Fundamentals GCSE Product Design

Year 11

Unit 1- Theory Content

Key Topics	Knowledge	Skills
New technology	To review and evaluate the use of new technology across different manufacturing and design sectors, how these are funded and what impact they might have on culture, society and economics.	I can look at new technology in terms of discussing advantages and disadvantages across a variety of sectors, as well as develop critical analysis of their effects on different people and the environment.
Power and Energy	To determine the advantages and disadvantages of a range of power systems, including finite and renewable sources. To conclude how best to select sources of power for a variety of products. To understand storage needs for power systems and requirements for design considerations for both small and large products.	I can name a range of finite and renewable power sources as well as explain how each can be used in different scenarios and for different design considerations. I can explain the reasons for design choices in terms of power source and storage capacity. I can link my understanding to user needs and design briefs.
Smart Materials	To explain the use of a range of smart materials across different design and technology products, including usability performance. To know the advantages and disadvantages of a range of smart technologies.	I can explain design limitations and consideration for the use of smart materials in a variety of products. I can discuss the positives and negatives of using a variety of smart and modern materials to help me make successful design decisions.
Electronics and Programmable systems	To explain the difference between a range of circuit components including resistors, transistors and output/input devices. To determine how these components respond in feedback systems and other programmable design variants.	I can name and explain the use of a range of input, processing and output devices used in electronic systems. I can determine the considerations and limitations of each component. I can explain the use of these components in programmable

		systems and create flowcharts to highlight my conclusions.
Mechanisms	To explain the difference between mechanical devices such as gears, cams, pulleys and levers. To recall the motions for a variety of mechanical devices. To calculate mechanical advantage in lever systems and use this data to discuss the efficiency of each system. To calculate velocity ratio of gear and pulley systems to determine function and performance of these systems. To use mathematical data to determine how efficient mechanical systems are and use this to determine design contexts.	I can name the different components used in a variety of mechanical systems. I can explain the different classes of lever and gear systems to determine their limitations and possible design outcomes. I can calculate how efficient different mechanical systems are, in terms of advantage, efficiency and velocity. I can analyse mathematical equations to determine design limitations and possible outcomes for different processes.
Materials; Polymers, timbers, textiles, paper and boards, metals	To understand the considerations and limitations of using a range of materials including: • Woven and non woven textiles • Natural and synthetic fibres • Natural and man made timbers • Thermoforming and thermosetting ploymers • Ferrous and non-ferrous metals • Paper and board products To explain the impact of all materials on the environment.	I can explain advantages and disadvantages of each material area in terms of their effectiveness in developing a successful product. I can discuss ecological effects of each material area to then further determine product suitability. I can highlight properties of each material that make them suitable for a variety of applications. I can analyse each material area in terms of its life cycle analysis and impact of the environment.

	To determine correct processes to manipulate each material for a variety of design contexts.	
Design Strategies	To analyse the work of other designers to further inspire creative outcomes in design work. To explain a variety of features across different areas to determine product limitations and suitability. To implement design strategies across different media to enable effective communication of ideas	I can discuss the work of others in detail, explaining advantages and disadvantages of their work. I can highlight the considerations and limitations of materials and products when analysing the work of others I can reflect on the usability of different products and discuss research strategies to develop ideas further, using research to determine effective methods. I can communicate my ideas in a range of formats and media, including isometric, working drawings, perspective drawings and CAD. I can use annotation and sketches to explain my thought process and highlight important features of my designs to communicate a thorough understanding of my ideas.
CAD/CAM	To explore computer aided design platforms to inform design outcomes To develop an understanding of CAD in terms of how it is used to power Computer Aided Manufacture systems	I can use a variety of CAD/CAM software to create and develop ideas from my initial design stages. I can explain the advantages and disadvantages of using CAD and CAM systems when working in the design industry.
Subject Specialims Material	Students will gain a deeper insight to the sources, origins, properties and processes linked with their chosen material area. This will either be Timbers, Polymers or Paper and Board products.	I can explain how my material is sourced, processed and transported for manufacture. I can evaluate my material area in terms of suitability for various design criteria, user input and environmental impact.

	Students will use this material area to evaluate effective design strategies and gain further core knowledge.	
Unit 2- Design and Making Unit (NEA)		
Key Topics	**Knowledge**	**Skills**
Investigating the Design Context	Know a range of research techniques and processes. Know what a design specification is and how to write an effective, measurable one.	Select and present relevant research for the design context. Write a clear design specification from the research for your customer chosen.
Development of Design Proposals	Know how to produce a range of design ideas following the specification. Understand how to develop ideas towards a creative and feasible final design. Know how to model ideas to show selection and use of materials. Show understanding of social, moral, environmental and sustainability issues. Know how manufacturing specifications are used.	Be able to use a range of techniques to present design ideas that follow the brief and your specification points. Show design development through drawing and/or testing Be able to produce models of your proposed ideas. Through annotation of your ideas and testing show how issues could be addressed. Produce a manufacturing specification for the final product.
Making	Produce a final outcome suitable for the target market-working speaker dock. Understand the selection and use of appropriate tools, materials, and technologies (where appropriate) and how to work skilfully and safely. Know how to check for quality as you work.	Show accuracy in your production of the speaker dock, following your manufacturing specification. Produce a production plan that details the process of production, and quality control in your work.

Testing and Evaluating	Know how to test and evaluate your work as it develops. Understand the importance of testing your work against the design brief and specification.	Show testing and evaluation as work has progressed, within research, design and making stages. Show testing of the final product against the design specification and design brief.
	Understand commercial production processes.	Show how you could modify your work for commercial production.
Communication	Know a range of communication techniques for written and design work.	Present a clear design folder showing good understanding of the design brief and using technical language. Design work communicated clearly using 2D/3D, traditional and CAD processes.