






SKI(LL)	LOGO	KS3 Design & Technology with links to the National Curriculum		KS4 BTEC TECH Award in Engineering with Links to the Pearson Specification		
		Year 7 - SOW: 1. Analyse it 2. Vex Robotics 3. Blockhead 4. Starburst 5. Design Workshop 6. J20	Year 8 – SOW: 1. Design Influences 2. Vex Robotics 3. Pull Along 4. Tetris Lighting 5. Design Workshop 6. KitKat	Year 9 - SOW: 1. PLAN TOY 2. FUSION 360 3. DESIGN SOFTWARE 4. TECHNICAL DRAWING 5. ELECTRONICS 6. ENGINEERING THEORY	Year 10 - SOW: COMPONENT 1 A Understand engineering sectors, products and organisations, and how they interrelate B Explore engineering skills through the design process. COMPONENT 2 A Understand materials, components and processes for a given engineered product B Investigate a given engineered product using disassembly techniques C Plan the manufacture of and safely reproduce/inspect/test a given engineered component.	Year 11 - SOW: COMPONENT 3 AO1 Understand how to respond to an engineering brief AO2 Select skills and techniques in response to an engineering brief AO3 Apply skills and techniques in response to an engineering brief AO4 Evaluate and review the outcomes of the application of skills and techniques in response to an engineering brief
DESIGN		<ul style="list-style-type: none"> Identify and understand user needs (SOW 1, 2, 6) Identify and solve design (SOW 1, 2, 6) Develop specifications to inform the design of innovative, functional prototypes (SOW 1, 6) Generate creative ideas (SOW 1, 2, 3, 4, 6) Develop and communicate design ideas using annotated sketches, 3-D oral and digital presentations and computer-based tools (SOW 1, 2, 3, 4, 5, 6) 	<ul style="list-style-type: none"> Use research and exploration, such as the study of different cultures, to identify and understand user needs (SOW 1, 2, 6) Identify and solve their own design problems and understand how to reformulate problems given to them (SOW 1, 2, 6) Develop specifications to inform the design of innovative, functional, appealing products that respond to needs in a variety of situations (SOW 1, 6) Use a variety of approaches [for example, biomimicry and user-centred design], to generate creative ideas and avoid stereotypical responses (SOW 1, 2, 3, 4, 6) Develop and communicate design ideas using annotated sketches, detailed plans, 3-D and mathematical modelling, oral and digital presentations and computer-based tools (SOW 1, 2, 3, 4, 5, 6) 	<p>PLAN TOY</p> <ul style="list-style-type: none"> Use CAD to design components on the CNC machines to manufacture the Plan Toy components. <p>FUSION:</p> <ul style="list-style-type: none"> Use CAD (Computer Aided Design) to produce individual components of the Plan Toy product. Understand how to use the different specialist tools and rendering in the software to create a realistic model Explore how to assemble different components with a 3D modelling package. <p>DESIGN SOFTWARE:</p> <ul style="list-style-type: none"> Develop design solutions from a brief using CAD Consider design developments, identify problems, understand how to solve them and suggest alternative solutions <p>TECHNICAL DRAWING:</p> <ul style="list-style-type: none"> Use CAD software to design and develop ideas in the form of perspective and orthographic drawings Developing detailed designs through annotation <p>ELECTRONICS</p> <ul style="list-style-type: none"> Design and develop schematic circuit diagrams and program flow charts within a programming software 	<p>COMPONENT 1:</p> <p>B1 – Produce design solutions in response to a design brief (considering physical requirements, aesthetics, size, and function and performance requirements). They will produce 2D and 3D design ideas developing them into a final design solution. Pupils will use CAD during the development process to produce a realistic model. Initial sketches will be annotated, orthographic drawings and drawing templates will be produced.</p> <p>COMPONENT 2:</p> <p>B3 – Design and make a product using a PDS (Product Design Specification) considering materials, dimensions, function.</p> <p>C1 – develop possible solutions to the engineering problem and develop these towards a final outcome.</p> <p>C2 – pupils will develop a production plan to follow through the manufacture of the component.</p>	<p>AO2 Select skills and techniques in response to an engineering brief</p> <p>AO3 Apply skills and techniques in response to an engineering brief</p> <p>COMPONENT 3:</p> <p>B2 – Identify relevant issues with the existing design and produce design sketches (2D and 3D, exploded diagrams, circuit diagrams) for a redesign. These will be annotated. Consider variations in form, approach, methods and use of different componentry.</p>
MAKE		<ul style="list-style-type: none"> Use specialist tools, techniques, processes, equipment and machinery precisely (SOW 3, 4, 6) Select from and use materials and components taking into account their properties (SOW 3, 4, 6) 	<ul style="list-style-type: none"> Select from and use specialist tools, techniques, processes, equipment and machinery precisely, including computeraided manufacture. (SOW 3, 4, 6) Select from and use a wider, more complex range of materials and components taking into account their properties (SOW 3, 4, 6) 	<p>PLAN TOY:</p> <ul style="list-style-type: none"> Manufacture the individual Plan Toy components using different materials (wood, metal and polymer). Select and use different processes (hand tools and machinery) and assemble the final product. Identify and solve design solutions and issues during the manufacture process Follow health and safety consideration during practical element of the topic. <p>FUSION 360</p> <ul style="list-style-type: none"> Use CAD to produce designs for Plan Toy components considering accurate dimensions <p>DESIGN SOFTWARE</p> <ul style="list-style-type: none"> Use design software and specialist tools to create design solutions <p>TECHNICAL DRAWING</p> <ul style="list-style-type: none"> Select modelling materials and produce a final design prototype <p>ELECTRONICS:</p> <ul style="list-style-type: none"> Manufacture a PCB. Soldering different electronic components to the PCB. Carry out manufacture of the PCB selecting appropriate tools and equipment. Follow health and safety consideration during practical element of the topic. 	<p>COMPONENT 1:</p> <p>B1 – Pupils will produce a model for their final design solution using 3D modelling software. They will consider their solutions against the design brief.</p> <p>COMPONENT 2:</p> <p>C1 – Produce solutions to the problems using different engineering skills</p> <p>C1 – manufacture a component following the PDS (Product Design Specification). Pupils will use different engineering process to manufacture the component and consider the materials used.</p>	<p>COMPONENT 3:</p> <p>AO2 Select skills and techniques in response to an engineering brief</p> <p>AO3 Apply skills and techniques in response to an engineering brief</p> <p>C3 – Undertake the manufacture of the component selecting appropriate materials and processes and equipment. Carry out processes considering health and safety, time scale, dimensions, tolerances and materials.</p>
EVALUATE		<ul style="list-style-type: none"> Analyse the work of past and present professionals develop understanding (SOW 1, 2, 3, 4, 5, 6) Investigate new and emerging technologies (SOW 1, 2) Test, evaluate and refine their ideas against a specification (SOW 1, 2, 6) 	<ul style="list-style-type: none"> Analyse the work of past and present professionals and others to develop and broaden their understanding (SOW 1, 2, 3, 4, 5, 6) Investigate new and emerging technologies (SOW 1, 2) test, evaluate and refine their ideas and products against a specification, taking into account the views of intended users 	<p>PLAN TOY:</p> <ul style="list-style-type: none"> Evaluate existing products and consider Product Design Specifications (PDS) Analyse and reflect on practical work of the different components considering dimensions, materials, health and safety considerations and aesthetics. <p>FUSION 360:</p>	<p>COMPONENT 1:</p> <p>A1 – Pupils will evaluate different Engineering sectors and products that they produce. Pupils will also look at how the sectors work together to produce components and final products.</p> <p>A2 – Evaluation of the Engineering organisations in terms of their size, job roles, career progression and opportunities.</p>	<p>AO1 Understand how to respond to an engineering brief</p> <p>AO2 Select skills and techniques in response to an engineering brief</p> <p>AO3 Apply skills and techniques in response to an engineering brief</p> <p>AO4 Evaluate and review the outcomes of the application of skills and techniques in response to an engineering brief</p>

		<ul style="list-style-type: none"> Understand developments in design and technology, its impact on individuals, society and the environment (SOW 1, 2, 4) 	<ul style="list-style-type: none"> and other interested groups (SOW 1, 2, 6) Understand developments in design and technology, its impact on individuals, society and the environment, and the responsibilities of designers, engineers and technologists (SOW 1, 2, 4) 	<ul style="list-style-type: none"> Evaluate design process considering the specialist tools used throughout the process Reflect on self and peer review feedback to consider modifications to the product/ component design <p>DESIGN SOFTWARE:</p> <ul style="list-style-type: none"> Evaluate design solutions with consideration of the PDS (Product Design Specification) <p>TECHNICAL DRAWING:</p> <ul style="list-style-type: none"> Evaluate design drawings considering international standards <p>ELECTRONICS:</p> <ul style="list-style-type: none"> Evaluate the function of a PCB and they use in products within industry. <p>ENGINEERING THEORY:</p> <ul style="list-style-type: none"> Evaluate different engineering organisations and sectors. Evaluate the need for engineering and the different products Understand key engineering principles including engineering sectors and disciplines Understand how Engineering links to the wider world and how components, materials and services can be designed, developed and manufactured by different sized organisations. Understand different engineering processes, materials, machinery and equipment 	<p>B1 – Pupils will evaluate initial design ideas, design development and their final solution considering the design brief.</p> <p>COMPONENT 2:</p> <p>A1 – Investigate different material categories such as ferrous and non-ferrous metals explaining the properties and characteristics of the engineering materials.</p> <p>A2 – Investigate different component types such as proprietary and product specific components.</p> <p>A3 – Investigate different engineering processes (cutting, shaping, forming, joining)</p> <p>B1 – Observation and recording of the design features of an engineering product.</p> <p>B2 – Undertake the disassembly of a product and the evaluation of the different components.</p> <p>B3 – Produce a PDS (Product Design Specification) for a disassembled engineering product.</p> <p>C2 – Develop a product plan considering health and safety, risks, processes, inspection and testing, equipment and materials.</p> <p>C2 – Evaluation of the engineering component through testing and written analysis.</p>	<p>COMPONENT 3:</p> <p>A2 – Record data after carrying out a process with accuracy and precision.</p> <p>A3 – Interpret the data and represent their findings using tables and, charts and graphs. Produce written evaluation comparing the trends and patterns to draw valid conclusions and make recommendations</p> <p>B1 – Interpret an engineering brief. Research into existing products and consider the following: dimensions and tolerances, physical form, attributes, materials, processes</p> <p>B2 – pupils will annotate their design sketches considering variations in form, approach, methods and use of different componentry.</p> <p>B3 – Pupils will review the credibility of their design ideas against the needs of the engineering brief. Pupils will select and justify their final design solution and justify the processes used to manufacture.</p> <p>C1 – Analyse engineering information (data, engineering technical drawings), interpret patterns and trends and identify issues and causes associated with the engineering problem.</p> <p>C2 – Evaluate different solutions (design, tooling, processes) and consider wider factors in order to meet the brief. identify advantages, disadvantages and limitations/ constraints. Justify the best solutions. Reflect on the processes and make recommendations for improvements.</p> <p>C3 – Evaluate and analyse the solutions to overcome problems considering: resources required, designs of solutions, processes, data, safety and timescales.</p>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);">TECHNICAL KNOWLEDGE</p>	 <p>The following logo is used in Engineering Y9-13 to demonstrate key terminology:</p> 	<ul style="list-style-type: none"> Use the properties of materials to achieve functioning solutions (SOW 3, 4, 6) Understand how more advanced mechanical systems used in their products enable changes in movement and force (SOW 2) Understand how electrical and electronic systems can be powered and used in their products [for example, circuits with light, movement, inputs and outputs] (SOW 2, 4) Apply computing and use electronics to embed intelligence in products that respond to inputs [for example, sensors], and control outputs [for example, actuators], using programmable components [for example, microcontrollers]. (SOW 2) 	<ul style="list-style-type: none"> Use the properties of materials and the performance of structural elements to achieve functioning solutions (SOW 3, 4, 6) understand how more advanced mechanical systems used in their products enable changes in movement and force (SOW 2, 3) understand how more advanced electrical and electronic systems can be powered and used in their products [for example, circuits with heat, light, sound and movement as inputs and outputs] (SOW 2, 4) apply computing and use electronics to embed intelligence in products that respond to inputs [for example, sensors], and control outputs [for example, actuators], using programmable components [for example, microcontrollers]. (SOW 2) 	<p>PLAN TOY:</p> <ul style="list-style-type: none"> Use key terms in written evaluation and written annotation Understand different engineering processes and how they are used to develop a component and product. Understand dimensions and tolerances <p>FUSION 360:</p> <ul style="list-style-type: none"> Apply knowledge of the software skills to develop the components for the Plan Toy <p>DESIGN SOFTWARE:</p> <ul style="list-style-type: none"> Apply knowledge and understanding of the different software tools to explain the development process. <p>TECHNICAL DRAWING:</p> <ul style="list-style-type: none"> Apply understanding of different skills and specialist tools to producing high quality design drawings <p>ELECTRONICS:</p> <ul style="list-style-type: none"> Understand the difference between input, process and output electronic components and their functions Understand software to program microprocessors considering different electronic components Use software to program microprocessor considering timings, input, process and output components. <p>ENGINEERING THEORY:</p> <ul style="list-style-type: none"> Apply knowledge of key engineering principles including engineering sectors, disciplines and how Engineering links to the wider world within written annotation. Understand key terminology for components, materials (metals and polymers), services, equipment and processes. Apply theory to Component 1, 2 and 3 in years 10 and 11 internal and external assessments. <p><i>Key Words used throughout the SOW PowerPoints.</i></p> <p><i>BTEC Key Words are stuck into each pupils' book to refer to throughout the assessment process.</i></p>	<p>COMPONENT 1:</p> <p>A1, A2, B1 – Technical language will be used throughout the assignment work for Learning Aim A and Learning Aim B. Pupils will be taught content and produce written annotation to justify the development of design solutions. Pupils will evaluate the design process against the design brief and the peer reviews completed.</p> <p>COMPONENT 2:</p> <p>A1, A2, A3 - Use high technical written language within their assignment work to evaluate their investigation into Materials, component and processes.</p> <p>B1, B2, B3 – Produce a written report describing the disassembly of an engineered product and describe how the main components link together. Pupils will justify the components and complete a detailed PDS.</p> <p>C1, C2 – Produce a written report evaluating the success of their planning and documenting their progress. Use high technical written language to obtain the Distinction criteria in the assignment.</p> <p><i>Key Words used throughout the SOW PowerPoints.</i></p> <p><i>BTEC Key Words are stuck into each pupils' book to refer to throughout the assessment process.</i></p>	<p>AO4 Evaluate and review the outcomes of the application of skills and techniques in response to an engineering brief</p> <p>COMPONENT 3:</p> <p>Knowledge from Component 1 and Component 2 will be recalled within Component 3.</p> <p>A1, A2, A3 – Understand how to explore, record, collect and interpret data. Apply this knowledge to carry out testing processes to gather data in response to a problem/ brief. Use knowledge and technical language to interpret the data.</p> <p>B1, B2, B3 – Use technical knowledge to interpret and engineering brief, explain and justify design solutions and engineering process used to manufacture the component.</p> <p>C1, C2, C3 – use technical knowledge to analyse information to produce a considered and justified response to solve design solutions. Use technical language within written annotation to explain processes, thoughts, materials, safety considerations, modifications.</p> <p><i>Key Words used throughout the SOW PowerPoints.</i></p> <p><i>BTEC Key Words are stuck into each pupils' book to refer to throughout the assessment process.</i></p>

COMPONENT 1: Exploring Engineering Sectors and Design Applications	COMPONENT 2: Investigating an Engineering Project	COMPONENT 3: Responding to an Engineering Brief
<p>Levels: 1/2 Assessment type: Internal Guided learning hours: 36</p> <p>Component in brief Learners will explore the links between the various engineering sectors and the role of design in the production of engineered products.</p> <p>Introduction A range of people with different skill sets work together during the production of electrical, electronic and mechanical engineered products, such as mobile phones and mountain bikes. In this component, you will develop knowledge and understanding of the engineering industry, the interconnections within engineering sectors, and how these are integrated to enable organisations to find solutions to real-life problems. You will explore the role that design applications play in the production of engineered products. Through practical exercises, you will produce solutions to problems using different combinations of design and modelling engineering skills. This component will support you in progressing to a Level 2 or 3 qualification in a range of engineering sectors, for example aerospace, automotive, electrical, electronic, manufacturing, marine, mechanical or telecommunications. You will develop transferable skills such as problem solving, communication and aspects of critical thinking, all of which will support your progression to Level 2 or 3 vocational or academic qualifications.</p> <p>Learning aims A Understand engineering sectors, products and organisations, and how they interrelate B Explore engineering skills through the design process.</p>	<p>Levels: 1/2 Assessment type: Internal Guided learning hours: 36</p> <p>Component in brief Learners will investigate the selection of materials, proprietary components, making processes and disassembly of a given engineered product. They will plan, reproduce, inspect and test a single component.</p> <p>Introduction This component builds on the knowledge and skills you have learned and used in <i>Component 1</i>. The manufacture of an engineered product involves design, the correct selection of materials, components and the making processes. This component will give you an understanding of the types and properties of metallic and polymeric materials, and proprietary components commonly used in engineered products. You will acquire an understanding of the selection of materials, proprietary components, making processes and disassembly of a given engineered product. You will then plan, reproduce, inspect and test a single component. This component will support you in progressing to a Level 2 or 3 qualification in a range of engineering sectors, for example aerospace, automotive, electrical, electronic, manufacturing, marine, mechanical or telecommunications. You will develop transferable skills such as problem solving, communication and aspects of critical thinking, all of which will support your progression to Level 2 or 3 vocational or academic qualifications.</p> <p>Learning aims A Understand materials, components and processes for a given engineered product B Investigate a given engineered product using disassembly techniques C Plan the manufacture of and safely reproduce/inspect/test a given engineered component.</p>	<p>Levels: 1/2 Assessment type: External Guided learning hours: 48</p> <p>Component in brief Learners will investigate and create solutions to problems in response to given engineering briefs.</p> <p>Introduction This component builds on the knowledge and skills you have learned in <i>Components 1</i> and <i>2</i> and is synoptic. You will be given engineering briefs with problems you need to respond to. Your response will include possible solutions that you will test against the brief. You will be given the opportunity to carry out tests, collect and analyse data, reflect on your findings, consider any issues, and suggest solutions. This component will support you in progressing to a Level 2 or 3 qualification in a range of engineering sectors, for example aerospace, automotive, electrical, electronic, manufacturing, marine, mechanical or telecommunications. You will develop transferable skills such as problem solving, which will support your progression to Level 2 or 3 vocational or academic qualifications.</p> <p>Summary of assessment This external component builds on knowledge, understanding and skills acquired and developed in <i>Components 1</i> and <i>2</i>. Learners will apply developed skills in problem solving, design and communication to enable them to respond to engineering briefs. A set task comprised of two parts worth 60 marks in total will be completed under supervised conditions. The supervised assessment period is two hours for Part 1 and one and a half hours for Part 2. Both parts of the set task are completed during a one-week period timetabled by Pearson. The assessment availability is February and May/June only. The first assessment is February 2019. For assessment, learners will be given a brief to carry out a practical set task before completing the three activities based on the practical task. An additional task, consisting of two activities, will target higher-order, planning, redesign and evaluative skills, and relate to independent scenarios. Sample assessment materials will be available to help centres prepare learners for assessment.</p> <p>Assessment objectives AO1 Understand how to respond to an engineering brief AO2 Select skills and techniques in response to an engineering brief AO3 Apply skills and techniques in response to an engineering brief AO4 Evaluate and review the outcomes of the application of skills and techniques in response to an engineering brief</p>