STJ Long-Term Plan: Design & Technology

Department Curriculum Overview Document

At the end of each cycle what knowledge and skills do students need to be secure with to make progress to the next stage of their learning in your subject?

Year 7	Cycle 1	Cycle 2	Cycle 3	TRANSFER skills/links to end points
What do students need to know and understand by the end of each cycle to progress to the next stage?	***Focus of Cycle:*** **Food Technology Concepts** - Food Safety and Hygiene - Good/bad Microbes - Function of Ingredients (Oaty Biscuits) **Assessment** - Extended Piece of Writing (Pizza Specification) - Design Idea Development (Pasta Packaging) **Practical** - Pizza - Pasta	***Focus of Cycle:*** **Food Technology/Design Concepts** - Cooking Chicken Safely - Design Brief/Task Analysis for the Jitterbug - Vacuum Forming **Assessment** - Extended Piece of Writing (Why does a balanced diet keep you healthy?) - Design Idea Development (Jitterbug Ideas) **Practical** - Oaty Biscuits - Mexican Chicken Wraps	***Focus of Cycle:*** **Design Concepts** - Designing a Jitterbug Face using CAD/CAM (2D Designer/Laser Cutter) - Electronic Circuits/Components **Assessment** - End of Year Test on Food and Design - Extended Piece of Writing (Food/Jitterbug Evaluation) **Practical** - Using 2D Designer to design the Jitterbug Face - Using the Vacuum Forming Machine to make the Jitterbug Body - Using a Soldering Iron to make the Jitterbug Circuit - Using appropriate joining methods to construct the Jitterbug	***The ability to…** - The ability to make a clear connection between food safety, hygiene and good/bad microbes. - The ability to make connections between the function of ingredients and the adaptation of recipes - The ability to write a specification for a pizza, stating a point, explaining that point and linking it to evidence (outside knowledge) - The ability to produce 3D drawings of packages, showing additional views, with detailed explanations. - The ability to state the information needed on a package and why that information is important. - The ability to cook a range of dishes independently. - The ability to produce a Design Brief and understand the questions required when analysing a product, taking into consideration what the answers may be. - The ability to produce 3D drawings of a Jitterbug stating information needed to manufacture this product. - The ability to manufacture the Jitter Bug to a high standard using appropriate equipment, fully understanding how this equipment works.
Ambition for all: what non-negotiable knowledge must all students learn, regardless of their starting points?	- A basic understanding of food safety and hygiene needed in the kitchen. - A basic understanding of a good and bad microbe. - A basic understanding of the design process when designing and making a pizza. - A basic understanding of the design process when designing and making pasta and its packaging.	- A basic understanding of how to cook oaty biscuits safely. - A basic understanding of how to cook chicken safely. - A basic understanding of the different food groups and why a balanced diet keeps us healthy. - A basic understanding of a design brief and a task analysis. - A basic understanding of how to design and make a jitterbug.	- A basic understanding of how to use CAD/CAM to design and make the face of the jitterbug. - A basic understanding of how to use the vacuum forming machine to make the body for the jitterbug. - A basic understanding of how to use a soldering iron to make the circuit for the jitterbug. - A basic understanding of simple joining methods to construct the Jitterbug. - A basic understanding of evaluation.	**Bridging Unit into Y8** Drawing Isometric objects and shading to make them look like wood, plastic and metal.

Faith ***Learning*** ***Attitude*** ***Mutual Respect*** ***Enrichment***

Year 8	Cycle 1	Cycle 2	Cycle 3	TRANSFER skills/links to end points
What do students need to know and understand by the end of each cycle to progress to the next stage?	***Focus of Cycle:*** **Design Concepts** - Design Brief/Task Analysis for the clock - Card Model/Template production for the clock **Assessment**	***Focus of Cycle:*** **Design Concepts** - Producing a Risk Assessment for the tools that will be used to make the clock **Assessment**	***Focus of Cycle:*** **Design Concepts** - Design Idea Development (Aluminium Key Fob) **Assessment** - End of Year Test on Design	***The ability to…** - The ability to produce a Design Brief and understand the questions required when analysing a product, taking into consideration what the answers may be.

STJ Long-Term Plan: Design & Technology

	- Extended Piece of Writing (Clock Specification) - Design Idea Development (Clock Designs) **Practical** - Using a Coping Saw to cut out the clock	- Extended Piece of Writing (What are materials and their properties?) **Practical** - Using a Coping Saw/Fret Saw to cut out the clock - Using a File/Disc Sander to smooth the edges of the clock - Using a Pillar Drill to drill a hole in the clock for the mechanism - Using paint to add surface decoration to the clock	- Extended Piece of Writing (Clock/Aluminium Key Fob Evaluation) **Practical** - Using a Hack Saw to cut out the key fob - Using a File to smooth the edges of the key fob - Using a Pillar Drill to drill a hole in the key fob - Using Emery Paper to polish the key fob	- The ability to produce 3D drawings of a clock, showing additional views, stating information needed to manufacture this product. - The ability to produce a card template of a proposed solution, using appropriate equipment, and modifying this model appropriately to make a working solution. - The ability to produce a Risk Assessment, fully understanding the difference between a risk, a hazard and a control measure. - The ability to manufacture the Clock\Aluminium Key Fob to a high standard using appropriate equipment, fully understanding how this equipment works.
Ambition for all: what non-negotiable knowledge must all students learn, regardless of their starting points?	- A basic understanding of how to produce a design brief and a task analysis for the clock. - A basic understanding of the design process when designing and making the clock. - A basic understanding of how to produce a card model for a final idea of the clock. - A basic understanding of how to use a coping saw to cut out the clock.	- A basic understanding of what is meant by a risk assessment. - A basic understanding of materials and their properties. - A basic understanding of how to use a coping saw/fret saw to cut out the clock. - A basic understanding of how to use a file/disc sander to smooth the edges of the clock. - A basic understanding of how to use a pillar drill to put a hole in the clock. - A basic understanding of how to apply surface decoration (paint) to the clock.	- A basic understanding of the design process when designing and making an aluminium key fob. - A basic understanding of how to use a hack saw to cut out the key fob. - A basic understanding of how to use a file to smooth the edges of the key fob. - A basic understanding of how to use a pillar drill to put a hole in the key fob. - A basic understanding of how to use emery paper to polish the key fob. - A basic understanding of evaluation.	**Bridging Unit into Y9** Drawing 2-point perspective drawings and shading to show tone.
	Faith	***Learning*** ***Attitude***	***Mutual Respect*** ***Enrichment***	
Year 9	**Mobile Phone Holder**	**Timber Puzzle**	**Drawing Practice**	**TRANSFER skills/links to end points**
What do students need to know and understand by the end of each cycle to progress to the next stage?	***Focus of Cycle:*** **Design Concepts** - Design Brief/Task Analysis for the mobile phone holder - CAD/CAM and Orthographic Drawing - Card Model/Template production for the mobile phone holder - **Assessment** - Extended Piece of Writing (Mobile Phone Holder Specification) - Design Idea Development (Mobile Phone Holder Designs) **Practical** - Using 2D Designer to design the Mobile Phone Holder - Using 2D Designer to produce an orthographic drawing of the mobile holder - Using the Laser Cutter to cut out the Mobile Phone Holder - Using Vinyl to add surface decoration to the Mobile Phone Holder - Using the Line Bender to shape the Mobile Phone Holder	***Focus of Cycle:*** **Design Concepts** - Design Brief/Task Analysis for the Timber Puzzle - Producing a Risk Assessment for the tools that will be used to make the timber puzzle - Producing a Risk Assessment for the tools that will be used to make the timber puzzle **Assessment** - Extended Piece of Writing (What is mechanical movement and force?) - Design Idea Development (Timber Puzzle) **Practical** - Using measuring and marking out techniques to create the design for the timber puzzle - Using a Tenon Saw/Bench Hook to cut out the parts of the timber puzzle - Using a Pillar Drill to drill appropriate holes in the timber puzzle - Using a Coping Saw/Woodwork Vice to cut out the inside of the timber puzzle	***Focus of Cycle:*** **Design Concepts** - Produce basic sketches using Isometric Drawing Techniques - Produce basic sketches using 2-Point Perspective Drawing Techniques **Assessment** - End of Year Test on Design/Engineering - Extended Piece of Writing (Mobile Phone Holder/Timber Puzzle Evaluation) (This Assessment will take place in Cycle 3 regardless of unit taught at this time) **Practical** - Using appropriate drawing techniques to develop basic drawing skills	***The ability to…** - The ability to produce a Design Brief and understand the questions required when analysing a product, taking into consideration what the answers may be. - The ability to produce 3D drawings of a mobile phone holder/timber puzzle, showing additional views, stating information needed to manufacture these products. - The ability to produce a card template of a proposed solution, using appropriate equipment, and modifying this model appropriately to make a working solution. - The ability to design the Mobile Phone Holder using 2D Designer, fully understanding the process of CAD/CAM in terms of its advantages and disadvantages. - The ability to produce a Risk Assessment, fully understanding the difference between a risk, a hazard and a control measure. - The ability to manufacture the Mobile Phone Holder/Timber Puzzle to a high standard using appropriate equipment, fully understanding how this equipment works.

STJ Long-Term Plan: Design & Technology

		- Using Files/Disc Sander to smooth the edges/inside of the timber puzzle - Using a Coping Saw/Woodwork Vice to cut out 2 sections to allow the timber puzzle to be assembled - Using a Fret Saw/Disc Sander to add features to the timber puzzle - Using Emery Paper to sand the timber puzzle before adding a surface finish - Using paint/varnish to apply a surface finish to the timber puzzle		
Ambition for all: what non-negotiable knowledge must all students learn, regardless of their starting points?	- A basic understanding of how to produce a design brief and a task analysis for the mobile phone holder. - A basic understanding of the design process when designing and making the mobile phone holder. - A basic understanding of how to produce a card model for a final idea of the mobile phone holder. - A basic understanding of how to use CAD/CAM to design and make the mobile phone holder. - A basic understanding of how to use the laser cutter to cut out the mobile phone holder. - A basic understanding of how to add vinyl decoration to the mobile phone holder. - A basic understanding of how to use the line bending machine to shape the mobile phone holder. - A basic understanding of orthographic drawings.	- A basic understanding of how to produce a design brief and a task analysis for the timber puzzle. - A basic understanding of the design process when designing and making the timber puzzle. - A basic understanding of mechanical movement and force. - A basic understanding of what is meant by a risk assessment. - A basic understanding of measuring and marking out needed to manufacture the timber puzzle. - A basic understanding of how to use a tenon saw/bench hook to cut out the parts for the timber puzzle. - A basic understanding of how to use a pillar drill to put appropriate holes in the timber puzzle. - A basic understanding of how to use a coping saw to cut out the centre sections of the timber puzzle. - A basic understanding of how to use files/disc sander to smooth the edges/inside of the timber puzzle. - A basic understanding of how to use a fret saw/disc sander to add features to the timber puzzle. - A basic understanding of how to use emery paper to sand the timber puzzle before adding a surface finish. - A basic understanding of how to use paint/varnish to apply a surface finish to the wooden puzzle. - A basic understanding of isometric drawing techniques. - A basic understanding of 2-point perspective drawing techniques. - A basic understanding of evaluation.	- A basic understanding of how to produce isometric drawings. - A basic understanding of how to produce 2-point perspective drawings.	**Bridging Unit into Y10** Drawing orthographic drawings to show the different views of products.

	Faith	***Learning*** ***Attitude***	***Mutual Respect*** ***Enrichment***	
Year 10 Design & Technology	**Cycle 1**	**Cycle 2**	**Cycle 3**	**Exceptional performance/links to end points**
What do students need to know and understand by the end of each cycle to progress to the next stage?	***Focus of Cycle:*** **Design Concepts – Core Principles** - Industry and Enterprise - Sustainability and People and Society 1 - People and Society 2 and The Environment - Production Systems	***Focus of Cycle:*** **Design Concepts – Core Principles** - Types of Movement - Changing Magnitude and Direction of Force 1 & 2 - Material Sources	***Focus of Cycle:*** **Design Concepts – Specialist Principles** - Material Properties - Modifying Material Properties - Shaping and Forming Materials 1, 2 & 3 - Stock Forms	***The ability to…** **Core Principles** - The ability to identify concepts relating to industry and enterprise.

STJ Long-Term Plan: Design & Technology

	- New Technology and Design Decisions - Fossil Fuels and Nuclear Power - Renewable Energy 1 - Renewable Energy 2 - Modern and Smart Materials - Composites and Technical Textiles - New and Modern Materials - Electronic Systems - Inputs - Processes - Outputs **Design Concepts – Design Principles** - Sketching and Rendering - Isometric Drawing - Context, Brief and Customer Research - Existing Product Research - Ergonomic and Anthropometric Research - Research Summary - The Work of Others (Designers/Companies) - Specification - Moral, Ethical, Social and Sustainable Design - Generating Ideas and identifying Issues or Needs - Freehand Sketches - CAD Designs - CAD Designs (Documentation and Tolerances) - Circuit/Card Modelling - Circuit Manufacture - Evaluation and Improving Outcomes **Assessment – Core Principles** - Apply your Knowledge Ass. Point 1 - Apply your Knowledge Ass. Point 2 **Assessment – Design Principles** - Design 1 Ass. Point 1 - Design 2 Ass. Point 1 - Design 3 Ass. Point 2 - Design 4 Ass. Point 2 **Practical** - Night Light Circuit and Casing	- Papers and Boards - Timbers - Metals and Polymers - Textiles and Material Properties **Design Concepts – Specialist Principles** - Choosing Materials Based on Functionality - Selecting Materials/Forces and Stresses - Enhancing Materials - Ecological and Socially Responsible Design 1 & 2 **Design Concepts – Design Principles** - Candle Holder Sketches - Measuring and Marking Out/Using a Tenon Saw - Measuring and Marking Out/Using a Pillar Drill - Measuring and Marking Out/Using a Coping Saw - Using a File/Disc Sander - Using Glass Paper - Applying a Finish to the Candle Holder **Assessment – Core Principles** - Apply your Knowledge Ass. Point 3 **Assessment – Specialist Principles** - Apply your Knowledge Ass. Point 4 **Practical** - Candle Holder	- Manufacturing in Different Volumes - Commercial Processes - Treatments and Finishes - Quality Control **Design Concepts – NEA Portfolio** - CAD Drawing Practice (mini project) - CAM Manufacturing Practice (mini project) - NEA Task Analysis - NEA Research Plan/Design Inspiration - NEA Scenario/Design Context/Design Problem - NEA Existing Product Examples - NEA Customer Profile - NEA Client Interviews/Surveys - NEA Existing Product Analysis - NEA Brief and Specification **Assessment – Specialist Principles** - Apply your Knowledge Ass. Point 5 - Apply your Knowledge Ass. Point 6 **Assessment – NEA Portfolio** - NEA Section A Ass. Point - NEA Section B Ass. Point **Practical** - CAD/CAM mini project practice (Time Dependant)	- The ability to identify concepts relating to sustainability, people, society and the environment. - The ability to identify concepts relating to production systems. - The ability to identify concepts relating to new technology and design decisions. - The ability to identify concepts relating to fossil fuels and nuclear power. - The ability to identify concepts relating to renewable energy. - The ability to identify concepts relating to modern and smart materials. - The ability to identify concepts relating to composites and technical textiles. - The ability to identify concepts relating to new and modern materials. - The ability to identify concepts relating to electronic systems, inputs, processes and outputs. - The ability to identify concepts relating to types of movement. - The ability to identify concepts relating to changing magnitude and direction of force. - The ability to identify concepts relating to material sources. - The ability to identify properties relating to papers, boards, timbers, metals, polymers and textiles. **Specialist Principles** - The ability to identify concepts relating to choosing materials based on functionality. - The ability to identify concepts relating to selecting materials based on forces and stresses. - The ability to identify concepts relating to enhancing materials. - The ability to identify concepts relating to ecological and socially responsible design. - The ability to identify concepts relating to modifying material properties. - The ability to identify concepts relating to shaping and forming materials. - The ability to identify concepts relating to stock forms. - The ability to identify concepts relating to manufacturing in different volumes. - The ability to identify concepts relating to commercial processes.

STJ Long-Term Plan: Design & Technology

				- The ability to identify concepts relating to treatments and finishes. - The ability to identify concepts relating to quality control. **Design Principles** - The ability to identify and apply the various stages of the design process to design and manufacture products using a range of materials and processes.
Ambition for all: what non-negotiable knowledge must all students learn, regardless of their starting points?	- A basic understanding of the core principles relating to design and technology and applying these principles to exam style questions. (Content above) - A basic understanding of the design process when designing and making a night light using CAD/CAM and Electronics. (2D Designer, Laser Cutter, Soldering, Vacuum Forming, Joining Methods)	- A basic understanding of the core principles relating to design and technology and applying these principles to exam style questions. (Content above) - A basic understanding of the specialist principles relating to design and technology and applying these principles to exam style questions. (Content above) - A basic understanding of the design process when designing and making a candle holder out of timber. (Measuring Tools, Tenon Saw, Pillar Drill, Coping Saw, Files, Disc Sander, Glass Paper, Finishing Technique - Stain)	- A basic understanding of the specialist principles relating to design and technology and applying these principles to exam style questions. (Content above) - A basic understanding of the CAD/CAM process when making a mini project using 2D Design and the Laser Cutter. - A basic understanding of the NEA (Section A – Research) (Section B – Design Brief and Specification) PREMINILARY GRADE GIVEN FOR THESE SECTIONS	**Bridging Unit into Y11** NEA practice for final Year 11 coursework.
		Faith Learning Attitude Mutual Respect Enrichment		
Year 11 Design & Technology	**Cycle 1**	**Cycle 2**	**Cycle 3**	**Exceptional performance/links to end points**
What do students need to know and understand by the end of each cycle to progress to the next stage?	***Focus of Cycle:*** **Design Concepts – Specialist Principles** - Retrieval Power Point (1 – 5) **Design Concepts – NEA Portfolio** - NEA Design Ideas - NEA Design Idea Review & Decision Matrix - NEA Design Idea Development - NEA Design Idea Development Evaluation - NEA SCAMPER - NEA Final Development Model - NEA Analysis of Design against Specification - NEA Packaging Nets - NEA Further Research (Materials/Components) - NEA CAD Development - NEA Orthographic Drawing/Cutting List - NEA Materials and Process Testing - NEA Manufacturing Specification - NEA Evaluation against Specification - NEA Design Issues - NEA MESS Development - NEA Commercial Design Development - NEA Plan of Making **Assessment** - November Mock Exam - NEA Section C Ass. Point - NEA Section D Ass. Point	***Focus of Cycle:*** **Design Concepts – Specialist Principles** - Retrieval Power Point (6-10) **Design Concepts – NEA Portfolio** - NEA Manufacture - NEA Diary of Making - NEA Evaluation against Specification - NEA Testing and Third-Party Feedback - NEA Design Improvements - NEA Commercial Development **Assessment** - February Mock Exam - NEA Section E Ass. Point - NEA Section F Ass. Point	***Focus of Cycle:*** **Design Concepts** - Exam Practice Questions - Past Paper 2021 (Walking, Talking Mock) - Past Paper 2022 (Walking, Talking Mock) - Past Paper 2023 (Walking, Talking Mock) - Past Paper 2024 (Walking, Talking Mock) **Assessment** - Final Exam **Practical**	***The ability to…** **Design Principles** The ability to identify and apply the various stages of the design process to design and manufacture products using a range of materials and processes. - NEA Design Ideas - NEA Design Idea Review & Decision Matrix - NEA Design Idea Development - NEA Design Idea Development Evaluation - NEA SCAMPER - NEA Final Development Model - NEA Analysis of Design against Specification - NEA Packaging Nets - NEA Further Research (Materials/Components) - NEA CAD Development - NEA Orthographic Drawing/Cutting List - NEA Materials and Process Testing - NEA Manufacturing Specification - NEA Evaluation against Specification - NEA Design Issues - NEA MESS Development - NEA Commercial Design Development - NEA Plan of Making - NEA Manufacture - NEA Diary of Making - NEA Evaluation against Specification

STJ Long-Term Plan: Design & Technology

	Practical - NEA Portfolio	**Practical** - NEA Portfolio	- None	- NEA Testing and Third-Party Feedback - NEA Design Improvements - NEA Commercial Development **Core/Specialist Principles** The ability to identify and apply design principles to a range of exam style questions from the Core and Specialist Principles content.
Ambition for all: what non-negotiable knowledge must all students learn, regardless of their starting points?	- A basic understanding of the core principles relating to design and technology and applying these principles to exam style questions. (Retrieval Booklet) - A basic understanding of the specialist principles relating to design and technology and applying these principles to exam style questions. (Retrieval Booklet) - A basic understanding of the NEA (Section C – Initial Design Solutions) (Section D – Development of Design Solutions) PREMINILARY GRADE GIVEN FOR THESE SECTIONS	- A basic understanding of the core principles relating to design and technology and applying these principles to exam style questions. (Retrieval Booklet) - A basic understanding of the specialist principles relating to design and technology and applying these principles to exam style questions. (Retrieval Booklet) - A basic understanding of the NEA (Section E – Manufacturing Design Solutions) (Section F – Evaluation and Testing) FINAL GRADE AWADED FOR NEA PORTFOLIO	- A basic understanding of the core principles relating to design and technology and applying these principles to exam style questions. (Past Papers – Walking Talking Mocks) - A basic understanding of the specialist principles relating to design and technology and applying these principles to exam style questions. (Past Papers – Walking Talking Mocks)	**Bridging into Y12** Scholarly articles relating to Design and Technology, supported with documentaries and videos.
	Faith	***Learning*** ***Attitude***	***Mutual Respect*** ***Enrichment***	
Year 12 Design & Technology	**Cycle 1**	**Cycle 2**	**Cycle 3**	**Exceptional performance/links to end points**
What do students need to know and understand by the end of each cycle to progress to the next stage?	***Focus of Cycle:*** **Design Concepts – Theory** - Material Properties - Testing Materials - Classification of Materials - Materials and their Applications (Key Terms) - Performance characteristics of materials: Papers and Board - Performance characteristics of materials: Composites - Performance characteristics of materials: Hardwood - Performance characteristics of materials: Softwoods - Performance characteristics of materials: Manufactured Board - Performance characteristics of materials: Polymer based sheet and film - Performance characteristics of materials: Thermoplastics - Performance characteristics of materials: Thermosetting Plastics - Performance characteristics of materials: Metals	***Focus of Cycle:*** **Design Concepts – Theory** - Enhancement of Materials 1 - Enhancement of Materials 2 - Enhancement of Materials 3 - Forming, Redistribution and Addition Processes - Finishes 1 - Finishes 2 - Modern and Industrial Scales of Practice	***Focus of Cycle:*** **Design Concepts - Theory** - Digital Design and Manufacture - The requirements for Product Design and Development - Health and Safety - Protecting Designs and Intellectual property - Design for Manufacturing, Maintenance, Repair and Disposal - Feasibility Studies - Enterprise and Marketing in the Development of Products - Design Communication	***The ability to…** - The ability to be open to taking design risks, showing innovation and enterprise whilst considering their role as responsible designers and citizens. - The ability to develop intellectual curiosity about the design and manufacture of products and systems, and their impact on daily life and the wider world. - The ability to work collaboratively to develop and refine their ideas, responding to feedback from users, peers and expert practitioners. - The ability to gain an insight into the creative, engineering and/or manufacturing industries. - The ability to develop the capacity to think creatively, innovatively and critically through focused research and the exploration of design opportunities arising from the needs, wants and values of users and clients. - The ability to develop knowledge and experience of real world contexts for design and technological activity.

STJ Long-Term Plan: Design & Technology

	- Performance characteristics of materials: Smart Materials - Performance characteristics of materials: Modern Materials **Design Concepts – NEA** - Problem/Brief - Task Analysis - Research Plan - Existing Product Analysis - Initial Sketch Ideas - Disassembly of Existing Product - Questionnaire/Analysis Research - Client Research - Environment Research - Research Analysis - ISR - Design Ideas **Assessment** - Key Assessment Task – Problem/Brief/Research - Theory Exam Question 1 - Key Assessment Task – Research - Theory Exam Question 2 - Key Assessment Task – Specification - Theory Exam Question 3 **Practical** - NEA Practice	**Design Concepts – NEA** - Design Ideas - Modelling Ideas - Development, Testing and Manufacturing of Ideas **Assessment** - Key Assessment Task – Design Ideas - Theory Exam Question 4 - Key Assessment Task – Development and Testing - Theory Exam Question 5 - Key Assessment Task – Development and Testing - Theory Exam Question 6 **Practical** - NEA Practice	**Design Concepts – NEA** - Development, Testing and Manufacturing of Ideas - Manufacturing Specification - Manufacturing Plan - Manufacture and Development Diary **Assessment** - Key Assessment Task – Manufacture and Development - Theory Exam Question 7 - Key Assessment Task – Manufacturing Specification - Theory Exam Question 8 - Key Assessment Task – Manufacturing Specification - Theory Exam Question 9 **Practical** - NEA Practice	- The ability to develop an in-depth knowledge and understanding of materials, components and processes associated with the creation of products that can be tested and evaluated in use. - The ability to be able to make informed design decisions through an in-depth understanding of the management and development of taking a design through to a prototype/product. - The ability to be able to create and analyse a design concept and use a range of skills and knowledge from other subject areas, including maths and science, to inform decisions in design and the application or development of technology. - The ability to be able to work safely and skilfully to produce high-quality prototypes/products. - The ability to have a critical understanding of the wider influences on design and technology, including cultural, economic, environmental, historical and social factors. - The ability to draw on and apply a range of skills and knowledge from other subject areas, including the use of maths and science for analysis and informing decisions in design.
Ambition for all: what non-negotiable knowledge must all students learn, regardless of their starting points?	- A basic understanding of materials and their applications. - A basic understanding of the performance characteristics of materials. - A basic understanding of the enhancement of materials. - A basic understanding of forming, redistribution and addition processes. - A basic understanding of the use of finishes. - A basic understanding of modern industrial and commercial practice.	- A basic understanding of digital design and manufacture. - A basic understanding of the requirements for product design and development. - A basic understanding of health and safety. - A basic understanding of protecting designs and intellectual property. - A basic understanding of design for manufacturing, maintenance, repair and disposal. - A basic understanding of feasibility studies. - A basic understanding of enterprise and marketing in the development of products. - A basic understanding of design communication.	- A basic understanding of design methods and processes. - A basic understanding of design theory. - A basic understanding of how technology and cultural changes can impact on the work of designers. - A basic understanding of design processes. - A basic understanding of critical analysis and evaluation. - A basic understanding of selecting appropriate tools, equipment and processes. - A basic understanding of accuracy in design and manufacture. - A basic understanding of responsible design. - A basic understanding of design for manufacture and project management. - A basic understanding of national and international standards in product design.	**Bridging into Y13** NEA practice for final Year 13 coursework. Initial ideas for Y13 coursework to be completed over the summer break.
	Faith	***Learning*** ***Attitude***	***Mutual Respect*** ***Enrichment***	
Year 13 Design & Technology	**Cycle 1**	**Cycle 2**	**Cycle 3**	**Exceptional performance/links to end points**

STJ Long-Term Plan: Design & Technology

What do students need to know and understand by the end of each cycle to progress to the next stage?	***Focus of Cycle:*** **Design Concepts** Design methods and processes - Iterative design process - Designing to meet needs, wants or values - Investigations to inform the use of primary and secondary data - The development of a design proposal - The planning and manufacture of a prototype solution • the evaluation of a prototype solution to inform further development Design theory - Design influences Design styles and movements - Arts and craft movement - Art Deco - Modernism - (Bauhaus) - Post modernism - (Memphis) Designers and their work - Phillipe Starck - James Dyson - Margaret Calvert - Dieter Rams - Charles and Ray Eames - Marianne Brandt How technology and cultural changes can impact on the work of designers - Socio economic influences - Post WW1: the Bauhaus and development of furniture for mass production - WW2: rationing, the development of 'utility' products - Contemporary times: - Fashion and demand for mass produced furniture - Decorative design. Major developments in technology - Micro electronics - New materials - New methods of manufacture - Advancements in CAD/CAM. Social, moral and ethical issues - Products are made using sustainable materials and ethical production methods - Culturally acceptable products - Inclusive products - Products that could assist with social problems - The impact of Fairtrade on design and consumer demand - Designing products to consider the six Rs of sustainability.	***Focus of Cycle:*** **Design Concepts** Critical analysis and evaluation - Improvements on original ideas - Testing and evaluating products in commercial products - Use of third-party feedback in the testing and evaluation process Selecting appropriate tools, equipment and processes - The importance of using the correct tools and equipment for specific tasks - The importance of ensuring their own safety and that of others - How designs are developed from a single prototype into mass produced products - The effect on the manufacturing process that is brought about by the need for batch and mass manufacture - How to select the most appropriate manufacturing process - The importance of health and safety in a commercial setting Accuracy in design and manufacture - How testing can eliminate errors - The value in the use of measuring aids - The reduction of human error. Responsible design Environmental issues - The responsibilities of designers and manufacturers in ensuring products are made from sustainable materials and components - The environmental impact of packaging of products Conservation of energy and resource - How products are designed to conserve energy, materials and components - The design of products for minimum impact on the environment - Sustainable manufacturing - The impact of waste - Cost implications of dealing with waste - The impact of global manufacturing on product miles	***Focus of Cycle:*** **Design Concepts** Design for manufacture and project management Planning for accuracy and efficiency Quality assurance Total Quality Management (TQM) Quality control - The monitoring, checking and testing of materials - Specific quality control methods - Use of digital measuring devices - Non-destructive testing National and international standards in product design - British Standards Institute (BSI) - International Organisation for Standardisation (ISO) - Restriction of Hazardous Substances (ROHS) directive - Battery directive - Polymer codes for identification and recycling - Packaging directives - WEEE directives - Energy ratings of products - Eco-labelling: Mobius Loop/European Eco-label/NAPM recycled mark/EC energy label/Energy Efficient label/Forest Stewardship Council (FSC)	***The ability to…** - The ability to be open to taking design risks, showing innovation and enterprise whilst considering their role as responsible designers and citizens. - The ability to develop intellectual curiosity about the design and manufacture of products and systems, and their impact on daily life and the wider world. - The ability to work collaboratively to develop and refine their ideas, responding to feedback from users, peers and expert practitioners. - The ability to gain an insight into the creative, engineering and/or manufacturing industries. - The ability to develop the capacity to think creatively, innovatively and critically through focused research and the exploration of design opportunities arising from the needs, wants and values of users and clients. - The ability to develop knowledge and experience of real world contexts for design and technological activity. - The ability to develop an in-depth knowledge and understanding of materials, components and processes associated with the creation of products that can be tested and evaluated in use. - The ability to be able to make informed design decisions through an in-depth understanding of the management and development of taking a design through to a prototype/product. - The ability to be able to create and analyse a design concept and use a range of skills and knowledge from other subject areas, including maths and science, to inform decisions in design and the application or development of technology. - The ability to be able to work safely and skilfully to produce high-quality prototypes/products. - The ability to have a critical understanding of the wider influences on design and technology, including cultural, economic, environmental, historical and social factors. - The ability to draw on and apply a range of skills and knowledge from other subject areas, including the use of maths and science for analysis and informing decisions in design.

STJ Long-Term Plan: Design & Technology

	Product life cycle - Evolution, growth, maturity, decline and replacement. - How designers refine and re-develop products in their lifecycle. Design processes - The use of a design process - Prototype development - The iterative design process in industrial or commercial contexts **Design Concepts NEA** - Development, Testing and manufacturing of Ideas. - Manufacture and development write up. **Assessment** - November Mock Exam **Practical** - NEA - Development, Testing and manufacturing of Ideas. - Manufacture and development write up.	**Design Concepts NEA** - Development, Testing and manufacturing of Ideas. - Manufacture and development write up. **Assessment** - February Mock Exam **Practical** - NEA - Development, Testing and manufacturing of Ideas. - Manufacture and development write up.	**Design Concepts NEA** - Manufacture of Products and Modifications - Evaluation - Client Evaluation - Correction and completion of NEA **Assessment** - Summer Exam **Practical** - Manufacture of Products and Modifications - Evaluation - Client Evaluation - Correction and completion of NEA	
Ambition for all: what non-negotiable knowledge must all students learn, regardless of their starting points?	- A basic understanding of NEA Section A (Identifying and investigating design possibilities) 20 marks. - A basic understanding of NEA Section B (Producing a design brief and specification) 10 marks.	- A basic understanding of NEA Section C (Development of design proposals 25 marks. - A basic understanding of NEA Section D (Development of design prototypes) 25 marks.	- A basic understanding of NEA Section E (Analysing and evaluating) 20 marks.	

	Faith	*Learning* *Attitude*	*Mutual Respect* *Enrichment*	
Year 10 Engineering (NCFE)	**Cycle 1**	**Cycle 2**	**Cycle 3**	**Exceptional performance/links to end points**
What do students need to know and understand by the end of each cycle to progress to the next stage?	***Focus of Cycle:*** **Examined Assessment (EA)** - Content Area 1 – Engineering Disciplines - Content Area 2 – Applied Science and Mathematics in Engineering **Non-Exam Assessment Practice (NEA)** - Drawing Practice on Onshape (Cube/Key Fob)	***Focus of Cycle:*** **Examined Assessment (EA)** - Content Area 3 – Reading Engineering Drawings - Content Area 4 – Properties, Characteristics and Selection of Engineering Materials **Non-Exam Assessment Practice (NEA)**	***Focus of Cycle:*** **Examined Assessment (EA)** - Content Area 5 – Engineering Tools, Equipment and Machines - Content Area 6 – Hand-Drawn Engineering Drawings - Content Area 7 – Computer-Aided Design (CAD) Engineering Drawings - Content Area 8 – Production Planning Techniques **Non-Exam Assessment Practice (NEA)**	***The ability to…** - The ability to identify engineering disciplines through projects and products. (1.1.1. Engineering discipline skills) - The ability to identify the health and safety legislation governing engineering. (1.2.1. Health and safety legislation) - The ability to identify the application of SI units of measurement. (2.1.1. SI units of measurement, 2.1.2. Application of base SI units)

STJ Long-Term Plan: Design & Technology

	- 3D Printer Practice (Cube/Key Fob) - Soldering Practice (Timer Circuit) - 2D Designer Practice (Timer Casing) - Laser Cutter Practice (Timer Casing) **Assessment** - Content Area 1 – Engineering Disciplines Test - Content Area 2 – Applied Science and Mathematics in Engineering Test **Practical** - Practical Practice (Cube/Key Fob/Timer)	- Orthographic Drawing Practice on 2D Designer - Two-Dimensional Drawing Practice by Hand - Three-Dimensional Drawing Practice by Hand - Practical Practice – Metal Hammer **Assessment** - Content Area 3 – Reading Engineering Drawings Test - Content Area 4 - Properties, Characteristics and Selection of Engineering Materials Test **Practical** - Practical Practice (Hand-Drawing/2D Drawing/Metal Hammer)	- Task 1 – Materials Research and Materials Selection - Task 2 – Hand-Drafted Engineering Drawings - Task 3 – Engineering Drawings using CAD Software - Task 4 – Production Plan - Task 5 – Functioning Prototype Manufacture - Task 6 - Evaluation of Your Final Product **Assessment** - Content Area 5 – Engineering Tools, Equipment and Machines Test - Content Area 6 – Hand-Drawn Engineering Drawings Test - Content Area 7 – Computer-Aided Design (CAD) Engineering Drawings Test - Content Area 8 – Production Planning Techniques Test **Practical** - NEA Practice (Task 1 – 6 Tablet Holder)	- The ability to identify the equations used to calculate energy, force, motion, electrical and geometric shapes. (2.2.1. Equations for properties, 2.2.2. Application of equations) - The ability to identify the reading of engineering drawings. (3.1.1. Drawing conventions, 3.1.2. British standards (BS) - The ability to identify the properties and characteristics of materials. (4.1.1. Properties, 4.1.2. Characteristics, 4.1.3. Materials) - The ability to identify the tools, equipment and machines used in engineering. (5.1.1. Marking out, 5.1.2. Modification, 5.1.3. Joining, 5.1.4. Finishing) - The ability to identify the safe and correct use of these machines. (5.2.1. Control measures) - The ability to identify hand-drawn engineering drawings. (6.1.1. A freehand sketch, 6.1.2. A hand-drafted isometric drawing sheet, 6.1.3. A hand-drafted orthographic drawing sheet) - The ability to identify CAD engineering drawings. (7.1.1. A CAD isometric drawing sheet, 7.1.2. A CAD orthographic drawing sheet, 7.1.3. The uses of CAD) - The ability to identify production planning. (8.1.1. Risk assessment, 8.1.2. Production plan)
Ambition for all: what non-negotiable knowledge must all students learn, regardless of their starting points?	- A basic understanding of engineering disciplines. - A basic understanding of health and safety legislation. - A basic understanding of SI units of measurement. - A basic understanding of the application of base SI units. - A basic understanding of equations for properties. - A basic understanding of the application of equations.	- A basic understanding of engineering drawing conventions. - A basic understanding of British standards (BS). - A basic understanding of properties of materials. - A basic understanding of characteristics of materials. - A basic understanding of materials.	- A basic understanding of marking out. - A basic understanding of modification. - A basic understanding of joining. - A basic understanding of finishing - A basic understanding of control measures. - A basic understanding of a freehand sketch. - A basic understanding of a hand-drafted isometric drawing sheet. - A basic understanding of a hand-drafted orthographic drawing sheet. - A basic understanding of a CAD isometric drawing sheet. - A basic understanding of a CAD orthographic drawing sheet. - A basic understanding of the uses of CAD. - A basic understanding of risk assessment. - A basic understanding of a production plan.	**Bridging Unit into Y11** Practice NEA – The Tablet Holder Project (Subject to change based on the examiners report from the previous year)
	Faith	***Learning*** ***Attitude***	***Mutual Respect*** ***Enrichment***	
Year 11 Engineering (NCFE)	**Cycle 1**	**Cycle 2**	**Cycle 3**	**Exceptional performance/links to end points**

STJ Long-Term Plan: Design & Technology

What do students need to know and understand by the end of each cycle to progress to the next stage?	***Focus of Cycle:*** **Engineering Concepts** - Content Area 9 Applied Processing Skills and Techniques - Review Content Area 1 – Engineering Disciplines - Review Content Area 2 – Applied Science and Mathematics in Engineering - Review Content Area 3 – Reading Engineering Drawings - Walking Talking Mock (Jan 2024) **Engineering Concepts – NEA** - Task 1 – Material Research and Materials Selection (12 Marks/1 hours 30 min) - Task 2 – Hand-Drafted Engineering Drawings (20 Marks/2 hours 30 min) - Task 3 – CAD Produced Engineering Drawings (20 Marks/2 hours 30 min) **Assessment** - Content Area 9 – Applied Processing Skills and Techniques Test - EA December Mock Exam **Practical** - NEA (Task 1 – 3 Exam Board)	***Focus of Cycle:*** **Engineering Concepts** - Review Content Area 4 – Properties, Characteristics and Selection of Engineering Materials - Review Content Area 5 – Engineering Tools, Equipment and Machines - Review Content Area 6 – Hand-Drawn Engineering Drawings - Review Content Area 7 – Computer-Aided Design (CAD) Engineering Drawings - Review Content Area 8 – Production Planning Techniques - Walking Talking Mock (June 2024) **Engineering Concepts – NEA** - Task 4 – Production Plan (24 Marks/4 hours) - Task 5 – Functioning Prototype Manufacture (36 Marks/6 hours) - Task 6 – Summative Evaluation (8 Marks/1 hours 30 min) **Assessment** - EA February Mock Exam **Practical** - NEA (Task 4 – 6 Exam Board)	***Focus of Cycle:*** **Engineering Concepts** - Review Content Area 9 – Applied Processing Skills and Techniques - Walking Talking Mock (Previous Year) **Assessment** - EA Final Exam **Practical** - None	***The ability to…** - The ability to identify the skills and techniques used to make engineering products. (9.1.1. Prepare materials, 9.1.2. Modify shape and size of materials, 9.1.4. Join materials, 9.1.4. Finish materials) - The ability to identify the safe and correct use of tools, equipment and machines. (9.2.1. Preparation and use of tools, equipment and machines, 9.2.2. Control measures) - The ability to provide evidence on materials, tools and/or machinery in the NEA Task 1. - The ability to provide evidence to show the meaning of BS 8888 in the NEA Task 2. - The ability to provide evidence of hand-drawn engineering drawing(s) of the given product from the brief in the NEA Task 2. - The ability to provide evidence of CAD software engineering drawing(s) of the given product from the brief in the NEA Task 3. - The ability to provide evidence of a plan for the engineering prototype in the NEA Task 4. - The ability to provide evidence of a functioning prototype in the NEA Task 5. - The ability to provide evidence of an evaluation of the finished prototype in the NEA Task 6.
Ambition for all: what non-negotiable knowledge must all students learn, regardless of their starting points?	- A basic understanding of skills and techniques. - A basic understanding of safe and correct use of tools, equipment and machines. - A developed understanding of Content Area 1 - 3 and relating these topics to exam style questions. - NEA Task 1 – Select the materials, tools and/or machinery that you will use to manufacture your product. You must also provide evidence to support and justify your selection. - NEA Task 2 – Provide a brief description on the requirements of British Standard 8888 which you can refer to throughout this project. Create hand drawn engineering drawing(s) of the free-hand sketch of the product provided in the brief. - NEA Task 3 – Use CAD software to create engineering drawing(s) of the free-hand sketch of the product	- A developed understanding of Content Area 4 – 8 and relating these topics to exam style questions. - NEA Task 4 – Create a production plan for your engineering prototype, based on the drawings you developed in tasks 2 and 3. - NEA Task 5 – Create a functioning prototype of the product to an appropriate scale. You must use suitable processing skills and techniques. Test the functionality of the prototype. - NEA Task 6 – Evaluate your final product. Your evaluation must include how your prototype met the brief, how you could improve your prototype, in relation to the brief.	- A developed understanding of Content Area 9 and relating these topics to exam style questions.	**Bridging into Y12** Scholarly articles relating to Engineering, supported with documentaries and videos. Y12 Bridging Project on Engineering Disciplines.

STJ Long-Term Plan: Design & Technology

	included in the brief. Your diagram(s) must apply a layout recognised within the engineering industry following British Standards.			
	Faith	***Learning*** ***Attitude***	***Mutual Respect*** ***Enrichment***	
Year 12 Engineering (Unit 1)	**Cycle 1**	**Cycle 2**	**Cycle 3**	**Exceptional performance/links to end points**
What do students need to know and understand by the end of each cycle to progress to the next stage?	***Focus of Cycle:*** **Engineering Concepts** - **A1 Algebraic Methods** - Solve, transpose and simplify equations. - Application of the laws of indices and logarithms to engineering problems involving exponential growth and decay. - Linear equations and straight line graphs to represent engineering functions and data. - Factorisation and quadratics. - **A2 Trigonometric Methods** - Circular measure. - Use of triangular measurement techniques to determine unknown values in engineering problems. - Application of vectors. - Mensuration. - **A3 Calculus Methods** - Functions, rate of change and gradient of engineering functions. - Methods of differentiation. - Numerical value of a derivative - Integration as the reverse/inverse of differentiation. - Integration as a summating tool. **Assessment** - Exam Practice Questions Ass. 1 based around Engineering Concepts from A1, A2 and A3. **Practical** - Algebraic Problems - Trigonometric Problems	***Focus of Cycle:*** **Engineering Concepts** - **B1 Static Engineering Systems** - Static engineering systems. - Loaded components. - **B2 Dynamic Engineering Systems** - Dynamic engineering systems. - Dynamic parameters and principles. - Angular parameters. - Lifting machines and mechanical systems. - **B3 Fluid Engineering Systems** - Fluid systems. **Assessment** - Exam Practice Questions Ass. 2 based around Engineering Concepts from B1, B2 and B3. **Practical** - Static Engineering Problems	***Focus of Cycle:*** **Engineering Concepts** - **C1 Direct Current Electricity and Circuits** - Direct current electricity. - Direct current circuit theory. - Direct current networks. - **C2 Magnetism and Electromagnetic Induction** - Magnetism. - Electromagnetic induction and applications. - **C3 Single-phase Alternating Current** - Single-phase alternating current theory. - Single-phase alternating current principles. **Assessment** - Exam Practice Questions Ass. 3 based around Engineering Concepts from C1, C2 and C3. **Practical**	***The ability to…** - The ability to apply, solve, transpose and simplify equations. - The ability to apply the laws of indices and logarithms to engineering problems involving exponential growth and decay. - The ability to apply linear equations and straight line graphs to represent engineering functions and data. - The ability to apply factorisation and quadratics. - The ability to apply circular measure. - The ability to apply the use of triangular measurement techniques to determine unknown values in engineering problems. - The ability to apply the application of vectors. - The ability to apply mensuration. - The ability to apply functions, rate of change and gradient of engineering functions. - The ability to apply methods of differentiation. - The ability to apply numerical value of derivative. - The ability to apply integration as the reverse/inverse of differentiation. - The ability to apply integration as a summating tool. - The ability to apply and solve problems in relation to static engineering systems. - The ability to apply and solve problems in relation to loaded components. - The ability to apply and solve problems in relation to dynamic engineering systems. - The ability to apply and solve problems in relation to dynamic parameters and principles. - The ability to apply and solve problems in relation to angular parameters. - The ability to apply and solve problems in relation to lifting machines and mechanical systems.

STJ Long-Term Plan: Design & Technology

	- Calculus Problems	- Dynamic Engineering Problems - Fluid Engineering Problems	- Direct Current Electricity and Circuits Problems - Magnetism and Electromagnetic Induction Problems - Single-phase Alternating Current Problems	- The ability to apply and solve problems in relation to fluid systems. - The ability to apply and solve problems in relation to direct current electricity. - The ability to apply and solve problems in relation to direct current circuit theory. - The ability to apply and solve problems in relation to direct current networks. - The ability to apply and solve problems in relation to magnetism. - The ability to apply and solve problems in relation to electromagnetic induction and applications. - The ability to apply and solve problems in relation to single-phase alternating current theory. - The ability to apply and solve problems in relation to single-phase alternating current principles.
Ambition for all: what non-negotiable knowledge must all students learn, regardless of their starting points?	- The application of these maths principles will be assessed in the context of the engineering principles in section B and C of this unit specification. Standalone pure maths questions will not be set, however students will be expected to apply these mathematical principles in being able to solve engineering related problems.	- Students should be able to apply appropriate mathematical and engineering procedures and methods to complete calculations and solve problems related to static engineering systems, dynamic engineering systems and fluid engineering systems using the correct units and to an appropriate degree of accuracy.	- Students should be able to apply appropriate mathematical and engineering procedures and methods to complete calculations and solve problems related to electrical circuits (networks) and devices, magnetism and electromagnetic induction and single-phase alternating current using the correct units and showing working clearly and to an appropriate degree of accuracy.	**Bridging into Y13** Theory topics covered from the Learning Aim A, Learning Aim B and Learning Aim C prepare students for recall in Year 13 in line with the final exam for unit 1 at the end of the course. Practical tasks completed based on the theory topics from Learning Aim A, Learning Aim B and Learning Aim C help to reinforce theory tasks to make learning stick.
	Faith	***Learning*** ***Attitude***	***Mutual Respect*** ***Enrichment***	
Year 13 Engineering (Unit 1)	**Cycle 1**	**Cycle 2**	**Cycle 3**	**Exceptional performance/links to end points**
What do students need to know and understand by the end of each cycle to progress to the next stage?	***Focus of Cycle:*** **Engineering Concepts** - Retrieval of Algebraic Methods - Retrieval of Trigonometric Methods - Retrieval of Calculus Methods Retrieval is achieved through past paper questions and walking talking mocks. **Assessment** - November Mock Exam **Practical**	***Focus of Cycle:*** **Engineering Concepts** - Retrieval of Static Engineering Systems - Retrieval of Dynamic Engineering Systems - Retrieval of Fluid Engineering Systems Retrieval is achieved through past paper questions and walking talking mocks. **Assessment** - February Mock Exam **Practical**	***Focus of Cycle:*** **Engineering Concepts** - Retrieval of Direct Current Electricity and Circuits - Retrieval of Magnetism and Electromagnetic Induction - Retrieval of Single-phase Alternating Current Retrieval is achieved through past paper questions and walking talking mocks. **Assessment** - Final Summer Exam **Practical**	***The ability to…** - The ability to apply, solve, transpose and simplify equations. - The ability to apply the laws of indices and logarithms to engineering problems involving exponential growth and decay. - The ability to apply linear equations and straight line graphs to represent engineering functions and data. - The ability to apply factorisation and quadratics. - The ability to apply circular measure. - The ability to apply the use of triangular measurement techniques to determine unknown values in engineering problems. - The ability to apply the application of vectors. - The ability to apply mensuration. - The ability to apply functions, rate of change and gradient of engineering functions.

STJ Long-Term Plan: Design & Technology

				- The ability to apply methods of differentiation. - The ability to apply numerical value of derivative. - The ability to apply integration as the reverse/inverse of differentiation. - The ability to apply integration as a summating tool. - The ability to apply and solve problems in relation to static engineering systems. - The ability to apply and solve problems in relation to loaded components. - The ability to apply and solve problems in relation to dynamic engineering systems. - The ability to apply and solve problems in relation to dynamic parameters and principles. - The ability to apply and solve problems in relation to angular parameters. - The ability to apply and solve problems in relation to lifting machines and mechanical systems. - The ability to apply and solve problems in relation to fluid systems. - The ability to apply and solve problems in relation to direct current electricity. - The ability to apply and solve problems in relation to direct current circuit theory. - The ability to apply and solve problems in relation to direct current networks. - The ability to apply and solve problems in relation to magnetism. - The ability to apply and solve problems in relation to electromagnetic induction and applications. - The ability to apply and solve problems in relation to single-phase alternating current theory. - The ability to apply and solve problems in relation to single-phase alternating current principles.
Ambition for all: what non-negotiable knowledge must all students learn, regardless of their starting points?	- The application of these maths principles will be assessed in the context of the engineering principles in section B and C of this unit specification. Standalone pure maths questions will not be set, however students will be expected to apply these mathematical principles in being able to solve engineering related problems.	- Students should be able to apply appropriate mathematical and engineering procedures and methods to complete calculations and solve problems related to static engineering systems, dynamic engineering systems and fluid engineering systems using the correct units and showing working clearly and to an appropriate degree of accuracy.	- Students should be able to apply appropriate mathematical and engineering procedures and methods to complete calculations and solve problems related to electrical circuits (networks) and devices, magnetism and electromagnetic induction and single-phase alternating current using the correct units and showing working clearly and to an appropriate degree of accuracy.	
	Faith	***Learning*** ***Attitude***	***Mutual Respect*** ***Enrichment***	
Year 12 Engineering (Unit 2)	**Cycle 1**	**Cycle 2**	**Cycle 3**	**Exceptional performance/links to end points**

STJ Long-Term Plan: Design & Technology

What do students need to know and understand by the end of each cycle to progress to the next stage?	***Focus of Cycle:*** **Engineering Concepts** - **A1 Engineering Sectors** - (Aerospace, Agricultural, Automotive, Biomedical, Chemical, Civil, Energy Generation, Mechatronic, Marine, Rail) - **A2 Functional Areas** - (Research and Development, Sales and Marketing, Design of Engineering Products and Services, Process Monitoring and Control, Manufacturing, Maintenance, Quality Management, Energy Management, Health and Safety Management, Information Management) - **A3 Modern and Emerging Technologies** - (Robotics, Virtual Reality, Augmented Reality, Cloud Computing, Internet of Things, Artificial Intelligence, 3D Printing, Digital Twin) **Assessment** - Exam Practice Questions Ass. 1 based around Engineering Concepts from A1, A2 and A3. **Practical** - Pupils use Onshape Software to design and make a product that is manufactured using the 3D printer. - Pupils use 2D Designer Software to design and make a product that is manufactured using the Laser Cutter.	***Focus of Cycle:*** **Engineering Concepts** - **B1 Materials:** - Metals (Pure Metals, Ferrous Alloys, Non-ferrous Alloys) - Polymers (Thermoplastic Polymers, Thermoset Polymers, Thermoplastic Elastomers, Thermoplastic Elastomers) - Composite Materials (Fibre Based Composites, Particle Based Composites, the effects of matrix/reinforcement structure on the properties of composites) - **B2 Properties of Materials** - (Physical Properties, Mechanical Properties, Heat Treatment of Metals) **Assessment** - Exam Practice Questions Ass. 1 based around Engineering Concepts from B1 and B2. **Practical** - Pupils use Engineering Processes to manufacture a product out of metal.	***Focus of Cycle:*** **Engineering Concepts** - **B3 Manufacturing Processes** - (Forming, Casting, Moulding, Machining, Cutting, additive Manufacturing) **Assessment** - Exam Practice Questions Ass. 1 based around Engineering Concepts from B3. - End of Year Unit 2 Mock Exam **Practical** - Pupils use Engineering Processes to manufacture a product out of metal.	***The ability to…*** - The ability to be aware of a range of engineering sectors, and be familiar with the engineering products and/or services they provide, the activities they carry out in the functional areas of engineering organisations and the impact of modern and emerging technologies. - The ability to be aware of the activities undertaken by the functional areas of engineering organisations operating in different sectors. - The ability to be aware of modern and emerging technologies, their use, benefits and impact on the operation of functional areas in engineering organisations. - The ability to be aware of how to select and evaluate the selection of engineering materials to fulfil the performance and sustainability requirements of a given product. - The ability to be familiar with the crystalline structure of metals, including the formation of grains, the effect of grain size on material properties and how solid solutions of dissimilar atoms distort the crystalline structure of metal alloys to alter material properties. - The ability to be familiar with the chemical symbols used for metals, the typical composition of alloys and the groups in which they belong. - The ability to be familiar with the amorphous molecular structure of polymers, how these structures differ in thermoplastic polymers, thermoset polymers and elastomers and how these differences affect their properties. - The ability to be familiar with the abbreviations used to identify polymers and the groups in which they belong. - The ability to be familiar with the structures of composites and how the structures affect the mechanical properties of the material. - The ability to be familiar with the abbreviations used to identify composites and the groups in which they belong. - The ability to be able to define and recall the units of measure and understand the important properties of the materials listed in section B1 Materials.

STJ Long-Term Plan: Design & Technology

				- The ability to be familiar with heat treatment processes and their effects on grain size, crystal structure (ferrite, cementite, austenite and martensite) and mechanical properties of high carbon steels. - The ability to be familiar with the relative benefits of each process, how it is set-up and operated, the tools and equipment required, compatible materials, the dimensional accuracy and surface finish that is achievable, speed, batch size, set-up/tooling, cost and waste products/sustainability considerations.
Ambition for all: what non-negotiable knowledge must all students learn, regardless of their starting points?	- A basic understanding of Engineering Sectors (Aerospace, Agricultural, Automotive, Biomedical, Chemical, Civil, Energy Generation, Mechatronic, Marine, Rail) - A basic understanding of Functional Areas (Research and Development, Sales and Marketing, Design of Engineering Products and Services, Process Monitoring and Control, Manufacturing, Maintenance, Quality Management, Energy Management, Health and Safety Management, Information Management) - A basic understanding of Modern and Emerging Technologies (Robotics, Virtual Reality, Augmented Reality, Cloud Computing, Internet of Things, Artificial Intelligence, 3D Printing, Digital Twin) - A basic understanding of how to use Onshape to design and a 3D printer to make this product.	- A basic understanding of Materials: Metals (Pure Metals, Ferrous Alloys, Non-ferrous Alloys) - Polymers (Thermoplastic Polymers, Thermoset Polymers, Thermoplastic Elastomers, Thermoplastic Elastomers) - Composite Materials (Fibre Based Composites, Particle Based Composites, the effects of matrix/reinforcement structure on the properties of composites) - A basic understanding of B2 Properties of Materials (Physical Properties, Mechanical Properties, Heat Treatment of Metals) - A basic understanding of how to use 2D Designer to design and a Laser Cutter to make this product.	- A basic understanding of Manufacturing Processes (Forming, Casting, Moulding, Machining, Cutting, additive Manufacturing) - A basic understanding of how to use the centre lathe, milling machine, pillar drill, metal bending press, tap and die equipment as well as traditional hand tools to manufacture a product out of metal.	**Bridging into Y13** Theory topics covered from the Learning Aim A and Learning Aim B prepare students for recall in Year 13 in line with the final exam for unit 2 at the end of the course. Practical tasks completed based on the theory topics from Learning Aim A and Learning Aim B help to reinforce theory tasks to make learning stick.
	Faith	***Learning*** ***Attitude***	***Mutual Respect*** ***Enrichment***	
Year 13 Engineering (Unit 2)	**Cycle 1**	**Cycle 2**	**Cycle 3**	**Exceptional performance/links to end points**
What do students need to know and understand by the end of each cycle to progress to the next stage?	***Focus of Cycle:*** **Engineering Concepts** - Retrieval of Engineering Sectors - Retrieval of Functional Areas - Retrieval of Modern and Emerging Technologies Retrieval is achieved through past paper questions and walking talking mocks. **Assessment** - November Mock Exam **Practical** -	***Focus of Cycle:*** **Engineering Concepts** - Retrieval of Materials - Retrieval of Properties of Materials Retrieval is achieved through past paper questions and walking talking mocks. **Assessment** - February Mock Exam **Practical** -	***Focus of Cycle:*** **Engineering Concepts** - Retrieval of Manufacturing Processes Retrieval is achieved through past paper questions and walking talking mocks. **Assessment** - Final Summer Exam **Practical** -	***The ability to…** - The ability to be aware of a range of engineering sectors, and be familiar with the engineering products and/or services they provide, the activities they carry out in the functional areas of engineering organisations and the impact of modern and emerging technologies. - The ability to be aware of the activities undertaken by the functional areas of engineering organisations operating in different sectors. - The ability to be aware of modern and emerging technologies, their use, benefits and impact on the operation of functional areas in engineering organisations. - The ability to be aware of how to select and evaluate the selection of engineering materials to fulfil the performance and

				sustainability requirements of a given product. - The ability to be familiar with the crystalline structure of metals, including the formation of grains, the effect of grain size on material properties and how solid solutions of dissimilar atoms distort the crystalline structure of metal alloys to alter material properties. - The ability to be familiar with the chemical symbols used for metals, the typical composition of alloys and the groups in which they belong. - The ability to be familiar with the amorphous molecular structure of polymers, how these structures differ in thermoplastic polymers, thermoset polymers and elastomers and how these differences affect their properties. - The ability to be familiar with the abbreviations used to identify polymers and the groups in which they belong. - The ability to be familiar with the structures of composites and how the structures affect the mechanical properties of the material. - The ability to be familiar with the abbreviations used to identify composites and the groups in which they belong. - The ability to be able to define and recall the units of measure and understand the important properties of the materials listed in section B1 Materials. - The ability to be familiar with heat treatment processes and their effects on grain size, crystal structure (ferrite, cementite, austenite and martensite) and mechanical properties of high carbon steels. - The ability to be familiar with the relative benefits of each process, how it is set-up and operated, the tools and equipment required, compatible materials, the dimensional accuracy and surface finish that is achievable, speed, batch size, set-up/tooling, cost and waste products/sustainability considerations.
Ambition for all: what non-negotiable knowledge must all students learn, regardless of their starting points?	- A developed understanding of Engineering Sectors (Aerospace, Agricultural, Automotive, Biomedical, Chemical, Civil, Energy Generation, Mechatronic, Marine, Rail) - A developed understanding of Functional Areas (Research and Development, Sales and Marketing, Design of Engineering Products and Services, Process Monitoring and Control, Manufacturing,	- A developed understanding of Materials: Metals (Pure Metals, Ferrous Alloys, Non-ferrous Alloys) - Polymers (Thermoplastic Polymers, Thermoset Polymers, Thermoplastic Elastomers, Thermoplastic Elastomers) - Composite Materials (Fibre Based Composites, Particle Based Composites, the effects of	- A developed understanding of Manufacturing Processes (Forming, Casting, Moulding, Machining, Cutting, additive Manufacturing) - A developed understanding of how to use the centre lathe, milling machine, pillar drill, metal bending press, tap and die equipment as well as traditional hand tools to manufacture a product out of metal.	

STJ Long-Term Plan: Design & Technology

	Maintenance, Quality Management, Energy Management, Health and Safety Management, Information Management) - A developed understanding of Modern and Emerging Technologies (Robotics, Virtual Reality, Augmented Reality, Cloud Computing, Internet of Things, Artificial Intelligence, 3D Printing, Digital Twin) - A developed understanding of how to use Onshape to design and a 3D printer to make this product.	matrix/reinforcement structure on the properties of composites) - A developed understanding of B2 Properties of Materials (Physical Properties, Mechanical Properties, Heat Treatment of Metals) - A developed understanding of how to use 2D Designer to design and a Laser Cutter to make this product.		
	Faith	***Learning*** ***Attitude***	***Mutual Respect*** ***Enrichment***	
Year 12 Engineering (Unit 3)	**Cycle 1**	**Cycle 2**	**Cycle 3**	**Exceptional performance/links to end points**
What do students need to know and understand by the end of each cycle to progress to the next stage?	***Focus of Cycle:*** **Engineering Concepts** - **A1 Interpreting Product Technical Requirements** - Interpreting technical requirements to produce a product design specification. - **A2 The Characteristics and Applications of Materials** - **A3 The Characteristics and Applications of Manufacturing Processes** - **A4 Generating Initial Design Ideas** - Use of information. - Producing freehand design sketches. - Generation of initial design ideas. - **A5 Modelling Design Solutions** - Using modelling materials. - Casting and moulding materials. - Modelling systems. - Using modelling tools and awareness of commercial processes. - Using spreadsheets to model production costs of initial design ideas.	***Focus of Cycle:*** **Engineering Concepts** - **B1 Review of Initial Design Ideas** - Design review meeting. - Consideration of the peer review feedback to select any elements that will be used to refine the 3-dimensional models. - Selection of best idea to develop based on reasoned comparison of initial design ideas for the PDS of the engineering challenge. - **B2 CAD and 3D Parametric Modelling** - Configure the parametric modeller, including origin, units, snap and grid, correct format, project files, selection of file types and planes, e.g. XY, XZ and YZ. - Sketching commands, including line, arc, centre line, construction line, circle, fillet and dimension. - Display commands, including pan, zoom, and orbit. - Editing commands, including erase, extend, trim, and rotate. - Construction commands. - **B3 Developing 3-Dimensional Components** - Creation of 2D sketches, including basic shape, dimensioning, modifications and geometric constraints. - 2D sketch to a 3D model, including rotate about an axis, revolve, extrude, and Boolean manipulation. - £D features. - Combination of solid objects, including Boolean operations. - 2D sketching on 3D faces. - Modification of the 3D model to improve solutions to the requirements of the engineering brief. - Analysis of the financial consequences of different material choices.	***Focus of Cycle:*** **Engineering Concepts** - **C1 Two-Dimensional Detailed Computer Aided Drawings of an Engineered Product** - Generation of 2D drawings from a 3D model. - Configuration of a 2D CAD system. - Use of layers. - Drawing commands. - Modify commands. - Display commands. - Dimensioning. - Component drawings. - Assembly drawings. - **C2 Presentation and Communication Skills** - Recording documentation for presentation use. - Convey intended meaning using different media, e.g. graphical, written, verbal. - Context of presentation, e.g. one-to-one, group informal, formal situations. - Use of tone and language for verbal and written communications to convey intended meaning and make a positive and constructive impact on an audience. - Responding constructively to the contributions of others. - Presentation, behaviour and conduct of presenter. - Negotiation and communication skills. - **D1 Review of the Final Design Solution** - Design process review outcomes. - **D2 Reflection on Personal Performance** - Theories and frameworks for reflective practice. - Reviewing own performance. - Performance review tools e.g. SWOT or SOAR analysis.	***The ability to…** - The ability to interpret information to produce a Product Design Specification (PDS). - The ability to apply their knowledge of the properties of materials, in relation to Unit 2: Engineering Applications to suggest appropriate materials for the manufacture of a product that will fulfil the requirements of the engineering design challenge. - The ability to apply their knowledge of the processes applied in engineering, as specified in Unit 2: Engineering Applications to suggest appropriate methods for the manufacture of a product that will fulfil the requirements of the engineering design challenge. - The ability to apply skills to generate initial design ideas to meet customer needs for a given brief including freehand, or assistive technology design. - The ability to produce physical models to test viability of initial design ideas and aid communication with third parties. - The ability to review engineering goals in terms of performance when designing an engineering product. - The ability to use a range of tools available within CAD software to develop a 3-dimensional model of a design idea. - The ability to communicate a developed proposition to improve an engineering design idea. - The ability to understand engineering goals in terms of performance when designing an engineering product. - The ability to use a range of tools available within CAD software to develop a 3-dimensional model of a design idea. - The ability to communicate a developed proposition to improve an engineering design idea. - The ability to combine different elements of their 3D dimensional components into an optimal solution for the engineering brief. - The ability to produce drawings that comply with British Standards BS 8888or other international equivalents. - The ability to communicate the outcomes of the design developments using appropriate content and methods.

STJ Long-Term Plan: Design & Technology

	Assessment - Unit 3 Engineering Design Practice Project (A.P1, A.P2, A.M1, A.M2, A.D1, A.D2) **Practical** - Unit 3 Engineering Design Practice Project	- **B4 Developing a 3-Dimensional Assembled Model** - Placement of 3D components, including degrees of freedom, XYZ translational freedom and XYZ rotational freedom. - Assembly constraints and the relationships between components, including mate constraint and angle constraint assembly relationships, insert constraint and tangent constraint assembly relationships. - Modification to 3D components due to assembly constraints. **Assessment** - Unit 3 Engineering Design Practice Project (B.P3, B.P4, B.M3, B.M4, B.D3, B.D4) **Practical** - Unit 3 Engineering Design Practice Project	**Assessment** - Unit 3 Engineering Design Practice Project (C.P5, C.M5, C.D5, D.P6, D.M6, D.D6) **Practical** - Unit 3 Engineering Design Practice Project	- The ability to review the outcomes of the design process. - The ability to reflect on their own performance when completing all stages and activities of their response to the engineering challenge, design of final solutions and presentation of these solutions to others.
Ambition for all: what non-negotiable knowledge must all students learn, regardless of their starting points?	- A basic understanding of how to interpret information to produce a Product Design Specification (PDS). - A basic understanding of how to apply their knowledge of the properties of materials, in relation to Unit 2: Engineering Applications to suggest appropriate materials for the manufacture of a product that will fulfil the requirements of the engineering design challenge. - A basic understanding of how to apply their knowledge of the processes applied in engineering, as specified in Unit 2: Engineering Applications to suggest appropriate methods for the manufacture of a product that will fulfil the requirements of the engineering design challenge. - A basic understanding of how to apply skills to generate initial design ideas to meet customer needs for a given brief including freehand, or assistive technology design. - A basic understanding of how to produce physical models to test viability of initial design ideas and aid communication with third parties.	- A basic understanding of how to review engineering goals in terms of performance when designing an engineering product. - A basic understanding of how to use a range of tools available within CAD software to develop a 3-dimensional model of a design idea. - A basic understanding of how to communicate a developed proposition to improve an engineering design idea. - A basic understanding of engineering goals in terms of performance when designing an engineering product. - A basic understanding in terms of how to use a range of tools available within CAD software to develop a 3-dimensional model of a design idea. - A basic understanding in terms of how to communicate a developed proposition to improve an engineering design idea. - A basic understanding of how to combine different elements of their 3D dimensional components into an optimal solution for the engineering brief.	- A basic understanding of how to produce drawings that comply with British Standards BS 8888or other international equivalents. - A basic understanding of how to communicate the outcomes of the design developments using appropriate content and methods. - A basic understanding of how to review the outcomes of the design process. - A basic understanding of how to reflect on their own performance when completing all stages and activities of their response to the engineering challenge, design of final solutions and presentation of these solutions to others.	**Bridging into Y13** Practice project covered from the Learning Aim A, Learning Aim B, Learning Aim C and Learning Aim D prepare students for recall in Year 13 in line with the final coursework for unit 3 provided by the exam board for submission in the second year of the course.

	Faith	***Learning***	***Attitude***	***Mutual Respect***	***Enrichment***
Year 13 Engineering (Unit 3)	**Cycle 1**	**Cycle 2**		**Cycle 3**	**Exceptional performance/links to end points**
What do students need to know and understand by the end of each cycle to progress to the next stage?	***Focus of Cycle:*** **Engineering Concepts** - **A1 Interpreting Product Technical Requirements** - Interpreting technical requirements to produce a product design specification. - **A2 The Characteristics and Applications of Materials** - **A3 The Characteristics and Applications of Manufacturing Processes** - **A4 Generating Initial Design Ideas**	***Focus of Cycle:*** **Engineering Concepts** - **B1 Review of Initial Design Ideas** - Design review meeting. - Consideration of the peer review feedback to select any elements that will be used to refine the 3-dimensional models. - Selection of best idea to develop based on reasoned comparison of initial design ideas for the PDS of the engineering challenge. - **B2 CAD and 3D Parametric Modelling**		***Focus of Cycle:*** **Engineering Concepts** - **C1 Two-Dimensional Detailed Computer Aided Drawings of an Engineered Product** - Generation of 2D drawings from a 3D model. - Configuration of a 2D CAD system. - Use of layers. - Drawing commands. - Modify commands. - Display commands.	***The ability to…** - The ability to interpret information to produce a Product Design Specification (PDS). - The ability to apply their knowledge of the properties of materials, in relation to Unit 2: Engineering Applications to suggest appropriate materials for the manufacture of a product that will fulfil the requirements of the engineering design challenge. - The ability to apply their knowledge of the processes applied in engineering, as specified in Unit 2: Engineering Applications to suggest appropriate methods for the manufacture of a product that will

STJ Long-Term Plan: Design & Technology

	- Use of information. - Producing freehand design sketches. - Generation of initial design ideas. - **A5 Modelling Design Solutions** - Using modelling materials. - Casting and moulding materials. - Modelling systems. - Using modelling tools and awareness of commercial processes. - Using spreadsheets to model production costs of initial design ideas. **Assessment** - Unit 3 Engineering Design Final Project (A.P1, A.P2, A.M1, A.M2, A.D1, A.D2) **Practical** - Unit 3 Engineering Design Final Project	- Configure the parametric modeller, including origin, units, snap and grid, correct format, project files, selection of file types and planes, e.g. XY, XZ and YZ. - Sketching commands, including line, arc, centre line, construction line, circle, fillet and dimension. - Display commands, including pan, zoom, and orbit. - Editing commands, including erase, extend, trim, and rotate. - Construction commands. - **B3 Developing 3-Dimensional Components** - Creation of 2D sketches, including basic shape, dimensioning, modifications and geometric constraints. - 2D sketch to a 3D model, including rotate about an axis, revolve, extrude, and Boolean manipulation. - £D features. - Combination of solid objects, including Boolean operations. - 2D sketching on 3D faces. - Modification of the 3D model to improve solutions to the requirements of the engineering brief. - Analysis of the financial consequences of different material choices. - **B4 Developing a 3-Dimensional Assembled Model** - Placement of 3D components, including degrees of freedom, XYZ translational freedom and XYZ rotational freedom. - Assembly constraints and the relationships between components, including mate constraint and angle constraint assembly relationships, insert constraint and tangent constraint assembly relationships. - Modification to 3D components due to assembly constraints. **Assessment** - Unit 3 Engineering Design Final Project (B.P3, B.P4, B.M3, B.M4, B.D3, B.D4) **Practical** - Unit 3 Engineering Design Final Project	- Dimensioning. - Component drawings. - Assembly drawings. - **C2 Presentation and Communication Skills** - Recording documentation for presentation use. - Convey intended meaning using different media, e.g. graphical, written, verbal. - Context of presentation, e.g. one-to-one, group informal, formal situations. - Use of tone and language for verbal and written communications to convey intended meaning and make a positive and constructive impact on an audience. - Responding constructively to the contributions of others. - Presentation, behaviour and conduct of presenter. - Negotiation and communication skills. - **D1 Review of the Final Design Solution** - Design process review outcomes. - **D2 Reflection on Personal Performance** - Theories and frameworks for reflective practice. - Reviewing own performance. - Performance review tools e.g. SWOT or SOAR analysis. **Assessment** - Unit 3 Engineering Design Final Project (C.P5, C.M5, C.D5, D.P6, D.M6, D.D6) **Practical** - Unit 3 Engineering Design Final Project	fulfil the requirements of the engineering design challenge. - The ability to apply skills to generate initial design ideas to meet customer needs for a given brief including freehand, or assistive technology design. - The ability to produce physical models to test viability of initial design ideas and aid communication with third parties. - The ability to review engineering goals in terms of performance when designing an engineering product. - The ability to use a range of tools available within CAD software to develop a 3-dimensional model of a design idea. - The ability to communicate a developed proposition to improve an engineering design idea. - The ability to understand engineering goals in terms of performance when designing an engineering product. - The ability to use a range of tools available within CAD software to develop a 3-dimensional model of a design idea. - The ability to communicate a developed proposition to improve an engineering design idea. - The ability to combine different elements of their 3D dimensional components into an optimal solution for the engineering brief. - The ability to produce drawings that comply with British Standards BS 8888or other international equivalents. - The ability to communicate the outcomes of the design developments using appropriate content and methods. - The ability to review the outcomes of the design process. - The ability to reflect on their own performance when completing all stages and activities of their response to the engineering challenge, design of final solutions and presentation of these solutions to others.

STJ Long-Term Plan: Design & Technology

Ambition for all: what non-negotiable knowledge must all students learn, regardless of their starting points?	- A.P1 Produce an adequate product design specification for the given engineering design challenge using some research and analysis. - A.P2 Produce adequate initial design ideas that address some requirements of the product design specification.	- B.P3 Review the initial design ideas and use some peer feedback to clarify the features that address some of the requirements of the product design specification. - B.P4 Develop initial design ideas into adequate digital 3D models that address some requirements of the product design specification.	- C.P5 Develop 3-dimensional models into 2-dimensional engineering drawings to partially communicate a final design solution that meets some requirements of the product design specification, describing some decisions taken. - D.P6 Explain how the design process was used to produce a final design solution that meets some of the requirements of the product design specification.	
	Faith	***Learning*** ***Attitude***	***Mutual Respect*** ***Enrichment***	
Year 12 Engineering (Unit 4)	**Cycle 1**	**Cycle 2**	**Cycle 3**	**Exceptional performance/links to end points**
What do students need to know and understand by the end of each cycle to progress to the next stage?	***Focus of Cycle:*** **Engineering Concepts** - **A1 Project Life Cycle** - Initiation. - Planning and design. - Implementation. - Evaluation. - **A2 Project Idea Generation and Solution** Development - Investigating. - Researching. - Specification. - **A3 Feasibility Study of Solutions** - Criteria to determine the feasibility of different solutions to a problem. - Selection of the proposed solution. **Assessment**	***Focus of Cycle:*** **Engineering Concepts** - **B1 Planning and Monitoring Project** Management Processes. - Resource planning. - Time planning. - Project contingency. - Project constraints. - Monitoring of the project. - **B2 Risk and Issue Project Management Processes.** - The purpose of risk and issue management. - A risk is an event that adversely impacts on the project processes or outcomes. - Risk and issue measures. - The risk or issue severity. - The need to assess risks and issues throughout the delivery of the project. - Management of risks and issues (mitigation). - Allowing contingency in the plans provides some flexibility in the event that risks and issues occur. - **B3 Technical Support** - Technical specification for the chosen solution being developed. - **B4 Design Information** - Tools used to design the solution. - Test plans to relevant British Standards (BS) or International Standard (IS) where appropriate. **Assessment** - Unit 4 Engineering Project Practice	***Focus of Cycle:*** **Engineering Concepts** - **C1 Undertake and Test the Solution to the Problem** - The use of project management processes during the development of a solution. - The safe use of resources. - Troubleshooting methods to resolve problems. - Fitness for purpose. - Testing methods. - Types of test data. - Test data analysis, visual presentation of test data analysis. - **C2 Demonstrate Relevant Behaviours** - Time planning and management. - Communication and literacy skills. - Commercial and customer awareness. - Observable emotions. - Individual support required. - **C3 Present a Solution to the Problem** - Thematic title and/or initial idea. - Research and clarification of the problem. - Possible solutions and constraints. - Initial specification of alternative technical solutions. - Feasibility study. - Technical specification. - Project management documents. - Logbook of events. - Design documents. - Artefacts for a product/service, process or system. - Test documentation. - Peer reviews and tutor monitoring. - Conclusions on the success of the solution against the project theme and initial idea. **Assessment** - Unit 4 Engineering Project Practice	***The ability to…** - The ability to apply knowledge of the four stages of a project life cycle. - The ability to apply knowledge when identifying a suitable problem, perhaps based on a theme, and creation of alternative solutions. - The ability to apply knowledge to determine the feasibility of different solutions to a problem. - The ability to apply knowledge, understanding and skills in resource planning, time planning, project contingency, project constraints with scheduled and frequent monitoring and management of the project. - The ability to apply knowledge, understanding and skills in relation to risk and project management. - The ability to produce a technical specification for the chosen solution being developed. - The ability to apply knowledge, understanding and skills in relation to tools used to design the solution including test plans to relevant standards. - The ability to undertake and test the final solution against the technical specification. - The ability to understand the relevant behaviours surrounding the solution. - The ability to understand the collation of the project portfolio.

STJ Long-Term Plan: Design & Technology

	- Unit 4 Engineering Project Practice (A.P1, A.M1, A.D1) **Practical** - Unit 4 Engineering Project Practice	(B.P2, B.P3, B.P4, B.M2, B.M3, B.D2) **Practical** - Unit 4 Engineering Project Practice	(C.P5, C.P6, C.M4, C.D3) **Practical** - Unit 4 Engineering Project Practice	
Ambition for all: what non-negotiable knowledge must all students learn, regardless of their starting points?	- A basic understanding of how to apply knowledge of the four stages of a project life cycle. - A basic understanding of how to apply knowledge when identifying a suitable problem, perhaps based on a theme, and creation of alternative solutions. - A basic understanding of how to apply knowledge to determine the feasibility of different solutions to a problem.	- A basic understanding of how to apply knowledge, understanding and skills in resource planning, time planning, project contingency, project constraints with scheduled and frequent monitoring and management of the project. - A basic understanding of how to apply knowledge, understanding and skills in relation to risk and project management. - A basic understanding of how to produce a technical specification for the chosen solution being developed. - A basic understanding of how to apply knowledge, understanding and skills in relation to tools used to design the solution including test plans to relevant standards.	- A basic understanding of how to undertake and test the final solution against the technical specification. - A basic understanding of relevant behaviours surrounding the solution. - A basic understanding of the collation of the project portfolio.	**Bridging into Y13** Practice project covered from the Learning Aim A, Learning Aim B and Learning Aim C prepare students for recall in Year 13 in line with the final coursework for unit 4 provided by the exam board for submission in the second year of the course.
	Faith	***Learning*** ***Attitude***	***Mutual Respect*** ***Enrichment***	
Year 13 Engineering (Unit 4)	**Cycle 1**	**Cycle 2**	**Cycle 3**	**Exceptional performance/links to end points**
What do students need to know and understand by the end of each cycle to progress to the next stage?	***Focus of Cycle:*** **Engineering Concepts** - **A1 Project Life Cycle** - Initiation. - Planning and design. - Implementation. - Evaluation. - **A2 Project Idea Generation and Solution** Development - Investigating. - Researching. - Specification. - **A3 Feasibility Study of Solutions** - Criteria to determine the feasibility of different solutions to a problem. - Selection of the proposed solution.	***Focus of Cycle:*** **Engineering Concepts** - **B1 Planning and Monitoring Project** Management Processes. - Resource planning. - Time planning. - Project contingency. - Project constraints. - Monitoring of the project. - **B2 Risk and Issue Project Management Processes.** - The purpose of risk and issue management. - A risk is an event that adversely impacts on the project processes or outcomes. - Risk and issue measures. - The risk or issue severity. - The need to assess risks and issues throughout the delivery of the project. - Management of risks and issues (mitigation). - Allowing contingency in the plans provides some flexibility in the event that risks and issues occur. - **B3 Technical Support** - Technical specification for the chosen solution being developed. - **B4 Design Information** - Tools used to design the solution.	***Focus of Cycle:*** **Engineering Concepts** - **C1 Undertake and Test the Solution to the Problem** - The use of project management processes during the development of a solution. - The safe use of resources. - Troubleshooting methods to resolve problems. - Fitness for purpose. - Testing methods. - Types of test data. - Test data analysis, visual presentation of test data analysis. - **C2 Demonstrate Relevant Behaviours** - Time planning and management. - Communication and literacy skills. - Commercial and customer awareness. - Observable emotions. - Individual support required. - **C3 Present a Solution to the Problem** - Thematic title and/or initial idea. - Research and clarification of the problem. - Possible solutions and constraints. - Initial specification of alternative technical solutions. - Feasibility study. - Technical specification. - Project management documents.	***The ability to…** - The ability to apply knowledge of the four stages of a project life cycle. - The ability to apply knowledge when identifying a suitable problem, perhaps based on a theme, and creation of alternative solutions. - The ability to apply knowledge to determine the feasibility of different solutions to a problem. - The ability to apply knowledge, understanding and skills in resource planning, time planning, project contingency, project constraints with scheduled and frequent monitoring and management of the project. - The ability to apply knowledge, understanding and skills in relation to risk and project management. - The ability to produce a technical specification for the chosen solution being developed. - The ability to apply knowledge, understanding and skills in relation to tools used to design the solution including test plans to relevant standards. - The ability to undertake and test the final solution against the technical specification. - The ability to understand the relevant behaviours surrounding the solution. - The ability to understand the collation of the project portfolio.

STJ Long-Term Plan: Design & Technology

	Assessment - Unit 4 Engineering Project Final (A.P1, A.M1, A.D1) **Practical** - Unit 4 Engineering Project Final	- Test plans to relevant British Standards (BS) or International Standard (IS) where appropriate. **Assessment** - Unit 4 Engineering Project Final (B.P2, B.P3, B.P4, B.M2, B.M3, B.D2) **Practical** - Unit 4 Engineering Project Final	- Logbook of events. - Design documents. - Artefacts for a product/service, process or system. - Test documentation. - Peer reviews and tutor monitoring. - Conclusions on the success of the solution against the project theme and initial idea. **Assessment** - Unit 4 Engineering Project Final (C.P5, C.P6, C.M4, C.D3) **Practical** - Unit 4 Engineering Project Final	
Ambition for all: what non-negotiable knowledge must all students learn, regardless of their starting points?	- A.P1 Explain, using some technical terms, at least three solutions to an engineering problem and select a preferred solution that partially addresses the researched problem.	- B.P2 Implement some appropriate project management planning and monitoring processes. - B.P3 Produce an adequate technical specification for a solution to the engineering problem that covers aspects of the chosen solution with some gaps. - B.P4 Produce design documentation to detail the solution taking account of some aspects of sustainability.	- C.P5 Produce a partially appropriate solution safely, using appropriate project management planning and monitoring processes. - C.P6 Demonstrate some appropriate behaviours while developing a solution safely.	