?**	How would you group these plants and animals based on what habitat you would find them in?	How does the school pond change over the year?	What conditions do woodlice prefer to live in? Which habitat do worms prefer – where can we find the most worms?	How are the animals in Australia different to the ones that we find in Britain? How does the habitat of the Arctic compare with the habitat of the rainforest? What ideas did botanist Arthur Tansley have about habitats in 1935?	Why do different animals live in different places?

Crayke Church of England Primary School
Curriculum Long Term Plan and Progression Overview - SCIENCE

Year 1 – Materials

National Curriculum Objectives

- **Distinguish between and object and the material from which it is made.**
- **Identify and name a variety of everyday materials, including wood, metal, plastic, glass, water and rock,**
- **Describe the simple physical properties of a variety of everyday materials.**
- **Compare and group together a variety of everyday materials based on their simple properties**

Sticky Knowledge

- There are many different materials that have different describable and measurable properties.
- Materials that have similar properties are grouped into metals, rocks, fabrics, wood, plastic and ceramics (including glass).
- The properties of a material determine whether they are suitable for a purpose.

Vocabulary

Hard, soft, stretchy, stiff, shiny, dull, rough, smooth, bendy/not bendy, waterproof/not waterproof, absorbent, opaque,

Key Scientists	Linked Texts
William Addis (Toothbrush Inventor)	***The Great Paper Caper*** *(Oliver Jeffers)*
Charles Mackintosh (Waterproof coat)	***Who Sank the Boat*** *(Pamela Allen)*
John McAdam (roads)	***The Story of Cinderella*** *(Walt Disney)*

Prior Learning

In Early Years children should:

- **be able to ask questions about the place they live.**
- **Talk about why things happen and how things work.**
- **Discuss the things they have observed such as natural and found objects.**
- **Manipulates materials to achieve a planned effect.**

Key Question(s):

It is recommended that materials be taught three times through KS1. Give a theme for each topic e.g. buildings, exploration, toys, the seaside. Plan to investigate a couple of classes of materials and properties in each topic so children get a depth of experience each topic and cover all the classes of materials over the key stage

Buildings

- Which rocks are the least crumbly?
- Which materials absorb the most water?
- Which type of brick would be the easiest to drag to make a pyramid?
- Which material would be the strongest to use as a floor tile?

Toys & Nice things

- Which fabric would make the softest blanket?
- The baby has spilt her drink, which material would absorb the drink the best?
- We want to make a really slippery slide; which liquid would be best to use?
- Which chocolate will melt the fastest on a warm plate (a model of a warm hand)
- Which wrapping papers are strong enough to wrap and send a present?

Clothing & Materials

- Which material could be used to make a waterproof hat for the teacher when she is on the playground at playtime?
- Which plastic would be flexible enough to make a belt?
- Which material could I wrap my ice egg / snowman in to stop it melting, or would it make it melt quicker?
- What could I wrap a chicken egg in to keep it warm when it is waiting to hatch?
- What could you paint on the runaway gingerbread man that would allow him to swim the river and get away from the fox and not turn to mush?

Future Learning

In Year 2 children will:

- Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses.
- Find out how shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.

Teaching Ideas

Comparative tests	Identify & Classify	Observation over time	Pattern Seeking	Research	BIG Question – Assessment Opportunity
Which materials are the most flexible? **Which materials are the most absorbent?**	We need to choose a material to make an umbrella. Which materials are waterproof?	What happens to materials over time if we bury them in the ground? What happens to shaving foam over time?	Is there a pattern in the types of materials that are used to make objects in a school?	How are bricks made? Which materials can be recycled?	What are the things I use made from?

Crayke Church of England Primary School
Curriculum Long Term Plan and Progression Overview - SCIENCE

Year 1 – Animals, including Humans

National Curriculum Objectives

- **Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals.**
- **Identify and name a variety of common animals that are carnivores, herbivores and omnivores**

Sticky Knowledge

- There are many different animals with different characteristics.
- Animals have senses to help individuals survive. When animals sense things they are able to respond.
- Animals need food to survive.
- Animals need a variety of food to help them grow, repair their bodies, be active and stay healthy.

Vocabulary

Amphibians, birds, fish, mammals, reptiles, carnivores, herbivore, omnivore, sight, hearing, touch, taste, smell, head, neck, ear, mouth, shoulder, hand, fingers, leg, foot, thumb, eye, nose, knee, toes, teeth, elbow

Key Scientists	Linked Texts
Chris Packham (Animal Conservationist)	***One Year with Kipper*** *(Mick Inkpen)* **Snail Trail** (Ruth Brown) **Superworm** (Julia Donaldson & Axel Scheffler)

Prior Learning

In Early Years children should:

- **be able to identify different parts of their body.**
- **Have some understanding of healthy food and the need for variety in their diets.**
- **Be able to show care and concern for living things.**
- **Know the effects exercise has on their bodies.**
- **Have some understanding of growth and change.**
- **Can talk about things they have observed including animals**

Key Question(s):

- What do animals eat?
- Do all animals eat the same food?
- Which of our senses is the most accurate at identifying food?
- Do all animals hunt?
- Why are animals different colours and patterns?

Future Learning

In Year 2 children will:

- Know that animals, including humans, have offspring which grow into adults
- Know the basic stages in a life cycle for animals, including humans.
- Find out and describe the basic needs of animals, including humans, for survival (water, food and air).
- Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.

Teaching Ideas

Comparative tests	Identify & Classify	Observation over time	Pattern Seeking	Research	BIG Question – Assessment Opportunity
Is our sense of smell better when we cannot see?	How can we organise all the zoo animals? What are the names for all the parts of our bodies?	How does my height change over the year?	Do you get better at smelling as you get older?	Do all animals have the same senses as humans?	What are animals like?

Crayke Church of England Primary School
Curriculum Long Term Plan and Progression Overview - SCIENCE

Year 2 – Animals, including Humans

National Curriculum Objectives

- **Know that animals, including humans, have offspring which grow into adults**
- **Know the basic stages in a life cycle for animals, including humans.**
- **Find out and describe the basic needs of animals, including humans, for survival (water, food and air).**
- **Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.**

Sticky Knowledge

- Animals move in order to survive.
- Different animals move in different ways to help them survive.
- Exercise keeps animal's bodies in good condition and increases survival chances.
- All animals eventually die.
- Animals reproduce new animals when they reach maturity.
- Animals grow until maturity and then do not grow any larger.

Vocabulary

Living, dead, never alive, habitats, micro-habitats, food, food chain, leaf litter, shelter, seashore, woodland, ocean, rainforest, conditions, desert, damp, shade,

Key Scientists	Linked Texts
Steve Irwin (Crocodile Hunter)	***The Gruffalo*** *(Julia Donaldson)*
Robert Winston (Human Scientist)	***Meerkat Mail*** *(Emily Gravett)*
Joe Wicks (Personal Trainer)	***Tadpole's Promise*** *(Jeanne Willis and Tony Ross)*

Prior Learning

In Year 1 children should:

- **Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals.**
- **Identify and name a variety of common animals that are carnivores, herbivores and omnivores.**

Key Question(s):

- How long do should my pets live for?
- Do all animals grow and live the same way?
- Do bigger animals live longer?
- Why are we all different heights?
- How and why do we grow and change?

Future Learning

In Year 3 children will:

- Identify that animals, including humans, need the right types and amount of nutrition, and they cannot make their own food; they get their nutrition from what they eat.
- Know how nutrients, water and oxygen are transported within animals and humans.
- Know about the importance of a nutritious, balanced diet.
- Identify that humans and some other animals have skeletons and muscles for support, protection and movement:

Teaching Ideas

Comparative tests	Identify & Classify	Observation over time	Pattern Seeking	Research	BIG Question – Assessment Opportunity
Do amphibians have more in common with reptiles or fish? **Do bananas make us run faster?**	Which offspring belongs to which animal? How would you group things to show which are living, dead, or have never been alive?	How does a tadpole change over time? How much food and drink do I have over a week?	Which age group of children wash their hands the most in a day?	What food do you need in a healthy diet and why? What do you need to do to look after a pet dog/cat/lizard and keep it healthy?	Do living things change or stay the same?

Crayke Church of England Primary School
Curriculum Long Term Plan and Progression Overview - SCIENCE

Year 1 – Plants

National Curriculum Objectives

- **Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees.**
- **Identify and describe the basic structure of a variety of common flowering plants.**
- **Identify and name the roots, trunk, branches and leaves of trees.**

Sticky Knowledge

- Plants grow from seeds/bulbs
- Plants need light and water to grow and survive
- Plants are important
- We can eat lots of plants

Vocabulary

Leaves, trunk, branch, root, seed, bulb, flower, stem, wild, garden, deciduous, evergreen

Key Scientists

Beatrix Potter
(Author & Botanist)

Linked Texts

Tree: Seasons Come, Seasons Go
(Patricia Hegarty and Britta Teckentrup)

A Little Guide to Wild Flowers
(Charlotte Voake)

The Things That I LOVE about TREES
(Chris Butterworth)

Harry's Hazelnut
(Ruth Parsons)

Prior Learning

In EYFS Children should:

- **Make observations of plants**
- **Know some names of plants, trees and flowers**
- **May be able to name and describe different plants, trees and flowers**
- **Show some care for their world around them**

Key Question(s):

- How do Plants grow?
- What do Plants need to grow?
- Do all plants need water?
- Are all plants green?
- Why do seeds look different?
- Can plants grow as big in the shade?
- What is the biggest/smallest/smelliest (etc) tree/flower/plant on the planet?

Future Learning

In Year 2 Children will:

- Observe and describe how seeds and bulbs grow into mature plants.
- Find out and describe how plants need water, light and warmth to grow and stay healthy.

Teaching Ideas

Comparative tests	Identify & Classify	Observation over time	Pattern Seeking	Research	BIG Question: Assessment Opportunity
Which type of compost grows the tallest sunflower? **Which tree has the biggest leaves?**	How can we sort the leaves that we collected on our walk?	How does a daffodil bulb change over the year? How does my sunflower change each week? How does the oak tree change over the year?	Do trees with bigger leaves lose their leaves first in autumn? Is there a pattern in where we find moss growing in the school grounds?	What are the most common British plants and where can we find them? How did Beatrix Potter help our understanding of mushrooms and toadstools?	How many types of plant are there?

Crayke Church of England Primary School
Curriculum Long Term Plan and Progression Overview - SCIENCE

Lower Key Stage 2

Year 3/4 (A) 2022 - 2023			
	Autumn	**Spring**	**Summer**
Theme	Through the Ages	The Inventing Room	Radical Romans
National Curriculum Area of Study	Plants Light	Electricity Sound	Animals including humans
Enquiry Question	Why do plants have flowers? What is a shadow?	What can we do with electricity? How can we make different sounds?	Why do animals have skeletons? What is a healthy diet and why is it important?
Form of Enquiry	Observation over time  Identify & Classify 	Research  Pattern Seeking 	Comparative Tests 
Progression of procedural knowledge (Chris Quigley Milestones)	**WS:** H1, H2, H3, H4, H5, H6, H7, H8, H9 **UP:** H10, H11, H12, H13 **UAH:** **ILT:** **UEI:** **IM:** **UMFM:** **ULS:** H38, H39, H40, H41, H42 **ISH:** **UEC:** **UEMS:**	**WS:** H1, H2, H3, H4, H5, H6, H7, H8, H9 **UP:** **UAH:** **ILT:** **UEI:** **IM:** **UMFM:** **ULS:** **ISH:** H43, H44, O39, O40, O41 **UEC:** H45, H46, H47, H48, H49 **UEMS:**	**WS:** H1, H2, H3, H4, H5, H6, H7, H8, H9 **UP:** **UAH:** H14, H16 **ILT:** **UEI:** **IM:** **UMFM:** **ULS:** **ISH:** **UEC:** **UEMS:**

Crayke Church of England Primary School
Curriculum Long Term Plan and Progression Overview - SCIENCE

Year 3/4 (B) 2023 - 2024			
	Autumn	**Spring**	**Summer**
Theme	Our Blue Planet	Tales from Dragon Mountain	Pharaohs, Farms and Feasts
National Curriculum Area of Study	Living things and their habitats States of matter	Forces and magnets Rocks	Animals including humans
Enquiry Question	Are living things in danger? Where do ice cubes go when they disappear?	How can we move magnets? What are rocks and soils like?	What do our bodies do with the food we eat?
Form of Enquiry			
Progression of procedural knowledge (Chris Quigley Milestones)	**WS:** H1, H2, H3, H4, H5, H6, H7, H8, H9 **UP:** **UAH:** **ILT:** H19, H20, H21 **UEI:** H24 **IM:** H29, H30, H31 **UMFM:** **ULS:** **ISH:** **UEC:** **UEMS:**	**WS:** H1, H2, H3, H4, H5, H6, H7, H8, H9 **UP:** **UAH:** **ILT:** **UEI:** H23 **IM:** H25, H26, H27, H28 **UMFM:** H32, H33, H34, H35, H36, H37 **ULS:** **ISH:** **UEC:** **UEMS:**	**WS:** H1, H2, H3, H4, H5, H6, H7, H8, H9 **UP:** **UAH:** H14, H15, H17, H18 **ILT:** **UEI:** **IM:** **UMFM:** **ULS:** **ISH:** **UEC:** **UEMS:**

Crayke Church of England Primary School
Curriculum Long Term Plan and Progression Overview - SCIENCE

Year 3 – Plants

National Curriculum Objectives

- **Identify and describe the functions of different parts of the flowering plant: roots, stem/trunk/leaves and flowers**
- **Explore the part flowers play in a flowering plants life cycle, including pollination, seed formation and seed dispersal**
- **Explain the requirements of plants for life and growth (air, light, water, nutrients from soil, room to grow) and how they vary between plants**
- **Know the way in which water is transported between plants**

Sticky Knowledge

- Plants are producers, they make their own food.
- Their leaves absorb sunlight and carbon dioxide
- Plants have roots, which provide support and draw water from the soil
- Flowering plants have specific adaptations which help it to carry out pollination, fertilisation and seed production
- Seed dispersal improves a plants chances of successful reproduction
- Seeds/bulbs require the right conditions to germinate and grow.
- Seeds contain enough food for the plant's initial growth

Vocabulary

Air, light, water, nutrients, soil, support, anchor, reproduction, pollination, dispersal, transportation, flower, energy, growth, seedling, carbon dioxide, oxygen, sugar, material, photosynthesis, chlorophyll

Key Scientists	Linked Texts
Jan Ingenhousz (Photosynthesis) **Joseph Banks** (Botanist)	***The Hidden Forest*** *(Jeannie Baker)* ***George and Flora's Secret Garden*** *(Jo Elworthy)*

Prior Learning

In Year 2 Children should:

- **Observe and describe how seeds and bulbs grow into mature plants.**
- **Find out and describe how plants need water, light and warmth to grow and stay healthy.**

Key Question(s):

- How do plants reproduce?
- Do all flowers look the same?
- How do insects know which flowers to pollinate?
- Why do flowers smell?
- What do seeds do?
- Can a plant live without its leaves?
- Do grass/trees make flowers?
- What conditions are perfect for a seed to grow?
- Where do weeds come from?
- How does the space between seeds affect how well they grow?
- Does seed size match plant size?
- Do plants take in water through their roots?
- How does water move through the plant?
- How do plants make their food?
- How does light affect plant growth?
- How does a plant get carbon dioxide?

Future Learning

In Year 6 Children will:

- Recognise that living things have changed over time and that fossils provide information about living things
- Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents
- Identify how animals and plants are adapted to suit their environment in different ways, and that adaptation can lead to evolution.

Teaching Ideas

Comparative tests	Identify & Classify	Observation over time	Pattern Seeking	Research	BIG Question – Assessment Opportunity
How does the length of the carnation stem affect how long it takes for the food colouring to dye the petals? **Which conditions help seeds germinate faster?**	How many ways can you group our seed collection?	What happens to celery when it is left in a glass of coloured water? How do flowers in a vase change over time?	What colour flowers do pollinating insects prefer?	What are all the different ways that seeds disperse?	Why do plants have flowers?

Crayke Church of England Primary School
Curriculum Long Term Plan and Progression Overview - SCIENCE

Year 3 – (ENERGY) Light & Sight

National Curriculum Objectives

- **Recognise that they need light in order to see things and that dark is the absence of light.**
- **Notice that light is reflected from surfaces.**
- **Recognise that light from the sun can be dangerous and that there are ways to protect their eyes.**
- **Recognise that shadows are formed when the light from a light source is blocked by a solid object.**
- **Find patterns in the way that the sizes of shadows change.**

Sticky Knowledge

- There must be light for us to see. Without light it is dark.
- We need light to see things even shiny things.
- Transparent materials let light travel through them, and opaque materials don't let light through.
- Beams of light bounce off some materials (reflection).
- Shiny materials reflect light beams better than non-shiny materials.
- Light comes from a source

Vocabulary

Light source, dark, reflect, ray, mirror, bounce, visible, beam, sun, glare, travel, straight, opaque, shadow, block, transparent, translucent.

Key Scientists	Linked Texts
James Clerk Maxwell (Visible and Invisible Waves of Light)	The Owl Who Was Afraid of the Dark (Jill Tomlinson) The Dark (Lemony Snicket) The Firework-Maker's Daughter (Philip Pullman)

Prior Learning

In Year 1 children should have:

- **Observed changes across the four seasons**
- **Observed and describe weather associated with the seasons and how day length varies.**

Children may:

- **have some knowledge of were light comes from.**
- **have seen their shadows and may know they appear when it is sunny.**
- **Have some understanding of a reflection.**
- **May understand they need light to be able to see things.**

Key Question(s):

- A coin is lost, what would be the best way to find it? (Turn the lights out and see it shine? Use a torch to see it reflect?)
- How does distance from a light source affect how bright it looks?
- How does being in darkness affect your sense of hearing?
- What colour would be the best to make a safety jacket from?
- How does the colour of a material affect how reflective it is?
- What would be the best material to make a blind for a baby's room?
- How does thickness of a material affect how much light can pass through it?
- How many pieces of tracing paper are as translucent as a single piece of white paper?
- How does the shape of a mirror affect how the light reflects?
- How can we change the darkness, size and shape of a shadow?

Future Learning

In Year 6 children will:

- Recognise that light appears to travel in straight lines.
- Use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye.
- Explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes.
- Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.
- Know how simple optical instruments work, e.g. periscope, telescope, binoculars, mirror, magnifying glass etc.

Teaching Ideas

Comparative tests	Identify & Classify	Observation over time	Pattern Seeking	Research	BIG Question – Assessment Opportunity
How does the distance between the shadow puppet and the screen affect the size of the shadow? **Which pair of sunglasses will be best at protecting our eyes?**	How would you organise these light sources into natural and artificial sources?	When is our classroom darkest? Is the Sun the same brightness all day?	Are you more likely to have bad eyesight and to wear glasses if you are older?	How does the Sun make light?	What is a shadow?

Crayke Church of England Primary School
Curriculum Long Term Plan and Progression Overview - SCIENCE

Year 4 – Electricity

National Curriculum Objectives

- **Identify common appliances that run on electricity.**
- **Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers.**
- **Identify whether a lamp will light in a simple series circuit, based on whether the lamp is part of a complete loop with a battery.**
- **Recognise that a switch opens and closes the circuit and associate this with whether a lamp lights in a simple series circuit. Recognise some common conductors and insulators, and associate metals with being good conductors.**
- **Know the difference between a conductor and an insulator, giving examples of each.**
- **Safety when using electricity.**

Sticky Knowledge

- A source of electricity (mains of battery) is needed for electrical devices to work.
- Electricity sources push electricity round a circuit.
- More batteries will push the electricity round the circuit faster.
- Devices work harder when more electricity goes through them.
- A complete circuit is needed for electricity to flow and devices to work.
- Some materials allow electricity to flow easily and these are called conductors. Materials that don't allow electricity to flow easily are called insulators.

Vocabulary

Electricity, electric current, appliances, mains, crocodile clips, wires, bulb, battery cell, battery holder, motor, buzzer, switch, conductor, electrical insulator, component.

Key Scientists	Linked Texts
Thomas Edison (First Working Lightbulb)	Until I Met Dudley (Roger McGough)
Joseph Swan (Incandescent Light Bulb)	Oscar and the Bird: A Book about Electricity (Geoff Waring)
	Electrical Wizard: How Nikola Tesla Lit Up the World (Elizabeth Rusch)

Prior Learning

In Early Years children:

- **May have some understanding that objects need electricity to work.**
- **May understand that a switch will turn something on or off.**

Key Question(s):

- What would life be like without electricity?
- What sorts of things use/need electricity?
- What electricity do I use?
- In which ways can we 'get' electricity? (mains/plugs/batteries/wireless)
- How do we make electricity?
- How do batteries work?
- How quickly can batteries run out? Does this make a difference depending on number of components?
- How does the number of batteries added to the circuit affect a device?
- What materials can carry electricity? (conductors/insulators)

Future Learning

In Year 6 children will:

- Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit.
- Compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches.
- Use recognised symbols when representing a simple circuit in a diagram.

Teaching Ideas

Comparative tests	Identify & Classify	Observation over time	Pattern Seeking	Research	BIG Question – Assessment Opportunity
How does the thickness of a conducting material affect how bright the lamp is? **Which metal is the best conductor of electricity?**	How would you group these electrical devices based on where the electricity comes from?	How long does a battery light a torch for?	Which room has the most electrical sockets in a house?	How has electricity changed the way we live? How does a light bulb work?	What can we do with electricity?

Crayke Church of England Primary School
Curriculum Long Term Plan and Progression Overview - SCIENCE

Year 4 – (ENERGY) Sound

National Curriculum Objectives

- **Know how sound is made associating some of them with vibrating.**
- **Know what happens to a sound as it travels from its source to our ears.**
- **Know the correlation between the volume of a sound and the strength of the vibrations that produced it.**
- **Know how sound travels from a source to our ears.**
- **Know the correlation between pitch and the object producing a sound.**

Sticky Knowledge

- Sound travels from its source in all directions and we hear it when it travels to our ears.
- Sound travel can be blocked.
- Sound spreads out as it travels.
- Changing the shape, size and material of an object will change the sound it produces.
- Sound is produced when an object vibrates.
- Sound moves through all materials by making them vibrate.
- Changing the way an object vibrates changes its sound.
- Bigger vibrations produce louder sounds and smaller vibrations produce quieter sounds.
- Faster vibrations (higher frequencies) produce higher pitched sounds

Vocabulary

Amplitude, volume, quiet, loud, ear, pitch, high, low, particles, instruments, wave.

Key Scientists	Linked Texts
Aristotle (Sound Waves)	***Horrid Henry Rocks*** *(Francesca Simon)*
Galileo Galilei (Frequency and Pitch of Sound Waves)	***Moonbird*** *(Joyce Dunbar)*
Alexander Graham Bell (Invented the Telephone)	***The Pied Piper of Hamelin*** *(Natalia Vasquez)*

Prior Learning

In KS1 children:

- **May have some understanding that objects make different sounds.**
- **Some understanding that they use their ears to hear sounds.**
- **Know about their different senses.**

Key Question(s):

- How can you change the volume of a sound?
- How does the size of an ear trumpet affect the volume of sound detected?
- How does the type of material affect how well is blocks a sound?
- How does thickness of material affect how well it blocks a sound?
- Which materials vibrate better and produce louder sounds? Can we identify any patterns?
- Which materials make the best string telephone components? (tin cans, paper cups, plastic cups, wire, cable, string, plastic or elastic – predict and test)
- How does length of the tube (when making a straw oboe) affect the pitch and volume?
- Can you predict the relative pitch of tuning forks from the patterns of ripples they make in the water?

Future Learning

In KS3 children will learn about:

- frequencies of sound waves measured in hertz (Hz), echoes, reflection and absorption of sound
- sound needs a medium to travel, the speed of sound in air, in water, in solids
- sound produced by vibrations of objects, in loudspeakers, detected by their effects on microphone diaphragm and the ear drum; sound waves are longitudinal
- auditory range of humans and animals.

Teaching Ideas

Comparative tests	Identify & Classify	Observation over time	Pattern Seeking	Research	BIG Question – Assessment Opportunity
How does the volume of a drum change as you move further away from it? **How does the length of a guitar string/tuning fork affect the pitch of the sound?** **Are two ears better than one?**	Which material is best to use for muffling sound in ear defenders?	When is our classroom the quietest?	Is there a link between how loud it is in school and the time of day? If there is a pattern, is it the same in every area of the school?	Do all animals have the same hearing range?	How can we make different sounds?

Crayke Church of England Primary School
Curriculum Long Term Plan and Progression Overview - SCIENCE

Year 3 – Animals, including Humans

National Curriculum Objectives

- **Identify that animals, including humans, need the right types and amount of nutrition, and they cannot make their own food; they get their nutrition from what they eat.**
- **Know how nutrients, water and oxygen are transported within animals and humans.**
- **Know about the importance of a nutritious, balanced diet.**
- **Identify that humans and some other animals have skeletons and muscles for support, protection and movement:**

Sticky Knowledge

- Different animals are adapted to eat different foods.
- Many animals have skeletons to support their bodies and protect vital organs.
- Muscles are connected to bones and move them when they contract.
- Movable joints connect bones.

Vocabulary

Nutrients, nutrition, carbohydrates, protein, fats, vitamins, minerals, water, fibre, skeleton, bones, joints, endoskeleton, exoskeleton, hydrostatic skeleton, vertebrates, invertebrates, muscles, contract, relax,

Key Scientists	Linked Texts
Adelle Davis (20th Century Nutritionist) **Marie Curie** (Radiation / X-Rays)	***The Story of Frog Belly Rat Bone*** *(Timothy Basil Ering)* ***Funnybones*** *(Janet and Allan Ahlberg)* ***I Will Never Not Ever Eat a Tomato*** *(Lauren Child)* ***Goldilocks and the Three Bears*** *(Samantha Berger)*

Prior Learning

In Year 2 children should:

- **Know that animals, including humans, have offspring which grow into adults**
- **Know the basic stages in a life cycle for animals, including humans.**
- **Find out and describe the basic needs of animals, including humans, for survival (water, food and air).**
- **Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.**

Key Question(s):

- Why do we need a skeleton?
- What types of skeleton are there?
- Are all skeletons the same?
- Can something survive without a skeleton?
- What happens if we break a bone?
- How do we move?
- Are bones that are bigger, stronger?
- Why do we need joints?
- Why do muscles get tired?
- Can we 'break' muscles?

Future Learning

In Year 4 children will:

- Describe the simple functions of the basic parts of the digestive system in humans.
- Identify the different types of teeth in humans and their simple functions.
- Construct and interpret a variety of food chains, identifying producers, predators and prey

Teaching Ideas

Comparative tests	Identify & Classify	Observation over time	Pattern Seeking	Research	BIG Question – Assessment Opportunity
How does the angle that your elbow/knee is bent affect the circumference of your upper arm/thigh? **How does the skull circumference of a girl compare with that of a boy?**	How do the skeletons of different animals compare?	How does our skeleton change over time? (from birth to death)	Do male humans have larger skulls that female humans?	Why do different types of vitamins keep us healthy and which foods can we find them in?	Why do animals have skeletons? What is a healthy diet and why is it important?

Crayke Church of England Primary School
Curriculum Long Term Plan and Progression Overview - SCIENCE

Year 4 – Living Things & their Habitats

National Curriculum Objectives

- **Recognise that living things can be grouped in a variety of ways.**
- **Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment.**
- **Recognise that environments can change and that this can sometimes pose danger to living things.**

Sticky Knowledge

- Living things can be divided into groups based upon their characteristics
- Environmental change affects different habitats differently
- Different organisms are affected differently by environmental change
- Different food chains occur in different habitats
- Human activity significantly affects the environment

Vocabulary

Environment, flowering, nonflowering, plants, animals, vertebrates, fish, amphibians, reptiles, mammals, invertebrate, human impact, nature reserves, deforestation.

Key Scientists	Linked Texts
Cindy Looy (Environmental Change and Extinction) **Jaques Cousteau** (Marine Biologist)	***The Vanishing Rainforest*** *(Richard Platt)* ***The Morning I Met a Whale*** *(Michael Morpurgo)* ***Journey to the River Sea*** *(Eva Ibbotson)*

Prior Learning

In Year 2, children should:

- **Explore and compare the difference between things that are living, dead and things that have never been alive.**
- **Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other.**
- **Identify and name a variety of plants and animals in their habitats, including micro habitats.**
- **Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name the different sources of food.**

Key Question(s):

- What food chains and webs are there in our local habitat?
- How does energy move through the food chain?
- How does removal of one species from an environment, affect others? (keystone species)
- How does environmental change affect different organisms?
- What are the most important things we could do to improve our outside area? (big hotels, pond, compost, wildflowers)
- How does human activity affect our environment (ferries on the Solent? Sandown Airport? KFC?)

Future Learning

In Year 5:

- Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird.
- Describe the life process of reproduction in some plants and animals.

Teaching Ideas

Comparative tests	Identify & Classify	Observation over time	Pattern Seeking	Research	BIG Question – Assessment Opportunity
Does the amount of light affect how many woodlice move around? **How does the average temperature of the pond water change in each season?**	Can we use the classification keys to identify all the animals that we caught pond dipping?	How does the variety of invertebrates on the school field change over the year?	How has the use of insecticides affected bee population?	Why are people cutting down the rainforests and what effect does that have?	Are living things in danger?

Crayke Church of England Primary School
Curriculum Long Term Plan and Progression Overview - SCIENCE

Year 4 – Materials - Solids, Liquids & Gases

National Curriculum Objectives

- **Compare and group materials together, according to whether they are solids, liquids or gases.**
- **Observe that some materials change state when heated or cooled, and measure and research the temperature at which this happens in degrees Celsius.**
- **Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.**

Sticky Knowledge

- Solids, liquids and gases are described by observable properties.
- Materials can be divided into solids, liquids and gases.
- Heating causes solids to melt into liquids and liquids evaporate into gases. d) Cooling causes gases to condense into liquids and liquids to freeze into solids.
- The temperature at which given substances change state are always the same.

Vocabulary

Solid, liquid, gas, particles, state, materials, properties, matter, melt, freeze, water, ice, temperature, process, condensation, evaporation, water vapour, energy, precipitation, collection,

Key Scientists	Linked Texts
Anders Celsius (Celsius Temperature Scale) **Daniel Fahrenheit** (Fahrenheit Temperature Scale / Invention of the Thermometer)	***Once Upon a Raindrop: The Story of Water*** *(James Carter)* ***Sticks*** *(Diane Alber)*

Prior Learning

In KS1 children should:

- **Distinguish between an object and the material from which it is made.**
- **Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock.**
- **Describe the simple physical properties of a variety of everyday materials.**
- **Compare and group together a variety of everyday materials based on their simple physical properties.**
- **Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses.**
- **Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.**

Key Question(s):

- How does the amount of water added to flour affect its state?
- How does the amount of detergent added to water affect how slippery it is?
- How does the temperature affect how viscous a liquid is (use cooking oil)?
- Place a peach in a glass of lemonade and watch it spin. Why does it behave that way, and can you prove it?
- How does the material sprinkled on ice and snow affect how quickly it melts?
- What chocolate would be best to smuggle? How does the type of chocolate affect its melting temperature?
- What is the melting temperature of ice and how does it compare with the freezing temperature of water?
- Is the melting temperature of wax the same as its freezing temperature?

Future Learning

In Year 5 children will:

- Compare and group together everyday materials based on their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets.
- Know that some materials will dissolve in liquid to form a solution and describe how to recover a substance from a solution.
- Use knowledge of solids, liquids, and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating.
- Give reasons based on evidence from comparative and fair tests, for the uses of everyday materials, including wood, metals and plastic.
- Demonstrate that dissolving, mixing and changes of state are reversible changes.
- Explain that some changes result in the formation of new materials, and this kind of change is usually not reversible, including changes associated with burning and the action of acid on bicarbonate of soda.

Teaching Ideas

Comparative tests	Identify & Classify	Observation over time	Pattern Seeking	Research	BIG Question – Assessment Opportunity
How does the mass of a block of ice affect how long it takes to melt? **How does the surface area of water affect how long it takes to evaporate?** **Does seawater evaporate faster than fresh water?**	Can you group these materials and objects into solids, liquids, and gases? How would you sort these objects/materials based on their temperature?	Which material is best for keeping our hot chocolate warm? How does the level of water in a glass change when left on the windowsill?	Is there a pattern in how long it takes different sized ice lollies to melt? How does evaporation rate change as you add more salt to your water?	What are hurricanes, and why do they happen?	Where do ice cubes go when they disappear? Why does it rain and hail?

Crayke Church of England Primary School
Curriculum Long Term Plan and Progression Overview - SCIENCE

Year 3 – Forces (& Magnetism)

National Curriculum Objectives

- **Compare how things move on different surfaces.**
- **Know how a simple pulley works and use making lifting an object simpler**
- **Notice that some forces need contact between two objects, but magnetic forces can act at a distance.**
- **Observe how magnets attract and repel each other and attract some materials and not others.**
- **Compare and group together a variety of everyday materials based on whether they are attracted to a magnet and identify some magnetic materials.**
- **Describe magnets as having two poles.**
- **Predict whether two magnets with attract or repel each other, depending on which poles are facing.**

Sticky Knowledge

- Magnets exert attractive and repulsive forces on each other.
- Magnets exert non-contact forces, which work through some materials.
- Magnets exert attractive forces on some materials.
- Magnet forces are affected by magnet strength, object mass, distance from object and object material.

Vocabulary

Force, push, pull, friction, surface, magnet, magnetic, magnetic field, pole, north, south, attract, repel, compass

Key Scientists	Linked Texts
William Gilbert (Theories on Magnetism)	The Iron Man (Ted Hughes)
Andre Marie Ampere (Founder of Electro-Magnetism)	Mrs Armitage: Queen of the Road (Quentin Blake)
	Mr Archimedes' Bath (Pamela Allen)

Prior Learning

In Year 2 children:

- **May have an awareness of how to make things stop and start, using simple pushes and pulls.**
- **They may know about floating and sinking.**

Key Question(s):

- What are magnetic materials? How can we find out?
- Can I make a magnetic material non-magnetic?
- How far away does a magnet have to be before it attracts a magnetic material?
- How far away can the magnetic attraction between two magnets be experiences?
- Is the repulsive force the same size?
- How is the magnetic attraction of repulsion force affected by putting materials between the magnets?
- Are bigger magnets stronger?
- How could you use magnets to measure the number of pages in a book?

Future Learning

In Year 5 children will:

- Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object and the impact of gravity on our lives.
- Identify the effects of air resistance, water resistance and friction, which act between moving surfaces.
- Recognise that some mechanisms, including levers, pulleys, and gears, allow a smaller force to have a greater effect.
- Describe the movement of the Earth, and other planets, relative to the Sun in the solar system
- Describe the movement of the Moon relative to the Earth
- Describe the Sun, Earth and Moon as approximately spherical bodies
- Describe the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.

Teaching Ideas

Comparative tests	Identify & Classify	Observation over time	Pattern Seeking	Research	BIG Question – Assessment Opportunity
How does the mass of an object affect how much force is needed to make it move? **Which magnet is strongest?** **Which surface is best to stop you slipping?**	Which materials are magnetic?	If we magnetise a pin, how long does it stay magnetised for?	Do magnetic materials always conduct electricity? Does the size and shape of a magnet affect how strong it is?	How have our ideas about forces changed over time? How does a compass work?	How can we move magnets?

Crayke Church of England Primary School
Curriculum Long Term Plan and Progression Overview - SCIENCE

Year 3 – Materials

National Curriculum Objectives

- **Compare and group together different kinds of rocks based on their appearance and simple physical properties**
- **Describe in simple terms how fossils are formed when things that have lived are trapped within rock**
- **Recognise that soils are made from rocks and organic matter**

Sticky Knowledge

- There are different types of rock.
- There are different types of soil.
- Soils change over time.
- Different plants grow in different soils.
- Fossils tell us what has happened before.
- Fossils provide evidence.
- Palaeontologists use Fossils to find out about the past.
- Fossils provide evidence that living things have changed over time.

Vocabulary

Rocks, igneous, metamorphic, sedimentary, anthropic, permeable, impermeable, chemical fossil, body fossil, trace fossil, Mary Anning, cast fossil, mould fossil, replacement fossil, extinct, organic matter, topsoil, sub soil, base rock.

Key Scientists	Linked Texts
Mary Anning (Discovery of Fossils) **Inge Lehmann** (Earth's Mantle)	***The Pebble in My Pocket*** *(Meredith Hooper)* ***Stone Girl, Bone Girl*** *(Laurence Anholt)* ***The Street Beneath My Feet*** *(Charlotte Guillain & Yuval Zommer)*

Prior Learning

In Year 2 children should:

- **Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses.**
- **Find out how shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.**

Children may:

- **May have some understanding of a variety of different rocks in the natural world.**
- **Some understanding of what soil is. (how to identify soil etc)**
- **May have some knowledge of what a fossil is.**

Key Question(s):

- How are the soils different?
- Which do you think has best drainage?
- Which is more likely to lead to flooding?
- How many soil types have we found?
- Where might you find more?
- How might the soil be different in different countries?
- What rock is best for a kitchen chopping board? What might be the issues with various materials and what they must withstand?
- What types of rocks are there?
- How do rocks change?
- What would grow best in your soil?
- Why do you think worms are important to the creation of soil?
- How can we use composting to make our own soil?
- Does it currently look like real soil?
- How long do you think this process will take and why?
- How are fossils created?
- Why do fossils help us find out about historical events?
- If you could fossilise an object what would it be?

Future Learning

In Year 4 children will:

- Compare and group materials together, according to whether they are solids, liquids or gases.
- Observe that some materials change state when heated or cooled, and measure and research the temperature at which this happens in degrees Celsius.
- Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.

In Year 6 children will:

- Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago.

Teaching Ideas

Comparative tests	Identify & Classify	Observation over time	Pattern Seeking	Research	BIG Question – Assessment Opportunity
How does adding different amounts of sand to soil affect how quickly water drains through it? **Which soil absorbs the most water?**	Can you use the identification key to find out the name of each of the rocks in your collection?	How does tumbling change a rock over time? What happens when water keeps dripping on a sandcastle?	Is there a pattern in where we find volcanos on planet Earth?	Who was Mary Anning and what did she discover?	What are rocks and soils like?

Crayke Church of England Primary School
Curriculum Long Term Plan and Progression Overview - SCIENCE

Year 4 – Animals, including Humans

National Curriculum Objectives

- **Describe the simple functions of the basic parts of the digestive system in humans.**
- **Identify the different types of teeth in humans and their simple functions.**
- **Construct and interpret a variety of food chains, identifying producers, predators and prey**

Sticky Knowledge

- Animals have teeth to help them eat.
- Different types of teeth do different jobs.
- Food is broken down by the teeth and further in the stomach and intestines where nutrients go into the blood.
- The blood takes nutrients around the body.
- Nutrients produced by plants move to primary consumers then to secondary consumers through food chains.

Vocabulary

Herbivore, Carnivore, Digestive system, tongue, mouth, teeth, oesophagus, stomach, gall bladder, small intestine, pancreas, large intestine, liver, tooth, canine, incisor, molar, premolar, producer, consumer.

Key Scientists	Linked Texts
Ivan Pavlov (Digestive System Mechanisms)	***Human Body Odyssey*** *(Werner Holzwarth)*
Joseph Lister (Discovered Antiseptics)	***Crocodiles Don't Brush Their Teeth*** *(Colin Fancy)*
	Wolves *(Emily Gravett)*

Prior Learning

In Year 3 children should:

- **Identify that animals, including humans, need the right types and amount of nutrition, and they cannot make their own food; they get their nutrition from what they eat.**
- **Know how nutrients, water and oxygen are transported within animals and humans.**
- **Know about the importance of a nutritious, balanced diet.**
- **Identify that humans and some other animals have skeletons and muscles for support, protection and movement**

Key Question(s):

- What different types of food are there?
- Why do we need a variety of different foods?
- Do all organisms eat the same things?
- Why do some people need different diets? (weightlifter vs marathon runner)
- Why are teeth important?
- What happens to our food?
- What is our digestive system?
- How does our food turn into poo and wee?

Future Learning

In Year 5 children will:

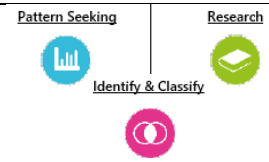
- Know the life cycle of different living things, e.g. Mammal, amphibian, insect bird.
- Know the differences between different life cycles.
- Know the process of reproduction in plants.
- Know the process of reproduction in animals

Teaching Ideas

Comparative tests	Identify & Classify	Observation over time	Pattern Seeking	Research	BIG Question – Assessment Opportunity
In our class, are omnivores taller than vegetarians?	What are the names for all the organs involved in the digestive system? How can we organise teeth into groups?	How does an eggshell change when it is left in cola?	Are foods that are high in energy always high in sugar?	How do dentists fix broken teeth?	What do our bodies do with the food we eat?

Crayke Church of England Primary School
Curriculum Long Term Plan and Progression Overview - SCIENCE

Upper Key Stage

Year 5/6 (A) 2022 - 2023			
	Autumn	**Spring**	**Summer**
Theme	A Child's War	A Taste of Tuscany	Riches in the Rainforest
National Curriculum Area of Study	Forces Light	Animals including humans	Living things and their habitats Evolution and inheritance
Enquiry Question	How and why do objects move? Why does my shadow change length over the course of a day?	How do our choices affect how our bodies work? Why does my heart beat?	In what ways can we sort living things? What is evolution, how does it happen and how do scientists know?
Form of Enquiry			
Progression of procedural knowledge (Chris Quigley Milestones)	**WS:** O1, O2, O3, O4, O5, O6, O7, O8, O9 **UP:** **UAH:** **ILT:** **UEI:** **IM:** **UMFM:** O28, O29, O30, O31, O32, O33, O34, O35, O36, O37, O38 **ULS:** **ISH:** **UEC:** **UEMS:**	**WS:** O1, O2, O3, O4, O5, O6, O7, O8, O9 **UP:** **UAH:** O12, O13, O14 **ILT:** **UEI:** **IM:** **UMFM:** **ULS:** **ISH:** **UEC:** **UEMS:**	**WS:** O1, O2, O3, O4, O5, O6, O7, O8, O9 **UP:** **UAH:** **ILT:** O17, O18 **UEI:** O19, O20, O21 **IM:** **UMFM:** **ULS:** **ISH:** **UEC:** **UEMS:**

Crayke Church of England Primary School
Curriculum Long Term Plan and Progression Overview - SCIENCE

Year 5/6 (B) 2023 - 2024			
	Autumn	**Spring**	**Summer**
Theme	It's All Greek to Me	Into the Darkness…	Journeys
National Curriculum Area of Study	Electricity Properties and changes of materials	Earth and space	Living things and their habitats Animals including humans
Enquiry Question	Can we vary the effects of electricity? How can we change materials reversibly and irreversibly?	Sun, Earth and Moon: What is moving and how do we know?	Do all plants and animals reproduce in the same way? Why and how does the human body change over time?
Form of Enquiry			
Progression of procedural knowledge (Chris Quigley Milestones)	**WS:** O1, O2, O3, O4, O5, O6, O7, O8, O9 **UP:** **UAH:** **ILT:** **UEI:** **IM:** O22, O23, O24, O25, O26, O27 **UMFM:** **ULS:** **ISH:** **UEC:** O42, O43, O44 **UEMS:**	**WS:** O1, O2, O3, O4, O5, O6, O7, O8, O9 **UP:** **UAH:** **ILT:** **UEI:** **IM:** **UMFM:** **ULS:** **ISH:** **UEC:** **UEMS:** O45, O46, O47, O48	**WS:** O1, O2, O3, O4, O5, O6, O7, O8, O9 **UP:** O9, O10 **UAH:** O11 **ILT:** O15, O16, O18 **UEI:** **IM:** **UMFM:** **ULS:** **ISH:** **UEC:** **UEMS:**

Crayke Church of England Primary School
Curriculum Long Term Plan and Progression Overview - SCIENCE

Year 5 – Forces

National Curriculum Objectives

- **Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object and the impact of gravity on our lives.**
- **Identify the effects of air resistance, water resistance and friction, which act between moving surfaces.**
- **Recognise that some mechanisms, including levers, pulleys, and gears, allow a smaller force to have a greater effect.**

Sticky Knowledge

- Air resistance and water resistance are forces against motion caused by objects having to move air and water out of their way.
- Friction is a force against motion caused by two surfaces rubbing against each other.
- Some objects require large forces to make them move; gears, pulley and levers can reduce the force needed to make things move

Vocabulary

Air resistance, Water resistance, Friction, Gravity, Newton, Gears, Pulleys, force, push, pull, opposing, streamline, brake, mechanism, lever, cog, machine, pulley.

Key Scientists	Linked Texts
Galileo Galilei (Gravity and Acceleration)	The Enormous Turnip (Katie Daynes)
Isaac Newton (Gravitation)	Leonardo's Dream (Hans de Beer)
Archimedes of Syracuse (Levers)	The Aerodynamics of Biscuits (Clare Helen Welsh)
John Walker (The Match)	

Prior Learning

In Year 3 children should:

- **Compare how things move on different surfaces.**
- **Know how a simple pulley works and use making lifting an object simpler**
- **Notice that some forces need contact between two objects, but magnetic forces can act at a distance.**
- **Observe how magnets attract and repel each other and attract some materials and not others.**
- **Compare and group together a variety of everyday materials based on whether they are attracted to a magnet and identify some magnetic materials.**
- **Describe magnets as having two poles.**
- **Predict whether two magnets with attract or repel each other, depending on which poles are facing.**

Key Question(s):

- What is a force?
- How can a force act on an object?
- How can we see forces?
- How can we measure forces?
- How does the saltiness (salinity) of water affect the water resistance?
- How does the length of a piece of a paper helicopter's wings affect the time it takes to fall?
- How does the changing the shape of a piece of plasticine affect water resistance?
- How does adding holes to a parachute affect the time it takes to fall?
- How does the amount/depth of tread affect the friction between a shoe and a surface?
- How can we use levers to lift heavy objects?
- What is the most effective way to move an object?
- How do see-saws work?
- Can you create a pulley system to life a given load?

Future Learning

In KS3 children will learn about:

- opposing forces and equilibrium: weight held by stretched spring or supported on a compressed surface
- forces being needed to cause objects to stop or start moving, or to change their speed or direction of motion (qualitative only)
- change depending on direction of force and its size.

Teaching Ideas

Comparative tests	Identify & Classify	Observation over time	Pattern Seeking	Research	BIG Question – Assessment Opportunity
How does the angle of launch affect how far a paper rocket will go? **How does the surface area of an object affect the time it takes to sink?**	Can you label and name all the forces acting on the objects in each of these situations?	How long does a pendulum swing for before it stops?	Do all objects fall through water in the same way? How does surface area of parachute affect the time it takes to fall?	How do submarines sink if they are full of air?	How and why do objects move?

Crayke Church of England Primary School
Curriculum Long Term Plan and Progression Overview - SCIENCE

Year 6 – (ENERGY) Light and Sight

National Curriculum Objectives

- **Recognise that light appears to travel in straight lines.**
- **Use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye.**
- **Explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes.**
- **Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.**
- **Know how simple optical instruments work, e.g. periscope, telescope, binoculars, mirror, magnifying glass etc.**

Sticky Knowledge

- Animals see light sources when light travels from the source into their eyes.
- Animals see objects when light is reflected off that object and enters their eyes.
- Light reflects off all objects (unless they are black). Non shiny surfaces scatter the light, so we do not see the beam.
- Light travels in straight lines.

Vocabulary

Light source, dark, reflect, ray, mirror, bounce, visible, beam, sun, glare, travel, straight, opaque, shadow, block, transparent, translucent. Reflect Absorb Emitted Scattered Refraction

Key Scientists	Linked Texts
Thomas Young (Wave Theory of Light)	***Letters from the Lighthouse*** *(Emma Carroll)*
Ibn al-Haytham (Alhazen) (Light and our Eyes)	***The Gruffalo's Child*** *(Julia Donaldson)*
Percy Shaw (The Cats Eye)	***The King Who Banned the Dark*** *(Emily Haworth-Booth)*

Prior Learning

In Year 3 children should:

- **Recognise that they need light in order to see things and that dark is the absence of light.**
- **Notice that light is reflected from surfaces.**
- **Recognise that light from the sun can be dangerous and that there are ways to protect their eyes.**
- **Recognise that shadows are formed when the light from a light source is blocked by a solid object.**
- **Find patterns in the way that the sizes of shadows change.**

Key Question(s):

- How does the size of an object affect the size of a shadow?
- How does the distance between the light and the object change the size of a shadow?
- How does the distance between the object and the size of the screen affect the size of a shadow?
- How would a solar eclipse be different if:
  - The moon was a different size?
  - The earth span faster or slower?
  - The sun was larger or smaller?
  - If the earth and moon where the same size but further away in the solar system?
- How does the amount of aluminium foil scrunched affect how much light is scatters?
- How does the amount of polishing affect how well a piece of metal scatters light?
- How perfect are our mirrors? Do some scatter light more than others?
- What happens to light when it is shone through water? How is this affected by putting glitter, salt or talc in the water?
- How does a periscope/microscope/telescope work?

Future Learning

In Key Stage 3, children will learn about:

- the similarities and differences between light waves and waves in matter
- light waves travelling through a vacuum; speed of light
- the transmission of light through materials: absorption, diffuse scattering and specular reflection at a surface Science
- use of ray model to explain imaging in mirrors, the pinhole camera, the refraction of light and action of convex lens in focusing (qualitative), the human eye
- light transferring energy from source to absorber leading to chemical and electrical effects; photo-sensitive material in the retina and in cameras
- colours and the different frequencies of light, white light and prisms (qualitative only); differential colour effects in absorption and diffuse reflection.

Teaching Ideas

Comparative tests	Identify & Classify	Observation over time	Pattern Seeking	Research	BIG Question – Assessment Opportunity
How does the angle that a light ray hits a plane mirror affect the angle at which it reflects off the surface? **Which material is most reflective?**	Can you identify all the colours of light that make white light when mixed together? What colours do you get if you mix different colours of light together?	Does the temperature of a light bulb go up the longer it is on? How does my shadow change over the day?	Is there a pattern to how bright it is in school over the day? And, if there is a pattern, is it the same in every classroom?	Why do some people need to wear glasses to see clearly? How do our eyes adapt to different conditions?	Why does my shadow change length over the course of a day?

Crayke Church of England Primary School
Curriculum Long Term Plan and Progression Overview - SCIENCE

Year 6 – Animals, including Humans

National Curriculum Objectives

- **Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood.**
- **Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function.**
- **Describe the ways in which nutrients and water are transported within animals, including humans.**

Sticky Knowledge

- The heart pumps blood around the body.
- Oxygen is breathed into the lungs where it is absorbed by the blood.
- Muscles need oxygen to release energy from food to do work. (Oxygen is taken into the blood in the lungs; the heart pumps the blood through blood vessels to the muscles; the muscles take oxygen and nutrients from the blood.)

Vocabulary

Oxygenated, Deoxygenated, Valve, Exercise, Respiration Circulatory system, heart, lungs, blood vessels, blood, artery, vein, pulmonary, alveoli, capillary, digestive, transport, gas exchange, villi, nutrients, water, oxygen, alcohol, drugs, tobacco.

Key Scientists	Linked Texts
Justus von Liebig (Theories of Nutrition and Metabolism)	***Pig-Heart Boy*** *(Malorie Blackman)*
Sir Richard Doll (Linking Smoking and Health Problems)	***Skellig*** *(David Almond)*
Leonardo Da Vinci (Anatomy)	***A Heart Pumping Adventure*** *(Heather Manley)*

Prior Learning

In Year 5 children should:

- Describe the changes as humans develop to old age.

Yea

Key Question(s):

- Why do we need oxygen?
- How do we breathe?
- Do fish and plants breathe?
- Do all living things need oxygen?
- How does the size of a person's lungs affect their lung capacity?
- Are there ways to increase/decrease our lung capacity? Is lung capacity fixed?
- Why do we have blood?
- How does our heart work?
- How does size of muscle affect our pulse rate?
- How does exercise effect our pulse rate?
- How might the circulatory system of an elephant, a hummingbird, or a polar bear differ?
- Is the air you breathe out, the same as that you breathe in?

Future Learning

In Key Stage 3 children will learn about:

- the hierarchical organisation of multicellular organisms: from cells to tissues to organs to systems to organisms.
- the tissues and organs of the human digestive system, including adaptations to function and how the digestive system digests food (enzymes simply as biological catalysts)
- calculations of energy requirements in a healthy daily diet
- the consequences of imbalances in the diet, including obesity, starvation and deficiency diseases
- the structure and functions of the gas exchange system in humans, including adaptations to function
- the effects of recreational drugs (including substance misuse) on behaviour, health and life processes.

Teaching Ideas

Comparative tests	Identify & Classify	Observation over time	Pattern Seeking	Research	BIG Question – Assessment Opportunity
How does the length of time we exercise for affect our heart rate? **Can exercising regularly affect your lung capacity?** **Which type of exercise has the greatest effect on our heart rate?**	Which organs of the body make up the circulation system, and where are they found?	How does my heart rate change over the day? How much exercise do I do in a week?	Is there a pattern between what we eat for breakfast and how fast we can run?	How have our ideas about disease and medicine changed over time?	How do our choices affect how our bodies work? Why does my heart beat?

Crayke Church of England Primary School
Curriculum Long Term Plan and Progression Overview - SCIENCE

Year 6 – Living Things & their Habitats

National Curriculum Objectives

- **Classify living things into broad groups according to observable characteristics and based on similarities and differences.**
- **Give reasons for classifying plants and animals based on specific characteristics.**

Sticky Knowledge

- Variation exists within a population (and between offspring of some plants) – *NB: this Key Idea is duplicated in Year 6 Evolution and Inheritance.*
- Organisms best suited to their environment are more likely to survive long enough to reproduce.
- Organisms are best adapted to reproduce are more likely to do so.
- Organisms reproduce and offspring have similar characteristic patterns.
- Competition exists for resources and mates.

Vocabulary

Variation Organisms Populations. Classification Characteristics Environment, flowering, nonflowering, plants, animals, vertebrates, fish, amphibians, reptiles, mammals, invertebrate, human impact, nature reserves, deforestation. Classify, compare, bacteria, microorganism, organism, invertebrates, vertebrates, Linnaean.

Key Scientists	Linked Texts
Carl Linnaeus (Identifying, Naming and Classifying Organisms)	***Beetle Boy*** *(M G Leonard)* ***Insect Soup*** *(Barry Louis Polisar)* ***Fur and Feathers*** *(Janet Halfmann)*

Prior Learning

In Year 4, children should:

- **Recognise that living things can be grouped in a variety of ways.**
- **Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment.**
- **Recognise that environments can change and that this can sometimes pose danger to living things.**

Key Question(s):

- Why do we need to classify living things?
- How do we classify?
- What are the difficulties with classification? (penguins, whales, platypus)
- How do animals change over time?
- Why does variation exist?
- What happens if animals of different species breed? (hybrids)
- What happens to house plants outside?
- What are microorganisms?
- How can we prevent the spread of disease?
- Why do animals and plants compete – and what for?

Future Learning

In Key Stage 3 children will learn about:

- the dependence of almost all life on Earth on the ability of photosynthetic organisms, such as plants and algae, to use sunlight in photosynthesis to build organic molecules that are an essential energy store and to maintain levels of oxygen and carbon dioxide in the atmosphere
- the adaptations of leaves for photosynthesis.
- the interdependence of organisms in an ecosystem, including food webs and insect pollinated crops
- the importance of plant reproduction through insect pollination in human food security
- how organisms affect, and are affected by, their environment, including the accumulation of toxic materials.

Teaching Ideas

Comparative tests	Identify & Classify	Observation over time	Pattern Seeking	Research	BIG Question – Assessment Opportunity
How does the temperature affect how much gas is produced by yeast? **Which is the most common invertebrate on our school playing field?**	How would you make a classification key for vertebrates/invertebrates or microorganisms?	What happens to a piece of bread if you leave it on the windowsill for two weeks?	Do all flowers have the same number of petals?	What do different types of microorganisms do? Are they always harmful?	In what ways can we sort living things?

Crayke Church of England Primary School
Curriculum Long Term Plan and Progression Overview - SCIENCE

Year 6 – Evolution & Inheritance

National Curriculum Objectives

- **Know about evolution and can explain what it is.**
- **Know how fossils can be used to find out about the past.**
- **Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents**
- **Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution- recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago**

Sticky Knowledge

- Life cycles have evolved to help organisms survive to adulthood.
- Over time the characteristics that are most suited to the environment become increasingly common.

NB: The following could be duplicated in Year 6 Living things and their habitats.

- Organisms best suited to their environment are more likely to survive long enough to reproduce. Organisms are best adapted to reproduce are more likely to do so.
- Organisms reproduce and offspring have similar characteristic patterns.
- Variation exists within a population (and between offspring of some plants)
- Competition exists for resources and mates

Vocabulary

Fossils, Adaptation, Evolution, Characteristics, Reproduction, Genetics, Variation, Inherited, Environmental, Mutation, Competition, Survival of the Fittest, Evidence,

Key Scientists	Linked Texts
Charles Darwin and Alfred Russel Wallace (Theory of Evolution by Natural Selection) **Jane Goodall** (Chimpanzees)	***One Smart Fish*** *(Christopher Wormell)* ***The Molliebird*** *(Jules Pottle)* ***Our Family Tree*** *(Lisa Westberg Peters)*

Prior Learning

From Key Stages 1 & 2, children should:

- **Understand there is a variety of life on Earth**
- **Know that some animal's differences are important to their survival**
- **Know how animals and plants reproduce**
- **Know how fossils form over time**

Key Question(s):

- Why are we all different?
- What is variation, and why is it important?
- How did life begin on Earth?
- How do we change?
- What is evolution?
- What evidence is there for evolution?
- How does evolution happen?
- What reasons do animals become extinct?
- Polar Bears' habitat is rapidly changing, what possible futures do they face, and can we predict which is most likely?
- How did Darwin come up with the theory?
- Why was his theory not initially accepted?

Future Learning

In Key Stage 3 children will learn about:

- heredity as the process by which genetic information is transmitted from one generation to the next
- the variation between individuals within a species being continuous or discontinuous, to include measurement and graphical representation of variation
- the variation between species and between individuals of the same species means some organisms compete more successfully, which can drive natural selection
- changes in the environment may leave individuals within a species, and some entire species, less well adapted to compete successfully and reproduce, which in turn may lead to extinction
- the importance of maintaining biodiversity and the use of gene banks to preserve hereditary material.

Teaching Ideas

Comparative tests	Identify & Classify	Observation over time	Pattern Seeking	Research	BIG Question – Assessment Opportunity
What is the most common eye colour in our class?	Compare the skeletons of apes, humans, and Neanderthals – how are they similar, and how are they different? Can you classify these observations into evidence for the idea of evolution, and evidence against?	How has the skeleton of the horse changed over time?	Is there a pattern between the size and shape of a bird's beak and the food it will eat?	What happened when Charles Darwin visited the Galapagos islands? What ideas did American geneticist Barbara McClintock have about genes that won her a Nobel Prize?	What is evolution, how does it happen and how do scientists know?

Crayke Church of England Primary School
Curriculum Long Term Plan and Progression Overview - SCIENCE

Year 6 – Electricity

National Curriculum Objectives

- Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit.
- Compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches.
- Use recognised symbols when representing a simple circuit in a diagram.

Sticky Knowledge

- Batteries are a store of energy. This energy pushes electricity round the circuit. When the battery's energy is gone it stops pushing. Voltage measures the 'push.'
- The greater the current flowing through a device the harder it works.
- Current is how much electricity is flowing round a circuit.
- When current flows through wires heat is released. The greater the current, the more heat is released.

Vocabulary

Electricity, neutrons, protons, electrons, nucleus, atom, electric current, appliances, mains, crocodile clips, wires, bulb, battery cell, battery holder, motor, buzzer, switch, conductor, electrical insulator, conductor.

Key Scientists	Linked Texts
Alessandro Volta (Electrical Battery)	Goodnight Mister Tom (Michelle Magorian)
Nicola Tesla (Alternating Currents)	Blackout (John Rocco)
	Hitler's Canary (Sandi Toksvig)

Prior Learning

In Year 4, children should:

- **Identify common appliances that run on electricity.**
- **Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers.**
- **Identify whether a lamp will light in a simple series circuit, based on whether the lamp is part of a complete loop with a battery.**
- **Recognise that a switch opens and closes the circuit and associate this with whether a lamp lights in a simple series circuit. Recognise some common conductors and insulators, and associate metals with being good conductors.**
- **Know the difference between a conductor and an insulator, giving examples of each.**
- **Safety when using electricity.**

Key Question(s):

- Do all batteries push as hard as each other?
- What is electricity?
- How does the voltage of a batters affect how much current is pushed?
- How does the length of time I leave the current flowing for affect the brightness of the bulb?
- How does number of bulbs affect the brightness of a bulb?
- Are all types of wires as good as conducting electricity?
- Why are wires insulated in plastic? Does type of material make a difference?
- Does length of wire make a difference?
- Does the type of circuit affect how the components work/long the battery lasts?
- What renewable ways can we generate electricity?
- How does current affect heat?
- What are the dangers of a short circuit?

Future Learning

In Key Stage Three children will learn:

- Electric current, measured in amperes, in circuits, series and parallel circuits, currents add where branches meet and current as flow of charge
- Potential difference measured in volts, battery and bulb ratings, resistance measured in ohms, as the ratio of potential difference (p.d.) to current
- Differences in resistance between conducting and insulating components (quantitative).
- Separation of positive or negative charges when objects are rubbed together: transfer of electrons, forces between charged objects
- The idea of electric field, forces acting across the space between objects not in contact.

Teaching Ideas

Comparative tests	Identify & Classify	Observation over time	Pattern Seeking	Research	BIG Question – Assessment Opportunity
How does the voltage of the batteries in a circuit affect the brightness of the lamp? **How does the voltage of the batteries in a circuit affect the volume of the buzzer?** **Which make of battery lasts the longest?** **Which type of fruit makes the best fruity battery?**	How would you group electrical components and appliances based on what electricity makes them do?	How does brightness of bulb change as the battery runs out? How can we measure how quickly a battery is used up?	Does the temperature of a light bulb go up the longer it is on?	How has our understanding of electricity changed over time?	Can we vary the effects of electricity?

Crayke Church of England Primary School
Curriculum Long Term Plan and Progression Overview - SCIENCE

Year 5 – Materials (Mixtures & Separation)

National Curriculum Objectives

- **Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.**
- **Know that some materials will dissolve in liquid to form a solution and describe how to recover a substance from a solution.**
- **Use knowledge of solids, liquids, and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating.**

Sticky Knowledge

- When two or more substances are mixed and remain present the mixture can be separated.
- Some changes can be reversed, and some cannot.
- Materials change state by heating and cooling.

Separating technique	Difference in property required
Filtration and sieving	A solid that does not dissolve in a liquid. Different sized solid bits
Magnets	Some materials magnetic others not
Evaporation	A solid dissolved in water and the solid has a high boiling temperature
Floating	Some materials float and other sink

Vocabulary

Solid, liquid, gas, particles, state, materials, properties, matter, melt, freeze, water, ice, temperature, process, condensation, evaporation, water vapour, energy, precipitation, collection,

Key Scientists	Linked Texts
Spencer Silver, **Arthur Fry and Alan Amron** (Post-It Notes) **Ruth Benerito** (Wrinkle-Free Cotton)	***Itch*** *(Simon Mayo)* ***Kensuke's Kingdom*** *(Michael Morpurgo)* ***The BFG*** *(Roald Dahl)*

Prior Learning

In KS1 children should:

- **Distinguish between an object and the material from which it is made.**
- **Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock.**
- **Describe the simple physical properties of a variety of everyday materials.**
- **Compare and group together a variety of everyday materials based on their simple physical properties.**
- **Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses.**
- **Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.**

Key Question(s):

- What are mixtures?
- What does dissolve mean?
- Which of the following dissolve in water: sugar, bicarbonate of soda, oil, chocolate, coffees, dark vinegar and wax?
- How does the amount of water used affect how much sugar will dissolve in it?
- Which sweets dissolve in water?
- How can we separate mixtures?
- How can we clean our dirty water?

Future Learning

In Year 5 children will:

- Compare and group together everyday materials based on their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets.
- Give reasons based on evidence from comparative and fair tests, for the uses of everyday materials, including wood, metals and plastic.
- Demonstrate that dissolving, mixing and changes of state are reversible changes.
- Explain that some changes result in the formation of new materials, and this kind of change is usually not reversible, including changes associated with burning and the action of acid on bicarbonate of soda

Teaching Ideas

Comparative tests	Identify & Classify	Observation over time	Pattern Seeking	Research	BIG Question – Assessment Opportunity
How does the temperature of tea affect how long it takes for a sugar cube to dissolve? **Which type of sugar dissolves the fastest?**	Can you group these materials based on whether they are transparent or not?	How does a container of saltwater change over time? How does a sugar cube change as it is put in a glass of water?	Do all stretchy materials stretch in the same way? How does temperature affect how much solute we can dissolve?	What are microplastics and why are they harming the planet?	How can we separate a mixture of water, iron filings, salt and sand?

Crayke Church of England Primary School
Curriculum Long Term Plan and Progression Overview - SCIENCE

Year 5 – Materials (Changes)

National Curriculum Objectives	Sticky Knowledge	Vocabulary
• **Compare and group together everyday materials based on their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets.** • **comparative and fair tests, for the uses of everyday materials, including wood, metals and plastic.** • **Demonstrate that dissolving, mixing and changes of state are reversible changes.** • **Explain that some changes result in the formation of new materials, and this kind of change is usually not reversible, including changes associated with burning and the action of acid on bicarbonate of soda**	• All matter (including gas) has mass. • Sometimes mixed substances react to make a new substance. These changes are usually irreversible. • Heating can sometimes cause materials to change permanently. When this happens, a new substance is made. These changes are not reversible. • Indicators that something new has been made are: The properties of the material are different (colour, state, texture, hardness, smell, temperature) • If it is not possible to get the material back easily it is likely that it is not there anymore and something new has been made (irreversible change)	Hardness, Solubility, Transparency, Conductivity, Magnetic, Filter, Evaporation, Dissolving, Mixing Material, conductor, dissolve, insoluble, suspension, chemical, physical, irreversible, solution, reversible, separate, mixture, insulator, transparent, flexible, permeable, soluble, property, magnetic, hard.

Key Scientists	Linked Texts
Spencer Silver, **Arthur Fry and Alan Amron** (Post-It Notes) **Ruth Benerito** (Wrinkle-Free Cotton)	***Itch*** *(Simon Mayo)* ***Kensuke's Kingdom*** *(Michael Morpurgo)* ***The BFG*** *(Roald Dahl)*

Prior Learning	Key Question(s):	Future Learning
In Year 4 children should: • **Compare and group materials together, according to whether they are solids, liquids or gases.** • **Observe that some materials change state when heated or cooled, and measure and research the temperature at which this happens in degrees Celsius.** • **Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.**	• The key question we want children to interrogate is "have we made a new substance?" - Wet clay → air-dried clay → fired clay. - Flour and water → dough → bread • Add sugar to fizzy water; it fizzes up. Has a new substance been made? (No, the gas was dissolved in the water and adding sugar made it become undissolved) • Add baking powder to vinegar, it fizzes up. Has a new substance been made? (Yes, the gas was not in the vinegar as it was not fizzy, so it must have been made) • Add water to instant snow. • Use lemon juice as an invisible ink, heating gently makes the ink visible. Is this a new substance? • When water is added to jelly and it is set, is it a new substance. • When materials are heated or mixed with other materials they sometimes can be made to turn into new materials. The question is how would we know if it was a new material or the same material mixed differently?	In KS3 children will learn about: • the concept of a pure substance mixtures, including dissolving • diffusion in terms of the particle model • simple techniques for separating mixtures: filtration, evaporation, distillation and chromatography • the identification of pure substances

Teaching Ideas

Comparative tests	Identify & Classify	Observation over time	Pattern Seeking	Research	BIG Question – Assessment Opportunity
Which material rusts fastest/slowest? **How can we change the 'jelly-ness' of jelly?**	Can you identify and classify these reactions and changes into reversible, and irreversible? Can you describe their groups similarities and differences?	How does a nail in saltwater change over time?	What patterns can you notice in different reactions? How does the amount of bicarbonate of soda, washing up liquid and vinegar affect the reaction?	What are smart materials and how can they help us?	How can we change materials reversibly and irreversibly?

Crayke Church of England Primary School
Curriculum Long Term Plan and Progression Overview - SCIENCE

Year 5 – Earth & Space

National Curriculum Objectives

- **Describe the movement of the Earth, and other planets, relative to the Sun in the solar system**
- **Describe the movement of the Moon relative to the Earth**
- **Describe the Sun, Earth and Moon as approximately spherical bodies**
- **Describe the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.**

Sticky Knowledge

- Stars, planets and moons have so much mass they attract other things, including each other due to a force called gravity. Gravity works over distance.
- Objects with larger masses exert bigger gravitational forces.
- Objects like planets, moons and stars spin.
- Smaller mass objects like planets orbit large mass objects like stars.
- Stars produce vast amounts of heat and light.
- All other objects are lumps of rock, metal or ice and can be seen because they reflect the light of stars.

Vocabulary

Earth, Sun, Moon, Axis, Rotation, Day, Night, Phases of the Moon, star, constellation, waxing, waning, crescent, gibbous. Mercury, Venus, Mars, Jupiter, Saturn, Uranus, Neptune, planets, solar system, day, night, rotate, orbit, axis, spherical, geocentric, heliocentric.

Key Scientists	Linked Texts
Claudius Ptolemy and Nicolaus Copernicus (Heliocentric vs Geocentric Universe) **Neil Armstrong** (First man on the Moon) **Helen Sharman** (First British astronaut) **Tim Peake** (First British ESA astronaut)	***The Skies Above My Eyes*** *(Charlotte Guillain & Yuval Zommer)* ***George's Secret Key to the Universe*** *(Lucy and Stephen Hawking with Christophe Galfard)* ***The Way Back Home*** *(Oliver Jeffers)*

Prior Learning

In Key Stage 1 and in Year 3 children should:

- **Understand changes in weather patterns and seasons.**
- **Compare how things move on different surfaces.**
- **Notice that some forces need contact between two objects, but magnetic forces can act at a distance.**
- **Describe magnets as having two poles. Predict whether two magnets with attract or repel each other, depending on which poles are facing**

Key Question(s):

How does temperature/size/day length/year length change as you get closer/further to the sun?
How does distance from a light source affect how much light hits an object?
Does having more moons result in more light hitting a planet? How could you test this?
How does speed/size of a meteorite affect the size of the moon crater formed?
If the moon became heavier as a result of meteorite collisions what would happen to its position relative to Earth?
If the mass of the Earth is 80x that of the moon, why is the gravity at the Earth's surface only 6x greater than at the surface of the moon?
Why do we have day/night/months/years/seasons?
Why does day length change?
Why does shadow size change over the course of a day?

Future Learning

In KS3 children will learn about:

- Gravity force, weight = mass x gravitational field strength (g), on Earth g=10 N/kg, different on other planets and stars; gravity forces between Earth and Moon, and between Earth and Sun (qualitative only)
- Our Sun as a star, other stars in our galaxy, other galaxies
- The seasons and the Earth's tilt, day length at different times of year, in different hemispheres the light year as a unit of astronomical distance

Teaching Ideas

Comparative tests	Identify & Classify	Observation over time	Pattern Seeking	Research	BIG Question – Assessment Opportunity
How does the length of daylight hours change in each season?	How could you organise all the objects in the solar system into groups?	Can you observe and identify all the phases in the cycle of the Moon?	Is there a pattern between the size of a planet and the time it takes to travel around the Sun?	What unusual objects did Jocelyn Bell Burnell discover? How do astronomers know what stars are made of? How have our ideas about the solar system changed over time?	Sun, Earth & Moon: What is moving and how do we know?

Crayke Church of England Primary School
Curriculum Long Term Plan and Progression Overview - SCIENCE

Year 5 – Living things and their Habitats

National Curriculum Objectives	Sticky Knowledge	Vocabulary
• Know the life cycle of different living things, e.g. Mammal, amphibian, insect bird. • Know the process of reproduction in plants. • Know the process of reproduction in animals.	• Different animals mature at different rates and live to different ages. • Some organisms reproduce sexually where offspring inherit information from both parents. • Some organisms reproduce asexually by making a copy of a single parent. • Environmental change can affect how well an organism is suited to its environment. • Different types of organisms have different lifecycles.	Reproduction, Sexual, Asexual, Pollination, Dispersal, reproduction, cell, fertilisation, pollination, male, female, pregnancy, young, mammal, metamorphosis, amphibian, insect, egg, embryo, bird, plant .

Key Scientists	Linked Texts
James Brodie of Brodie (Reproduction of Plants by Spores) **David Attenborough** (Naturalist and Nature Documentary Broadcaster)	***The Land of Neverbelieve*** *(Norman Messenger)* ***Mummy Laid an Egg*** *(Babette Cole)*

Prior Learning	Key Question(s):	Future Learning
In Year 4 children should: • **Construct and interpret a variety of food chains, identifying producers, predators and prey** • **Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other.** • **Identify and name a variety of plants and animals in their habitats, including micro habitats.**	• What is a life cycle? What types of life cycles are there? • Are life cycles the same? • Do plants reproduce in the same ways as us? • How do plants spread their seeds?	In Year 6: • Classify living things into broad groups according to observable characteristics and based on similarities and differences. • Give reasons for classifying plants and animals based on specific characteristics.

Teaching Ideas

Comparative tests	Identify & Classify	Observation over time	Pattern Seeking	Research	BIG Question – Assessment Opportunity
How does the level of salt affect how quickly brine shrimp hatch?	Compare this collection of animals based on similarities and differences in their lifecycle.	How do brine shrimp change over their lifetime? How does a bean change as it germinates?	Is there are relationship between number of petals and number of stamens?	What are the differences between the life cycle of an insect and a mammal?	Do all plants and animals reproduce in the same way?

Crayke Church of England Primary School
Curriculum Long Term Plan and Progression Overview - SCIENCE

Year 5 – Animals, including Humans

National Curriculum Objectives	Sticky Knowledge	Vocabulary
• **Describe the changes as humans develop to old age.**	• Different animals mature at different rates and live to different ages. • Puberty is something we all go through, a process which prepares our bodies for being adults, and reproduction • Hormones control these changes, which can be physical and/or emotional.	Foetus, Embryo, Womb, Gestation, Baby, Toddler, Teenager, Elderly, Growth, Development, Puberty, Hormone, Physical, Emotional, .

Key Scientists	Linked Texts
Dr Steve Jones (Geneticist) Prof Robert Winston (Human Scientist)	***Hair in Funny Places*** *(Babette Cole)* ***Giant*** *(Kate Scott)* ***You're Only Old Once!*** *(Dr. Seuss)*

Prior Learning	Key Question(s):	Future Learning
In Year 4 children should: • **Describe the simple functions of the basic parts of the digestive system in humans.** • **Identify the different types of teeth in humans and their simple functions.**	• What do humans look like? • Do all animal embryos look the same? • How do humans change? • Why do humans change? • What causes puberty? • What changes do we go through during puberty? • Are there any patterns between vertebrate animals and their gestation periods?	In Year 6: • Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood. • Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function. • Describe the ways in which nutrients and water are transported within animals, including humans.

Teaching Ideas

Comparative tests	Identify & Classify	Observation over time	Pattern Seeking	Research	BIG Question – Assessment Opportunity
How does age affect a human's reaction time? **Who grows the fastest, girls or boys?**	Can you identify all the stages in the human life cycle?	How do different animal embryos change?	Is there a relationship between a mammal's size and its gestation period?	Why do people get grey/white hair when they get older?	Why and how does the human body change over time?

Crayke Church of England Primary School
Curriculum Long Term Plan and Progression Overview - SCIENCE

Working Scientifically Progression

Statements taken from:
Science programmes of study: National curriculum in England (2013) DFE, key stages 1 and 2.
Statutory framework for the early years foundation stage (2021) DFE.

skills / stage	EYFS (3-5 years)	KS1 (5-7 years)	Lower KS2 (7-9 years)	Upper KS2 (9-11 years)
PLAN Ask questions, make predictions, decide on the method and equipment	➢ listen attentively and respond to what they hear with relevant questions	➢ ask simple questions and recognise that they can be answered in different ways	➢ ask relevant questions and use different types of scientific enquiries to answer them ➢ set up simple practical enquiries, comparative and fair tests	➢ plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
DO Carry out an enquiry using equipment	➢ show an ability to follow instructions involving several ideas or actions ➢ be confident to try new activities… ➢ use a range of small tools… ➢ safely use and explore a variety of materials, tools and techniques	➢ observe closely, using simple equipment ➢ perform simple tests ➢ identify and classify	➢ make systematic and careful observations and, where appropriate, take accurate measurements using standard units, use a range of equipment, including thermometers and data loggers	➢ take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate

skills / stage	EYFS (3-5 years)	KS1 (5-7 years)	Lower KS2 (7-9 years)	Upper KS2 (9-11 years)
RECORD Use drawings, tables or graphs to note observations and measurements	➢ explore the natural world around them, making observations and drawing pictures of animals and plants	➢ gather and record data to help in answering questions	➢ gather, record, classify and present data in a variety of ways to help in answering questions ➢ record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables	➢ record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
REVIEW Interpret, communicate and evaluate results	➢ participate in discussions, offering their own ideas, using recently introduced vocabulary ➢ offer explanations for why things might happen… ➢ express their ideas and feelings about their experiences ➢ know some similarities and differences… drawing on their experiences	➢ use their observations and ideas to suggest answers to questions	➢ report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions ➢ use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions ➢ identify differences, similarities or changes related to simple scientific ideas and processes ➢ use straightforward scientific evidence to answer questions or to support their findings	➢ use test results to make predictions to set up further comparative and fair tests ➢ report and present findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations ➢ identify scientific evidence that has been used to support or refute ideas or arguments

Crayke Church of England Primary School
Curriculum Long Term Plan and Progression Overview - SCIENCE

Child A's Science Journey Through Crayke School		
Year 1	Autumn	Uses of everyday materials/Seasons
	Spring	Plants/Seasons
	Summer	Living things and their habitats/Seasons
Year 2	Autumn	Everyday materials/Seasons
	Spring	Animals Including Humans/Seasons
	Summer	Plants/Seasons
Year 3	Autumn	Plants/Light
	Spring	Electricity/Sound
	Summer	Animals including humans
Year 4	Autumn	Living things & their habitat/States of matter
	Spring	Forces & Magnets/Rocks
	Summer	Animals including humans
Year 5	Autumn	Forces/Light
	Spring	Animals including humans
	Summer	Living things & their habitat/Evolution & Inheritance
Year 6	Autumn	Electricity/Properties and changes of materials
	Spring	Earth & Space
	Summer	Living things & their habitat/Animals including humans

Crayke Church of England Primary School
Curriculum Long Term Plan and Progression Overview - SCIENCE

Child B's Science Journey Through Crayke School		
Year 1	Autumn	Everyday materials/Seasons
	Spring	Animals Including Humans/Seasons
	Summer	Plants/Seasons
Year 2	Autumn	Uses of everyday materials/Seasons
	Spring	Plants/Seasons
	Summer	Living things and their habitats/Seasons
Year 3	Autumn	Living things & their habitat/States of matter
	Spring	Forces & Magnets/Rocks
	Summer	Animals including humans
Year 4	Autumn	Plants/Light
	Spring	Electricity/Sound
	Summer	Animals including humans
Year 5	Autumn	Electricity/Properties and changes of materials
	Spring	Earth & Space
	Summer	Living things & their habitat/Animals including humans
Year 6	Autumn	Forces/Light
	Spring	Animals including humans
	Summer	Living things & their habitat/Evolution & Inheritance

Crayke Church of England Primary School
Curriculum Long Term Plan and Progression Overview - SCIENCE

Threshold concept	Milestone 1 (Beech/Year 1+2)			Milestone 2 (Holly/Year 3+4)			Milestone 3 (Oak/Year 5+6)		
Work scientifically This concept involves learning the methodologies of the discipline of science.	• Ask simple questions.			• Ask relevant questions.			• Plan enquiries, including recognising and controlling variables where necessary.		
	AUT A	SPR A	SUM A	AUT A	SPR A	SUM A	AUT A	SPR A	SUM A
	AUT B	SPR B	SUM B	AUT B	SPR B	SUM B	AUT B	SPR B	SUM B
	• Observe closely, using simple equipment.			• Set up simple, practical enquiries and comparative and fair tests			• Use appropriate techniques, apparatus, and materials during fieldwork and laboratory work.		
	AUT A	SPR A	SUM A	AUT A	SPR A	SUM A	AUT A	SPR A	SUM A
	AUT B	SPR B	SUM B	AUT B	SPR B	SUM B	AUT B	SPR B	SUM B
	• Perform simple tests.			• Make accurate measurements using standard units, using a range of equipment, e.g. thermometers and data loggers.			• Take measurements, using a range of scientific equipment, with increasing accuracy and precision.		
	AUT A	SPR A	SUM A	AUT A	SPR A	SUM A	AUT A	SPR A	SUM A
	AUT B	SPR B	SUM B	AUT B	SPR B	SUM B	AUT B	SPR B	SUM B
	• Identify and classify.			• Gather, record, classify and present data in a variety of ways to help in answering questions.			• Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, bar and line graphs, and models.		
	AUT A	SPR A	SUM A	AUT A	SPR A	SUM A	AUT A	SPR A	SUM A
	AUT B	SPR B	SUM B	AUT B	SPR B	SUM B	AUT B	SPR B	SUM B

	• Use observations and ideas to suggest answers to questions.			• Record findings using simple scientific language, drawings, labelled diagrams, bar charts and tables.			• Report findings from enquiries, including oral and written explanations of results, explanations involving causal relationships, and conclusions.		
	AUT A	SPR A	SUM A	AUT A	SPR A	SUM A	AUT A	SPR A	SUM A
	AUT B	SPR B	SUM B	AUT B	SPR B	SUM B	AUT B	SPR B	SUM B
	• Gather and record data to help in answering questions.			• Report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions.			• Present findings in written form, displays and other presentations.		
	AUT A	SPR A	SUM A	AUT A	SPR A	SUM A	AUT A	SPR A	SUM A
	AUT B	SPR B	SUM B	AUT B	SPR B	SUM B	AUT B	SPR B	SUM B
				• Use results to draw simple conclusions and suggest improvements, new questions and predictions for setting up further tests.			• Use test results to make predictions to set up further comparative and fair tests.		
				AUT A	SPR A	SUM A	AUT A	SPR A	SUM A
				AUT B	SPR B	SUM B	AUT B	SPR B	SUM B
				• Identify differences, similarities or changes related to simple, scientific ideas and processes.			• Use simple models to describe scientific ideas, identifying scientific evidence that has been used to support or refute ideas or arguments.		

Crayke Church of England Primary School
Curriculum Long Term Plan and Progression Overview - SCIENCE

<table>
<tr><td></td><td></td><td>AUT A | SPR A | SUM A
AUT B | SPR B | SUM B</td><td>AUT A | SPR A | SUM A
AUT B | SPR B | SUM B</td></tr>
<tr><td></td><td></td><td>• Use straightforward, scientific evidence to answer questions or to support their findings.
AUT A | SPR A | SUM A
AUT B | SPR B | SUM B</td><td></td></tr>
<tr><td rowspan="4"><u>Biology</u>

Understand plants
This concept involves becoming familiar with different types of plants, their structure and reproduction.</td><td>• Identify and name a variety of common plants, including garden plants, wild plants and trees and those classified as deciduous and evergreen.</td><td>• Identify and describe the functions of different parts of flowering plants: roots, stem, leaves and flowers.</td><td>• Relate knowledge of plants to studies of evolution and inheritance.</td></tr>
<tr><td>AUT A | SPR A | SUM A
AUT B | SPR B | SUM B</td><td>AUT A | SPR A | SUM A
AUT B | SPR B | SUM B</td><td>AUT A | SPR A | SUM A
AUT B | SPR B | SUM B</td></tr>
<tr><td>• Identify and describe the basic structure of a variety of common flowering plants, including roots, stem/trunk, leaves and flowers.</td><td>• Explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant.</td><td>• Relate knowledge of plants to studies of all living things.</td></tr>
<tr><td>AUT A | SPR A | SUM A
AUT B | SPR B | SUM B</td><td>AUT A | SPR A | SUM A
AUT B | SPR B | SUM B</td><td>AUT A | SPR A | SUM A
AUT B | SPR B | SUM B</td></tr>
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Crayke Church of England Primary School
Curriculum Long Term Plan and Progression Overview - SCIENCE

	• Observe and describe how seeds and bulbs grow into mature plants. AUT A | SPR A | SUM A AUT B | SPR B | SUM B	• Investigate the way in which water is transported within plants. AUT A | SPR A | SUM A AUT B | SPR B | SUM B	
	• Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy AUT A | SPR A | SUM A AUT B | SPR B | SUM B	• Explore the role of flowers in the life cycle of flowering plants, including pollination, seed formation and seed dispersal AUT A | SPR A | SUM A AUT B | SPR B | SUM B	
Understand animals and humans This concept involves becoming familiar with different types of animals, humans and the life processes they share.	• Identify and name a variety of common animals that are birds, fish, amphibians, reptiles, mammals and invertebrates. AUT A | SPR A | SUM A AUT B | SPR B | SUM B	• Identify that animals, including humans, need the right types and amounts of nutrition, that they cannot make their own food and they get nutrition from what they eat. AUT A | SPR A | SUM A AUT B | SPR B | SUM B	• Describe the changes as humans develop to old age. AUT A | SPR A | SUM A AUT B | SPR B | SUM B
	• Identify and name a variety of common animals that are carnivores,	• Construct and interpret a variety of food chains, identifying	• Identify and name the main parts of the human circulatory system, and describe the

	herbivores and omnivores.			producers, predators and prey.			functions of the heart, blood vessels and blood.		
	AUT A	SPR A	SUM A	AUT A	SPR A	SUM A	AUT A	SPR A	SUM A
	AUT B	SPR B	SUM B	AUT B	SPR B	SUM B	AUT B	SPR B	SUM B
	• Describe and compare the structure of a variety of common animals (birds, fish, amphibians, reptiles, mammals and invertebrates, including pets).			• Identify that humans and some animals have skeletons and muscles for support, protection and movement.			• Recognise the importance of diet, exercise, drugs and lifestyle on the way the human body functions.		
	AUT A	SPR A	SUM A	AUT A	SPR A	SUM A	AUT A	SPR A	SUM A
	AUT B	SPR B	SUM B	AUT B	SPR B	SUM B	AUT B	SPR B	SUM B
	• Identify name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.			• Describe the simple functions of the basic parts of the digestive system in humans.			• Describe the ways in which nutrients and water are transported within animals, including humans.		
	AUT A	SPR A	SUM A	AUT A	SPR A	SUM A	AUT A	SPR A	SUM A
	AUT B	SPR B	SUM B	AUT B	SPR B	SUM B	AUT B	SPR B	SUM B
	• Notice that animals, including humans, have offspring which grow into adults.			• Identify the different types of teeth in humans and their simple functions.					
	AUT A	SPR A	SUM A	AUT A	SPR A	SUM A			
	AUT B	SPR B	SUM B	AUT B	SPR B	SUM B			

<table>
<tr><td></td><td>• Investigate and describe the basic needs of animals, including humans, for survival (water, food and air).
AUT A | SPR A | SUM A
AUT B | SPR B | SUM B
• Describe the importance for humans of exercise, eating the right amounts of different types of food and hygiene.
AUT A | SPR A | SUM A
AUT B | SPR B | SUM B</td><td></td><td></td></tr>
<tr><td>Investigate living things
This concept involves becoming familiar with a wider range of living things, including insects and understanding life processes.</td><td>• Explore and compare the differences between things that are living, that are dead and that have never been alive.
AUT A | SPR A | SUM A
AUT B | SPR B | SUM B
• Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the</td><td>• Recognise that living things can be grouped in a variety of ways.
AUT A | SPR A | SUM A
AUT B | SPR B | SUM B
• Explore and use classification keys.</td><td>• Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird.
AUT A | SPR A | SUM A
AUT B | SPR B | SUM B
• Describe the life process of reproduction in some plants and animals.</td></tr>
</table>

	basic needs of different kinds of animals and plants and how they depend on each other.		
	AUT A SPR A SUM A AUT B SPR B SUM B	AUT A SPR A SUM A AUT B SPR B SUM B	AUT A SPR A SUM A AUT B SPR B SUM B
	• Identify and name a variety of plants and animals in their habitats, including micro-habitats.	• Recognise that environments can change and that this can sometimes pose dangers to specific habitats.	• Describe how living things are classified into broad groups according to common observable characteristics
	AUT A SPR A SUM A AUT B SPR B SUM B	AUT A SPR A SUM A AUT B SPR B SUM B	AUT A SPR A SUM A AUT B SPR B SUM B
	• Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food.		• Give reasons for classifying plants and animals based on specific characteristics.
	AUT A SPR A SUM A AUT B SPR B SUM B		AUT A SPR A SUM A AUT B SPR B SUM B
Understand evolution and inheritance This concept involves understanding that organisms come into existence, adapt, change	*• Identify how humans resemble their parents in many features.*	*• Identify how plants and animals, including humans, resemble their parents in many features.*	• Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago.
	AUT A SPR A SUM A	AUT A SPR A SUM A	AUT A SPR A SUM A

and evolve and become extinct.	AUT B	SPR B	SUM B	AUT B	SPR B	SUM B	AUT B	SPR B	SUM B
				• *Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago.*			• Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents.		
				AUT A	SPR A	SUM A	AUT A	SPR A	SUM A
				AUT B	SPR B	SUM B	AUT B	SPR B	SUM B
				• *Identify how animals and plants are suited to and adapt to their environment in different ways.*			• Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.		
				AUT A	SPR A	SUM A	AUT A	SPR A	SUM A
				AUT B	SPR B	SUM B	AUT B	SPR B	SUM B
Chemistry: **Investigate materials** This concept involves becoming familiar with a range of materials, their properties, uses and how	• Distinguish between an object and the material from which it is made.			**Rocks and Soils** • Compare and group together different kinds of rocks on the basis of their simple, physical properties.			• Compare and group together everyday materials based on evidence from comparative and fair tests, including their hardness, solubility, conductivity (electrical and thermal), and response to magnets.		
	AUT A	SPR A	SUM A	AUT A	SPR A	SUM A	AUT A	SPR A	SUM A
	AUT B	SPR B	SUM B	AUT B	SPR B	SUM B	AUT B	SPR B	SUM B

<table>
<tr><td rowspan="11">they may be altered or changed.</td><td colspan="3">• Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water and rock.</td><td colspan="3">• Relate the simple physical properties of some rocks to their formation (igneous or sedimentary).</td><td colspan="3">• Understand how some materials will dissolve in liquid to form a solution and describe how to recover a substance from a solution.</td></tr>
<tr><td>AUT A</td><td>SPR A</td><td>SUM A</td><td>AUT A</td><td>SPR A</td><td>SUM A</td><td>AUT A</td><td>SPR A</td><td>SUM A</td></tr>
<tr><td>AUT B</td><td>SPR B</td><td>SUM B</td><td>AUT B</td><td>SPR B</td><td>SUM B</td><td>AUT B</td><td>SPR B</td><td>SUM B</td></tr>
<tr><td colspan="3">• Describe the simple physical properties of a variety of everyday materials.</td><td colspan="3">• Describe in simple terms how fossils are formed when things that have lived are trapped within sedimentary rock.</td><td colspan="3">• Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating.</td></tr>
<tr><td>AUT A</td><td>SPR A</td><td>SUM A</td><td>AUT A</td><td>SPR A</td><td>SUM A</td><td>AUT A</td><td>SPR A</td><td>SUM A</td></tr>
<tr><td>AUT B</td><td>SPR B</td><td>SUM B</td><td>AUT B</td><td>SPR B</td><td>SUM B</td><td>AUT B</td><td>SPR B</td><td>SUM B</td></tr>
<tr><td colspan="3">• Compare and group together a variety of everyday materials on the basis of their simple physical properties.</td><td colspan="3">• Recognise that soils are made from rocks and organic matter.</td><td colspan="3">• Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic.</td></tr>
<tr><td>AUT A</td><td>SPR A</td><td>SUM A</td><td>AUT A</td><td>SPR A</td><td>SUM A</td><td>AUT A</td><td>SPR A</td><td>SUM A</td></tr>
<tr><td>AUT B</td><td>SPR B</td><td>SUM B</td><td>AUT B</td><td>SPR B</td><td>SUM B</td><td>AUT B</td><td>SPR B</td><td>SUM B</td></tr>
<tr><td colspan="3">• Find out how the shapes of solid objects made from some materials can be changed by squashing,</td><td colspan="3">States of Matter

• Compare and group materials together, according to whether they</td><td colspan="3">• Demonstrate that dissolving, mixing and changes of state are reversible changes.</td></tr>
</table>

	bending, twisting and stretching.			are solids, liquids or gases.					
	AUT A	SPR A	SUM A	AUT A	SPR A	SUM A	AUT A	SPR A	SUM A
	AUT B	SPR B	SUM B	AUT B	SPR B	SUM B	AUT B	SPR B	SUM B
	• Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick/rock, and paper/cardboard for particular uses.			• Observe that some materials change state when they are heated or cooled, and measure the temperature at which this happens in degrees Celsius (°C), building on their teaching in mathematics.			• Explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning, oxidisation and the action of acid on bicarbonate of soda.		
	AUT A	SPR A	SUM A	AUT A	SPR A	SUM A	AUT A	SPR A	SUM A
	AUT B	SPR B	SUM B	AUT B	SPR B	SUM B	AUT B	SPR B	SUM B
				• Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.					
				AUT A	SPR A	SUM A			
				AUT B	SPR B	SUM B			
	• Notice and describe how things move, using simple comparisons such as faster and slower.			• Compare how things move on different surfaces.			**Magnets** • Describe magnets as having two poles.		
	AUT A	SPR A	SUM A	AUT A	SPR A	SUM A	AUT A	SPR A	SUM A
	AUT B	SPR B	SUM B	AUT B	SPR B	SUM B	AUT B	SPR B	SUM B

Crayke Church of England Primary School
Curriculum Long Term Plan and Progression Overview - SCIENCE

<table>
<tr><td rowspan="11">Physics:

Understand movement, forces and magnets
This concept involves understanding what causes motion.</td><td colspan="3" rowspan="2">• Compare how different things move.</td><td colspan="3">• Notice that some forces need contact between two objects, but magnetic forces can act at a distance.</td><td colspan="3">• Predict whether two magnets will attract or repel each other, depending on which poles are facing.</td></tr>
<tr><td>AUT A</td><td>SPR A</td><td>SUM A</td><td>AUT A</td><td>SPR A</td><td>SUM A</td><td>AUT A</td><td>SPR A</td><td>SUM A</td></tr>
<tr><td>AUT B</td><td>SPR B</td><td>SUM B</td><td>AUT B</td><td>SPR B</td><td>SUM B</td><td>AUT B</td><td>SPR B</td><td>SUM B</td></tr>
<tr><td colspan="3" rowspan="9"></td><td colspan="3">• Observe how magnets attract or repel each other and attract some materials and not others.</td><td colspan="3">Forces

• Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object.</td></tr>
<tr><td>AUT A</td><td>SPR A</td><td>SUM A</td><td>AUT A</td><td>SPR A</td><td>SUM A</td></tr>
<tr><td>AUT B</td><td>SPR B</td><td>SUM B</td><td>AUT B</td><td>SPR B</td><td>SUM B</td></tr>
<tr><td rowspan="8"></td><td colspan="3">• Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials.</td><td colspan="3">• Identify the effect of drag forces, such as air resistance, water resistance and friction that act between moving surfaces.</td></tr>
<tr><td>AUT A</td><td>SPR A</td><td>SUM A</td><td>AUT A</td><td>SPR A</td><td>SUM A</td></tr>
<tr><td>AUT B</td><td>SPR B</td><td>SUM B</td><td>AUT B</td><td>SPR B</td><td>SUM B</td></tr>
<tr><td colspan="3">• Describe magnets as having two poles.</td><td colspan="3">• Describe, in terms of drag forces, why moving objects that are not driven tend to slow down.</td></tr>
<tr><td>AUT A</td><td>SPR A</td><td>SUM A</td><td>AUT A</td><td>SPR A</td><td>SUM A</td></tr>
</table>

<table>
<tr><td rowspan="11"></td><td rowspan="11"></td><td>AUT B</td><td>SPR B</td><td>SUM B</td><td>AUT B</td><td>SPR B</td><td>SUM B</td></tr>
<tr><td colspan="3">• Predict whether two magnets will attract or repel each other, depending on which poles are facing.</td><td colspan="3">• Understand that force and motion can be transferred through mechanical devices such as gears, pulleys, levers and springs.</td></tr>
<tr><td>AUT A</td><td>SPR A</td><td>SUM A</td><td>AUT A</td><td>SPR A</td><td>SUM A</td></tr>
<tr><td>AUT B</td><td>SPR B</td><td>SUM B</td><td>AUT B</td><td>SPR B</td><td>SUM B</td></tr>
<tr><td colspan="3" rowspan="4"></td><td colspan="3">• Understand that some mechanisms including levers, pulleys and gears, allow a smaller force to have a greater effect.</td></tr>
<tr><td>AUT A</td><td>SPR A</td><td>SUM A</td></tr>
<tr><td>AUT B</td><td>SPR B</td><td>SUM B</td></tr>
<tr><td colspan="3"></td></tr>
<tr><td rowspan="5">Understand light and seeing
This concept involves understanding how light and reflection affect sight.</td><td colspan="3">• Observe and name a variety of sources of light, including electric lights, flames and the Sun, explaining that we see things because light travels from them to our eyes.</td><td colspan="3">• Recognise that they need light in order to see things and that dark is the absence of light.</td><td colspan="3">• Understand that light appears to travel in straight lines.</td></tr>
<tr><td>AUT A</td><td>SPR A</td><td>SUM A</td><td>AUT A</td><td>SPR A</td><td>SUM A</td><td>AUT A</td><td>SPR A</td><td>SUM A</td></tr>
<tr><td>AUT B</td><td>SPR B</td><td>SUM B</td><td>AUT B</td><td>SPR B</td><td>SUM B</td><td>AUT B</td><td>SPR B</td><td>SUM B</td></tr>
<tr><td colspan="3"></td><td colspan="3">• Notice that light is reflected from surfaces.</td><td colspan="3">• Use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eyes.</td></tr>
</table>

Crayke Church of England Primary School
Curriculum Long Term Plan and Progression Overview - SCIENCE

				AUT A	SPR A	SUM A	AUT A	SPR A	SUM A
				AUT B	SPR B	SUM B	AUT B	SPR B	SUM B
				• Recognise that light from the sun can be dangerous and that there are ways to protect their eyes.			• Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them, and to predict the size of shadows when the position of the light source changes.		
				AUT A	SPR A	SUM A	AUT A	SPR A	SUM A
				AUT B	SPR B	SUM B	AUT B	SPR B	SUM B
				• Recognise that shadows are formed when the light from a light source is blocked by a solid object.			• Explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes.		
				AUT A	SPR A	SUM A	AUT A	SPR A	SUM A
				AUT B	SPR B	SUM B	AUT B	SPR B	SUM B
				• Find patterns in the way that the size of shadows change.					
				AUT A	SPR A	SUM A			
				AUT B	SPR B	SUM B			
Investigate sound and hearing This concept involves understanding how sound is produced, how it	• *Observe and name a variety of sources of sound, noticing that we hear with our ears.*			• Identify how sounds are made, associating some of them with something vibrating.			• Find patterns between the pitch of a sound and features of the object that produced it. ***Covered in Class 3***		
	AUT A	SPR A	SUM A	AUT A	SPR A	SUM A	AUT A	SPR A	SUM A

travels and how it is heard.	AUT B	SPR B	SUM B	AUT B	SPR B	SUM B	AUT B	SPR B	SUM B
				• Recognise that vibrations from sounds travel through a medium to the ear.			• Find patterns between the volume of a sound and the strength of the vibrations that produced it. ***Covered in Class 3***		
				AUT A	SPR A	SUM A	AUT A	SPR A	SUM A
				AUT B	SPR B	SUM B	AUT B	SPR B	SUM B
							• Recognise that sounds get fainter as the distance from the sound source increases. ***Covered in Class 3***		
							AUT A	SPR A	SUM A
							AUT B	SPR B	SUM B
Understand electrical circuits This concept involves understanding circuits and their role in electrical applications.	• *Identify common appliances that run on electricity.* • *Construct a simple series electrical circuit.*			• Identify common appliances that run on electricity.			• Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit.		
	AUT A	SPR A	SUM A	AUT A	SPR A	SUM A	AUT A	SPR A	SUM A
	AUT B	SPR B	SUM B	AUT B	SPR B	SUM B	AUT B	SPR B	SUM B
				• Construct a simple series electrical circuit, identifying and			• Compare and give reasons for variations in how components function, including		

<table>
<tr><td rowspan="14"></td><td rowspan="14"></td><td colspan="3">naming its basic parts, including cells, wires, bulbs, switches and buzzers.</td><td colspan="3">the brightness of bulbs, the loudness of buzzers and the on/off position of switches.</td></tr>
<tr><td>AUT A</td><td>SPR A</td><td>SUM A</td><td>AUT A</td><td>SPR A</td><td>SUM A</td></tr>
<tr><td>AUT B</td><td>SPR B</td><td>SUM B</td><td>AUT B</td><td>SPR B</td><td>SUM B</td></tr>
<tr><td colspan="3">• Identify whether or not a lamp will light in a simple series circuit, based on whether or not the lamp is part of a complete loop with a battery.</td><td colspan="3">• Use recognised symbols when representing a simple circuit in a diagram.</td></tr>
<tr><td>AUT A</td><td>SPR A</td><td>SUM A</td><td>AUT A</td><td>SPR A</td><td>SUM A</td></tr>
<tr><td>AUT B</td><td>SPR B</td><td>SUM B</td><td>AUT B</td><td>SPR B</td><td>SUM B</td></tr>
<tr><td colspan="3">• Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit.</td><td colspan="3" rowspan="6"></td></tr>
<tr><td>AUT A</td><td>SPR A</td><td>SUM A</td></tr>
<tr><td>AUT B</td><td>SPR B</td><td>SUM B</td></tr>
<tr><td colspan="3">• Recognise some common conductors and insulators, and associate metals with being good conductors.</td></tr>
<tr><td>AUT A</td><td>SPR A</td><td>SUM A</td></tr>
</table>

Crayke Church of England Primary School
Curriculum Long Term Plan and Progression Overview - SCIENCE

<table>
<tr><td></td><td colspan="3"></td><td>AUT B</td><td>SPR B</td><td>SUM B</td><td colspan="3"></td></tr>
<tr><td rowspan="11">Understand the Earth’s movement in space

This concept involves understanding what causes seasonal changes, day and night.</td><td colspan="3">• Observe the apparent movement of the Sun during the day.</td><td colspan="3">• Describe the movement of the Earth relative to the Sun in the solar system.</td><td colspan="3">• Describe the movement of the Earth, and other planets, relative to the Sun in the solar system.</td></tr>
<tr><td>AUT A</td><td>SPR A</td><td>SUM A</td><td>AUT A</td><td>SPR A</td><td>SUM A</td><td>AUT A</td><td>SPR A</td><td>SUM A</td></tr>
<tr><td>AUT B</td><td>SPR B</td><td>SUM B</td><td>AUT B</td><td>SPR B</td><td>SUM B</td><td>AUT B</td><td>SPR B</td><td>SUM B</td></tr>
<tr><td colspan="3">• Observe changes across the four seasons.</td><td colspan="3">• Describe the movement of the Moon relative to the Earth</td><td colspan="3">• Describe the movement of the Moon relative to the Earth.</td></tr>
<tr><td>AUT A</td><td>SPR A</td><td>SUM A</td><td>AUT A</td><td>SPR A</td><td>SUM A</td><td>AUT A</td><td>SPR A</td><td>SUM A</td></tr>
<tr><td>AUT B</td><td>SPR B</td><td>SUM B</td><td>AUT B</td><td>SPR B</td><td>SUM B</td><td>AUT B</td><td>SPR B</td><td>SUM B</td></tr>
<tr><td colspan="3">• Observe and describe weather associated with the seasons and how day length varies.</td><td colspan="3" rowspan="3"></td><td colspan="3">• Describe the Sun, Earth and Moon as approximately spherical bodies.</td></tr>
<tr><td>AUT A</td><td>SPR A</td><td>SUM A</td><td>AUT A</td><td>SPR A</td><td>SUM A</td></tr>
<tr><td>AUT B</td><td>SPR B</td><td>SUM B</td><td>AUT B</td><td>SPR B</td><td>SUM B</td></tr>
<tr><td colspan="6" rowspan="3"></td><td colspan="3">• Use the idea of the Earth’s rotation to explain day and night and the apparent movement of the sun across the sky.</td></tr>
<tr><td>AUT A</td><td>SPR A</td><td>SUM A</td></tr>
<tr><td>AUT B</td><td>SPR B</td><td>SUM B</td></tr>
</table>

Crayke Church of England Primary School
Curriculum Long Term Plan and Progression Overview - SCIENCE

Vocabulary Progression: Science

The following represents the core vocabulary introduced in each year group but is not an exhaustive list and subject specific vocabulary will be introduced in line with subject areas.

The following vocabulary is introduced in Reception	
Scienc e Experi ment Fair Find out Explain Reason Why Chang e	A system of studying, testing and experimenting on things in nature A carefully planned test to answer something previously unknown Not showing favour or giving advantage to one thing over another To discover or learn something To make something clear The power to think clearly For what reason, purpose or cause To make different or alter something
The following vocabulary is introduced in Year 1/2	
question	A matter which is in doubt or not certain
answer	The solution or response to a question
observe	To watch carefully
equipment	Things to be used for a particular activity
identify	To show who someone is or what something is
classify	To group or order in classes

sort	To place or separate into groups
diagram	A drawing or plan that shows the parts of something
chart	A sheet that gives information in the form of a graph or table
map	To lay out/follow carefully
data	Facts, figures or information that can be used to learn about something
compare	To note or describe the similarities and differences between two or more things
contrast	To compare in order to make differences clear
describe	To tell or what about something
biology	The science that studies the growth and life processes of living things
chemistry	The science that studies the form and function of basic elements
physics	The science that deals with matter and energy, their qualities and their relationship
group	A collection of people or things that are related by characteristics
record	To write or collect information
The following vocabulary is introduced in Year 3/4	
research	Careful study of something to find information
relevant questions	Questions that are related to what is being discussed
scientific enquiry	Asking or looking for scientific information
comparative	Something that involves comparisons
fair test	To carry out a test without showing favour or giving advantage to one side
systematic	Based on a method or plan
accurate measurements	The act of measuring something precisely
thermometer	An instrument for measuring temperature
data gather	To collect information that can be used to learn about something
labelled diagrams	A drawing or plan that includes writing to describe each part
keys	Used to identify different species
bar charts	Displays information using rectangular bars of different heights/lengths

oral	Spoken rather than written
written	To present information using writing on a page
explanations	The act or process of making something clear
conclusion	An opinion reached after careful consideration or process
predictions	Something that might happen or is expected to happen
differences	The condition of being different or not like something
similarities	The state or quality of being similar or sharing resemblance
changes	The act of making something different
evidence	Something that gives proof or reason to believe
improve	To make something better
primary sources	First hand account or record of something
secondary sources	Work that analyses or interprets something by using primary sources

The following vocabulary is introduced in Year 5/6	
plan	An action one intends to take to achieve something
variables	Something that is likely to change; it is not constant
accurate measurements	The act of measuring something precisely
accuracy	The condition of being accurate or precise
precision	The state of being exact or accurate
repeat readings	Taking information from a measurement more than once over time
record data	To write or collect facts, figures or information that can be used to learn about something
scientific diagrams	A drawing or plan that shows the parts of something related to science
classification keys	A set of questions about the characteristics of living things
tables	An organised set of information presented in rows and columns

scatter graphs	A diagram which shows the values of two or more different properties
line graphs	Points connected by a line to show how the value of something changes over time
report and present conclusions	To give an account of findings or information
causal relationships	When an occurrence to the first causes a change to the other
explanations	The act or process of making something clear
degree of trust	The extent to which something can be relied upon to be accurate
support ideas	To provide proof or evidence in favour of something
refute ideas	To demonstrate a falseness or error in something
patterns	Something that is repeated regularly
systematic measurements	To record measurements based on a plan or method
quantitative measurements	Measuring something in the form of a quantity or amount

Crayke Church of England Primary School
Curriculum Long Term Plan and Progression Overview - SCIENCE

Including pupils with SEND in Science

Sound and light issues

- Interactive whiteboards are non-reflective to reduce glare.

Seating

- Consider the accessibility of science demonstrations.
- Plan the demonstration area so that it is clearly laid out, uncluttered and gives all pupils clear view.
- Height-adjustable tables and benches make activities more accessible.
- Seating should allow all pupils in the class to communicate, respond and interact with each other and the teacher in discussions.
- Avoid the need for copying lots of information. For example, notes on interactive whiteboards can be printed off for all pupils.

Resources

- Use systems such as racks so that science equipment can be found and put back easily.
- Get specialist advice on equipment for pupils with particular SEN or disabilities, e.g. tactile ridges on measuring glassware for pupils with a visual impairment.

Health and safety

- Make sure pupils do not come into contact with any substances or materials that they are allergic to.

Unfamiliar learning environments

- Make sure pupils are well prepared for visits, particularly to museums. Preparation can include photographs, videos etc so that pupils are not worried about unfamiliar situations.

Multi-sensory approaches

- Build on pupils' preferred learning styles when explaining concepts, by using different media – eg diagrams, stories, acting out processes, computer simulations, concept mapping, etc.
- Use mind maps to help pupils see patterns and relationships.
- Simple audio recorders can be used instead of written notes during investigations or field trips.

ICT

- ICT can be used to make science lessons more accessible for all pupils. For example, it can be used to:
- capture images and processes and replay them at different speeds and magnifications, and with particular image characteristics – e.g. to help pupils study events and causality,
- to identify underlying patterns or to look at detail
- monitor activities and experiments that require mobility and dexterity that some pupils do not have, and to explore difficult or dangerous environments
- carry out research
- present work in a variety of formats to a high standard, and extend the range of the senses and make difficult-to-see processes visible – e.g. using camcorders or CCTV.

Planning support

Consider:

- risk points in the lesson, e.g. for pupils with noise or smell sensitivity
- when it would be useful to pre-tutor important science vocabulary, concepts or processes
- whether pupils need support in using science equipment, especially for tasks that require a high level of skill or accuracy.

Teachers' communication

- Recognise that the language of science may be challenging for many pupils – for example: the specific scientific use of everyday words such as 'weight', or terms specific to science, such as 'electrical circuit'.
- Plan to teach new language explicitly.

Pupils' communication

- Build on investigations, using careful discussions that help pupils understand and use scientific vocabulary and help them to analyse and understand what they have observed.

Pupil-teacher interaction

- In a plenary after the class has completed an investigation, allow pupils time to discuss the answers to questions in pairs, before asking for verbal responses.

Crayke Church of England Primary School
Curriculum Long Term Plan and Progression Overview - SCIENCE

Understanding the aims of the lesson

- Build up a chart (using a wallchart or other space) to show the focus of each lesson and how successive lesson topics link together to develop understanding of an area of science work. This could include symbols, images or objects to make it more accessible.

Pupils know where they are in relation to learning aims

- Revisiting a mind map of the same area of learning, say after three weeks of studying a science topic, can be a good way of demonstrating and assessing – through the added 'branches' of the map – how pupils' understanding of concepts is developing. This approach can be particularly valuable for pupils for whom oral and written communication present a barrier, as pictures and symbols can be included.

Reviewing progress and helping pupils to improve

- For example, ask pupils which key scientific words, concepts or processes were difficult and why, and how this could be improved. Ask them which parts of a task slowed them down and what could be done to make things go more efficiently – e.g. using ICT to log temperature continuously rather than taking frequent readings manually.

Gathering assessment evidence

- Check pupils' understanding by inviting them to reformulate explanations in their own words or in other ways. For example, after an investigation of floating and sinking, ask pupils to explain what happened using diagrams, as well as explaining it orally or in writing.

Relevant and motivating tasks

- Identify pupils' existing science knowledge and prior experience – eg using posters, concept maps or mind-mapping software.
- Use real objects as a starting point for developing the concepts and the language needed to describe, discuss and explain what pupils have observed or experienced.

Recapping

Invite pupils to list the key points from the lesson under specific headings – eg in an investigation about bridge building:

- what they were trying to find out
- how they went about it
- how they controlled the variables
- what happened
- suggested reasons for what happened, and
- what they will do next.

Reducing reliance on memory

- Use a digital camera to capture each stage of an investigation, or important findings on a field trip, for future reference. Images can also be used to build a visual record.
- Use mnemonics to help pupils remember things like the order of the colours in a rainbow or the relative distance of the planets from Earth.