

Curriculum 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.

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A combination of the principles outlined in our rationale (above) allowed us to produce the 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 appendix attached to the back of this policy.

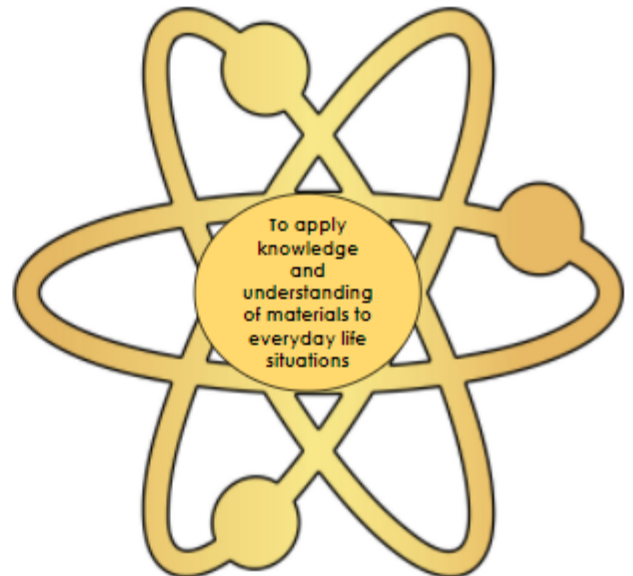
Materials

Opportunities for Scientific Investigation

Properties of materials- testing
Suitability of materials for everyday use - What is best to stir a hot drink?
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
Transparent, opaque, translucent
Separating materials
Insulation, dissolve, absorption

Conscious Connections

Intra-Curricular:
Earth and Space
States of matter
Cross Curricular:
Art
Design Technology



Strand: Materials Key vocabulary: Everyday materials (wood, plastic, paper etc...), hard, soft, bendy, shiny, magnet, Key Skills: Explores textures in their immediate environment, e.g. wallpaper, draining board, etc. Identifies one property of a material being handled, e.g. cold, hard, shiny, etc. Puts objects that stick to a magnet in a group Feels and simply describes the substance they have mixed Finds materials with a specific property, e.g. feels different objects in the garden to find a collection of rough items Identifies simple differences between materials, e.g. states if a material is dry or wet Manipulates an object in their hand to find out properties Communicates about textures they feel on different materials Carries out a simple adult led experiment to find out what happens when different items melt, e.g. ice cubes, frozen vegetables, etc. Comments on changes they see between raw and cooked items, e.g. a raw and boiled egg	Strand: Materials Key vocabulary: Dull, rough, smooth, stretch, twist, squash, squeeze, Key Skills: Explores items to find those which adhere to a specific property, e.g. objects that can bend Responds appropriately to texture based terminology, e.g. how many items are rough, which fabrics are smooth, etc. Demonstrates an awareness of the purpose of a variety of materials Sorts familiar foods into groups to show how they will change on heating with support, e.g. shape/ texture/colour States which property they will sort materials by before starting activity Communicates about how or if they can change a material back to its original state, e.g. when discussing changes they have already experienced, such as chocolate or wax Explains, using simple language, the differences between two materials Identifies what they did to change a material Strains a variety of mixtures using sieves, colanders and filters with support Finds objects in their immediate environment that react to a magnet Identifies which equipment they could use to separate mixtures when offered a selection	Strand: Materials Key vocabulary: Change, melt, filter, boil, cool, mix, stir, absorbent Key Skills: Employs different processes on a range of materials, e.g. bending, cutting, squashing Describes the textures of materials and makes simple links to objects made from a material, e.g. clothes – soft, smooth Observes and comments on changes to properties of materials, e.g. wax as liquid and when cooled Relates properties of wax and water as materials that have reversible changes Sorts objects using a magnet Understands simple safety rules when near heat/flames Separates mixtures, e.g. using a filter paper Watches water boil and observes and describes the steam Gives two (or more) properties of a material Suggests what might happen if a material is heated, e.g. chocolate melts	Strand: Materials Key vocabulary: Reversible, irreversible, transparent, opaque, magnetic, liquid, solid, dissolve (not disappear) Key Skills: Describes some obvious changes to materials as "irreversible", e.g. in cooking Separates some materials as directed, e.g. using sieves to separate soil and stones Includes some simple terms to describe properties and changes to materials, e.g. magnetic, dissolve Explores which processes may be used on different materials, e.g. if they can bend, be cut, melt Explores materials to find their properties, e.g. which are magnetic, waterproof, transparent Classifies objects made from a variety of materials, e.g. clay, glass, metal	Strand: Materials Key vocabulary: Separate, sieving, translucent, Key Skills: Suggests that a change to a familiar material is irreversible or reversible based on what they have observed Identifies if a substance mixed with water can be separated by filtering or sieving Observes and describes the changes different processes create, e.g. in a raw egg, and cooking it for three and seven minutes Mixes a variety of substances with water to find out if they are soluble Identifies simple changes they see with substances they mix together Demonstrates how some materials can be changed, e.g. by bending and stretching Groups materials according to more than one given properties Uses scientific vocabulary to explain why they have used a specific material or object, e.g. a paper clip because it is magnetic	Strand: Materials Key vocabulary: Evaporate, condense, gas, particles, conduct, insulator, solubility/soluble, elasticity Key Skills: Separates mixtures using the appropriate equipment, e.g. filter paper or sieve Recognises that some changes are permanent, and others are not Describes the changes they observe to materials which have been heated or cooled, e.g. as a change in their state of matter Describes what has happened to a range of common materials to produce a change, e.g. heated or mixed Groups materials based on a range of simple properties after testing, e.g. transparency magnetic Lists materials which will dissolve (after testing) STEP 7 Recognises that some changes may result in a new material, e.g. in cooking Describes ways to recover substances from a solution Suggests how they can test materials to check their properties Describes ways to separate different materials Compares a variety of materials using different properties, e.g. solubility, conductivity Suggests ways to dissolve a substance
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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 science programmes.

Key Stage 1 Programme Science						*Seasonal Changes to Include 'Plants'		
Autumn			Spring			Summer		
Seasonal changes*	Animals inc. Humans (Humans)	Seasonal changes*	Materials	Animals inc. Humans (Animals)	Seasonal changes*	Materials	Animals inc. Humans (Animals)	
KS1 is a skills based curriculum and is broken down in further detail in the KS1 long term curriculum plans based on the EYFS skills and early introduction to KS1 skills in working scientifically.								

Key Stage Two Rolling Programme Science

	Autumn	Spring	Summer
4	Animals Inc Humans – Animals	Materials and their properties	STEM
1	Earth and Space (Investigations)	Animals inc Humans – Humans (excluding Teeth and Digestion)	States of Matter
2	Forces and Magnetism	Plants (Seasonal Changes)	STEM
3	Animals inc Humans – Teeth and Digestion	Electricity and light	Living Things and their Habitats

Key Stage Three Rolling Programme Science				
	Autumn	Spring		Summer
1	Electricity and Light	Materials		Animals inc Humans – Animals
2	Earth and Space	Animals inc Humans – Humans (including Teeth and Digestion)		States of Matter
3	Forces and Magnetism	Plants	Evolution and Inheritance	STEM

Key Stage Four Programme Science

Pupils in KS4 work towards achieving a WJEC award or certificate in Science from the WJEC Science Today Entry Pathways Qualifications.

Award = 8 Credits - 6 Credits from Science, 2 required from linked studies

Certificate = 13 credits – 12 credits from Science, 1 required from linked studies

Pupils are assessed and units are selected to suit both their needs and level.

Units that may be selected:

- Introduction to Plant Care
- Introduction to Animal Care
- Science: Health and Safety
- Science and our Universe
- Science and the Human Body
- Variation and Adaptation
- Working with Electrical Circuits
- Energy in the Home and Workplace
- Renewable Energy

All of the above mentioned units can be delivered as an Entry Level 3 level option for higher ability pupils or as an Entry 2 Level option for middle ability pupils

Example of a rolling programme for accreditation in science for KS4 pupils of higher ability; Entry Level 3 Certificate in Science

	Autumn	Spring	Summer
1	Science and Our Universe 3 credits	Introduction to Animal Care – Entry Level 3 3 credits	STEM Crest Awards
2	Science: Health and Safety 3 credits	Working with Electrical Circuits 3 credits	STEM Crest Awards

3	Variation and Adaptation 3 credits	Science and the Human Body 3 credits	STEM Crest Awards
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<p>Example of a rolling programme for accreditation in science for KS4 pupils of middle ability; Entry Level 2.Award in Science</p>			
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	Autumn	Spring	Summer
1	Introduction to Animal Care – Entry Level 2 3 Credits	Looking after ourselves -Food and Health	STEM Crest Awards
2	Looking after ourselves – Science skills for life-	Introduction to Plant Care 3 Credits	STEM Crest Awards
3	Energy in the Home and Workplace	Looking after ourselves – Health and Safety	STEM Crest Awards

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

Key Stage Four Rolling Programme Science for SLD pupils -- Personal Progress Units In Year 11 Pupils will study 'Sex and Relationship Education when they have completed accreditation.			
	Autumn	Spring	Summer
1	Science 6074 Developing self awareness: all about me	6066 Developing skills for the workplace: health and safety	STEM
2	Science 6063 Developing independent living skills: being healthy	Looking after ourselves science skills for life	STEM