Subject: Being an Engineer (Design and Technology)

Intent: An Engineer at The Weald and Scott-Broadwood, builds creative, technical and practical skills and knowledge in order to design, make and evaluate products that solve real-world problems. They learn to use tools effectively and safely to make increasingly complex structures, including mechanical, electrical and computer systems. An Engineer also uses the skills and knowledge of a gardener and chef, understanding and mastering the practical skills needed to grow plants, including those that can be used for food and understanding what makes a healthy diet.

Implementation: At The Weald and Scott-Broadwood, being an Engineer is embedded in enquiry learning. Some enquiries are lead engineer, where new or explicit skills are taught. Other enquiries use being an engineer as a supportive state of being, helping the children to apply new know of and know how in different ways. Through enquiries, teachers plan sequences of lessons that will build on and develop the children's skills culminating in a final project. The skills and knowledge that children will develop throughout each enquiry are mapped across the school to ensure progression. The key skills of designing, making (cutting, shaping, joining & finishing) and evaluating are returned to and developed annually. The emphasis on knowledge ensures that children understand the context of the project, as well as the engineers that they are learning about and being inspired by.
At The Weald and Scott-Broadwood, opportunities are taken to enrich the engineering curriculum that has been delivered through enquiries. In addition to curriculum learning, engineering skills are also taught within key stage 2 clubs: Cooking club, Gardening club and Outdoor Learning.

Impact: At the Weald and Scott-Broadwood, we know that we have created successful engineers, if children can:

- Confidently demonstrate the skills needed to cut, shape, join, and finish a range of materials to create high-quality products.
- Critically evaluate products and suggest improvements.
- Recall key knowledge relating to mechanical and electrical systems; and background knowledge relating to engineers through history.

As engineers, we encourage children to celebrate their learning and we ensure we find opportunities to share the children's learning and designs with parents.	

Scott-Broadwood and The Weald C of E Primary School ENQUIRY CURRICULUM OVERVIEW						
	Autumn 1	**Autumn 2**	**Spring 1**	**Spring 2**	**Summer 1**	**Summer 2**
Reception *Adapted to respond to the needs and interests of our children.*	People, culture and communities: Babies and my Body		The Natural World: Animals and Habitats		The Natural World Plants and Food Minibeasts	
Key Stage 1 **(Year 1 & 2)** **Cycle A**	How do we live a healthy life?	How can we help?	How are schools the same?	What could my classroom be made of?	How will we get around in the future?	How do plants grow near me? (4 weeks) What is a home? (1 week block with trip)
Key Stage 1 **(Year 1 & 2)** **Cycle B**	What do artists do? (4 weeks) How does our school change? (3 weeks – engage, immerse, know how)	What is my hat made of? What are we?	How does my school change? (1 week – Winter) Where is my school?	Who helps who? How does my school change? (1 week – Spring)	How do we move around? (4 weeks) How could we play in different ways?	How could we play in different ways? How does my school change? (1 week –Summer) What grows near me?
Lower KS2 **(Year 3 & 4)** **Cycle A**	Where does the darkness come from?	How can we find out about people in the past?	What's underneath our feet?	What is the difference between surviving and being healthy?	How can you feel the force? How do plants die?	How do plants die? Why did people travel in the past?

Lower KS2 (Year 3 & 4) Cycle B	What is the difference between noise and sound?	Why do we live here?	Where does our water come from? What should we flush down the loo?	What should we flush down the loo? What is creativity?	Why are more people becoming vegetarian? Who stood here before us?	Who stood here before us? How can we switch off?
Upper KS2 (Year 5 & 6) Cycle A	How are lives saved?	Who were the greater engineers? The Victorians or the Ancient Britons?	Linnaeus and Darwin – how are they connected?	Where does our food really come from?	Who is trading with whom? Why are shadows important?	Why are shadows important? How big is your footprint?
Upper KS2 (Year 5 & 6) Cycle B	What does the Earth look like from the solar system?	How can we show what we believe in?	Where is our twin?	What do forces actually do? How can Science help the homeless?	How do we all live together?	How are you helping to save the planet? What makes a good performance great?

Lead State of Being Supporting State of Being

EYFS Development Matters and ELG

- Return to and build on their previous learning, refining ideas and developing their ability to represent them
- Create collaboratively, sharing ideas, resources and skills
- Safely use and explore a variety of materials, tools and techniques, experimenting with colour, design, texture, form and function
- Share their creations, explaining the process they have used
- Make use of props and materials when role playing characters

Key Stage 1 National Curriculum

The national curriculum for design and technology aims to ensure that all pupils:

- develop the creative, technical and practical expertise needed to perform everyday tasks confidently and to participate successfully in an increasingly technological world
- build and apply a repertoire of knowledge, understanding and skills in order to design and make high-quality prototypes and products for a wide range of users

- critique, evaluate and test their ideas and products and the work of others
- understand and apply the principles of nutrition and learn how to cook.

Key Stage 2 National Curriculum

The national curriculum for design and technology aims to ensure that all pupils:

- develop the creative, technical and practical expertise needed to perform everyday tasks confidently and to participate successfully in an increasingly technological world
- build and apply a repertoire of knowledge, understanding and skills in order to design and make high-quality prototypes and products for a wide range of users
- critique, evaluate and test their ideas and products and the work of others
- understand and apply the principles of nutrition and learn how to cook.

	Key Stage 1 Enquiries	By the end of Year 2	Lower KS2 Enquiries	By the end of Year 4	Upper KS2 Enquiries	By the end of Year 6
Being an engineer: Design	**Cycle A: Spring 2: What could my classroom be made of?** *Design and make a new space for a reading area.* **Cycle A: Summer 1: How will we get around in the future?** *Design and make a water or air based mode of transport for the future.* **Cycle B: Autumn 2: What is my hat made of?** *Design and make a hat for a purpose.* **Cycle B: Summer 1: How do we move around?** *Design and make an illustrated pop up book*	Generate ideas based on simple design criteria and their own experiences, explaining what they could make. Develop, model and communicate their ideas through talking, mock-ups and drawings. Design purposeful, functional, appealing products for themselves and other users based on design criteria.	**How can you feel the force?** *Design and make a magnetic game.*	**Understanding contexts, uses and purposes:** Describe the purpose of their products. Gather information about the needs and wants of users Share and clarify ideas through discussion. **Generating, developing, modelling and communicating ideas:** Make design decisions that take into account the needs of the user. Model their ideas using prototypes and pattern pieces.	**Who were the greater engineers: The Ancient Britons or the Victorians?***Design and make a bridge* **Who is trading with whom?** *Currency* **Where is our twin?** *Make a banner representing twin towns* **What do forces actually do?** *Design a crazy contraption* **How can science help the homeless?** *Design a shelterbox filled with content from experimental work* **How are you helping to save the planet?**	**Understanding contexts, uses and purposes:** Work confidently within a range of contexts, ie home, school, leisure, culture , enterprise, industry, environment. Indicate the design features of their products that will appeal to users. Carry out research through surveys, interviews, questionnaires. **Generating, developing, modelling and communicating ideas:** Use annotated sketches, cross-sectional drawings and exploded diagrams to develop and communicate their ideas. Explain their choice of tools and equipment in relation to the skills and

	using hinges, levers, sliders, spinners.				*Design a manifesto to showcase small changes that either individuals or the school can make to help save the planet*	and techniques they will use to make the design. Explain their choice of materials and components according to functional and aesthetic qualities.
Being an engineer: Make	**Cycle A: Spring 2: What could my classroom be made of?** *Design and make a new space for a reading area.* *-Visits from builders to talk about materials and joining* *-Den building trip to Bentley Copse* **Cycle A: Summer 1: How will we get around in the future?** *Design and make a water or air based mode of transport for the future.* **Cycle B: Autumn 2: What is my hat made of?** *Design and make a hat for a purpose.* *Children will make at least 2 versions of their hat design, practising*	Plan by suggesting what to do next. Select and use tools, equipment, skills and techniques to perform practical tasks, explaining their choices. Select new materials, components, reclaimed materials and construction kits to build and create their products. Use simple joining techniques to join and combine materials. Use simple finishing techniques suitable for the products they are creating.	**Where does the darkness come from?** *Shadow puppets* **Technical knowledge:** Children will use a wider range of tools and equipment to accurately perform practical tasks [for example, cutting, shaping, joining and finishing]. Using different materials such as: paper, fabric, cardboard. **Resources:** Fairy lights, tea lights, mirrors, black paper (and fabric if possible), variety of lights, torches, a projector, a selection of materials (opaque, translucent, coloured etc). **How can you feel the force?** *Design and make magnetic game* **Technical knowledge:** Children will select from and use a wider range of tools and equipment such	**Planning:** Select tools and equipment suitable for the task. Select materials and components suitable for the task. Order the main stages of making. **Practical skills and techniques:** Measure, mark out, cut and shape material with some accuracy. Assemble, join and combine materials and components with some accuracy.	**Who were the greater engineers: The Ancient Britons or the Victorians?** *Design and make a bridge* **Technical knowledge:** Children will select from and use a wider range of tools and equipment such as: glue guns, wire, saws. Children will select from and use a wider range of materials and components such us: cardboard, wood, gears, pulleys, levers and linkages. **Resources:** gears, pulleys, cams, levers, linkages, drawing and painting resources, bridge building resources. **Where is our twin?** *Make a banner representing twin towns* **Technical knowledge:** Children will select from & use a wider range of tools & equipment to accurately perform practical tasks [e.g. cutting, shaping, joining & finishing]	**Planning:** Explain their choice of tools and equipment in relation to the skills and and techniques they will use to make the design. Produce appropriate lists of tools, equipment and materials they will need. **Practical skills and techniques:** Accurately measure, mark out, cut and shape materials and components. Accurately assemble, join and combine materials and components. Accurately apply a range of finishing techniques including those from art and design.

	cutting, sticking and joining different materials. **Cycle B: Summer 1: How do we move around?** *Design and make an illustrated pop up book using hinges, levers, sliders, spinners.*		as: scissors, scalpel, surfaces, etc. Children will select from and use a wider range of materials and components such as: magnet, metallic shapes, etc. **Resources:** Toy cars, range of surfaces, metallic objects, magnets of different shapes and sizes, scrap materials (cardboard, lollipop sticks etc.) and plenty of magnets for game creations. **Why did people travel in the past?** *Pennant (Textiles)* **Technical knowledge:** Children will select from and use a wider range of materials and components, including construction materials, textiles and ingredients, according to their functional properties and aesthetic qualities. **Resources:** Needles and thread, fabric, paint, instruments, selection of foods that were introduced to Britain in the past.		Children will select from & use a wider range of materials & components, inc. construction materials, textiles & ingredients, according to their functional properties & aesthetic qualities. **Resources:** Sewing equipment including fabric and glue guns. **What do forces actually do?** *Design a crazy contraption* **Technical knowledge:** Children will understand and use mechanical systems in their products [for example, gears, pulleys, cams, levers and linkages] **Resources:** Ramps and materials to cover them (e.g. sandpaper, bubble wrap, foil, cling film), lubricants (e.g. oil, washing up liquid), range of materials (e.g. cardboard tubes, split pins, elastic bands, coathangers), 'Levers/Pulleys/Gears' D&T pack, Newton meters, weights, plasticine, string.	

Being an engineer: Evaluate	**Cycle A Autumn 1: How can we lead a healthy life?** *Evaluate their end product against criteria (healthy choices and taste)* **Cycle A: Spring 2: What could my classroom be made of?** *Design and make a new space for a reading area. Evaluate end product for suitability and purpose.* **Cycle B: Autumn 2: What is my hat made of?** *Design and make a hat for a purpose.* *Evaluate a range of existing hats for design and purpose.* **Cycle B: Summer 1: How do we move around?** *Design and make an illustrated pop up book using hinges, levers, sliders, spinners.* *Evaluate a range of existing products and understand simple mechanisms (levers).*	Explore a range of existing products related to their design criteria. Evaluate their product by discussing how well it works in relation to the purpose, the user and whether it meets the original design criteria.	**How can we find out about people in the past?** **Technical knowledge:** Children will use their evaluating skills to understand how key events and individuals in design and technology have helped shape the world. **How can you feel the force?** *Design and make magnetic game* **What is the difference between noise and sound?** *Evaluate ear defenders* **Technical knowledge:** Children will use their evaluating skills to understand how key events and individuals in design and technology have helped shape the world. **What should you flush down the loo?** *Evaluate and redesign a product – plastic recyclable materials* **What is creativity?**	**Own ideas and products:** Identify strengths and weaknesses in their ideas and products. Consider the views of others (including users) to improve their work. Use their design criteria to evaluate their completed products. **Existing products - Investigate and analyse:** How well products have been designed. Why materials were chosen. How well products achieve their purposes. Whether products can be recycled or reused. **Key events and individuals:** Research into inventors, designers, engineers, chefs and manufacturers who have developed ground-breaking products.	**Who were the greater engineers: The Ancient Britons or the Victorians?***Design and make a bridge* **Who is trading with whom?** *Currency* **Technical knowledge:** Children will use their evaluating skills to understand how key events and individuals in design and technology have helped shape the world. **Where is our twin?** *Make a banner representing twin towns* **What do forces actually do?** *Design a crazy contraption* **How can science help the homeless?** *Design a shelterbox filled with content from experimental work* **Technical knowledge:** Children will use their evaluating skills to understand how key events and individuals in design and technology	**Own ideas and products:** Critically evaluate the quality of the design, manufacture and fitness for purpose of their products as they design and make. Evaluate their product against their original design specification. **Existing products - Investigate and analyse:** How well products have been made. How well products work. How well products meets user wants and needs. What impact products have beyond their intended purpose. **Key events and individuals:** Research into inventors, designers, engineers, chefs and manufacturers who have developed ground-breaking products.

			Evaluation of the work of others creativity **Technical knowledge:** Children will use their evaluating skills to understand how key events and individuals in design and technology have helped shape the world.		have helped shape the world. **How are you helping to save the planet?** *Design a manifesto to showcase small changes that either individuals or the school can make to help save the planet* **Technical knowledge:** Children will use their evaluating skills to understand how key events and individuals in design and technology have helped shape the world.	
Being an engineer: Technical knowledge	**Cycle B: Autumn 2: What is my hat made of?** *Design and make a hat for a purpose.* *Children will explore how materials can be made stronger.* **Cycle B: Summer 1: How do we move around?** *Design and make an illustrated pop up book using hinges, levers, sliders, spinners.* *Explore different types of levers and moving parts – pop up, left and right*	• Explore and use wheels, axles and axle holders. • Distinguish between fixed and freely moving axles. • Know and use technical vocabulary relevant to the project. • Know how to make freestanding structures stronger, stiffer and more stable. • Know and use technical vocabulary relevant to the project.	**Where does the darkness come from?** *Shadow puppets* **How can we switch off?** *Design and make an electronic quiz. Circuits.* **Technical knowledge:** Children will understand and use electrical systems in their products [for example, series circuits incorporating switches, bulbs, buzzers and motors] **Resources:** Equipment for constructing simple series	**Making products work:** How to use learning from Science to help design and make effective products. How to use learning from Mathematics to help design and make effective products. That materials can be combined and mixed to create more useful characteristics. How mechanical systems such as levers and linkages create movement. How simple electrical circuits and components	**Who were the greater engineers: The Ancient Britons or the Victorians?***Design and make a bridge* **What do forces actually do?** *Design a crazy contraption*	**Making products work:** That materials have both functional and aesthetic qualities. That materials can be combined and mixed to create more useful characteristics. The correct technical vocabulary for the projects they are undertaking. How mechanical systems such as cams, pulleys or gears create movement. How more complex electrical circuits and components can be used

	sliders, up and down levers, spin (pivot).		circuits e.g. batteries, wires, bulbs, switches, buzzers, range of materials (conductors and insulators).	can be used to create functional products. How to make strong, stiff, shell structures. That a single fabric shape can be used to make a 3D textiles product.		to create functional products. How to reinforce and strengthen a 3D framework. That a a 3D textiles product can be made from a combination of fabric shapes.
Vocabulary	**Cycle A, Spring 2: What could my classroom be made of?:** Cutting, shaping, joining, finishing, building, builder, engineer, construction, architecture, architect. **Cycle A, Summer 1: How will get around in the future?:** model, material, strong, waterproof, joining **Cycle B, Autumn 2: What is my hat made of?:** material, purpose, function, fixing, stregthen **Cycle B, Summer 1: How do we move around?:** cutting, shaping, joining, finishing, mechanism: fold, slide, pivot, lever.					
Being an engineer: Cooking and nutrition	**Cycle A Autumn 1: How can we lead a healthy life?** Children will be taught the link between nutrition and food choices and preparation. Children will design and make a healthy savoury wrap using techniques: chopping, slicing. *-Visit from Etherley Farm to talk about the production of apple juice*	Understand where a range of fruit and vegetables come from e.g. farmed or grown at home. Understand and use basic principles of a healthy and varied diet to prepare dishes, including how fruit and vegetables are part of The eatwell plate. Know and use technical and sensory vocabulary relevant to the project.	**What is the difference between surviving and being healthy?** **Technical knowledge:** Children will prepare and cook a variety of predominantly savoury dishes using a range of cooking techniques such as: peeling, chopping, slicing, grating, mixing. **Resources:** Cooking equipment such as: scales, knives, utensils, etc	**Where food comes from:** That food is grown (eg vegetable, wheat, rice), reared (eg cattle, poultry) and caught (eg fish) in the UK and across the wider world. **Food preparation, cooking and nutrition:** How to prepare and cook a variety of (focus on savoury) dishes safely and hygienically. To use a heat source safely as appropriate. How to use a range of techniques such as	**Where does our food really come from?** **Technical knowledge:** Children will prepare and cook a variety of predominantly savoury dishes using a range of cooking techniques such as: peeling, chopping, slicing, grating, mixing, spreading, kneading and baking. **Resources:** A variety of food from the supermarket and cooking utensils/equipment,	**Where food comes from:** How food is processed into ingredients that can be eaten and used in cooking. That seasons may affect the food available. **Food preparation, cooking and nutrition:** That recipes can be adapted to change the appearance, taste, texture and aroma. That different food and drink contain substances - nutrients, water, fibre -

	-*Visit from Lyne Farm to talk about the production of dairy products*		**Why are more people becoming vegetarian?** **Technical knowledge:** Children will prepare and cook a variety of predominantly savoury dishes using a range of cooking techniques such as: peeling, chopping, slicing, grating, mixing. **Resources:** Variety of foods, cooking utensils/equipment, various ingredients for cooking.	peeling, chopping, slicing, grating, mixing, spreading, kneading and baking. That to be active and healthy, food and drink are needed to provide energy for the body.	various ingredients for cooking.	that are needed for health.
Vocabulary	**Cycle A, Autumn 1: How can we lead a healthy life?:** fruit and vegetable names, names of equipment and utensils sensory vocabulary e.g. soft, juicy, crunchy, sweet, sticky, smooth, sharp, crisp, sour, hard flesh, skin, seed, pip, core, slicing, peeling, cutting, squeezing, healthy diet, choosing, ingredients, food source, nutrition, wild/farmed, healthy, balanced		name of products, names of equipment, utensils, techniques and ingredients texture, taste, sweet, sour, hot, spicy, appearance, smell, preference, greasy, moist, cook, fresh, savoury, hygienic, edible, grown, reared, caught, frozen, tinned, processed, seasonal, harvested healthy/varied diet		ingredients, yeast, dough, bran, flour, wholemeal, unleavened, baking soda, spice, herbs fat, sugar, carbohydrate, protein, vitamins, nutrients, nutrition, healthy, varied, gluten, dairy, allergy, intolerance, savoury, source, seasonality utensils, combine, fold, knead, stir, pour, mix, rubbing in, whisk, beat, roll out, shape, sprinkle, crumble	