

Science Intent

Rationale Underpinning Intent

As a science department we aim to base our curriculum on a combination of current academic research in education and personal knowledge, understanding and experience. When considering our curriculum intent, we define four elements, ‘**Mastery**’, ‘**Longitudinal Learning**’, ‘**Conscious Connections**’ and ‘**Golden Threads**’.

PCA has a whole school commitment to follow a curriculum based on the current National Curriculum in England (Department for Education, 2014). The research for the review of the National Curriculum (2011) concluded that a successful curriculum should “[focus on fewer things in greater depth, in secure learning which persists, rather than relentless, over-rapid progression](#)”; this is known as a ‘[Mastery Curriculum](#)’. Pupils should repeat the content as many times as possible across the key stage and gradually deepen their understanding. ‘Mastery’ is, therefore, not a style of teaching or a standard to meet. It is a concept of [gradual deepening of understanding](#). The aim is not to ‘achieve’ learning in a lesson as if this is a final destination. Instead, pupils should have multiple opportunities to return to content, over time, in order to [gain a growing developmental understanding](#)

Chris Quigley led whole school training and as a department we consider two of his fundamental principles when considering curriculum intent. Firstly, [longitudinal learning](#) which he describes as:

“how pupils may take their time to learn the things that matter across a much longer period of time than a lesson, perhaps even a whole key stage.”

(Quigley, 2017)

Secondly, Quigley accentuates the importance of '[conscious connections](#)' which he explains "shows how several aspects of the curriculum can be learned at the same time" This includes links between subjects (cross-curricular) and within subjects (intra-curricular). His principles are reinforced by the research of Brooks, 2002; Fletcher-Campbell, 2000; Reason, 2003; Schmidt et al., 2002.

Recently, as a department, we rigorously scrutinised each National Curriculum science theme, and from this, identified '[Golden Threads](#)' in each subject area which in turn link to our overarching Golden Threads; subject Golden Threads can be seen in figure 1.

Intent

A combination of the principles outlined in our rationale (above) allowed us to produce the following documents for each science topic which clearly shows our intent in each science topic and identifies golden threads, conscious connections, key vocabulary and opportunities for scientific investigations. An example is shown below and larger copies of all science topics can be found in the separate document 'Curriculum Intent'.

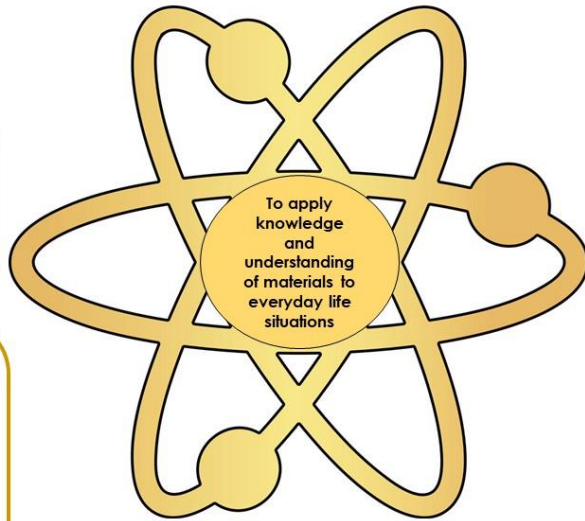
Materials

Key Vocabulary

Wood, Plastic, Glass, Paper, Water, Metal, Rock, Hard, Soft, Bendy, Rough, Smooth, Hard, Soft, Stretchy, Stiff, Shiny, Dull, Rough, Smooth, Bendy, Waterproof, Absorbent, Opaque, Transparent, Translucent, Brick, Fabrics, Squashing, Bending, Twisting, Stretching, Elastic, Foil, Hardness, Solubility, Transparency, Conductivity, Magnetic, Filter, Evaporation, Dissolving, Mixing

Opportunities for Scientific Investigation

Properties of materials- testing
 Suitability of materials for everyday use - What is best to stir a hot drink?
 Etc
 Waterproof or not?
 Fire retardant or not?
 Dissolve or not? Salt Water Vs Tap Water Vs 'Pure Water'
 What makes a good...boat?
 Float or sink?
 Reversible and irreversible changes - toast/milk tie-dye/gummy bears/melting crayons/making cakes/ etc.
 Separating materials - sieve/filer/mixing/salt crystal extraction



Conscious Connections

Intra-Curricular:

Earth and Space
 States of matter

Cross Curricular:

Art
 Design Technology

- Handles and tests materials (squash/squeeze/tear/ pull etc - not the vocab- just actions of testing)
- Begins to sort objects simply (e.g. by size, by colour, by use)
- Begin to take part in exploration experiments which test simple properties
- Begin to use Key Vocab - simple property descriptions and names of materials
- Understand that some things always happen (e.g. water makes paper wet)
- 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 with increasing complexity (e.g. see through to transparent)
- compare and group together a variety of everyday materials on the basis of 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
- Understand that a material is suitable for a particular use, begin to identify and explain this.
- find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.
- compare and group together everyday materials on the basis of 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 particular uses of everyday materials, including metals, wood 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 that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda.

Progression



This in turn led to our rolling programmes which, again, took the principles outlined in the rationale into consideration. The following tables show our current rolling programmes.

Key Stage 1 Rolling Programme Science							*Seasonal Changes	
to Include 'Plants'								
	Autumn		Spring			Summer		
1	Seasonal changes*	All About Me Humans - The Body	Seasonal changes*	Materials (Plastic)	Animals (sea)	Seasonal changes*	Material (Wood)	Animals (Farm)
2	Seasonal changes*	All About Me Humans - The Body	Seasonal changes*	Materials (Metal)	Animals (Wild)	Seasonal changes*	Materials (Fabric)	Animals (Pets)

Key Stage Two Rolling Programme Science			
	Autumn	Spring	Summer
1	Animals Inc Humans - Animals	Materials and their properties	STEM
2	States Of Matter	Animals inc Humans - Humans (Excluding Teeth and Digestion)	Earth and Space (Investigations)
3	STEM	Forces and Magnetism	Plants (Seasonal Changes)
4	Electricity and light	Animals inc Humans - Teeth and Digestion	Living Things and their Habitats

Key Stage Three Rolling Programme Science

	Autumn	Spring	Summer	
1	Animals inc Humans - Animals	Materials	Electricity and Light	
2	States Of Matter	Animals inc Humans - Humans (Excluding Teeth and Digestion)	Earth and Space	
3	Animals inc Humans - Teeth and Digestion	Forces and Magnetism	Plants	Evolution and Inheritance

(please continue to scroll for KS4)

Key Stage Four Rolling Programme Science - HIGHER ABILITY

In Year 11 Pupils will study 'Sex and Relationship Education when they have completed accreditation.

	Autumn	Spring	Summer
1	Science and Our Universe 3 credits	Introduction to Animal Care - Entry Level 3 3 credits	STEM
2	Science: Health and Safety 3 credits	Working with Electrical Circuits 3 credits	STEM
3	Variation and Adaptation 3 credits	Science and the Human Body 3 credits	STEM

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	Autumn	Spring	Summer
1	Introduction to Animal Care - Entry Level 2 3 Credits	Looking after our planet -Science skills for life-	STEM
2	Looking after ourselves - Science skills for life-	Introduction to Plant Care 3 Credits	STEM

Key Stage Four Rolling Programme Science - LOWER ABILITY

In Year 11 Pupils will study 'Sex and Relationship Education when they have completed accreditation.