Curriculum Plan - Overview

Through KS3 students will follow a series of projects, develop their understanding of designing and making and equipping them with the necessary skills to solve real world problems.

In year 7, students will be introduced to the tools and processes that they need to learn, in order for them to produce successful products. Year 7 is also an opportunity to introduce the students to, and build on prior learning, of the ‘design process’. They will follow the ‘design process’ allowing them to develop a product, suitable for an identified user. During year 7 Pupil are introduced to different working properties of materials and develop the necessary skills and knowledge to work with the materials.

Year 8 is an opportunity for pupils to expand their designing, making, and evaluating skills that they learnt in year 7. They will follow the design process with a focus on improving their ideas through the ‘iterative design process’. They will learn to develop their ideas through modelling and continual improvement. During year 8 pupils also develop their knowledge of mechanisms, mechanical devices, and how mechanical devices can alter and adapt movements. They will explore different inputs, processes, and outputs with a view to using these to enhance their designs.

Year 9 provides students with the ability to enhance and improve their designing skills, drawing on techniques used by designers such as ‘Biomimicry’ and looking at organic and geometric patterns in design. Pupils will also look at the work of others, drawing inspiration from designers and design movements to help them with their own ideas. As the students progress towards the end of the KS3 curriculum, they will be provided with the opportunity to enhance their problem-solving skills, drawing on prior learning and developing new techniques to encourage them to tackle a design problem that they have identified themselves.

**Assessment Opportunities.**

Assessment throughout KS3 will focus on the four key areas, design, making, evaluation, and technical knowledge. As the students progress through KS3 there will be regular formative assessment opportunities to enable them to show that they have developed in the three key skills areas. Feedback will be provided in these key skills areas, against the assessment tracker, providing pupils with tools to close the gaps in their learning. Peer assessment opportunities are provided at key points in design and make projects, to allow pupils to evaluate their own progress.

Summative assessment will be an important factor in ensuring that the pupils understand the ‘Technical Knowledge’ element of Design and Technology. Summative assessment can range from short quiz homework, starters and plenaries, enabling monitoring of pupils understanding and to eradicate any misconceptions prior to an end of topic summative assessment.

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|  |  | P1 Introduction to DT | P2 – Design & Make | P3 – Passive Amp | Project 4 - Mechanisms | P5 – Function and Aesthetics | P6 – Problem Solving |
| **Designing** | Use research and exploration, such as the study of different cultures, to identify and understand user needs |  |  |  |  |  |  |
| Develop specifications to inform the design of innovative, functional, appealing products that respond to needs in a variety of situations |  |  |  |  |  |  |
| Use a variety of approaches [for example, biomimicry and user-centred design], to generate creative ideas and avoid stereotypical responses |  |  |  |  |  |  |
| Develop and communicate design ideas using annotated sketches, detailed plans, 3D and mathematical modelling, oral and digital presentations, and computer-based tools |  |  |  |  |  |  |
| **Make** | Select from and use specialist tools, techniques, processes, equipment, and machinery precisely, including computer-aided manufacture |  |  |  |  |  |  |
| Select from and use a wider, more complex range of materials, components, taking into account their properties |  |  |  |  |  |  |
| **Evaluate** | Investigate new and emerging technologies |  |  |  |  |  |  |
| Test, evaluate and refine their ideas and products against a specification, taking into account the views of intended users and other interested groups |  |  |  |  |  |  |
| Understand developments in design and technology, its impact on individuals, society and the environment, and the responsibilities of designers, engineers and technologists |  |  |  |  |  |  |
| **Technical Knowledge** | Understand and use the properties of materials and the performance of structural elements to achieve functioning solutions |  |  |  |  |  |  |
| Understand how more advanced mechanical systems used in their products enable changes in movement and force |  |  |  |  |  |  |
| Understand how more advanced electrical and electronic systems can be powered and used in their products [for example, circuits with heat, light, sound and movement as inputs and outputs] |  |  |  |  |  |  |
| Apply computing and use electronics to embed intelligence in products that respond to inputs [for example, sensors], and control outputs [for example, actuators], using programmable components [for example, microcontrollers |  |  |  |  |  |  |

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|  | **Project** | **Project Overview** | **Key Skills, content and knowledge** | **Assessment**  **Opportunities** | **Blended Learning** | **Cross Curricular Links/SMSC** |
| **Year 7** | **P1** | **Introduction to DT – Phone Holders**  The phone holder project is an introduction to Design and Technology and is used as an opportunity for the students to learn about health and safety in the workshop and how to use the tools and processes correctly. It is also an opportunity for the pupils to gain hands on experience of working with a range of different materials and understand and evaluate their working properties. | **Making**   * Follow procedures for safety and understand the risk in a workshop. * Make use of specialist equipment to mark out materials. * Select appropriately from specialist tools, techniques, processes, equipment, and machinery, including computer-aided manufacture. * Use a broad range of material joining techniques including mechanical fastenings, heat processes and adhesives. * Use CAD/CAM to produce and apply surface finishing techniques.   **Evaluate**   * Evaluate my products against the original specification and identify ways of improving them. * Actively involve others in the testing of my products.   **Technical Knowledge**   * About the physical properties of materials e.g. grain, brittleness, flexibility, elasticity, malleability and thermal. | Entry baseline assessment  Age Related Assessment - Making  Age Related Assessment - Evaluations | Online Quiz  MS Teams | Measure and Mark, working in MM – Links to Maths |
| **P2** | **Design and Make Project – Coat Hook Project**  Through the coat hook project, the pupils will gain an understanding of the design process and how to use it to help them create and improve the quality of their design ideas. They will learn how to design products for a client and how to develop their ideas. Through the practical section of the project the pupils will develop their making skills and work with a selection of different materials. They will also learn quality control processes, such as the use of jigs, formers, and templates to improve the accuracy of their final outcomes. The pupils are also given the opportunity to develop their evaluation skills, checking they quality of making throughout. | **Design**   * Develop detailed design specifications to guide my thinking. * Use research including the study of different cultures, to identify and understand user needs. * Develop and communicate design ideas using annotated sketches. * Use Techsoft 2D Design to model my ideas.   **Make**   * Follow procedures for safety and understand the risk in a workshop. * Make use of specialist equipment to mark out materials. * Select appropriately from specialist tools, techniques, processes, equipment and machinery, including computer-aided manufacture. * Use a broad range of material joining techniques including mechanical fastenings, heat processes and adhesives. * Use CAD/CAM to produce and apply surface finishing techniques.   **Evaluate**   * Evaluate my products against the original specification and identify ways of improving them. * Actively involve others in the testing of my products. * Investigate and analyse the positive and negative impact that products can have in the wider world. * Test, evaluate and refine my ideas and products against a specification, taking into account the views of intended users and other interested groups.   **Technical Knowledge**   * How to classify materials by structure e.g. hard words, soft woods, ferrous and non-ferrous, thermoplastic and thermosetting plastics. * About the physical properties of materials e.g. grain, brittleness, flexibility, elasticity, malleability and thermal. | Age Related Assessment - Designing  Age Related Assessment - Making  Age Related Assessment – Evaluation  **End of unit assessment** |  | Literacy Links  RE/Geography  PSHE – understanding other cultures.  Graphical communication – Links to Art  ICT  Literacy Links |
| **Year 8** | **P3** | **Design and Make – Passive Amp**  The passive amp project allows the pupils to develop their designing skills, providing them with the opportunity to evaluate the work of others to help them develop a working solution. This project introduces the pupils to 3D CAD, allowing them to model their ideas and test them prior to manufacture. | **Design**   * Consider additional factors such as ergonomics and anthropometrics. * Work confidently within a range of relevant domestic, local and industrial contexts, such as the home, health, leisure, culture, engineering, manufacturing and construction. * Use specifications to inform the design of innovative, functional, appealing products that respond to needs in a variety of situations. * Use a variety of approaches, for example biomimicry and user-centred design, to generate creative ideas and avoid stereotypical responses. * Produce 3D models to develop and communicate my ideas. * Produce models of my ideas using CAM to test out my ideas.   **Make**   * Select appropriately from a wider, more complex range of materials and components, considering their properties such as water resistance and stiffness. * Understand the need for templates, jigs and formers to improve accuracy in making. * Exploit the use of CAD/CAM equipment to manufacture products, increasing standards of quality, scale of production and precision. * Apply a range of finishing techniques to a broad range of materials including metals, polymers and woods.   **Evaluate**   * Test, evaluate and refine my ideas and products against a specification, taking into account the views of intended users and other interested groups. * Investigate and analyse existing products to help guide my thinking. * Know about an increasing range of designers, engineers, technologists and manufacturers and be able to relate their products to my own designing and making. | Age Related Assessment - Designing  Assessment against age related expectations – Making.  Assessment against age related expectations – Evaluation.  **End of unit assessment** | Google Sketchup – Sketchup for Schools  MS Teams  On-shape | Literacy Links  PSHE – Stereotyping, discrimination and prejudice. Disability Focus inclusive design.  Graphical Communication – Links with Art  Mathematical Modelling – Links to Maths and Physics  Use of flow charts linking to ICT and Computing.  PSHE – Internet use – internet safety. Copying images and copy right laws  Literacy Links |
| **P4** | **Mechanisms – Automata Project**  The mechanisms project helps the pupils to understand the cross curricular mature of design and technology. They will be required to draw on learning from both maths and science to help them understand forces and stresses on materials, to help them develop working prototypes that incorporate a range of possible mechanisms, gear trains, linkages and leavers. | **Design**   * Use specifications to inform the design of innovative, functional, appealing products that respond to needs in a variety of situations * Produce 3D models to develop and communicate my ideas * Use mathematical modelling to indicate likely performance before using physical materials and components, for instance when developing gearing systems or mechanisms.   **Make**   * Select appropriately from a wider, more complex range of materials and components, considering their properties such as water resistance and stiffness. * Understand the need for templates, jigs and formers to improve accuracy in making. * Exploit the use of CAD/CAM equipment to manufacture products, increasing standards of quality, scale of production and precision. * Apply a range of finishing techniques to a broad range of materials including metals, polymers and woods.   **Evaluate**   * Test, evaluate and refine my ideas and products against a specification, taking into account the views of intended users and other interested groups.   **Technical Knowledge**   * Use learning from science to help design and make products that work. * Use learning from mathematics to help design and make products that work. * Understand the properties of materials, including smart materials, and how they can be used to advantage. * Understand the performance of structural elements to achieve functioning solutions. * Understand how more advanced mechanical systems used in their products enable changes in movement and force | Assessment against age related expectations – Designing.  Assessment against age related expectations – Making.  Assessment against age related expectations – Evaluation.  **End of unit assessment** | Google Sketchup – Sketchup for Schools  MS Teams  On-shape | Science/Physics link  Maths – Calculating mechanical advantage.  Science – Gear ratio and mechanical advantage.  Physics – motion and forces |
| **Year 9** | **P5** | **Functionality and Aesthetics – Lighting Project**  The functionality and aesthetics unit of work allows the pupils to understand the theory and ethos behind good design. They will learn what good design is and how it can be achieved, they will look at the work of existing and past designers and draw on their learning to design and manufacture a USB light based on a designer of their choice. | **Design**   * Research the health and wellbeing, cultural, religious, and socio-economic contexts of their intended users * Use 3D CAD to model, develop and present their ideas. * Use CAD and related software packages to validate their designs in advance of manufacture.   **Make**   * Create production schedules that inform their own and others’ roles in the manufacturing of products they design. * Make simple use of planning tools, for instance Gant charts. * Communicate their plans clearly so that others can implement them * Match and select suitable materials considering their fitness for purpose.   **Evaluate**   * Select appropriate methods to evaluate their products in use and modify them to improve performance. * Produce short reports, making suggestions for improvements. * Investigate and analyse products that they are less familiar with using themselves. * Investigate and analyse products considering life cycle analysis. * Investigate and analyse how products can be developed considering the concept of ‘cradle to grave’. * Investigate and analyse the concept of circular economy approaches in relation to product development and consumption.   **Technical Knowledge**   * How to make adjustments to the settings of equipment and machinery such as band facers and drilling machines. | Assessment of key skills – Designing (1-9)  Assessment of key skills – Making (1-9)  Assessment of key skills – Evaluation (1-9)  **End of unit assessment** | Google Sketchup – Sketchup for Schools  MS Teams  On-shape | Literacy Links  Data collection – Maths  Links to Science and nature – Biology  Literacy Links  Science |
| **P6** | **Problem Solving – Mini NEA**  The final project of KS3 provides the students with the opportunity to draw on their learning and solve a design problem that they have identified. They will need to develop and present a 3D solution. | **Design**   * Research the health and wellbeing, cultural, religious, and socio-economic contexts of their intended users * Understand how to reformulate design problems given to them. * Use 3D CAD to model, develop and present their ideas. * Use CAD and related software packages to validate their designs in advance of manufacture.   **Make**   * Create production schedules that inform their own and others’ roles in the manufacturing of products they design. * Make simple use of planning tools, for instance Gant charts. * Communicate their plans clearly so that others can implement them * Match and select suitable materials considering their fitness for purpose.   **Evaluation**   * Select appropriate methods to evaluate their products in use and modify them to improve performance. * Produce short reports, making suggestions for improvements. * Investigate and analyse products that they are less familiar with using themselves. * Investigate and analyse products considering life cycle analysis. * Investigate and analyse how products can be developed considering the concept of ‘cradle to grave’. * Investigate and analyse the concept of circular economy approaches in relation to product development and consumption.   **Technical Knowledge**   * How to make adjustments to the settings of equipment and machinery such as band facers and drilling machines. | Assessment of key skills – Designing (1-9)  Assessment of key skills – Making (1-9)  Assessment of key skills – Evaluation (1-9)  **End of unit assessment** |  | Links to geography/RE  PSHE – Research into other cultures, how can we protect from prejudices?  Understanding cultural differences and how to avoid offensive design.  ICT  ICT – Flow/Gant Charts  Literacy Links.  PSHE – What is sustainability and why is it essential to our environment? Understanding the cradle to grave policy of a product lifecycle |

1. What is your curriculum intent? What is your rationale for what you have produced? What is your curriculum’s aim?

The aim of the Design and Technology curriculum is to instil and develop the core skills required to succeed in D and T. The rational is to in introduce students to designing, making and evaluating their work and build on those identified skills as they progress through key stage 3.  The aim of the curriculum is to fully prepare our students and give them the skills that they need to achieve their potential at key stage 4.

1. What are the key skills/content/knowledge being learnt in years 7 and 8? What are they learning?

The key skills that they will learn in year 7 and 8 are:

Designing – how to use research into a variety of different areas to help them to produce creative and well-presented design ideas that are suitable for an identified client. They will develop skills and improve cross curricular link in areas such as writing a design brief and specification.

Making – They will learn all the tools, manufacturing techniques and processes (including CAD/CAM) needed to produce quality products

Evaluation – how to critically evaluate their own and the work of others, how to identify areas for improvement.

Subject Knowledge – Materials, tools and processes, mechanisms, learning from maths and science, the work of others.

1. How is the learning sequenced? Why? Where is the spiral curriculum evident?

 There is a repetition of skills in each project that the students do, gradually building on the skills that they need. Every project focuses on designing, making and evaluation.

1. How will you assess the learning? What are you putting in place to monitor and collate learning?

The skills will be assessed against the ARE framework which has been drawn up based on the DT national curriculum framework

1. Blended Learning – this will be a prescribed requirement which LB/RF will explain in the meeting

Blended learning will be online quizzes and online CAD packages that the students have access to.

1. Where, how and why does your curriculum link to other subjects? How does it reinforce school values, British values, social/cultural ideas and careers?

Please see links column.