KESTEVEN AND SLEAFORD HIGH SCHOOL

Design and Technology Scheme of Learning

Year 10 – Term 1-2/Section 1 - Core Technical Principles/Section 2 – Specialist Technical Principles/Section 3 – Designing and making Principles

Intent Rationale: Specification AQA Design and Technology 8552
Core Technical Principles (CTP): Taught through theory and practical application. Including: material categories; sources and origins of materials; properties of materials; modern and smart materials; new and emerging technologies; mechanical devices; electronic systems; energy storage and generation.
Specialist Technical Principles (STP): Taught through Textiles theory and practical lessons. Including: Users needs and contexts; past and present designers; environmental and social issues; design and communication; selection of materials; stock forms; surface treatments and finishes; prototypes; working with materials.
Designing and Making Principles (DMP): Taught through practical application and folder work. **1.Designing Principles: Investigation – primary and secondary data; The work of others; Design Strategies; Communication of design ideas and prototype development** **2. Making Principles: Selection of materials and components; Tolerances and Allowances; Material management and marking out; Specialist Tools, equipment, techniques and processes; Surface Treatments and Finishes**

Sequencing – what prior learning does this topic build upon?	Sequencing – what subsequent learning does this topic feed into?
• Y9 Skirt Project • Y8 Topic Textiles - Pyjama Project • Y7 Wall organiser project	• Y10 Term 3-4 • Y10 Term 5-6 • Y11 – Design and Technology GCSE • A Level design and Technology Fashion and Textiles
What are the links with other subjects in the curriculum?	**What are the links to SMSC, British Values and Careers?**
• History – study of different historical eras • Business Studies – manufacture marketing and pricing • Art – Presentation, illustration and design • Geography – Fair Trade; sustainability; environmental issues • Physics – mechanical devices, energy generation and storage • Chemistry – polymers • Mathematics – GCSE maths skills – area; geometry; trigonometry; volume etc.	• Problem solving; independence; resilience; encouraging creativity; communication skills; confidence; organisation (GB4) • Links with social/cultural understanding –. (BV4) (BV5) (C1) (C2) (SP1) (SP2) (SP3) • Moral, social and Environmental topics covered on sustainability and cloth wastage. (C2) (M1) (SO1)
What are the opportunities for developing literacy skills and developing learner confidence and enjoyment in reading?	**What are the opportunities for developing mathematical skills?**
• Independent research • Written instructions • Subject specific vocabulary FROM THE LIBRARY	• Measuring skills using a ruler and tape measure • Seam allowance of 15mm in construction • Average measurements • Mathematical problem solving • Geometric understanding

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Intent – Concepts

What knowledge will students gain and what skills will they develop as a consequence of this topic?

Know

- How to use research and exploration to identify and understand user needs
- How to identify and solve their own design problems and understand how to reformulate problems given to them
- How to develop specifications to inform the design of innovative, functional, appealing products that respond to needs in a variety of situations
- Develop an understanding of new and emerging technologies, energy systems and storage and materials and their working properties

Apply

- use a variety of approaches to generate creative ideas and avoid stereotypical responses
- User needs and user centred design
- select from and use specialist tools, techniques, processes, equipment and machinery precisely, including computer-aided manufacture when appropriate
- select from and use a wider, more complex range of materials and components, considering their properties
- analyse the work of past and present professionals and others to develop and broaden their understanding
- Make detailed plans in order to construct the desired product.

Extend

- test, evaluate and refine their ideas and products against a specification, considering the views of intended users and other interested groups
- understand and use the properties of materials and the performance of structural elements to achieve functioning solutions

What subject specific language will be used and developed in this topic?	What opportunities are available for assessing the progress of students?
• Primary research – information you collect yourself • Secondary research – gathering information from sources that already exist • Ergonomics - the study of people's efficiency in their working environment • Anthropometric Data - of or relating to the scientific study of the measurements and proportions of the human body • Co-operative - business owned, governed and self-managed by workers • Fair-Trade – movement that aims to achieve fair and better trading conditions and opportunities that promote sustainability for developing countries • Crowd-funding - fund (a project or venture) by raising money from a large number of people who each contribute a relatively small amount, typically via the Internet • Sustainability – meeting present day needs without compromising the needs of future generations. • Ecological Footprint – the impact of a person or community on the environment, the amount of land needed to supply the natural resources they use. • Social Footprint – the impact a company or organisation has on people and communities • Technology Push – where new technology or materials are developed and designers take the opportunity presented by this to design new products • Market Pull – where users want a product to be improved or redeveloped to meet their needs. • Planned obsolescence – planning or designing a product to have a short life span. • Computer aided design – CAD – using computer software to draw, design and model products on screen • Computer aided Manufacturing – CAM – manufacturing products designed by CAD • Flexible manufacturing systems – FMS – a system in which production is organised into cells of machines performing different tasks. • Computer numerically controlled – CNC – machine tools that are controlled by a computer • Just in Time Manufacturing – JIT- a production method that means materials and components are ordered to arrive at the product assembly point just in time for manufacture • Lean manufacturing – focusing on reduction of waste when manufacturing • Fossil Fuels – natural fuel such as oil, coal or gas, formed from the remains of organisms • Global warming – an increase in the temperature of the earth's atmosphere caused by the greenhouse effect and increased levels of greenhouse gases • Fission – the process in which uranium atoms are split and produce heat. • Renewable energy – energy from a source that is not depleted when used, such as wind or solar power.	**Outcomes & Key work for assessment:** **Practical E-Textiles Project** Research; design specification; techniques; product analysis; design work; finished product; diary of make; evaluation. **Final Assessment of completed project.** **Assessment Test – CTP** **New and Emerging Technologies** **Energy generation and storage** **Materials and their wiorking properties** **Regular marking of class and homework.** **Tracking points.**

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• Hydroelectricity – the process that uses a dam to block a river in a valley and channels water through turbines that are used to turn generators for producing electricity • Biomass – growing plants so that they can be burned, or using decaying plant or animal materials to produce heat. • Capacitors – non-chemical method of storing electricity – predates batteries • Hardwood – woods that come from deciduous trees • Softwood – woods that come from coniferous trees • Ferrous – metals that contain iron • Non-ferrous metals that do not contain iron • Alloy – A material produced by combining two or more elements together to produce a new material with refined properties • Thermoforming polymers – polymers that can be softened by heating, shaped and set over and over again • Thermosetting polymers – polymers that can only be formed by heat once. • Natural fibres – fibres from plant sources • Synthetic fibres – fibres manufactured from oil based chemicals • Blended/mixed fabric – fabric that contains two or more fibres	

Intent – Concepts

Lesson title	Learning challenge	Higher level challenge	Suggested activities and resources
Intro to Textiles GCSE **Designing and Making Principles** **Technology in Society**	How to use primary and secondary data to understand client needs How to carry out investigations in order to identify problems and needs	Use a real person as your client TMG and interview them	What is wearable technology? How is it used? Aesthetic v performance enhancing properties. Slides 3-6 - Should clothing help our emotional wellbeing in our stressful life? Cute circuit – celebrity clothing; body sensors; heated garments. Introduction to the iterative design process. T:\Departments\Curriculum\Design and Technology\DT_Textiles 2019\DT_GCSE Textiles\GCSE\NEA_practical\Y10 projects\Y10_ safety-first **H/W Mood board for e-textiles project.**
Electronics project – Safety First Design and Make project – Ergonomics and anthropometrics. Specification	How to write a design specification	Write a very detailed specification considering client's wants and needs	product for a child - Practical and creative solutions for the needs of others Selection of materials and components; – using e-textiles, reflective fabrics etc. design and make a product suitable for a child to use at night, inside or outside - to incorporate LED lights. BrightKidz Quiz. Show examples of similar products with soft circuit. Tetrahedron night light. Write 15 point specification with measurable and justified points.
Design strategies Initial Design Ideas Development of rough ideas	To produce a range of 10-15 innovative and creative initial ideas.	To produce a range of 10-15 innovative and creative initial ideas that are coloured and fully annotated.	Complete specification. Selection of materials and components -. Start rough speed designing ideas for product – encourage a range of creative products to suit user needs. **H/W Complete design ideas**
Design Development Selection of materials	Develop ideas through collaboration, combining ideas to develop new designs.	Use iterative design to prototype, test and refine design ideas.	Choose 3 designs to develop further- review - peer feedback – react make changes to improve design. Show materials available to use – glow in the dark threads and printing –Neon threads using the embroidery machines –. Felt, Velcro, fluorescent, reflective materials, sublimation printer. Consider function and cost.
Core Technical Principles **Industry and enterprise**	Understand the impact of new and emerging technologies on the design and organisation of the work place, buildings tools and equipment. Enterprise based on the development of effective business innovation. Understand how changing job roles due to the emergence of new ways of working driven by technological change.	Understand the impact, advantages and disadvantages of robots and automated systems in factories. Consider the benefits and drawbacks of worker co-operatives Consider what makes an innovative product – from the past or present – what could be an innovative product of the future?	design and organisation of the workplace; robotics; CNC machines; Innovation; crowdfunding; virtual retailing and marketing; co-operatives; fair trade. T:\Departments\Curriculum\Design and Technology\DT_Textiles 2019\DT_GCSE Textiles\GCSE\1.CORE TECHNICAL PRINCIPLES\Unit 1 - New and emerging technologies\1 - Industry and enterprise
Final Idea design development	Draw out final idea from a range of viewpoints to aid construction.	Draw out final idea from a range of viewpoints demonstrating 3D drawing and rendering techniques, considering perspective.	Draw up final idea using free hand sketching and colour rendering. Evaluate chosen idea against spec. Start to create paper model considering clients wants and needs. Ergonomics and anthropometics **H/W Diary of production with QC; Risk assessment; method; modifications and photographs.**

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Prototype Development	Complete construction of paper model of product	Complete construction of paper model of product which has been refined and improved	Complete card model or paper pattern for prototype
Making prototype product Making soft circuit Tolerances and material management	Complete the sub-assembly of the soft circuit considering how it will be included into the product. How a range of materials are cut and shaped to designated tolerances Why tolerances are applied	Incorporate the soft circuit as an integral part of the product construction. Materials are cut efficiently to minimise waste.	Teacher demo e-textiles soft circuit. Making **Health and Safety using sewing machines/ needles etc.** Tolerances and Allowances; Material management and marking out; Specialist Tools, equipment, techniques and processes; Surface Treatments and Finishes **H/W Diary of production with QC; Risk assessment; method; modifications and photographs.**
Making prototype product using specialist tools and equipment	Use machines, tools and equipment safely and accurately	Independently use machines, tools and equipment safely and accurately. Problem solving any issues as they occur.	Development of prototype
Core Technical Principles **Sustainability and the environment**	Understand the impact of resource consumption on the planet Understand finite and non-finite resources	Consider how various products contribute to resource consumption on the planet – how should these be disposed of?	T:\Departments\Curriculum\Design and Technology\DT_Textiles 2019\DT_GCSE Textiles\GCSE\1.CORE TECHNICAL PRINCIPLES\Unit 1 - New and emerging technologies\2 - Sustainability and the environment
Making prototype product	Use machines, tools and equipment safely and accurately	Independently use machines, tools and equipment safely and accurately. Problem solving any issues as they occur.	Development of prototype **H/W Diary of production with QC; Risk assessment; method; modifications and photographs.**
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Making prototype product	Use machines, tools and equipment safely and accurately	Independently use machines, tools and equipment safely and accurately. Problem solving any issues as they occur.	Development of prototype **H/W Diary of production with QC; Risk assessment; method; modifications and photographs.**
Evaluation	Evaluate prototype against specification, design brief with group feedback.	Evaluate prototype against specification, design brief with group feedback. Develop design further considering modifications and improvements.	Detailed evaluation and photographs of product being tested. **Hand in project for marking**
Core Technical Principles **People Culture and Society**	Respecting people of different faiths and beliefs How technology push and market pull affect choice Changes in fashion and trends in relation to new and emergent technologies How products are designed and made to avoid a negative impact on others	Consider a product you have bought recently and explain whether it has developed through market pull or technology push. List what settings could be changed on a computer tablet to help the elderly	T:\Departments\Curriculum\Design and Technology\DT_Textiles 2019\DT_GCSE Textiles\GCSE\1.CORE TECHNICAL PRINCIPLES\Unit 1 - New and emerging technologies\3 - People, culture and society
END OF TERM 1			
Core Technical Principles Sources and origins of materials; properties of materials; **Textiles**	Understand: the different classifications of materials, there properties and common uses. the physical and mechanical working characteristics of materials.	Understand: the different classifications of materials, there properties and common uses. the physical and mechanical working characteristics of materials and be able to identify these in different products. (Product analysis).	**T:\Departments\Curriculum\Design and Technology\DT_Textiles 2019\DT_GCSE Textiles\GCSE\1.CORE TECHNICAL PRINCIPLES\Unit 3 Materials and their working properties** **Fibres to Fabrics; Weaving; knitting; felting & bonding. Working properties. Where do fabrics come from – Natural – Cotton/ Silk/ Wool** Synthetic – Polyester/ Polyamide/ Elastane
Sources and origins of materials; properties of materials; **Textiles Construction Weaving**			Fabric construction weaving – plain /twill/ satin Paper weaving
Sources and origins of materials; properties of materials; **Textiles Construction Weaving/ knitting**			Knitting warp/ weft - samples Non-woven – heat-bonded Angelina fibres make samples
Sources and origins of materials; properties of materials; **Textiles Construction Felting**			Wool felting
Core Technical Principles **Production Techniques and Systems**	The contemporary and potential future use of production techniques and systems	Consider the benefits and disadvantages of automation in the manufacturing industry	T:\Departments\Curriculum\Design and Technology\DT_Textiles 2019\DT_GCSE Textiles\GCSE\1.CORE TECHNICAL PRINCIPLES\Unit 1 - New and emerging technologies\4 - Production techniques and systems
Sources and origins of materials; properties of materials; **Polymers**	Understand: the different classifications of materials, there properties and common uses. the physical and mechanical working characteristics of materials.	Understand: the different classifications of materials, there properties and common uses. the physical and mechanical working characteristics of materials and be able to identify these in different products. (Product analysis).	**Working properties. Polymers – Thermoforming & Thermosetting plastics.** **Health and Safety using irons and when melting plastics.** https://www.theguardian.com/environment/video/2017/jun/29/we-need-to-talk-about-plastic-bottles?CMP=Share_iOSApp_Other Films about plastics. Sort the trash - Using and identifying samples

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Sources and origins of materials; properties of materials; **Polymers**			Sampling: weaving; felting; bonding. Playing with plastics H&S irons and sewing machines
Sources and origins of materials; properties of materials; **Natural and Manufactured Timbers**			Hard woods and soft woods - Using and identifying samples
Sources and origins of materials; properties of materials; **Natural and Manufactured Timbers**			Manufactured boards - Using and identifying samples
Core Technical Principles **Informing Design Decisions** PP	How critical evaluation of new and emerging technologies informs design decisions	What are the alternatives to planned obsolescence? Why should manufacturers be made to reconsider producing products that have planned obsolescence?	T:\Departments\Curriculum\Design and Technology\DT_Textiles 2019\DT_GCSE Textiles\GCSE\1.CORE TECHNICAL PRINCIPLES\Unit 1 - New and emerging technologies\5 - Informing design decisions T:\Departments\Curriculum\Design and Technology\DT_Textiles 2019\DT_GCSE Textiles\GCSE\1.CORE TECHNICAL PRINCIPLES\Unit 1 - New and emerging technologies\Unit assessment
Sources and origins of materials; properties of materials; **Paper and Boards**	Understand: the different classifications of materials, there properties and common uses. the physical and mechanical working characteristics of materials.	Understand: the different classifications of materials, there properties and common uses. the physical and mechanical working characteristics of materials and be able to identify these in different products. (Product analysis).	Using and identifying samples
Sources and origins of materials; properties of materials; **Paper and Boards**			Using and identifying samples
Sources and origins of materials; properties of materials; **Metals and alloys**			Making slap sticks / working with RM drilling/ using laser cutter
Sources and origins of materials; properties of materials; **Metals and alloys**			Making slap sticks/ Working with RM drilling/ using laser cutter
Core Technical Principles **Energy Storage and Generation**	Understand: how fossil fuels are used for energy generation the different types of alternative energy sources how energy is stored batteries and their advantages and disadvantages	Independent extension activity: Find out when batteries became the most popular energy storage method for toys. What are the advantages and disadvantages of this development?	
Designing and Making Principles Practical application using sample materials	Understand: the different classifications of materials, there properties and common uses. the physical and mechanical working characteristics of materials.	Understand: the different classifications of materials, there properties and common uses. the physical and mechanical working characteristics of materials and be able to identify these in different products. (Product analysis).	Iterative design process – properties of materials - Sampling: weaving; felting; bonding. Stitching a variety of materials – plastics; felt; neoprene, wood, metal etc. **Health and Safety using sewing machines**
Designing and Making Principles Practical application using sample materials			
Designing and Making Principles Practical application using sample materials			
END OF TERM 2			