**Design and Technology**

**Intent:**

Design and technology is an inspiring, rigorous and practical subject and high-quality design and technology education makes an essential contribution to the creativity, culture, wealth and well-being of the nation Our curriculum demands that children use their imagination to design and make products that solve real problems within varied contexts. Children learn to take risks, be resourceful and will acquire a broad range of subject knowledge whilst drawing on disciplines such as mathematics, science, engineering, computing and art.

**Aims:**

At Bocking Primary School, we aim to develop children’s inventive, practical and technical skills so that they are able to positively contribute to our increasingly technological world.

Our Design and technology curriculum aim to provide:

* structured, progressive lessons which ensure teachers can cover the skills required to meet the aims of the national curriculum.
* exciting and interesting lessons which enable the children to generate ideas through their own experiences.
* opportunities for children to explore, develop and communicate their own ideas through planning, discussion and equipment.
* opportunities for children to design and make high-quality prototypes and products for a range of users. Thus, developing problem-solving skills and allowing children to learn to critique, evaluate and test their own ideas, designs and products.
* opportunities for children to understand nutrition and learn how to cook.

**Implementation:**

Design and Make Skills

These should be taught in every unit. The objectives are cumulative. Teachers will therefore routinely revisit those in previous year groups during teaching and discussions.

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| **Aspect** | **Year 1** | **Year 2** | **Year 3** | **Year 4** | **Year 5** | **Year 6** |
| **Evaluating existing products** | Know what a product isKnow that products have a purpose Know that products have a user/ consumer | Know how products are used or might be usedKnow what products are made fromExplain what they like or dislike about products | Consider how well a product has been designedConsider why certain materials have been chosenConsider how well products work | Consider how well a product has been madeConsider how well products meet the needs and wants of their users/consumers | Consider the methods of construction of productsConsider how well products achieve their purpose Consider how innovative a product is | Consider the cost of making products Consider that some products have impacts beyond their intended purposeConsider how sustainable products(or the materials within them) are |
| **Designing** | Know the product they are making and its intended user/consumerGenerate ideasUse knowledge of existing products to arrive at these ideasCommunicate ideas through talk and drawing | Use simple design criteria to help develop their ideasModel ideas by exploring materials and components and by making templates and mock-upsCommunicate their ideas with clarity | Describe the purpose of their productDevelop their own design criteriaExplain how their product will workGenerate realistic ideas based on purpose and design criteriaCreate clear annotated sketches | Gather information about the needs and wants of intended users/consumersIndicate the design features that will appeal to intended users/consumersLink design decisions to intended users/consumersCommunicate their ideas using prototypes  | Choose appropriate market research methods (interview, observation, focus group or survey) and formulate focused questionsCarry out a market research process and consider its findings in the design processExtend sketches through using exploded diagrams and cross-sections (when necessary) | Target market research to give clarity on wants, needs, preferences and valuesCreate a simple design specificationMake design decisions taking account of constraints such as time. resources and costGenerate innovative ideas based on market research and constraints |
| **Making** | Follow a simple procedureConfidently use a range of materials and componentsAssemble, join and combine materials | Measure, mark-out, cut and shape materialsSelect from a range of tools and equipment, explaining their choicesUse finishing techniques | Independently select tools and equipment suitable for the taskIndependently select materials and components suitable for the taskOrder the stages of makingFollow more complex procedures without reminders | Explain their choice of tools and equipment in relation to the skills and techniques they will be usingExplain their choice of materials and components according to functional properties and aesthetic qualitiesMeasure, mark-out, cut and shape materials with accuracy | Produce lists of tools, equipment and materials that they will needDevelop accuracy throughout the making processUse finishing techniques to enhance their product and make it more appealingDuring the making process, adapt their product when necessary | Formulate step-by-step plans that could be used by othersUse more complex techniques that need a number of stepsDemonstrate resourcefulness when tackling practical problems (troubleshooting)Independently seek advice to overcome issues Limit waste |
| **Evaluating** | Talk about their designMake simple judgements about their products | Explain their design in a logical orderMake simple judgements about their design against a design criteria | Suggest how their design and product could be improved (using their design criteria) | Identify the strengths are areas to develop in their products (using their design criteria)Consider the views of others to improve their work | Constantly refer to their design criteria as they design and make | Critically evaluate the quality of the design, manufacture and fitness for purpose of their products as they design and make |

**Unit Planner**

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| Year | Units |
| Y1 | Mechanisms – Sliders and levers Food – Preparing fruit and vegetablesTextiles – Templates and joining techniques |
| Y2 | Mechanisms – Wheels and axels Food – Healthy and varied dietStructures – Freestanding structures |
| Y3 | Mechanical systems – Levers and linkagesFood – Cooking savoury food Structures – Shell structures |
| Y4 | Mechanical systems – PneumaticsTextiles – 2D shape to 3D productElectrical systems – Simple circuits and switches |
| Y5 | Food – Cooking sweet food Mechanical systems – CamsStructures – Frame structures |
| Y6 | Mechanical systems – PulleysElectrical systems – Monitoring and controlTextiles – Combining different fabric shapes |

**Technical Skills**

**Mechanisms and mechanical systems**

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| Unit | Knowledge |
| Sliders and levers | * Explore and use sliders and levers
* Understand that different mechanisms produce different types of movement
* Know what lever, pivot and slider mean
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| Wheels and axels | * Explore and use wheels, axles and axle holders
* Distinguish between fixed and freely moving axles
* Know how wheels and axles may be assembled as either fixed axles or free axles
* Show different ways of making axle holders and stress the importance of making sure the axles run freely within the holders
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| Levers and linkages | * Understand and use lever and linkage mechanisms
* Distinguish between fixed and loose pivots
* Distinguish between the lever, the linkage, the input, the process and the output
* Understand the types of movement that can be created using levers and linkages
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| Pneumatics | * Understand and use pneumatic mechanisms.
* Understand that air can be used to lift heavy objects
* Distinguish between the input, process and output
* Know how pneumatic systems can be used to operate levers
* Know the differing effects of different pneumatic systems
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| Cams | * Understand and use cams in a product
* Understand how cams can be used to produce different types of movement and change the direction of movement.
* Distinguish between the input, process and output
* Know about the relationship between a cam and a follower
* Know how to make an off-centre cam and position it accurately in a housing
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| Pulleys  | * Understand and use pulleys
* Distinguish between the input, process and output
* Understand how pulleys can be used to speed up, slow down or change the direction of movement
* Investigate combinations of two different sized pulleys to learn about direction and speed of rotation
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**Electrical systems**

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| Unit | Knowledge |
| Simple circuits and switches | * Understand and use a simple electrical system in a product (such as series circuits incorporating switches, bulbs and buzzers)
* Understand how circuits are used in simple products
* Know the difference between input and output devices
* Demonstrate how to find a fault in a simple circuit and correct it
* Make a variety of switches by using simple classroom materials e.g. card, corrugated plastic, aluminium foil, paper fasteners and paper clips
* Make switches that operate in different ways e.g. when you press them, when you turn them, when you push them from side to side
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| Monitoring and control | * Create a product that uses computer control
* Know about products (such as nightlights, garden lights, alarm systems, security lighting) that respond to changes in the environment using a computer control program. Know how computer control systems enable these to work.
* Know how sensors (such as light dependent resistors (LDRs)) and switches work.
* Know how to use a Crumble controller
* Make secure electrical connections
* Write and modify control programs for a Crumble controller that works their product
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**Structures**

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| Unit | Knowledge |
| Freestanding structures | * Create a freestanding structure for a purpose
* Understand that different materials vary in strength
* Know that structure, materials and shape all affect strength and stability
* Know how to make freestanding structures stronger, stiffer and more stable.
* Know how to make strong joins
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| Shell structures | * Understand and use a strong, stiff shell structure in an attractive product
* Know how shell structures are created
* Create nets and use tabs
* Know how to assemble, stiffen and strengthen shell structures
* Understand the importance of aesthetics in shell structures and apply this
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| Frame structures | * Create a frame structure for a purpose
* Recognise frame structures in the world around them
* Understand how to strengthen, stiffen and reinforce 3-D frameworks.
* Understand and use triangulation to add strength to a structure
* Develop skills and techniques to accurately join framework materials together
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**Food**

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| Unit | Knowledge |
| Preparing fruit and vegetables | * Create a cold vegetable/fruit product
* Understand where a range of fruit and vegetables come from e.g. farmed or grown at home.
* Know basic food hygiene practices when handling food including the importance of following instructions to control risk
* Know how to use to use simple utensils to wash, peel and cut, and know the different effects achieved by different processes.
* Use the bridge hold and claw grip
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| Healthy and varied diet | * Create a cold lunchbox product e.g. a wrap or salad
* Understand anduse basic principles of a healthy and varied diet to prepare dishes
* Know about a range of fresh and processed ingredients appropriate for their product, and whether they are grown, reared or caught.
* Know basic food hygiene practices when handling food including the importance of following instructions to control risk
* Know how to use to use simple utensils to wash grate, peel, dice, slice and squeeze, and know the different effects achieved by different processes.
* Know how to combine ingredients in a dish to ensure the best taste and appearance
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| Cooking savoury food | * Create a cooked savoury food product e.g. a pizza
* Know how to use utensils and equipment including heat sources to prepare and cook food.
* Understand about seasonality in relation to food products and the source of different food products
* Know to measure out, cut, shape and combine (e.g. knead, beat, rub and mix) ingredients.
* Use the appropriate utensils and equipment safely and hygienically.
* Know which ingredients could be changed or added in a basic recipe and which must stay the same
* Consider the texture, shape, size, taste and appearance of products and relate these to purpose and the consumer
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| Cooking sweet food | * Create a baked sweet product e.g. a cake
* Know how to use utensils and equipment, including heat sources, to prepare and cook food.
* Know how to use an oven to bake
* Know to measure out, shape and combine (e.g. knead, beat, rub and mix) ingredients.
* Use the appropriate utensils and equipment safely and hygienically.
* Know which ingredients could be changed or added in a baking recipe and which must stay the same
* Know how to make their product appealing to the consumer
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**Textiles**

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| Unit | Knowledge |
| Templates and joining techniques | * Create a simple textile product created by joining two identical pieces of fabric together
* Understand how textile products are made by using a template to create two identical shapes.
* Mark out, tape or pin the fabric to the templates or paper patterns and cut out the relevant fabric pieces for the product.
* Understand how to join fabrics using running stitch
* Explore different finishing techniques e.g. using painting, fabric crayons, stitching, sequins, buttons and ribbons.
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| 2D shape to 3D product | * Create a 3D textile product by joining differently shaped pieces of fabric
* Create a paper pattern from an existing product
* Choose which fabric is appropriate
* Know how to pin a pattern on to fabric ensuring limited wastage, how to leave a seam allowance and how to cut out
* Sew textiles by joining right side together and making seams.
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| Combining different fabric shapes | * Create a 3D textile product from a combination of accurately made pattern pieces, fabric shapes and different fabrics.
* Make 2-D paper patterns using grid or tracing paper and create a 3-D mock-up of a product
* Know different stitches and be able to choose the most appropriate for a task
* Choose when and how to strengthen, stiffen and reinforce fabrics
* Know how to attach wadding or stiffening, and how to start and finish off a row of stitches.
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