



Curriculum Overview – Design and Technology - Year 10

Unit Title	Learning	How can parents best support?
3.1 Core technical principles	<p>In order to make effective design choices students will need a breadth of core technical knowledge and understanding that consists of:</p> <ul style="list-style-type: none">• new and emerging technologies• energy generation and storage• developments in new materials• systems approach to designing• mechanical devices• materials and their working properties.	<p>Encourage your child to revise the topics throughout the core technical principles as each topic emerges. Websites for revision can be:</p> <p>BBC bitesize – AQA exam board Technology student GCSE Design and Technology app (available on Apple devices only)</p>
3.1.1 New and emerging technologies	<p>Students must know and understand the impact of new and emerging technologies on contemporary and potential future scenarios in relation to the following areas:</p> <p>The impact of new and emerging technologies on:</p> <ul style="list-style-type: none">• the design and organisation of the workplace including automation and the use of robotics• buildings and the place of work• tools and equipment.	<p>Encourage your child to consider the differences between robotic and traditional methods of production in products.</p> <p>Encourage your child to think about positives and negatives of the use of robotics</p>

<p>3.1.2 Energy generation and storage</p>	<p>Students should understand how energy is generated and stored and how this is used as the basis for the selection of products and power systems.</p> <p>How power is generated from:</p> <ul style="list-style-type: none"> • coal • gas • oil. <p>Arguments for and against the selection of fossil fuels</p> <p>Potential links to maths and science:</p> <p>How to choose appropriate energy sources.</p>	<p>Encourage a discussion with your child when in the view of any renewable energy sources.</p> <p>Encourage your child to think about the energy they use on a day to day basis and how it could be reduced to save the environment.</p>
<p>3.1.3 Developments in new materials</p>	<p>Students should be aware of developments in new materials</p> <p>Developments made through the invention of new or improved processes eg Graphene, Metal foams and Titanium. Alterations to perform a particular function eg Coated metals, Liquid Crystal Displays (LCDs) and Nanomaterials.</p> <p>Potential links to maths and science:</p> <p>Classification of the types of properties of a range of materials. Selecting appropriate materials. Extracting information from technical specifications.</p>	<p>Encourage your child to watch 'Quick Guide to Smart & Modern Materials' on youtube.</p> <p>Your child can take notes and write information down that they feel are appropriate</p>

<p>3.1.4 Systems approach to designing</p>	<p>Students should consider electronic systems including programmable components to provide functionality to products and processes, and enhance and customise their operation.</p> <p>The use of light sensors, temperature sensors, pressure sensors and switches. The use of programming microcontrollers as counters, timers and for decision making, to provide functionality to products and processes. The use of buzzers, speakers and lamps, to provide functionality to products and processes.</p> <p>Potential links to maths and science:</p> <p>Extracting information from technical specifications. Component names, interaction and operation.</p>	<p>Encourage your child to use key terms from the lesson to discuss the different types of input, process and outputs</p> <p>Eg:</p> <p>Light switch – input Remote button – Input</p> <p>Light – Output Volume - Output</p>
<p>3.1.5 Mechanical devices</p>	<p>The functions of mechanical devices to produce linear, rotary, reciprocating and oscillating movements.</p> <p>Levers:</p> <ul style="list-style-type: none"> • first order • second order • third order. <p>Linkages:</p> <ul style="list-style-type: none"> • bell cranks • push/pull. <p>Rotary systems:</p> <ul style="list-style-type: none"> • CAMs and followers • simple gear trains • pulleys and belts. 	<p>Encourage your child to discuss the 4 types of motion they have learnt in the lessons in everyday life. Look at different products in the house and example which type of motion it uses</p> <p>Eg:</p> <p>Washing machine – Rotary motion</p>

<p>3.1.6 Materials and their working properties</p>	<p>Students should know and understand the categorisation of the types and properties of the following materials.</p> <p>Materials taught:</p> <p>Timber Metals Polymers Paper and boards Textiles</p> <p>In relation to the main categories outlined above (not the specific materials identified), students should know and understand physical properties such as:</p> <ul style="list-style-type: none"> • absorbency (resistance to moisture) • density • fusibility • electrical and thermal conductivity. <p>In relation to the main categories outlined above (not the specific materials identified), students should know and understand working properties such as:</p> <ul style="list-style-type: none"> • strength • hardness • toughness • malleability • ductility and elasticity. 	<p>Encourage the discussion regarding different types of materials in products, why they are used and how the properties benefit the purpose of the product.</p> <p>Encourage the notification of different hardwoods and softwoods you may see.</p> <p>Encourage the different type of fabric used in the clothes they own, are they natural or synthetic fibres</p> <p>Encourage the use and application of the different metals used in everyday house hold products. Are they ferrous or non ferrous?</p>
<p>Unit Title</p>	<p>Learning</p>	<p>How can parents best support?</p>

<p>3.2 Specialist technical principles</p>	<p>In addition to the core technical principles, all students should develop an in-depth knowledge and understanding of the following specialist technical principles:</p> <ul style="list-style-type: none"> • selection of materials or components • forces and stresses • ecological and social footprint • sources and origins • using and working with materials • stock forms, types and sizes • scales of production • specialist techniques and processes • surface treatments and finishes. 	<p>Encourage your child to revise the topics throughout the core technical principles as each topic emerges. Websites for revision can be:</p> <p>BBC bitesize – AQA exam board Technology student GCSE Design and Technology app (available on Apple devices only)</p>
<p>3.2.1 Selection of materials or components</p>	<p>In relation to at least one material category or system, students should be able to select materials and components considering the factors listed below.</p> <p>Functionality: application of use, ease of working. Aesthetics: surface finish, texture and colour. Environmental factors: recyclable or reused materials. Availability: ease of sourcing and purchase. Cost: bulk buying. Social factors: social responsibility. Cultural factors: sensitive to cultural influences. Ethical factors: purchased from ethical sources such as FSC.</p>	<p>Encourage your child to consider the different types of materials used in everyday products they see.</p>

<p>3.2.2 Forces and stresses</p>	<p>In relation to at least one material category or system, students should know and understand the impact of forces and stresses and the way in which materials can be reinforced and stiffened.</p> <p>Tension, compression, bending, torsion and shear.</p> <p>Potential links to maths and science:</p> <p>Changing the magnitude and direction of forces.</p>	<p>Encourage a discussion with your child regarding the different types of forces and stresses and how they impact everyday items they may use</p> <p>Encourage your child to use the key definitions for the different types of forces</p>
<p>3.2.3 Ecological and social footprint</p>	<p>In relation to at least one material category or system, students should have a knowledge and understanding of the ecological and social footprint left by designers.</p> <p>Deforestation, mining, drilling and farming. Mileage of product from raw material source, manufacture, distribution, user location and final disposal.</p> <p>That carbon is produced during the manufacture of products.</p> <p>Potential links to maths and science:</p> <p>Selecting appropriate materials. Understanding of how to choose appropriate energy sources.</p>	<p>Encourage your child to watch news bulletins and read news articles either on the internet or within a newspaper in regards to deforestation and any environmental impacts.</p>

<p>3.2.4 Sources and origins</p>	<p>In relation to at least one material category, students should know and understand the sources and origins of materials.</p> <p>Primary sources of materials and the main processes involved in converting into workable forms for at least one material area.</p> <ul style="list-style-type: none"> • Timber based materials (seasoning, conversion and creation of manufactured timbers). <p>Potential links to maths and science:</p> <p>Life cycle assessment and recycling ie the basic principles in carrying out a life cycle assessment of a material.</p>	<p>Encourage your child to watch ‘Logs to Lumber - An aerial journey through the sawmill’ on youtube and make notes of the stages of the log to lumber.</p>
<p>3.2.5 Using and working with materials</p>	<p>In relation to at least one material category or system, students should know and understand in addition to material properties, the factors listed below.</p> <p>Students must know and understand how different properties of materials and components are used in commercial products, how properties influence use and how properties affect performance.</p> <p>Students must know and understand the physical and mechanical properties relevant to commercial products in their chosen area as follows.</p>	<p>Encourage your child to discuss the tools and equipment they would use to make certain manufactured products if they were to make them in the workshop.</p>

<p>3.2.6 Stock forms, types and sizes</p>	<p>In relation to at least one material category or system, students should know and understand the different stock forms types and sizes in order to calculate and determine the quantity of materials or components required.</p> <p>Commercially available types and sizes of materials and components.</p> <p>Timber based materials:</p> <ul style="list-style-type: none"> • planks, boards and standard moldings • sold by length, width, thickness and diameter • standard components eg woodscrews, hinges, KD fittings. 	<p>Encourage your child to think about different components that may have been used on the everyday products they see at home</p> <p>Encourage you child to visit timber yards to understand the variety of different availabilities timber comes in</p>
<p>3.2.7 Scales of production</p>	<p>In relation to at least one material category or system, students should be able to select materials and components considering scales of production and referencing the processes listed in Specialist Techniques and processes.</p> <p>How products are produced in different volumes. The reasons why different manufacturing methods are used for different production volumes:</p> <ul style="list-style-type: none"> • prototype • batch • mass • continuous. 	<p>Encourage your child to identify the type of scale of production products have been made in. Your child can identify the products and give information as to why that particular method has been used.</p>

<p>3.2.8 Specialist techniques and processes</p>	<p>In relation to at least one material category or system, students should know and understand the factors listed below.</p> <p>How to use measurement/reference points, templates, jigs and patterns where suitable.</p> <p>Potential links to maths and science:</p> <p>Scaling of drawings, working to datums. Material quantities required.</p>	<p>Encourage your child to research jigs and template and create a fact sheet about the advantages and disadvantages of using them.</p>
<p>3.2.9 Surface treatments and finishes</p>	<p>In relation to at least one material category or system, students should have knowledge and understanding of surface treatments and finishes.</p> <p>The preparation and application of treatments and finishes to enhance functional and aesthetic properties.</p> <ul style="list-style-type: none"> • Timber based materials (painting, varnishing and tanalising). <p>Potential links to maths and science:</p> <p>Surface treatments to inhibit corrosion and oxidation.</p>	<p>Encourage your child to research the differences of finishes when using timber as a material. They can use BBC Bitesize as part of their revision.</p>