Curriculum Progression Pathway

DESIGN TECHNOLOGY

Why is the study of Design and Technology important?

Design and Technology is a practical and valuable subject. It enables students to actively contribute to the creativity, culture, wealth and well-being of themselves, their community and their nation. It teaches how to take risks and so become more resourceful, innovative, enterprising and capable. Students develop a critical understanding of the impact of design and technology on daily life and the wider world. Additionally, it provides excellent opportunities for students to develop and apply value judgments of an aesthetic, economic, moral, social, and technical nature both in their own designing and when evaluating the work of others.

What students will know and understand from their study –

Across the four-year curriculum the aims of Design and Technology curriculum is to include the development of capability within the subject, along with broad general skills. Below details the skills and knowledge that will be gained across the five years and this list whilst not exhaustive also includes skills and knowledge gained in year 7 and 8.

What skills will the study of Design and Technology teach you?

Design and Technology use knowledge, skills and understanding from within the subject itself and also a wide range of other sources, especially but not exclusively science and mathematics. Design and Technology will teach you to:

- Develop resilience by not being afraid of challenges when solving problems, but to break them down and keep trying.
- Be creative in developing solutions to real world problems.
- Use modelling and annotated sketches to develop and communicate ideas.
- How to act responsibly within a practical environment thinking of the safety of yourself and others..
- Identify how to competently use a range of practical techniques across a range of disciplines.

- Apply and use CAD/CAM equipment to design and manufacture a range of products and components considering scale of production and precision.
- Work independently and part of a team to solve complex problems.
- Construct reasoned arguments to ethical, social and moral problems that have arisen due to technology and communicate these in an effective way.
- Identify links between different materials and contextual references.
- Test, evaluate and refine their ideas and products against a specification, taking into account the views of intended users and other interested groups.
- Understand and apply the principles of nutrition and health.
- Cook a repertoire of predominantly savoury dishes so that they are able to feed themselves and others a healthy and varied diet.
- Become competent in a range of cooking techniques (for example, selecting and preparing ingredients: using utensils and electrical equipment, applying heat in different ways: using awareness of taste, texture and smell to decide how to season dishes and combine ingredients, adapting and using their recipes).
- Understand the source, seasonality and characteristics of a broad range of ingredients.

What will you know and understand from your study of Design and Technology?

- How to classify materials including smart materials and discuss their physical properties.
- How to use simple electronic circuits incorporating inputs and outputs.
- How to manufacture products with reference to their materials physical properties.
- Students will learn to use and adjust equipment and machinery dependent on tasks.
- Use learning from science and mathematics to help design and manufacture components and products.
- Students will learn to consider the influence of a range of lifestyle factors and consumer choices when designing and analysing products.
- Students will know and understand additional factors to consider such as ergonomics, anthropometrics or dietary needs.
- How to use a variety of approaches, for example biomimicry and user-centred design to generate creative ideas and avoid stereotypical responses.

- Students will be able to evaluate their work against an increasing range of designers, engineers, chefs, technologists and manufacturers and be able to relate their product to their own designing and making.
- Students will be able to evaluate products through disassembly to determine how they are constructed and function and consider the life cycle analysis.
- How to competently use a range of cooking techniques for example, selecting and preparing ingredients; using utensils and electrical equipment.

Curriculum Planning

It is recognised schools are teaching a wide range of KS4 specifications, the themes and subject content have been identified from the following sources :

- The Design and Technology programmes of study for KS3
- GCSE subject content for Food Preparation and Nutrition
- GCSE subject content for Design and Technology
- WJEC Level 1/2 in Hospitality and Catering.
- BTEC Technical award Engineering

Curriculum content only covers core knowledge common to all KS4 specifications. It is expected schools will include additional content from their chosen specification into their planning.

Context – Subject Curriculum Progression Overview

DESIGN AND TECHNOLOGY CURRICULUM PROGRESSION OVERVIEW OUTWOOD ACADEMY CITY		
	Year 7	**Year 8**
Autumn Term 1	**Block Bot Project:** The focus of the project is to introduce the students to Design Technology and health and safety in the workshop. The project gives the students the opportunity to use the workshop machines and a range of workshop tools such as the belt sander, pillar drill, tenon saw, coping saw and a number of marking out tools. Knowledge covers work of other designers. Health and safety in a workshop including risk assessments. Manufactured boards and their source and different types. Basic lever systems. **7Design 1, 2, 3, 5, 6.** **7Making 1,2, 3, 5, 6, 7, 8.** **7Evaluate 1, 2,** **7Technical knowledge 1, 2, 7, 8, 9**	**CAD Desk lamp Project** The focus of this project is to introduce students to a different type of resistant material. The students will be Introduced to thermoplastics and properties as a reusable plastic. Students should understand that plastics do not biodegrade quickly and can take 1000 years, but we are now commonly beginning to reuse plastics rather than single use. The student will also get the opportunity to use computer aided design. This will provide students with a greater knowledge of CAD - Computer Aided Design - Introduced using the 2D design software and vectorising a suitable image, referring to design brief They also get the opportunity to develop their designing skills by producing designs for the lamp which will be a fully functioning product. Knowledge covers types of polymers and the range of properties of materials. They will also look at existing balancing toys and analyse the products and look at the pros and cons. **8Design 1, 2, 3, 5, 6.** **8Making 1,2, 3, 5, 6, 7, 8.** **8Evaluate 1, 2,** **8Technical knowledge 1, 2, 7, 8, 9**

Autumn Term 2	**Toy Mechanism Project:** This project continues to build the skills and knowledge in the workshop for the students. It starts to embed practical skills such as Health and safety, marking out and measuring, cutting and finishing skills and assemble skills. It also introduces the concept of mechanisms in the form of CAM and the axle and wheel. The students also through their design work are introduced to CAD/CAM in the form of the laser cutter. They are also taught the knowledge of a system through input, control and an output. The main knowledge aspect of this project is mechanism and the students will learn about the types of motion and the fact that mechanisms are designed to change the input motion to a different type of output motion. **7Design 1, 2, 5, 6.** **7Making 1,2, 3, 5, 6, 7, 8.** **7Evaluate 1, 2, 7** **7Technical knowledge 1, 2, 7, 9**	**Buzz wire Game Project** The buzz wire game is an exciting way of introducing students to a basic system and also some knowledge of a basic circuit and some simple electronics. The students will learn to use soldering irons and how to construct a basic circuit and to also fault find should as problems occur. They get the opportunity to design their own theme for the game so it will help to enhance their design skills. The project also continues to look at non-ferrous metals which the student has to shape therefore they discover the malleability of a metal. The knowledge students will gain will be mostly basic electric circuits and components, but they will also understand how a basic system operates and that they require an input, control and output. Students will also investigate further their knowledge of non-ferrous metals such as copper and brass. **8Design 1, 2, 3, 5, 6.** **8Making 1,2, 3, 5, 6, 7, 8.** **8Evaluate 1, 2,** **8Technical knowledge 1, 2, 3, 7, 8, 9**

Spring 1	**Juggling Kit** The focus of the project is to introduce the students to Design Technology and health and safety in the textiles workshop. Students are familiarised with the layout of the workshop and how to set themselves up for practical lessons. Initially, students are encouraged to analyse a design brief and respond to client's needs, from which they discover they are expected to produce a juggling bag with three juggle pyramids. This is to promote and educate beginner level jugglers. Students use their research skills to develop innovative and fun designs which are then developed into a 2D model to consider scale and composition. Similarly, students are introduced to basic pattern templates from which they measure and mark out a paper template before cutting into fabric. Furthermore, students are introduced to natural and synthetic fibres and practice decorative methods such as hand embroidery, tie-dye and applique are used to construct the product. Students are introduced to sewing machines to build their confidence using machinery and assemble the final product. The product is then evaluated considering how it can be improved and what worked well considering the requirements of the design brief. **7Design 1, 2, 3, 5, 6.** **7Making 1,2, 3, 5, 6, 7, 8.** **7Evaluate 1, 2,** **7Technical knowledge 1, 2, 7, 8, 9**	**Graffiti style Make up bag/Pencil case/Tablet case** Students learn how to develop and annotate design ideas. These designs are then transferred on to fabric by constructing a graffiti themed foam block print. Students use skills to measure and mark out accurately to produce a grid to plan the process of carrying out a variety of repeat patterns. Students then print their chosen method on to fabric and further refine their design using fabric paints and fabric crayons. Finishing is applied to the hem of the fabric to neaten the edges, which allows students to explore arrange of fastening methods such as zips, Velcro, ribbon and buttons. Students construct their graffiti style case together safely using the correct tools and equipment. Temporary methods are a focus such as pins and tacking which is then developed permanently by using the sewing machine to assemble it together. **8Design 1, 2, 3, 5, 6.** **8Making 1,2, 3, 5, 6, 7, 8.** **8Evaluate 1, 2,** **8Technical knowledge 1, 2, 3, 7, 8, 9**

Spring 2	Continue with Juggling Kit	Continue with make-up bag/Pencil case/Tablet case
Summer 1	Food Preparation and Nutrition	Food Preparation and Nutrition
Summer 2	Food Preparation and Nutrition	Food Preparation and Nutrition

5 YEAR DESIGN AND TECHNOLOGY CURRICULUM PROGRESSION OVERVIEW

	Year 9	**Year 10**	**Year 11**
Autumn Term 1 **Core Knowledge and principals** **8.**Papers and boards	Storage **GCSE DT RM** The context for the first project with the GCSE course is storage. The student will analyse this context and decide on an area of storage they wish to investigate. The students are directed to produce some form of container storage which can include DVD storage of a Bird house/feeder. The rationale behind this is to further develop	**Core Knowledge and principals** **Revision set by knowledge trackers** **NEA Controlled assessment**	

9.Natural and manufactured timbers **10.**Ferrous and non-ferrous metals	their knowledge of timbers and how to work worth timbers in the workshop. *Timbers is one of the topics covered in section A of the exam also it is an option question in section B. Students are encouraged to answer questions on this topic in the exam.* **GCSE DT Textiles** Students explore sustainability and consider the effect of clothing on the environment, as a result students then go on to explore how they can upcycle a denim product constructing it into a new fashionable item. Students reuse an old pair of jeans and develop strategies of remaking this into either a skirt or shorts of their choice. Students develop skills of dissembling a product and then marking out and measuring to create a paper pattern template of their newly designed product. Fastening methods are attached and finishing techniques such as the overlocker is used to familiarise students with producing a high quality finish. Student work will also be assessed using the GCSE assessment criteria to allow students to become familiar with the assessment procedure. **9Design 1, 2, 3, 4, 5, 6.** **9Making 2, 3, 4, 5, 6, 7.**		

	9Evaluate 2. **9Technical knowledge 2, 4.**		
Autumn Term 2 **Core Knowledge and principals** **11.** Polymers **12.** Textiles	Indoor furniture **GCSE DT RM** Students will be given the opportunity to design and make an item of indoor furniture. Students will be guided into producing a table or stool which gives the students the chance to improve their making skills and further enhance their knowledge of timbers and manufactured boards. The expected outcome is much higher than previous projects and several techniques are high level ones which will challenge most students. Student work will also be assessed using the GCSE assessment criteria to allow students to become familiar with the assessment procedure. **GCSE DT Textiles** Students will be given the opportunity to design and make an item of indoor furniture. Students will be guided into producing a fabricated stool which gives the students the chance to use a range of materials considering all areas of design technology. This will improve their making	**Core Knowledge and principals** **Revision set by knowledge trackers** **NEA Controlled assessment**	

	skills and further enhance their knowledge of fabric, timbers, and manufactured boards. The expected outcome is much higher than previous projects and several techniques are high level ones which will challenge most students. Student work will also be assessed using the GCSE assessment criteria to allow students to become familiar with the assessment procedure. **9Design 1, 2, 3, 5, 6.** **9Making 1,2, 3, 5, 6, 7, 8.** **9Evaluate 1, 2,** **9Technical knowledge 1, 2, 7, 8, 9** *Timbers is one of the topics covered in section A of the exam also it is an option question in section B. Students are encouraged to answer questions on this topic in the exam.*		

Spring 1 **Core Knowledge and principals** **7.** Mechanical devices **5.** Electronic systems	Table/stool continued…	**Core Knowledge and principals** **Revision set by knowledge trackers** **NEA Controlled assessment**	

Spring 2 **Core Knowledge and principals** **6.** Programmable components. **4.** Modern, smart materials, composite materials and technical textiles	Children's toy. **GCSE DT RM** Within this context students are encouraged to apply their knowledge of previous work in DT and design a children's toy which has a need and solves a problem for children and their learning. Students will be expected to look at existing products and evaluate their strengths and weaknesses. Students have the freedom to choose their own materials, but they must be aware of constraints such as size, costing and manufacturing limitations. **GCSE DT Textiles** Within this context students are encouraged to apply their knowledge of previous work in DT and design a children's toy which has a need and solves a problem for children and their learning. Students will be expected to look at existing products and evaluate their strengths and weaknesses. Students have the freedom to choose their own materials, but they must be aware of constraints such as size, costing and manufacturing limitations. **9Design 1, 2, 3, 5, 6.** **9Making 1,2, 3, 5, 6, 7, 8.** **9Evaluate 1, 2,** **9Technical knowledge 1, 2, 7, 8, 9**	**Core Knowledge and principals** **Revision set by knowledge trackers** **NEA Controlled assessment**	

Summer 1 **Core Knowledge and principals** 1. The impact of new and emerging technologies.	Children's toy continued…	**Core Knowledge and principals** **Revision set by knowledge trackers** **NEA Controlled assessment** **COURSEWORK DEADLINE.** **Examination**	
Summer 2 **Core Knowledge and principals** **2.** Evaluation of new and emerging technologies.	**Introduction of the NEA Controlled assessment.** **Brief sent to centres on the 1st June**		

3. How energy is generated and stored.			

Assessment

Assessment Objectives Design and Technology

	Design	Make	Evaluate	Technical Knowledge

Y10	1.Understand that all design and technological practice takes place within contexts which inform outcomes	1.Develop and apply in-depth knowledge by selecting and working with appropriate materials and components in order to produce a prototype	1.Test, evaluate and refine their ideas and products against the specification taking into account the views of intended users and other interested groups.	1.Understand the impact of new and emerging technologies on industry, enterprise, sustainability, people, culture, society and the environment, production techniques and systems.
	2.Investigate and analyse the work of past and present professionals and companies in the area of design and technology in order to help inform their own ideas	2.Apply in depth knowledge using appropriate and accurate marking out methods including measuring and use of reference points, lines and surfaces; use templates, jigs and/or patterns; work within tolerances; understand efficient cutting and how to minimise waste.	2.Critically evaluate new and emerging technologies to inform design decisions; considering contemporary and potential future scenarios from different perspectives, such as ethics and the environment.	2.Know how energy is generated and stored in order to choose and use appropriate sources to make products and to power systems.
	3.Use different design strategies, such as collaboration, user-centred design and systems thinking, to generate initial ideas and avoid design fixation.	3.Follow procedures for safety and write risk assessments.	3.Evaluate an increasing range of designers, engineers, technologists and manufacturers and be able to relate their products to their own designing and making.	3.Understand developments in modern and smart materials, composite materials and technical textiles.
	4.Design and develop at least one prototype that responds to needs and/or wants and is fit for purpose, demonstrating functionality, aesthetics, marketability and consideration of innovation	4.Use specialist techniques and processes to shape, fabricate, construct and assemble a high quality prototype, including techniques such as wastage, addition, deforming and reforming, as appropriate to the materials and/or components being used		4.Understand how electronic systems provide functionality to products and processes, including sensors and control devices to respond to a variety of inputs, and devices to produce a range of outputs
	5.Consider additional factors such as ergonomics and anthropometrics.	5.Use appropriate surface treatments and finishes for functional and aesthetic purposes		5.Understand how the use of programmable components are used to embed functionality into products in order to enhance and customise their operation
				6.Understand the functions of mechanical devices, to produce different sorts of movement, changing the magnitude and direction of forces:
				7.Know how to make adjustments to the settings of equipment and machinery

				such as sewing machines and drilling machines. 8.Use learning from science and maths to help design and make products that work.
Y9	1.Work confidently within a range of relevant domestic, local and industrial contexts, such as the home, health, leisure, culture, engineering, manufacture etc. 2.Consider the influence of a range of lifestyle and consumer choices when designing products. 3.Take creative risks when making design decisions. 4.Analyse where human values may conflict and compromise has to be achieved. 5.Decide which design criteria clash and determine which should take priority. 6.Consider additional factors such as ergonomics and anthropometrics.	1.Produce costings spreadsheets for products they design and make. 2.Match and select suitable materials and their fitness for purpose. 3.Adapt their method of manufacture to changing circumstances. 4.Recognise when it is necessary to develop a new skill or technique. 5.Follow procedures for safety and understand the process of risk assessments. 6.Make independent choices when selecting and using a broad range of manufacturing techniques including hand craft skills and machinery to manufacture products precisely.	8.Evaluate the concept of circular economy approaches in relation to product development and consumption. 9.Test, evaluate and refine their ideas and products against the specification taking into account the views of intended users and other interested groups. 10.Evaluate new and emerging technologies. 11.Evaluate an increasing range of designers, engineers, technologists and manufacturers and be able to relate their products to their own designing and making.	1.How to construct and use simple and compound gear trains to drive mechanical systems from a high revving motor. 2.How to make adjustments to the settings of equipment and machinery such as sewing machines and drilling machines. 3.Use learning from science and maths to help design and make products that work. 4.Understand the properties of materials, including smart materials, and how they can be used to advantage.

		7.Apply a range of finishing techniques to a broad range of materials.		

Y8	1.Use research and **begin to exploration**, such as the study of different cultures, to identify and **begin understand** user needs. 2.To identify and solve issues within a design development task. 3.Develop specifications to inform the design of innovative, functional, appealing products that respond to needs in a variety of uses. 4.Use a variety of influences, to generate creative ideas and avoid stereotypical responses. 5.Use 2D and 3D to model and develop their ideas. 6.Use CAD software to validate their designs in advance of manufacture. 7.Develop and communicate design ideas using annotated sketches, detailed plans, 3-D and mathematical modelling, oral and digital presentations and computer-based tools. 8.Consider additional factors such as ergonomics and anthropometrics.	1.Select from a wider, more complex range of materials and components, taking into account their properties. 2.Make simple use of planning tools for instance Gantt charts, communicate their plans clearly so that others can implement them. 3.Use a broad range of material joining techniques including stitching, mechanical fastenings, heat processes and adhesives. 4.Make independent choices when selecting and using CAD/CAM to manufacture products/components and apply surface finishing techniques to increase the standard of quality. 5.Follow procedures for safety and understand the process of risk assessments. 6.Make independent choices when selecting and using a broad range of manufacturing techniques including hand craft skills and machinery to manufacture products precisely. 7.Apply a range of finishing techniques to a broad range of materials.	1.Select appropriate methods to evaluate their products in use and modify them to improve performance. 2.Produce shorts reports making suggestions for improvements. 3.Evaluate products that they are less familiar with using themselves. 4.Evaluate products considering life cycle analysis. 5.Evaluate how products can be developed considering the concept of cradle to grave. 6.Test, evaluate and refine their ideas and products against the specification taking into account the views of intended users and other interested groups. 7.Evaluate new and emerging technologies. 8.Evaluate an increasing range of designers, engineers, technologists and manufacturers and be able to relate their products to their own designing and making.	1.How to apply computing and use electronics to embed intelligence in products that responds to inputs. 2.How to control outputs such as actuators and motors. 3.How to use software and hardware to to develop programmes and transfer these programmable components for example, microcontrollers. 4.How to make use of microcontrollers in products they design and manufacture themselves. 5.How to make adjustments to the settings of equipment and machinery such as sewing machines and drilling machines. 6.Use learning from science and maths to help design and make products that work. Understand the properties of materials, including smart materials, and how they can be used to advantage.

Y7	1.Use research, such as the study of different cultures, to identify user needs. 2.Be able to outline a simple specification to inform design ideas and guide their thinking. 3.Use 2D packages to model their ideas. 4.Produce models of their ideas using CAM to test ideas. 5.Be able to independently generate creative ideas inform by stimulus using annotations to explain key features relating to brief/specification. 6.Consider additional factors such as ergonomics and anthropometrics.	1.Produce ordered sequences and schedules for manufacturing products they design detailing resources required. 2.Make use of specialist equipment to mark out materials. 3.Use a broad range of material joining techniques including stitching, mechanical fastenings, heat processes and adhesives. 4.Select and use CAD/CAM to manufacture products/components and apply surface finishing techniques to increase the standard of quality. 5.Investigate and develop skills in modifying the appearance of materials including textiles and other manufactured materials. 6.Follow procedures for safety and understand the process of risk assessments. 7.Select and use a broad range of manufacturing techniques including hand craft skills and machinery to manufacture products precisely. 8.Apply a range of finishing techniques to a broad range of materials.	1.Evaluate their products against their original specification and identify ways to improve them. 2.Actively involve others in the testing of their products. 3.Evaluate products through disassembly to determine how they are constructed and function. 4.Evaluate the positive and negative impact that products can have in the wider world. 5.Test, evaluate and refine their ideas and products against the specification taking into account the views of intended users and other interested groups. 6.Evaluate new and emerging technologies. 7.Evaluate an increasing range of designers, engineers, technologists and manufacturers and be able to relate their products to their own designing and making.	1.How to classify materials by structure e.g. hard words, soft wood, ferrous and non-ferrous, thermoplastics and thermosetting plastics. 2.Consider the physical properties of materials. e.g brittleness malleability. 3.How to use simple electronic circuits incorporating inputs and outputs. 4.Consider textile fibre sources e.g. natural and synthetic. 5.How materials can be cast in moulds. 6.Make use of sensors to detect heat, light etc such as thermistors and light dependent resistors. 7.How to make adjustments to the settings of equipment and machinery such as sewing machines and drilling machines. 8.Use learning from science and maths to help design and make products that work. 9.Understand the properties of materials, including smart materials, and how they can be used to advantage.

Assessment Grids – Age Related Assessment Descriptors

Design and Technology

Scheme of Work	Design	Make	Evaluate	Technical Knowledge
Excelling *Working well above ARE* (Trajectory for Grade 8 – 9)	I can explain how engineers/ designers from different sectors contribute /generate a product. I can create imaginative, creative and innovative ideas, fully avoiding design fixation and with full consideration of design functionality, aesthetics and innovation. I can produce detailed annotation that clearly justifies how I have considered the user/client needs and links directly to the context selected. I can produce a complex investigation into the work of others and use this to inform my designs.	I can develop an improved final solution using CAD and modelling in relation to the brief. I have correctly used tools, equipment and materials (including CAM where appropriate) have been consistently used or operated safely with a high level of skill. I can produce a high quality prototype that has the potential to be commercially viable and has been made to meet the needs of the end user. I have evidenced a constant use of quality control to ensure a high quality, accurate prototype. I have clearly shown where I have adapted my work to include feedback from QC checks and/or user.	I can fully justify the development of an improved final solution and evaluate use of the design process, with reference to the brief and peer review. I have a comprehensive understanding of testing, analysing and evaluating existing products and ongoing work. I used judgements for independent and external feedback to inform and record modifications that I make.	I have knowledge and understanding of the impact of new and emerging technologies from a user, designer and manufacturers point of view. I can discuss and explain the impact of resources consumption on the planet and measure taken to improve this. I can implement sensitive approach with design and evaluation, and avoid negative impact on individuals and groups. E.g inclusive design/religious beliefs. I can identify and explain when/why and how various production techniques and systems are used in manufacture. For example, automation, JIT.

Exceeding *Working beyond ARE* (Trajectory for Grade 6 – 7)	I research and explore relevant information based on the users needs. I know how to use social, moral and cultural information to understand the user more clearly. I can independently solve design problems and understand how to develop problems that are given to me. I have developed a specification that allows me to be innovative, functional, and create an appealing design that responds to the users needs. I have used a variety of approaches, for example, biomimicry and user centred design which has generated creative ideas that avoid stereotypical response to the brief.	I can select specialist tools in my practical and my choices are justified. I justify the reasons for my choice of materials, taking into consideration their properties. I justify the process that I choose to make my product. I can use CAM in my work. I am accurate and precise when I work. I can work very safely and can coach others to do.	I can compare and contrast existing products, analysing them and explaining how this will influence my design. I understand and can explain developments in DT, for example use of robotics in manufacturing. I test, evaluate and refine my ideas and products against a specification. I always take into account the views of users/groups. I understand the responsibilities of designers and engineers and clearly show this in my work. This could include, inclusive design, sustainability etc. I can evaluate the impact of my product on individuals, society and the environment.	I understand and use the properties of materials and the performance of structural elements to achieve functioning solutions. I understand how more advanced mechanical systems are used in my products and enable changes in movement and force. I understand how more advanced electrical and electronic systems can be powered and used in my product. I apply computing and use electronics to ebed intelligence in my product that respond to inputs, and control output, using programmable components.

Achieving *Working at ARE* (Trajectory for Grade 4 – 5)	I use research to state and describe the users needs. I can generate at least three different ideas, listing the constraints and develop them so they're improved following user/specification analysis. I analyse research to write a full specification which include users views/needs. I can select different methods to develop and improve ideas e.g. CAD/Modelling in response to the specification. I annotate ideas in response to the specification and clearly show how/why the design has been improved.	I can describe the tools and equipment I use. I can describe a range of materials that I use. I can describe the processes that I use. My work is generally accurate and pay attention to quality of finish. I always work safely adhering to workshop safety rules.	I analyse existing products on the market that are relevant and use these to inform my ideas. I can test and evaluate my product against the specification and improve my product as a result. I understand what my responsibilities are as a designer including reference to positive and negative impacts that products may have on the wider world. I can describe new technologies and smart materials and describe how they can help the environment and end product.	I can understand the properties of materials and select them to improve functioning solutions. I understand how electrical and electronic systems can be powered and used in their products. I apply computing and use electronics in my product that respond to input and controls outputs. I understand how mechanical systems are used in my product to enable changes in movement and force. I can independently select and use how CAD/CAM in design and manufacture of my product (identify between 2D and 3D).

Developing *Working towards ARE* (Trajectory for Grade 2 – 3)	I use research to identify the users needs. I can generate at least three different ideas and develop them so they're improved. I use research to write a basic specification. I use different methods to develop and improve ideas e.g. CAD/Modelling. I annotate ideas so they're clear to others.	I can name the tools and equipment I use. I can name a range of materials that I use. I can list the processes that I use. My work is mostly accurate. I work safely adhering to workshop safety rules.	I look at existing products on the market that are relevant and use these to inform my ideas. I can test and evaluate my product against the specification. I understand what my responsibilities are as a designer and show this in my work. I know about new technologies and smart materials and know how they can help the user.	I can recall the properties of materials. I understand systems and control and know what an input and output is. I understand mechanical systems. I can select how CAD/CAM can be used in manufacture (identify between 2D and 3D).
Emerging *Working below ARE* (Trajectory for Grade U – 1)	I can outline how the product meets my own needs. I know what a specification is and can work from one. My ideas are sketched and labelled with basic notes.	I can prepare myself for practical. I can name some of the tools I use. I can use equipment safely. Practical work is reasonably accurate.	I look at products to help me with my ideas. I can outline what I designed and what I made and state improvements needed. I know what some of my responsibilities are as a designer. I know a bit about new technologies and smart materials and how they can help the user.	I can identify the properties of some materials. I understand a little about systems and control and know what an input and output is. I understand basic mechanical systems. I know how CAD/CAM can be used in manufacture.

Assessment Objective	Design AO1	Make (Include H&S) AO2	Evaluate AO3	Technical Knowledge AO4

(Assessment Objectives refer to Design and Technology Programmes of Study)

Wider Subject Curriculum – *enrichment, homework programs, quizzing, awards, trips, visits, reading / vocabulary lists, competition etc.*

Resources

Glossary of key terms, rules & formula - *to be spelt / used correctly*

Key Terms

Vocabulary	Description
Sustainability	Working in a way that will ensure a continued supply of resources and energy for future generations (renewable/non-renewable/finite).
Environmental	Concerned with the impact or change in the environment.
Aesthetic	Our perception of beauty including sight, sound, smell, touch (mainly visual for Product Design).

Texture	The feel, appearance or consistency of a surface, substance or fabric.
Durability	The ability of a material to be hard-wearing.
Hardwoods	Come from deciduous or broadleaf trees. They are generally slow growing, hard, sold by cubic meter then rough sawn to size or mould (dowel).
Softwoods	Come from coniferous trees with needles instead of leaves. They are generally faster growing, softer, easier to work with. Supplied in standard sizes that are either rough sawn or planed smooth (PSE).
One-off	Only one product is made at a particular time (usually high quality/unique).
Batch	A series of identical products are made together, in small or large numbers (usually for a specific event).
Mass production	Products made on a production line with each worker responsible for a particular stage. Products are made in larger numbers to reduce the cost of each item.
Prototype	An accurate or working representation of what the product will do.
Quality control	Guarantees the accuracy of a product (size, material quality/ visual features).
Quality Assurance	Checks the machines, systems and staff within an organisation that make the products.
Risk assessment	The likelihood of safety problems arising from an activity (in designing and making a product).

CAD	Computer aided design is a drawn product or part of a product on a software package that can then be exported to an CAM machine (Increases accuracy and ease of repeat cuts).
CAM	Computer aided manufacture, a machine that turns a digital drawing into numerical code that plots a path for an item to be cut/drilled/milled out of a section of material.
Thermoplastics	These soften when heated and can be reshaped.
Thermosetting plastics	Heated and moulded into shape these plastics cannot be reshaped with heat because the polymer chains have been interlinked.