

## BEING AN ENGINEER (Design and Technology) AT THE WEALD

### A space to learn; a space to grow.

At The Weald, we support all members of our school community – our children, our staff and our families—to make and keep this pledge so that our children learn, grow and achieve their very best.

### Our curriculum:

- Puts the mental and physical wellbeing of our children at the heart of all that we do;
- Connects our learners as local citizens of today with the ideas, knowledge and skills they will need as the global citizens of the future;
- Applies National Curriculum content through real world contexts;
- Encourages our learners to be curious, ask probing questions and be brave in finding solutions;
- Enacts the core Christian values of our school ‘*Respect, Responsibility, Love, Trust and Forgiveness*’, which promote respect for others, responsibility for ourselves and mutual trust.
- Promotes diversity and inclusion;
- Is enriched by well-planned, outdoor learning opportunities, off-site experience days and immersive workshops.

At The Weald, our intention is to create a culture of enquiry, curiosity and challenge that runs through our whole curriculum. Our school is developing a local, bespoke version of the Curious-city™ framework which supports our teachers to create contextually relevant, enquiry-led experiences. This enquiry-led approach is enabling The Weald to create a bespoke, locally focused curriculum for our learners that goes beyond the current National Curriculum.

### How is the curriculum taught at The Weald?

Our enquiry-led curriculum supports our pupils to explore subjects through a sequence of ‘key questions’ which build up children’s knowledge and skills over time. Through our curriculum, our children see themselves as different states of being, for example, as Authors, Mathematicians and Artists – rather than simply learning about English, Mathematics or Art. Author (English) and Mathematicians (Maths) lessons are explicitly taught daily. Enquiries are planned to ensure a broad and balanced range of learning across each phase. The curriculum is enhanced by locally rich and relevant experiences, which weaves in faith, community, and culture.

We support learners to master both the *know of* and *know-how* of a subject, not just remember it. For instance, we want our learners to be Scientists, not just learn about science. It is also important to make logical links between subjects. We want our learners to discover for themselves that they can be an Author, Scientist, Geographer and Philosopher at the same time and that some adults combine these states to become Archaeologists, for instance. You will see these around our school buildings, on visual timetables, on school displays and our online learning platform. It is important that the children see the connection between the subjects they are learning and how this knowledge can be applied.

At The Weald our excellent outdoor environment and the local community are an opportunity for active learning for all our pupils. The school grounds are evolving to enrich different curriculum areas, and outdoor learning is actively promoted and planned for. We ensure in-school learning is enhanced by relevant educational visits and visitors, overnight residential visits which take place in Year 4 and 6, assemblies, charity days and responding to events in the news. A range of clubs and enrichment activities such as concerts, sports matches, gardening competitions, arts assemblies, music, and dance festivals are a regular occurrence in our school. These are a vital part of the children’s development as lifelong learners and ensure individual talents are nurtured and celebrated.

### How is the impact of our curriculum measured?

The impact of our enquiry curriculum can be seen and heard as well as represented in outcomes. Real learning can be seen through the children’s books, displays and the challenges that the children produce. In classrooms, working walls demonstrate the learning journey; States of Being characters feature in books, classroom displays and visual timetables as well as on our website and newsletters.



## Being an Engineer The Weald

### Intent: Our Vision

An Engineer at The Weald, 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: How we plan and teach for being an Engineer

At The Weald, 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, 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 clubs: Cooking club, Gardening club and Forest Schools

### Impact: How we evaluate our learning as Engineers

At the Weald, we know that we have created engineers, who can transition successfully to KS3 Design and Technology, 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.

**2022-2024: The Weald C of E Primary School WHOLE SCHOOL ENQUIRY CURRICULUM OVERVIEW**

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
<b>Lower KS2 (Year 3 &amp; 4) 2022-2023</b>	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?
<b>Lower KS2 (Year 3 &amp; 4) 2023-2024</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?
<b>Upper KS2 (Year 5 &amp; 6) 2022-2023</b>	How are lives saved?	Who were the greater engineers? The Victorians or the Ancient Britains?	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?
<b>Upper KS2 (Year 5 &amp; 6) 2023-2024</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

## 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.

	KS2 National Curriculum	Lower KS2 Enquiries	By the end of Year 4	Upper KS2 Enquiries	By the end of Year 6
<b>Being an engineer: Design</b>	Use research and develop design criteria to inform the design of innovative, functional, appealing products that are fit for purpose, aimed at particular individuals or groups. Generate, develop, model and communicate their ideas through discussion, annotated sketches, cross-sectional and exploded diagrams, prototypes, pattern pieces and computer-aided design	<b>How can you feel the force?</b> <i>Design and make a magnetic game.</i>	<b>Understanding contexts, uses and purposes:</b> Describe the purpose of their products. Gather information about the needs and wants of users Share and clarify ideas through discussion. <b>Generating, developing, modelling and communicating ideas:</b> Make design decisions that take into account the needs of the user. Model their ideas using prototypes and pattern pieces.	<b>Who were the greater engineers: The Ancient Britons or the Victorians?</b> <i>Design and make a bridge</i>  <b>Who is trading with whom?</b> <i>Currency</i>  <b>Where is our twin?</b> <i>Make a banner representing twin towns</i>  <b>What do forces actually do?</b> <i>Design a crazy contraption</i>  <b>How can science help the homeless?</b> <i>Design a shelterbox filled with content from experimental work</i>  <b>How are you helping to save the planet?</b> <i>Design a manifesto to showcase small changes that either individuals or the school can make to help save the planet</i>	<b>Understanding contexts, uses and purposes:</b> 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. <b>Generating, developing, modelling and communicating ideas:</b> 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 and techniques they will use to make the design. Explain their choice of materials and components according to functional and aesthetic qualities.
<b>Being an engineer: Make</b>	Select from and use a wider range of tools and equipment to perform practical tasks [for example, cutting, shaping, joining and finishing], accurately.	<b>Where does the darkness come from?</b> <i>Shadow puppets</i> <b>Technical knowledge:</b> Children will use a wider range of tools and equipment to	<b>Planning:</b> Select tools and equipment suitable for the task. Select materials and components suitable for the task.	<b>Who were the greater engineers: The Ancient Britons or the Victorians?</b> <i>Design and make a bridge</i> <b>Technical knowledge:</b>	<b>Planning:</b> Explain their choice of tools and equipment in relation to the skills and and techniques they will use to make the design.



	<p>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</p>	<p>accurately perform practical tasks [for example, cutting, shaping, joining and finishing]. Using different materials such as: paper, fabric, cardboard.</p> <p><b>Resources:</b> 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).</p> <p><b>How can you feel the force?</b> <i>Design and make magnetic game</i></p> <p><b>Technical knowledge:</b> Children will select from and use a wider range of tools and equipment such as: scissors, scalpel, surfaces, etc. Children will select from and use a wider range of materials and components such as: magnet, metallic shapes, etc.</p> <p><b>Resources:</b> 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.</p> <p><b>Why did people travel in the past?</b> <i>Pennant (Textiles)</i></p> <p><b>Technical knowledge:</b> Children will select from and use a wider range of materials and components, including construction materials, textiles and ingredients, according to</p>	<p>Order the main stages of making.</p> <p><b>Practical skills and techniques:</b> Measure, mark out, cut and shape material with some accuracy. Assemble, join and combine materials and components with some accuracy.</p>	<p>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 as: cardboard, wood, gears, pulleys, levers and linkages.</p> <p><b>Resources:</b> gears, pulleys, cams, levers, linkages, drawing and painting resources, bridge building resources.</p> <p><b>Where is our twin?</b> <i>Make a banner representing twin towns</i></p> <p><b>Technical knowledge:</b> Children will select from &amp; use a wider range of tools &amp; equipment to accurately perform practical tasks [e.g. cutting, shaping, joining &amp; finishing]</p> <p>Children will select from &amp; use a wider range of materials &amp; components, inc. construction materials, textiles &amp; ingredients, according to their functional properties &amp; aesthetic qualities.</p> <p><b>Resources:</b> Sewing equipment including fabric and glue guns.</p> <p><b>What do forces actually do?</b> <i>Design a crazy contraption</i></p> <p><b>Technical knowledge:</b> Children will understand and use mechanical systems in their products [for example, gears,</p>	<p>Produce appropriate lists of tools, equipment and materials they will need.</p> <p><b>Practical skills and techniques:</b> 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.</p>
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		<p>their functional properties and aesthetic qualities. <b>Resources:</b> Needles and thread, fabric, paint, instruments, selection of foods that were introduced to Britain in the past.</p>		<p>pulleys, cams, levers and linkages] <b>Resources:</b> 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&amp;T pack, Newton meters, weights, plasticine, string.</p>	
<p><b>Being an engineer: Evaluate</b></p>	<p>Investigate and analyse a range of existing products. Evaluate their ideas and products against their own design criteria and consider the views of others to improve their work. Understand how key events and individuals in design and technology have helped shape the world.</p>	<p><b>How can we find out about people in the past?</b>  <b>Technical knowledge:</b> Children will use their evaluating skills to understand how key events and individuals in design and technology have helped shape the world.  <b>How can you feel the force?</b> <i>Design and make magnetic game</i>  <b>What is the difference between noise and sound?</b> <i>Evaluate ear defenders</i> <b>Technical knowledge:</b> Children will use their evaluating skills to understand how key events and individuals in design and technology have helped shape the world.  <b>What should you flush down the loo?</b> <i>Evaluate and redesign a product – plastic recyclable materials</i></p>	<p><b>Own ideas and products:</b> 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. <b>Existing products - Investigate and analyse:</b> How well products have been designed. Why materials were chosen. How well products achieve their purposes. Whether products can be recycled or reused. <b>Key events and individuals:</b> Research into inventors, designers, engineers, chefs and manufacturers who have developed ground-breaking products.</p>	<p><b>Who were the greater engineers: The Ancient Britons or the Victorians?</b> <i>Design and make a bridge</i>  <b>Who is trading with whom?</b> <i>Currency</i> <b>Technical knowledge:</b> Children will use their evaluating skills to understand how key events and individuals in design and technology have helped shape the world.  <b>Where is our twin?</b> <i>Make a banner representing twin towns</i>  <b>What do forces actually do?</b> <i>Design a crazy contraption</i>  <b>How can science help the homeless?</b> <i>Design a shelterbox filled with content from experimental work</i> <b>Technical knowledge:</b></p>	<p><b>Own ideas and products:</b> 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. <b>Existing products - Investigate and analyse:</b> 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. <b>Key events and individuals:</b> Research into inventors, designers, engineers, chefs and manufacturers who have developed ground-breaking products.</p>



		<p><b>What is creativity?</b> <i>Evaluation of the work of others creativity</i></p> <p><b>Technical knowledge:</b> Children will use their evaluating skills to understand how key events and individuals in design and technology have helped shape the world.</p>		<p>Children will use their evaluating skills to understand how key events and individuals in design and technology have helped shape the world.</p> <p><b>How are you helping to save the planet?</b> <i>Design a manifesto to showcase small changes that either individuals or the school can make to help save the planet</i></p> <p><b>Technical knowledge:</b> Children will use their evaluating skills to understand how key events and individuals in design and technology have helped shape the world.</p>	
<p><b>Being an engineer:</b> <b>Technical knowledge</b></p>	<p>Apply their understanding of how to strengthen, stiffen and reinforce more complex Structures. Understand and use mechanical systems in their products [for example, gears, pulleys, cams, levers and linkages]. Understand and use electrical systems in their products [for example, series circuits incorporating switches, bulbs, buzzers and motors]. Apply their understanding of computing to program, monitor and control their products.</p>	<p><b>Where does the darkness come from?</b> <i>Shadow puppets</i></p> <p><b>How can we switch off?</b> <i>Design and make an electronic quiz. Circuits.</i></p> <p><b>Technical knowledge:</b> Children will understand and use electrical systems in their products [for example, series circuits incorporating switches, bulbs, buzzers and motors]</p> <p><b>Resources:</b> Equipment for constructing simple series circuits e.g. batteries, wires, bulbs, switches, buzzers, range of materials (conductors and insulators).</p>	<p><b>Making products work:</b> 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 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.</p>	<p><b>Who were the greater engineers: The Ancient Britons or the Victorians?</b> <i>Design and make a bridge</i></p> <p><b>What do forces actually do?</b> <i>Design a crazy contraption</i></p>	<p><b>Making products work:</b> 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 to create functional products. How to reinforce and strengthen a 3D framework. That a 3D textiles product can be made from a combination of fabric shapes.</p>



<p><b>Being and engineer: Cooking and nutrition</b></p>	<p>Understand and apply the principles of a healthy and varied diet. Prepare and cook a variety of predominantly savoury dishes using a range of cooking techniques. Understand seasonality, and know where and how a variety of ingredients are grown, reared, caught and processed.</p>	<p><b>What is the difference between surviving and being healthy?</b> <b>Technical knowledge:</b> Children will prepare and cook a variety of predominantly savoury dishes using a range of cooking techniques such as: peeling, chopping, slicing, grating, mixing. <b>Resources:</b> Cooking equipment such as: scales, knives, utensils, etc <b>Why are more people becoming vegetarian?</b> <b>Technical knowledge:</b> Children will prepare and cook a variety of predominantly savoury dishes using a range of cooking techniques such as: peeling, chopping, slicing, grating, mixing. <b>Resources:</b> Variety of foods, cooking utensils/equipment, various ingredients for cooking.</p>	<p><b>Where food comes from:</b> That food is grown (eg vegetable, wheat, rice), reared (eg cattle, poultry) and caught (eg fish) in the UK and across the wider world. <b>Food preparation, cooking and nutrition:</b> 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 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.</p>	<p><b>Where does our food really come from?</b> <b>Technical knowledge:</b> 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. <b>Resources:</b> A variety of food from the supermarket and cooking utensils/equipment, various ingredients for cooking.  <b>Who is trading with whom?</b> <i>Currency</i> <b>Technical knowledge:</b> Children will select from and use a wider range of tools and equipment such as: scissors, scalpel, surfaces, glue, etc. Children will select from and use a wider range of materials and components such as: cardboard, felt tip, counters, etc.  <b>Resources:</b> selection of levers, pulleys and gears, materials for making board games (cardboard, felt tip pens, glue, counters etc.)</p>	<p><b>Where food comes from:</b> How food is processed into ingredients that can be eaten and used in cooking. That seasons may affect the food available. <b>Food preparation, cooking and nutrition:</b> That recipes can be adapted to change the appearance, taste, texture and aroma. That different food and drink contain substances - nutrients, water, fibre - that are needed for health.</p>
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