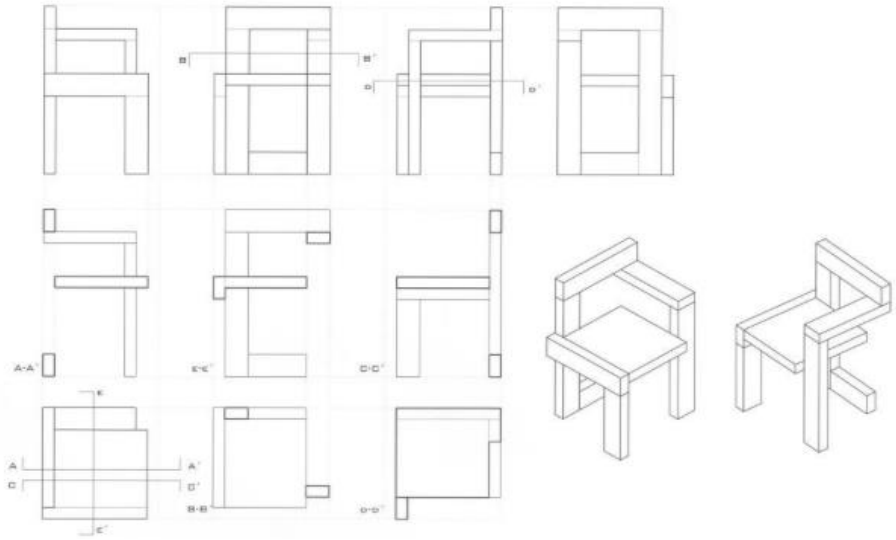
Ark John Archer Primary Academy *Design & Technology*

Design and Technology: *Rationale*

The Ark John Archer Design and Technology Curriculum intends to inspire and nurture pupils' creativity and innovation, giving them the opportunity to develop skills, knowledge and understanding of the design process, and to apply this through the creation of functional products. Pupils explore the practicalities of design, making direct reference to structures, mechanisms, electrical controls and a variety of materials and foods; they are encouraged to consider important issues and implications to inform the choices they make when designing for purpose. As pupils progress, they should be able to think critically and develop more rigorous understanding of design and construction in order to evaluate and adapt their creations, basing their reflections in part on the design, structures and architectures observed in the world around them. As their knowledge deepens, so too does their confidence to experiment, invent and create their own works of design.

Pupils learn how innovations in design and technology have shaped our history, contributing to the culture, creativity and wealth of our nation. They discover how past inventions have often offered a solution to relevant problems within a range of contexts and society; it is through evaluation of past and present design and technology that they develop a critical understanding of the impact this has had on daily life and the wider world. Pupils, in turn, draw upon their own creativity and imagination to design and make products that also attempt to solve real problems, considering their own and others' needs, wants and values. Just like the notable figures before them, they are encouraged to take risks, and in doing so learn to become resourceful, innovative, enterprising and capable citizens.



Throughout their journey, from Reception to Year 6, pupils acquire a broad range of subject knowledge and draw on disciplines such as Mathematics, Science, Engineering, Computing and Art to both enhance the design and making process, and demonstrate and reason about the decisions they have made. It is crucial that Design and Technology is recognised as a subject of its own and so links are not made to other areas of the curriculum unless these links are of benefit to both subject areas.

The curriculum has been developed to focus and build on the process of design, making and evaluating, providing pupils with the opportunity to apply these skills in the contexts of construction, textiles (forming a crossover with the Art and Design units) and cooking and nutrition (again forming a crossover, this time with the Sports and Health Curriculum offer). With a careful and consistent progression of skills and knowledge, pupils learn to make the necessary connections to piece their learning together throughout their learning journey. As children progress through the Design and Technology Curriculum, explicit links and connections are made to support pupils to continually build upon the knowledge and skills they have accumulated in previous year groups.

We teach Design and Technology in Reception as an integral part of the topic work covered during the year and as set out in the Early Years Foundation Stage Framework which underpin the curriculum planning for children aged three to five. We encourage the development of skills, knowledge and understanding that help pupils make sense of their world as an integral part of the academy's work. This learning forms the foundations for later work in Design and Technology. These early experiences include asking questions about how things work, investigating and using a variety of construction kits, materials, tools, and products, developing making skills and handling appropriate tools and construction material safely and with increasing control. We provide a range of experiences that encourage exploration, observation, problem solving, critical thinking and discussion. These activities, indoors and outdoors, attract the pupil's interest and curiosity.

Design and Technology: *Our Aims*

- Pupils develop the creative, technical and practical expertise needed to perform everyday tasks confidently and to participate successfully in an increasingly technological world.
- Pupils 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.
- Pupils critique, evaluate and test their ideas and products and the work of others.
- Pupils understand and apply the principles of nutrition and learn processes for cooking and preparing food safely.
- Pupils know about great designers and architects, and understand the historical and cultural development of their art forms.

Design and Technology: *Our Approach*

Knowledge and memory:

- *Connections and links:* while we acknowledge that most pupils find difficulty in transferring knowledge and skills from one context to another, explicit connections and references to prior learning are made for pupils throughout a unit to support mastery of the subject across different domains.
- *Wider reading and home learning:* suggested books and websites are shared with parents and pupils at the start of a unit of study to encourage wider reading, independent research and a collaborative approach to learning within the family environment.
- *Vocabulary is knowledge:* as part of a school-wide focus, children are exposed to challenging and innovative vocabulary at the beginning of each lesson to enrich their learning. Teachers take pupils through a deep dive into a few carefully selected words, providing opportunity to orally rehearse, apply in different contexts and construct sentences with accurate use of new terms. This enables children to expand their vocabulary knowledge, embed words and then have the confidence to apply them within their learning.
- *Learning excursions:* opportunities are mapped out for pupils to apply their knowledge acquired and expand their thinking through fieldtrips and linked excursions. These may come at the start of a unit to launch new learning, or throughout a unit to facilitate continually discovery and inspiration for writing.

Skills acquisition:

- *Design, making and evaluating skills and methods* form the foundations for the planning of each lesson. Throughout the sequence of learning, pupils are provided with the opportunity to build upon the skills they have already explored in order to continually refine their approach and apply for a range of contexts, domains and purposes.
- *Sketch books:* pupils record and annotate their creations and designs in sketch books in order to track their own progress, make reference to previous techniques and designs, and continually create, evaluate and adapt their work. Pupils move through the school with their sketchbooks, enabling them to make connections and links to the skills and knowledge acquired in previous year groups, and demonstrating progress year-on-year.

Learning Environments:

The classroom environment is designed to inspire and nurture pupils' creativity and innovation, reflecting the context for their design and modelling methods of creation. To enable children's knowledge to develop and evolve, the environment grows in complexity throughout the school. Key materials are displayed around the classroom to demonstrate design techniques and share key information throughout the progression of a unit of study:

- *Vocabulary:* key vocabulary to support application of both knowledge and skills are displayed on learning walls and throughout the classroom environment. Pupils are encouraged to make reference to this when completing tasks and reasoning verbally within class discussions.
- *Time line:* alongside the History Curriculum, pupils track innovative designs and developments from both the past and present on a timeline within the class.
- *Pupil outcomes and achievements:* pupils are motivated by the opportunity to have an example of their learning displayed within the classroom. Examples are chosen where pupils have demonstrated application of new techniques, progress in their manipulation and control of different tools and media, and exceptional achievements in their learning. Where possible, 3D creations are displayed, providing both exemplars and contrasting designs for pupils to reference while building new techniques and knowledge.
- *Home learning:* pupils are continually encouraged to engage further with their learning and study while at home and outside of the school environment. Home learning is celebrated during whole-school assemblies and displayed within classrooms / around the school for all pupils to view and celebrate.

Assessment:

- *Knowledge quizzes:* At the end of each unit of study, pupils complete a knowledge quiz to assess retention of knowledge and understanding of significant people, processes and innovations across the unit of study. Pupils enjoy the opportunity to demonstrate what they know and share in the success of their learning journey.
- *Sketch books:* pupils record and annotate their creations and designs in sketch books in order to track their own progress, make reference to previous techniques and designs, and continually create, evaluate and adapt their work. Pupils move through the school with their sketchbooks, enabling them to make connections and links to the skills and knowledge acquired in previous year groups, and demonstrating progress year-on-year.

Design and Technology: *Progression Map*

	Designing	Making	Evaluating	Construction	Textiles	Cooking and Nutrition
Reception	**Plan** Work within a range of contexts, stating what products they are designing. Describe the purpose of their design and how the product will work. Generate ideas based on their own experiences.	**Do** Select from a range of equipment, materials, and tools. With support, follow procedures for safety and hygiene, cut and shape materials. Assemble, join and combine materials and components.	**Review** Evaluate plans and making changes and adjustments where relevant to their product. Peer-assess to make improvements to product.	***Junk modelling:*** *Project based constructions completed independently. Using recycled materials to create a product such as a telescope, cars, rockets, buildings to reflect their topic.*		***Bread/Biscuits:*** Incorporate learning from Science and Maths to help design and make bread/biscuits. Learn how to prepare hygienically and safely, with use of a heat source where appropriate, using techniques such as chopping, mixing and baking. Explore how a healthy diet is made up from a variety and balance of different food and drink which, in different portions, provide energy for an active lifestyle.
Year 1	Work within a range of contexts, stating what products they are designing and who their target audience is. Describe the purpose of their design and how the product will work. Generate ideas based on their own experiences and knowledge of existing products.	Select from a range of equipment, materials, tools and components according to their functions and characteristics. Follow procedures for safety and hygiene to measure, mark out, cut and shape materials. Assemble, join and combine materials and components.	Explore a range of products to find who they are for, how they work, and how and where they are used. Discover the materials products are made from and evaluate what they like and dislike about products. Explain their own design ideas and what they are making. Make simple judgements about their products and ideas against design criteria.	***Moving-Parts Picture:*** *Pupils explore and use mechanisms (levers and sliders) in their own products. Select from a range of tools and materials to perform practical tasks.* ***Model vehicle:*** Explore the movement of mechanisms such wheels and axles. Discover the simple working characteristics of materials and components. Apply their findings to construct and design a functional model vehicle		***Fruit Kebabs:*** Understand where food comes from, and that fruit makes up part of a healthy diet. Be able to use tools safely (when chopping fruit
Year 2	Work within a range of contexts, stating what products they are designing and who their target audience is. Describe the purpose of their design and how the product will work. Generate ideas based on their own experiences and knowledge of existing products.	Select from a range of equipment, materials, tools and components according to their functions and characteristics. Follow procedures for safety and hygiene to measure, mark out, cut and shape materials. Assemble, join and combine materials and components. Use a range of finishing techniques.	Explore a range of products to find who they are for, how they work, and how and where they are used. Discover the materials products are made from and evaluate what they like and dislike about products. Explain their own design ideas and what they are making. Make judgements about their products and ideas against design criteria, suggesting how their products could be improved.	***Crowns:*** Pupils can make sensible choices as to which materials to use for their structures and develop their ideas from an initial stimulus. Pupils can consider how to make their models appealing to others. They can measure and join materials together in different ways ***Plant Potholders****:* Pupils develop ideas from a stimulus and consider how to make their models appealing to others. Pupils can make their structures stronger	***Puppets:*** Pupils measure and cut textiles and join pieces together to make a puppet. They can explain why they chose a certain textile and add embellishment to their puppet.	

Year 3	Work confidently within a range of contexts to gather information about the particular needs and wants of individuals and groups, describe the purpose of a product and select design features that will appeal to the user. Develop own design criteria to inform ideas, model ideas and share and clarify these through discussion and annotated sketches.	Select suitable tools, materials, equipment and components, explaining their choices in relation to the skills and techniques they will be using, and their desired functional properties and aesthetic qualities. Follow safety and hygiene procedures to measure, mark out, cut and shape materials with accuracy. Assemble, and combine materials and components. Use a range of finishing techniques.	Use their design criteria to evaluate and improve their products in consideration of the views of others, including intended users, identifying strengths and areas for development. Investigate how well products have been designed and made, how well they work and achieve their purpose and whether they can be recycled or reused. Investigate other products – who designed them, where/ when were they made?	***Bridges:*** Incorporate learning from Science and Maths to help design and make a bridge, exploring how mechanical systems, such as levels and linkages, create movement. Discover how materials have both functional properties and aesthetic qualities and that these can be combined and mixed to create more useful characteristics, including making strong, stiff shell structures. **Greenhouses:** Understand how key events and individuals in design and technology have helped shape the world. Know which materials are most suitable for creating shell structures. Pupils can explain the pros and cons of choosing certain materials for a structure. Pupils can join materials effectively and understand the impact of adding shapes to structures. Pupils can apply their understanding of how to strengthen and reinforce more complex structures. Use finishing techniques to ensure their structure is aesthetically pleasing.		***Pizza:*** Understand and apply the principles of a healthy and varied diet. Prepare and cook a savoury dish and know where and how some ingredients are grown. Pupils begin to understand the idea of seasonality and what we mean by airmiles. Pupils can choose appropriate ingredients and make their food look attractive. Prepare food products hygienically and safely.
Year 4	Work confidently within a range of contexts to gather information about the particular needs and wants of individuals and groups, describe the purpose of a product and select design features that will appeal to the user. Develop own design criteria to inform ideas, model ideas and share and clarify these through discussion and annotated sketches.	Select suitable tools, materials, equipment and components, explaining their choices in relation to the skills and techniques they will be using, and their desired functional properties and aesthetic qualities. Follow safety and hygiene procedures to measure, mark out, cut and shape materials with accuracy. Assemble, and combine materials and components. Use a range of finishing techniques.	Use their design criteria to evaluate and improve their products in consideration of the views of others, including intended users, identifying strengths and areas for development. Investigate how well products have been designed and made, how well they work and achieve their purpose and whether they can be recycled or reused. Investigate other products – who designed them, where/ when were they made?	***Skyscrapers:*** Incorporate learning from Science and Maths to design and make a skyscraper. Discover how materials have functional properties and aesthetic qualities and that these can be combined to create more useful characteristics. Learn how simple electrical circuits and components are used to create functional products, and how mechanical and electrical systems have input, process and output. Program computers to control products. **Moving pictures**: Understand the difference between a lever and a linkage and know how mechanical systems create movement. Pupils can accurately make cuts and holes and join	***Pencil cases:*** Weave paper and materials to represent an image of a landscape, pattern or texture. Learn to discriminate between fabric materials to make suitable selections. Print on to fabric using monoprint block or tile, or stencils. Attach different elements through arrange of stitching and adhesive techniques.	

				materials together in a way which still allows movement. Pupils can also identify the pivot point.		
Year 5	Work confidently within a range of contexts, carrying out research, surveys, interviews, questionnaires and web-based resources to identify needs, wants, preferences and values of particular individuals and groups. Describe the purpose of products and indicate design features that will appeal to users. Develop design criteria to inform ideas, model ideas, share and clarify these through discussion and annotated sketches. ***Year 6:*** Make design decisions, taking account of constraints such as time, resource and cost.	Select from a wider range of suitable tools, materials, equipment and components, explaining their choices in relation to the skills and techniques they will be using, and their desired functional properties and aesthetic qualities. Formulate step-by-step plans as a guide to making. Follow safety and hygiene procedures to measure, mark out, cut and shape materials with accuracy. Assemble, and combine materials and components. Use a range of finishing techniques. ***Year 6:*** Demonstrate resourcefulness when tackling practical problems.	Evaluate design ideas and products against their original design specification, and in consideration of the views of others, including intended users, identifying the strengths and areas for development. Investigate and critically evaluate the quality of the design, manufacture and fitness for purpose of their products as they design and make. Discover how much products cost to make, how sustainable the materials in products are, and the impact products have beyond their intended purpose.	***Armour:*** Pupils make accurate measurements when designing and making a structure which provides protection (helmet/shield). Structure can be worn by the user. Pupils apply their understanding of how to strengthen and reinforce more complex structures. Pupils can ensure their product is strong, sturdy and fit for intended purposes ***Toys****:* Pupils understand what a mechanical object is and how they are part of our daily lives. Pupils can explain how different shaped cams change the movement of the follower. Pupils can explain how gears transmit movement and design and make a product using gears/cams.		***Bread:*** Incorporate learning from Science and Maths to design and make bread, exploring how ingredients can be fresh, pre-cooked and processed. Learn how to prepare and cook a variety of predominantly savoury dishes hygienically, with use of a heat source where appropriate. Explore how a recipe can be adapted by substituting or adding or one or more ingredient, changing the appearance, taste, texture and aroma. Explore how healthy diets rely on vitamins and minerals that are essential for our bodies, how what we eat can impact more than what we physically see and how to make responsible food and lifestyle choices. Discover that food is grown, reared and caught in the UK, Europe and the wider world, with the seasons affecting the availability of food.
Year 6				**Bird boxes:** Incorporate learning from Science and Maths to design and make a functioning bird box. Discover how materials have both functional properties and aesthetic qualities and that these can be combined and mixed to create more useful characteristics. Learn how mechanical systems, such as cams or pulleys or gears create movement**.**	***Utility Belts:*** Pupils can think what the user would need when choosing textiles to use and make the product, attractive, strong and functional. Pupils can measure and cut textiles accurately by first making a prototype. Pupils can join multiple pieces of textiles using a range of joining techniques. Pupils consider how their product can be sold.	