Curriculum Overview for Design and Technology KS3 & KS4

The table below details the skills and knowledge students will be covering each half term in Years 7-11 in this subject area.

	HT1	HT2	HT3	HT4	HT5	HT6
7: The Fundamentals	**Health and safety**: Tool passport Baseline testing - assess prior learning.	**Design skills** - Graphics and modelling	**Illumination** - CAD and electronics	**Learning in Layers** - 3D printing and emerging technologies	**Zip it** - working with wood and metals	**Architecture** - materials and models
8: Understanding Industry	**Keep Out!** - Electronics, CAD, CAM and plastics.	**Media Player** - 3D, Cad and user design.	**Dynamic designs** - Graphics and photoshop.	**Mood Lighting** - working with metals and design.	**Mechanisms** - engineering, design and make	Mechanisms continued, extended with real world application
9: Contextual Application:	**Wheelies** - Graphics, CAD and CAM.	Iteration - Techniques and processes	Skill stick - working with wood, metal, casting and brazing,	Skill stick continued.	Move! - Electronics, programming and mechanisms. Field trip opportunity - Robotics	
10: GCSE Design and Technology	Mock NEA Unit 1 New and Emerging Technologies (Key ideas)	**Razor design** - Ergo modelling Unit 2 Energy, materials, systems and devices. Unit 3 Materials and their working	**Solar lights** - Resistant materials Unit 4 Common specialist technical principles	**Carton Design** - card modelling, graphics and 3D nets Unit 5 Commercial manufacturing processes	**Screwdrivers** - CAD, CAM applying ergonomic theory Unit 7 Making principles	**Start of NEA Coursework**

		properties		Unit 6 Designing principles		
11: GCSE Design and Technology	Continuation of NEA Coursework Revision Unit 1 New and Emerging Technologies (Key ideas)	Continuation of NEA Coursework Revision Unit 2 Energy, materials, systems and devices. Unit 3 Materials and their working properties	Continuation of NEA Coursework Revision Unit 4 Common specialist technical principles	Revision Unit 5 Commercial manufacturing processes Unit 6 Designing principles	Revision Unit 7 Making principles	**Final Revision**

KS/Unit	Overview
KS2	Through the study of Design and Technology in year 7, our pupils learn to be innovative designers who use many techniques to create products and solve problems by building on the knowledge and skills from KS2: **Design** In KS2 students should: ● 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 **Make** In KS2 students should: • Select from and use a wider range of tools and equipment to perform practical tasks [for example, cutting, shaping, joining and finishing], accurately • 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 **Evaluate** In KS2 students should: • 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 **Technical knowledge** In KS2 students should: • 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.
Year 7	**The Fundamentals** Students will learn how to develop existing drawing and design skills by learning how to improve their freehand sketches to then learning more formal methods of colouring and drawing techniques. Once students have learnt these skills, pupils will produce designs ideas in projects using both freehand sketches and then move from drawing in 2D to using their newly learnt 3D drawing skills. Alongside these drawing techniques, pupils will learn to use written techniques to explain and justify their design thinking. This is done through the use of annotations and the analysis and evaluation of their design ideas.

	Students will learn the safe use of tools and equipment in both the classroom and workshop environment. They will be taught the importance of adhering to these safe working practices to ensure they are keeping both themselves and their peers safe. Pupils will learn to think ahead about the order of their work, choosing appropriate tools, equipment, materials, components and techniques. They use tools and equipment with some accuracy to cut and shape materials and to put together components. At the end of the year pupils will have an understanding of combining practical skills with an understanding of aesthetic, social and environmental issues, both on a local and wider scale.
Baseline Testing	To gain a greater understanding of the knowledge the Pupils have brought with them from Primary School. All Pupils will complete a baseline test.
Workshop Licence	Pupils will learn the basics of workshop practice including health and safety, the use of tools and techniques for accurate measuring and marking. This will feed into their later lessons for creating MDF/acrylic slot together decorations by ensuring they have a basic knowledge of the workings of the workshop. It is unlikely that pupils will have worked with workshop tools during KS2 so we assume limited knowledge and teach students the basics from the start.
Design skills	Pupils will use a booklet of design tasks to help them develop and refine their skills in drawing and presenting design ideas as well as understanding the work of others. The booklet enables Pupils to work in an organised way, alongside developing skills. The material is written for those with no prior experience with perspective, beginning with basic concepts of 2D and 3D shapes, before working towards more complex three-dimensional forms. This topic will lead into helping with design and presentation skills in the slot together animals project.
Illumination	Pupils will use what they learnt earlier in the year to design and make a simple ergonomic torch.. Pupils will then further develop their workshop skills and knowledge in producing a practical outcome from waste materials. Pupils will understand the classification of the materials they are using in each stage of their project. Pupils will learn to understand needs, wants, values, interests & preferences of their target audience to inform their designing.
Learning in layers	Pupils will use a booklet of design tasks to help them develop and refine their skills in 3D drawing and presenting design ideas as well as understanding the work of others. Students learn how to design, manipulate shapes in 3D space. They understand the processes required to go from screen prototype to physical model.
Zip it	Pupils will use what they learnt earlier in the year to design and make a key holder for inside the house. Pupils will then further develop their workshop skills and knowledge in producing a practical outcome from wood and 1.2mm mild steel. Pupils will understand the classification of the materials they are using in each stage of their project. Pupils will learn to understand needs, wants, values, interests & preferences of their target audience to inform their designing.

Architecture	Pupils will use a booklet of design tasks to help them develop and refine their skills in drawing and presenting design ideas as well as understanding the work of others. The booklet enables Pupils to work in an organised way, alongside developing skills. The key focus for the project is to learn modelling skills with cardboard. Starting with looking at cutting lists and assembly stages. Students will develop skills in processes, that will help them further on in the DT curriculum.
Year 8	**Understanding Industry:** Following on from "The Fundamentals" learnt in year 7, in year 8 pupils will start to work in a way which closer links to how a real life designer or engineer would work. Pupils are provided with "contexts" to encourage them to respond with freedom and creativity. Pupils learn to embrace all materials and processes to best equip them with the most appropriate tools needed to solve the problem. Just as in industry, a designer or engineer would. Pupils will start the year gaining a basic understanding of what key electronic components do and how they can be arranged into systems comprising -input, process and output. Pupils should be able to demonstrate a level of skill in identifying components, correctly populating and soldering components into a pcb. Using batch production methods/jigs students will manufacture a wooden frame and base for their night mood light. Pupils will be introduced New and emerging technologies, learn how to create designs using CAD and then be able to print some of their designs immediately using a 3D printer, cut some vinyl with the plotter cutter and use the laser cutter, thereby giving them tangible results from their design process. The Iterative design process will lead students to high-quality products. We're transitioning from 2D drawings – to real-life prototypes and feedback. Using both traditional modelling methods, computer-aided design and 3D printing, the use of technology to photograph, screenshot and document constantly-changing iterations will develop higher-order thinking.
Keepout	Pupils will build on skills already learnt and developed throughout their time at BHS, to design a simple electronic device, which incorporates a number of components. Students will begin to develop an understanding of capacitors, resistors, diodes for example. They will begin to be able to discuss the flow of electricity using terms such as "ohms law" and be able to calculate power, current and voltage through manipulation of simple rules.

Media player CAD/CAM	- Tinkercad and 3D Printing - 2D Design and Laser Cutting - Vacuum forming In this project pupils will move away from the use of materials and use 3D modelling software to create their designs. They will develop their understanding of designing and modelling by improving their ICT skills. They will use computers as an integral part of designing. The main aim of this project is to develop pupils' understanding of designing in a virtual reality. Pupils will learn to use Tinkercad and 2D Design software to model a range of different products. These exercises will provide pupils with skills in working with plastics, and presentation design and consider aesthetics.
Dynamic Designs Drawing and Presentation Skills.	Pupils will use a booklet of design tasks to help them develop and refine their skills in drawing and presenting design ideas as well as understanding the work of others. They will then progress onto using photoshop and begin to understand the work involved. Possible PSHE topics will arise from the course, such as the increased use of “photoshop” to improve the look of people, animals and products we buy.
Mood Lighting	Building on previous experience students have had with both metals and wood (resistant materials) students will be able to work with materials, after giving consideration to their suitability for the job in hand. Pupils will understand the classification of the materials they are using in each stage of their project. Pupils will learn to understand needs, wants, values, interests & preferences of their target audience to inform their designing.
Mechanisms	In this project, students will build on experiences and understanding to focus on mechanisms: gears, levers. They will be able to access areas of other curricula, such as science for motions and movements (Physics) and the use of devices (History). Students will study previous examples of mechanisms, such as clocks, simple gears and siege devices use in a historical application. Opportunities will arise for the students to design and build simple mechanisms, using wood, plastics and metal to a simple design brief. Consideration could be made to any cross curricular days that could be developed. Such as the making of model working trebuchets, that could be tested on the school field.
Year 9	GCSE Preparation Contextual Application: The content learnt in year 7 and 8 will be built upon, laying the foundations of knowledge and skills, to create independent problem-solvers who are ready to tackle their GCSE Design and Technology coursework in year 10/11.

	Students learn different ways to make prototypes and models. In industry Modelling can be time-consuming and expensive, but a physical model allows a person to see and handle a product unlike viewing it on a screen through computer aided design (CAD). Computer aided manufacture (CAM) models made on a 3D printer using a CAD drawing are very accurate but also expensive and time-consuming.
Wheelies	- Tinkercad and 3D Printing - Graphics - 2D Design and Laser Cutting - Vacuum forming In this project pupils will move away from the use of materials and use 3D modelling software to create their designs. They will develop their understanding of designing and modelling by improving their ICT skills. They will use computers as an integral part of designing. The main aim of this project is to develop pupils' understanding of designing in a virtual reality. Pupils will learn to use Tinkercad and 2D Design software to model a range of different products. These exercises will provide pupils with skills in working with plastics, and presentation design and consider aesthetics.
LIT Techniques and Processes	Students learn different ways to make prototypes and models. In industry Modelling can be time-consuming and expensive, but a physical model allows a person to see and handle a product unlike viewing it on a screen through computer aided design (CAD). Computer aided manufacture (CAM) models made on a 3D printer using a CAD drawing are very accurate but also expensive and time-consuming. Students work as product designers to learn to use easy-to-form and easily accessible materials, eg balsa wood, salt dough, polymorph and cardboard, to create cheap models quickly and cheaply. This helps students to develop an understanding of an idea, design, object, shape or concept in 3D. Students then learn advanced workshop skills such as: ● Vacuum Forming - positive and negative ● Pewter Casting ● Exploring non familiar materials such as cement. ● Bending wood on a miniature scale with jigs and clamps, compound curves. Students can reference the old ways of making curves in materials, compared to the new ways: CNC vs Manual.
Skill stick	Building on previous experience students have had with both metals and wood (resistant materials) students will be able to work with materials, after giving consideration to their suitability for the job in hand. Pupils will understand the classification of the materials they are using in each stage of their project.

	Furthering a previous unit of work, students will directly experience the process of casting, brazing and cold riveting techniques. This will further allow them to consider manufacturing processes, when they move onto GCSE and have to make something themselves from scratch. Pupils will learn to understand needs, wants, values, interests & preferences of their target audience to inform their designing.
Move!	In this unit, students build on understanding of electrical components to start to expand their understand the processes involved with sensors, controllers, and switches. They will begin to appreciate simple programming, using Raspberry pi, Arduino or similar programmers. Access to Lego mindstorms will allow them to design and build mechanisms, capable of responding to external factors. Possible field trip considerations would be to Leeds Met uni, Wakefield College to visit robotics labs - learning how robotics is moving forward. Students can carefully consider the pros and cons of robotics, for example the loss of work due to automation (think car manufacturing plants). They will then begin to appreciate the differences between batch manufacturing opposed to mass production (Nissan vs Morgan).
Context throughout Year 9:	Who? what? why? where? when? (Providing flexibility, choice and interpretation) Real life contexts: Locally, nationally and globally. Pupils to choose their only contexts from the below list or come up with a suitable on of their own: Isolation / Protection / Medical / Needs of the disabled / Needs of the elderly / Healthy Lifestyles Future technology / Relax and reflect /Space saving / Shelter / On the move / Sport / Educational needs / Learning through play / Wearables / Travel and tourism / Modern living / Recycle-Reuse-Rethink / Flat pack / Packaging
Year 10	Following the PG Online Design and Technology Resources. Tailored to the AQA specification End of unit assessment based on exam style questions Accompanying textbook available in printed and electronic formats Practical exercises in each specialist material area - covering techniques in ergonomical design, modelling in resistant materials, Card modelling, 3D nets and finishing off with CAD/CAM techniques. Each unit is intertwined with theory based on socioeconomics, biomimicry, ergonomics and user profiling. Students will be able to consider market pull and technological push.

Mock NEA Unit 3 Materials and their working properties	Students undertake a “mock” NEA assignment to work on a contextual challenge by undertaking a project in response to one of the contextual challenges provided, taking into account the needs and wants of the user. These challenges are open for interpretation and Pupils should, in analysis, realise a design problem to tackle in relation to the end user. This unit focuses on Sections 3.1.6.1 and 3.1.6.2 of the AQA specification. It covers the categories and properties of a complete range of core materials within each of five specialist areas. The materials are covered through practical applications and with reference to the key material category in which they belong. The specific physical and working properties that best describe each material subcategory are identified and defined with reference to use and knowledge that will underpin practical designing and making activities.
Mock NEA Unit 4 Common specialist technical principles	This unit focuses on the specialist technical principles that are common to all material areas in Section 3.2 of the 8552 specification. The suite of topics begins by covering the various forces and stresses on materials and objects with detailed exemplification, before looking at how to enhance them to improve their functionality. Ecological issues including product mileage and the six Rs are covered in detail across two lessons. The final lesson covers the effect of scale in production and production methods.
Unit 6 Designing principles	This unit is subdivided into five topics plus an end-of-unit assessment spread across roughly six lessons. It is a theoretical unit covering sections 3.3.1 – 3.3.6 of the new AQA Design and Technology specification 8552. The unit begins by looking at methods of investigating sources of primary and secondary data before moving on to look at the work of others to examine influential designers and design companies; this is split over two subtopics 2A and 2B. Topic 3 covers design strategies to illustrate how students can generate a range of designs efficiently. Finally, the unit investigates the communication of design ideas, covering a range of drawing styles. Students can then sit an assessment test comprising questions similar to those found on the GCSE exam paper.
Unit 7 Making principles	The final unit in the series explores the making principles in Section 3.3.7 – 3.3.11 of the 8552 specification. The first lessons analyse the functional need, cost and availability of materials required for prototype development, using appropriate tolerances when working. Material management skills including marking out are covered in Lesson 3 before looking at the use of specialist tools and equipment in the penultimate lesson. The final lesson covers the surface treatments and finishes that can be applied to materials to improve functionality and aesthetics.
Unit 1 New and Emerging	This free unit is subdivided into five topics plus an end-of-unit assessment spread across roughly six lessons. It is a theoretical unit covering the latest AQA Design and Technology specification 8552. The first lesson looks at the impact of

Technologies Unit 2 Energy, materials, systems and devices.	new and emerging technology on industry and enterprise before moving on to look at the effect that industry can have on the environment. The influence that people, culture and society have on product development and vice versa are covered in the third lesson. Contemporary production techniques are then covered before a final lesson on planned obsolescence and informing design decisions. Students can then sit an assessment test comprising questions similar to those found on the GCSE exam paper. Following on from unit 1, students will learn about ways in which energy can be stored and transferred. They should be able to link this unit up with a similar strand in Science which will cement the ideas.
Start of NEA Coursework	**What's assessed** Practical application of: • Core technical principles • Specialist technical principles • Designing and making principles **How it's assessed** • Non-exam assessment (NEA): 30–35 hours approx • 100 marks • 50% of GCSE **Task(s)** • Substantial design and make task • Assessment criteria: • Identifying and investigating design possibilities • Producing a design brief and specification • Generating design ideas • Developing design ideas • Realising design ideas • Analysing & evaluating • In the spirit of the iterative design process, the above should be awarded holistically where they take place and not in a linear manner • Contextual challenges to be released annually by AQA on 1 June in the year prior to the submission of the NEA • Students will produce a prototype and a portfolio of evidence
Year 11	
Continuation	See Above for NEA

of NEA Coursework Revision Unit 6 Designing principles	This unit is subdivided into five topics plus an end-of-unit assessment spread across roughly six lessons. It is a theoretical unit covering sections 3.3.1 – 3.3.6 of the new AQA Design and Technology specification 8552. The unit begins by looking at methods of investigating sources of primary and secondary data before moving on to look at the work of others to examine influential designers and design companies; this is split over two subtopics 2A and 2B. Topic 3 covers design strategies to illustrate how students can generate a range of designs efficiently. Finally, the unit investigates the communication of design ideas, covering a range of drawing styles. Students can then sit an assessment test comprising questions similar to those found on the GCSE exam paper.
Continuation of NEA Coursework Revision Unit 7 Making principles	See Above for NEA The final unit in the series explores the making principles in Section 3.3.7 – 3.3.11 of the 8552 specification. The first lessons analyse the functional need, cost and availability of materials required for prototype development, using appropriate tolerances when working. Material management skills including marking out are covered in Lesson 3 before looking at the use of specialist tools and equipment in the penultimate lesson. The final lesson covers the surface treatments and finishes that can be applied to materials to improve functionality and aesthetics.
Revision Unit 3 Materials and their working properties Unit 4 Common specialist tech	This unit focuses on Sections 3.1.6.1 and 3.1.6.2 of the AQA specification. It covers the categories and properties of a complete range of core materials within each of five specialist areas. The materials are covered through practical applications and with reference to the key material category in which they belong. The specific physical and working properties that best describe each material subcategory are identified and defined with reference to use and knowledge that will underpin practical designing and making activities. This unit focuses on the specialist technical principles that are common to all material areas in Section 3.2 of the 8552 specification. The suite of topics begins by covering the various forces and stresses on materials and objects with detailed exemplification, before looking at how to enhance them to improve their functionality. Ecological issues including product mileage and the six Rs are covered in detail across two lessons. The final lesson covers the effect of scale in production and production methods.
Revision New and	This free unit is subdivided into five topics plus an end-of-unit assessment spread across roughly six lessons. It is a theoretical unit covering the latest AQA Design and Technology specification 8552. The first lesson looks at the impact of new and emerging technology on industry and enterprise before moving on to look at the effect that industry can have

Emerging Technologies	on the environment. The influence that people, culture and society have on product development and vice versa are covered in the third lesson. Contemporary production techniques are then covered before a final lesson on planned obsolescence and informing design decisions. Students can then sit an assessment test comprising questions similar to those found on the GCSE exam paper.
Final Revision	Students to work on their own areas of focus for final revision.