Cromwell Academy Science Strategy Statement

Intent

At Cromwell Academy our intention is to provide children with the best possible opportunities to develop their enquiry-based learning and master key scientific knowledge about themselves and our world.

Teachers confidently commit to a curriculum based on active learning, knowledge acquisition, reflection and assessment which has been supported and developed through the use of PLAN research.

We use PLAN (PAN- LONDON ASSESSMENT NETWORK) – promoted by Primary Science Quality Mark- to help us plan and develop our engaging and active Science lessons that not only facilitate knowledge development but also allow students to experience and improve key scientific skills that will allow them to access Science throughout their academic career and beyond.

Cromwell has a Science Curriculum which is grounded from Reception and built upon each year - with each year group developing their knowledge and using new skills to help them navigate the scientific world. The re-visiting and rehearsal of previous learning means our curriculum is progressively cyclical.

Whilst topics in isolation can be linear in their development we have ensured the themes often have links on a cross curricula level – broadening their learning and applying to other subject matter – such as 'Stages of Development (in Humans and Animals) being taught alongside Biography in English.

Previous relevant science learning is explicitly shared with all teachers and is explored / rehearsed in lessons before a new topic/ development is introduced.

What we intend pupils to know by the end of the unit/ year/ school can be found on our Long Term Plan/Medium Term Plan and supplementary Curriculum Content Overviews.

Long Term Plan – Sequenced Whole School plan

Science Long Term Plan

Subject	Rec	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Science	Aut 1 All about me (materials and senses) Aut 2 Seasons (changes) Spr 1 Antarctica (Water cycle) Spr 2 Dinosaur (rocks/ skeletons) Sum 1 Once upon a time (processes/ cooking) Sum 2 Toys (levers/ pulleys/ forces)	Aut 1: Everyday materials Aut 2: Animals Spr 1: Humans Spr 2: Plants Sum 1: Seasonal changes Sum 2: Working Scientifically Catch Up from Spring 1 & 2 (School closure) + Science Week	Aut 1: Living things and habitats Aut 2: Uses of everyday material Spr 1: Animals inc Humans Spr 2: Plants Sum 1: Science garden application Sum 2: Working Scientifically Catch Up from Spring 1 & 2 (School closure) + Science Week	Aut 1: Light Aut 2: Animals inc Humans Spr 1: Rocks Spr 2: Plants Sum 1: Forces & Magnets Sum 2: Working Scientifically Catch Up from Spring 1 & 2 (School closure) + Science Week	Aut 1: Living things and habitats Aut 2: Animals inc Humans Spr 1: States of matter Spr 2: Sound Sum 1: Electricity Sum 2: Working Scientifically Catch Up from Spring 1 & 2 (School closure) + Science Week	Aut 1: Living things and habitats Aut 2: Animals inc Humans Spr 1: Properties & Changes of material Spr 2: Earth & Space Sum 1: Forces Sum 2: Working Scientifically Catch Up from Spring 1 & 2 (School closure) + Science Week	Aut 1: Living things and habitats Aut 2: Animals inc Humans Spr 1: Light Spr 2: Evolution and Inheritance Sum 1: Electricity Sum 2: Working Scientifically Catch Up from Spring 1 & 2 (School closure) + Science Week

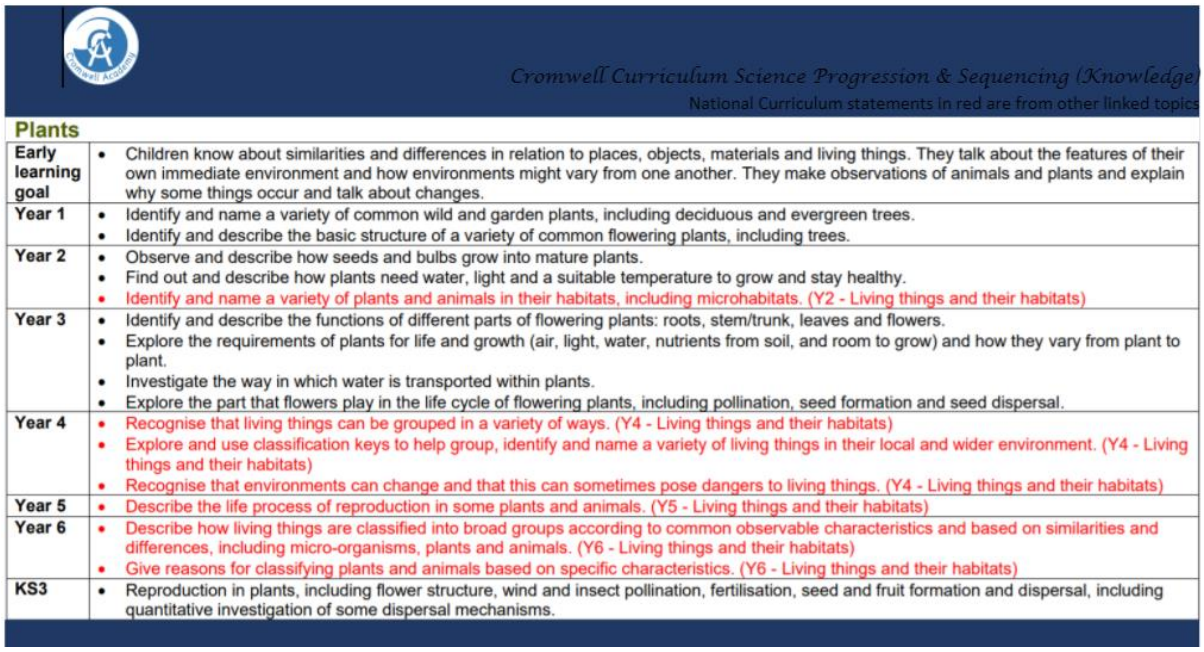
Whole School – Knowledge progression

Our knowledge progression document details what will be learnt, built on and known.

This was suggested by PSQM and created by PLAN (PAN- LONDON ASSESSMENT NETWORK).

Curriculum Content Organisers include these important skills which are built on through the years.

Below is an example of the Progression of Knowledge in 'Plants'



Cromwell Curriculum Science Progression & Sequencing (Knowledge)

National Curriculum statements in red are from other linked topics

Plants

Early learning goal	• Children know about similarities and differences in relation to places, objects, materials and living things. They talk about the features of their own immediate environment and how environments might vary from one another. They make observations of animals and plants and explain why some things occur and talk about changes.
Year 1	• 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, including trees.
Year 2	• Observe and describe how seeds and bulbs grow into mature plants. • Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy. • Identify and name a variety of plants and animals in their habitats, including microhabitats. (Y2 - Living things and their habitats)
Year 3	• Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers. • 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. • Investigate the way in which water is transported within plants. • Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.
Year 4	• Recognise that living things can be grouped in a variety of ways. (Y4 - Living things and their habitats) • Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment. (Y4 - Living things and their habitats) • Recognise that environments can change and that this can sometimes pose dangers to living things. (Y4 - Living things and their habitats)
Year 5	• Describe the life process of reproduction in some plants and animals. (Y5 - Living things and their habitats)
Year 6	• Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals. (Y6 - Living things and their habitats) • Give reasons for classifying plants and animals based on specific characteristics. (Y6 - Living things and their habitats)
KS3	• Reproduction in plants, including flower structure, wind and insect pollination, fertilisation, seed and fruit formation and dispersal, including quantitative investigation of some dispersal mechanisms.

Full document available at: › Cromwell Curriculum 2020 > Science Sept'20 > **Science Progression**

Curriculum Content Organisers include this knowledge as Learning Objectives and previous learning is also highlighted, ensuring knowledge is built on through the years.

Whole School - Skills Progression

Our progression in working scientifically skills document shows how pupils develop enquiry skills progressively across the school. Suggested by PSQM and created by PLAN.

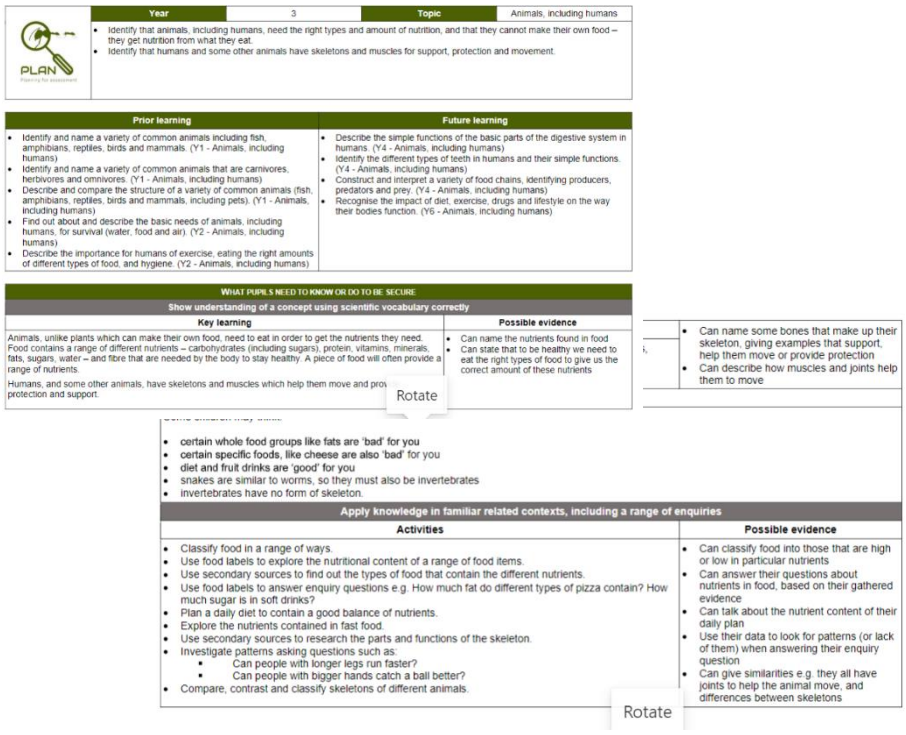
Example of Progression in Working Scientifically – 'Asking questions'

Year 1 & 2	Year 3 & 4	Year 5 & 6
Asking questions and recognising that they can be answered in different ways		
Asking simple questions and recognising that they can be answered in different ways • While exploring the world, the children develop their ability to ask questions (such as what something is, how things are similar and different, the ways things work, which alternative is better, how things change and how they happen). Where appropriate, they answer these questions. • The children answer questions developed with the teacher often through a scenario. • The children are involved in planning how to use resources provided to answer the questions using different types of enquiry, helping them to recognise that there are different ways in which questions can be answered.	**Asking relevant questions and using different types of scientific enquiries to answer them** • The children consider their prior knowledge when asking questions. They independently use a range of question stems. Where appropriate, they answer these questions. • The children answer questions posed by the teacher. • Given a range of resources, the children decide for themselves how to gather evidence to answer the question. They recognise when secondary sources can be used to answer questions that cannot be answered through practical work. They identify the type of enquiry that they have chosen to answer their question.	***Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary*** • Children independently ask scientific questions. This may be stimulated by a scientific experience or involve asking further questions based on their developed understanding following an enquiry. • Given a wide range of resources the children decide for themselves how to gather evidence to answer a scientific question. They choose a type of enquiry to carry out and justify their choice. They recognise how secondary sources can be used to answer questions that cannot be answered through practical work.

Full document available at: Cromwell Curriculum 2020 > Science Sept'20 > **Science Progression**

Curriculum Content Organisers & Medium Term Planning

To support our Cromwell Curriculum Content Overviews, we have incorporated elements of Key learning and activities developed by PLAN (see below example). These have supported our Curriculum Content Overviews providing teachers with a wealth of starting points, experiences and resources, as well as content to be taught.



Year	3	Topic	Animals, including humans

- Identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food – they get nutrition from what they eat.
- Identify that humans and some other animals have skeletons and muscles for support, protection and movement.

Prior learning	Future learning
• Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals. (Y1 - Animals, including humans) • Identify and name a variety of common animals that are carnivores, herbivores and omnivores. (Y1 - Animals, including humans) • Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets). (Y1 - Animals, including humans) • Find out about and describe the basic needs of animals, including humans, for survival (water, food and air). (Y2 - Animals, including humans) • Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene. (Y2 - Animals, including humans)	• Describe the simple functions of the basic parts of the digestive system in humans. (Y4 - Animals, including humans) • Identify the different types of teeth in humans and their simple functions. (Y4 - Animals, including humans) • Construct and interpret a variety of food chains, identifying producers, predators and prey. (Y4 - Animals, including humans) • Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function. (Y6 - Animals, including humans)

WHAT PUPILS NEED TO KNOW OR DO TO BE SECURE Show understanding of a concept using scientific vocabulary correctly	
Key learning	**Possible evidence**
Animals, unlike plants which can make their own food, need to eat in order to get the nutrients they need. Food contains a range of different nutrients – carbohydrates (including sugars), protein, vitamins, minerals, fats, sugars, water – and fibre that are needed by the body to stay healthy. A piece of food will often provide a range of nutrients. Humans, and some other animals, have skeletons and muscles which help them move and provide protection and support.	• Can name the nutrients found in food • Can state that to be healthy we need to eat the right types of food to give us the correct amount of these nutrients • Can name some bones that make up their skeleton, giving examples that support, help them move or provide protection • Can describe how muscles and joints help them to move

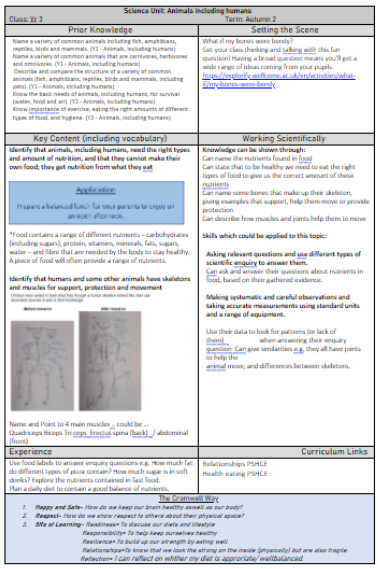
Rotate

- certain whole food groups like fats are 'bad' for you
- certain specific foods, like cheese are also 'bad' for you
- diet and fruit drinks are 'good' for you
- snakes are similar to worms, so they must also be invertebrates
- invertebrates have no form of skeleton.

Apply knowledge in familiar related contexts, including a range of enquiries	
Activities	**Possible evidence**

• Classify food in a range of ways.
• Use food labels to explore the nutritional content of a range of food items.
• Use secondary sources to find out the types of food that contain the different nutrients.
• Use food labels to answer enquiry questions e.g. How much fat do different types of pizza contain? How much sugar is in soft drinks?
• Plan a daily diet to contain a good balance of nutrients.
• Explore the nutrients contained in fast food.
• Use secondary sources to research the parts and functions of the skeleton.
• Investigate patterns asking questions such as:
  ▪ Can people with longer legs run faster?
  ▪ Can people with bigger hands catch a ball better?
• Compare, contrast and classify skeletons of different animals.
	• Can classify food into those that are high or low in particular nutrients
	• Can answer their questions about nutrients in food, based on their gathered evidence
	• Can talk about the nutrient content of their daily plan
	• Use their data to look for patterns (or lack of them) when answering their enquiry question
	• Can give similarities e.g. they all have joints to help the animal move, and differences between skeletons

Rotate



Science Unit: Animals including humans
Class: Yr 3 — Term: Autumn 2

Prior Knowledge	Setting the Scene
Name a variety of common animals including fish, amphibians, reptiles, birds and mammals. (Y1 - Animals, including humans) Name a variety of common animals that are carnivores, herbivores and omnivores. (Y1 - Animals, including humans) Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets). (Y1 - Animals, including humans) Know the basic needs of animals, including humans, for survival (water, food and air). (Y2 - Animals, including humans) Know importance of exercise, eating the right amounts of different types of food, and hygiene. (Y2 - Animals, including humans)	What if my bones were bendy? Get your class thinking and talking with this fun question! Having a broad question means you'll get a wide range of ideas coming from your pupils. https://explorer2.wellcome.ac.uk/im/activities/what-if/my-bones-were-bendy
Key Content (including vocabulary)	**Working Scientifically**
Identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat Application: Prepare a balanced fun... for your parents to enjoy on an exam afternoon. *Food contains a range of different nutrients – carbohydrates (including sugars), protein, vitamins, minerals, fats, sugars, water – and fibre that are needed by the body to stay healthy. A piece of food will often provide a range of nutrients. **Identify that humans and some other animals have skeletons and muscles for support, protection and movement** Name and Point to 4 main muscles_ could be ... Quadriceps Biceps Tri ceps Erectus spina (back) / abdominal (front)	**Knowledge can be shown through:** Can name the nutrients found in food Can state that to be healthy we need to eat the right types of food to give us the correct amount of these nutrients Can name some bones that make up their skeleton, giving examples that support, help them move or provide protection Can describe how muscles and joints help them to move **Skills which could be applied to this topic:** **Asking relevant questions and use different types of scientific enquiry to answer them.** Can ask and answer their questions about nutrients in food, based on their gathered evidence. **Making systematic and careful observations and taking accurate measurements using standard units and a range of equipment.** Use their data to look for patterns (or lack of them) when answering their enquiry question. Can give similarities e.g. they all have joints to help the animal move, and differences between skeletons.
Experience	**Curriculum Links**
Use food labels to answer enquiry questions e.g. How much fat do different types of pizza contain? How much sugar is in soft drinks? Explore the nutrients contained in fast food. Plan a daily diet to contain a good balance of nutrients.	Relationships PSHCE Health eating PSHCE
The Cromwell Way 1. *Happy and Safe- How do we keep our brain healthy aswell as our body?* 2. *Respect- How do we show respect to others about their physical space?* 3. *Sits of Learning- Resilinear= To discuss our diets and lifestyle* *Responsibility= To help keep ourselves healthy* *Resilience= To build up our strength by eating well.* *Relationships=To know that we look the strong on the inside (physicaly) but are also fragile.* *Reflection= I can reflect on whither my diet is appropriate/ wellbalanced.*	

Implementation

When developing a primary Science curriculum, a deeper understanding of assessment informs effective and engaging planning and, most importantly, enriches and improves learning.

- To plan successfully, it is important to understand what the children have been taught previously that links to the topics and related statements from the science National Curriculum that will be taught in the coming year.

- Having identified the linked content from previous years, this information can be used to plan initial activities to engage that prior learning

- Part of our excellent practice is to identify children whose knowledge was not yet secure when the linked learning was taught. Specific attention can be given to these children during the initial activity to ensure they are now secure.

- It is important to be clear about the content of knowledge, vocabulary and enquiry skills that the children need to acquire.

- When children have engaged in sufficient activities to have become secure in the required knowledge, it is time to reflect on their learning.

At Cromwell, we have encouraged teachers to provide observational and experimental experiences multiple times in a unit. This serves to give pupils the opportunity to reflect, question and learn through experience. Procedural knowledge is developed as lessons are reflected on and activities planned.

Key learning being given formally and almost instructionally is balanced with a more questioning/ observational approach. Pupils are encouraged to be curious, wonder, ask and probe. We are seeking pupils to make links in their own learning by asking 'Is that why …?'. This curiosity will secure our pupils as scientists.

We have implemented this approach through a solid CPD programme and enrolment onto the PSQM (Primary Science Quality Mark).

Impact

We develop assessment opportunities using TAPS – 'The Teacher Assessment in Primary Science project' which is a project funded by the Primary Science Teaching Trust (PSTT). This aims to develop support for a valid, reliable and manageable system of science assessment which has a positive impact on children's learning.

We use half termly assessments to measure progress and attainment in Science (summative) and our CCOs incorporate regular assessment opportunities which further support teachers in making their judgements. Additional support is available to teachers via the following link:

Cyclical retrieval practice, which was introduced since our last inspection, has ensured we have created long- term learning which can be built upon in the coming years.

We expect pupils to apply their learning to other contexts and think beyond the knowledge presented. This helps us to identify pupils who show insight, enquiry and natural interest beyond the taught classroom content and skills.

Judgements on the impact of our curriculum are made though learning walks, book looks, data and pupil/ staff voice.

Through our approach, Cromwell Scientists are curious, resilient and reflective in their scientific practice. We aim to foster inquisitive minds that are equipped not only to understand the world around them, but also change this world for the better.

"All truths are easy to understand once they are discovered; the point is to discover them."

Galileo Galilei