

Engineering Design (Cambridge National)				
Year 10 (Sept 2022 to July 2023 – new specification)				
	Topic / Theme	Knowledge and Skills	Assessment	Cultural Capital Independent Learning
Autumn – Term One	<p><b>The RO39 coursework unit</b> 60 marks (30%) (Communicating Designs)</p> <p><b>RO39 - Topic area (1a):</b> Use freehand sketching techniques to present your initial concepts for the remote control</p> <ul style="list-style-type: none"> <li>• use annotation and labelling techniques to explain your concepts</li> <li>• produce sketches of your design proposals using suitable methods</li> <li>• select your preferred design proposal and justify how it meets the design specification.</li> </ul>	<p><b>RO39 coursework unit (designing)</b> This topic is a coursework unit. Students will develop knowledge and understanding of how to communicate design ideas through hand rendering and computer-based techniques.</p> <p>Students will learn to generate design ideas using detailed hand rendering presentation techniques, including sketches in 2d and 3d. students will learn how to add dimensions and gain skills in annotation and labelling techniques, such as showing key features, functions, dimensions, materials, construction/manufacture methods.</p>	<p><b>RO38 assessment criteria</b></p> <p><b>Band (1)</b> Produces a <b>limited</b> range of creative freehand design proposals. <b>Limited</b> consideration of the design specification. Uses a <b>basic</b> Evidence of analysis of design proposals with <b>limited</b> annotation. Justification demonstrates <b>limited</b> understanding of needs and wants of the client/user.</p> <p><b>Band (2)</b> Produces an <b>adequate</b> range of creative freehand design proposals. <b>Partial</b> consideration of the design specification. Uses an <b>adequate</b> range of techniques. Evidence of analysis of design proposals, with <b>some</b> annotation. Justification demonstrating <b>some</b> understanding of needs and wants of the client/user.</p> <p><b>Band (3)</b> Produces a <b>wide</b> range of creative and innovative freehand design proposals. <b>Fully</b> considers the design specification.</p>	<p>In Engineering, enrichment of knowledge in a design context is achieved using a variety of methods and solutions including the use of computer aided design and the application of geometry. Students will gain an awareness of how the designs and work of individuals influence and reflect society, different cultures and social economic groups. Students will gain an understanding of Britain’s contemporary design practice and design heritage, as well as a knowledge of international design practice. We encourage wider reading and the exploration of academic theory of design. Research into concepts, the</p>

	<p><b>The RO38 examination unit</b> 80 marks (40%)</p> <p><b>Topic (3) Communicating Design Outcomes</b></p> <p><b><i>3.1 Types of drawing used in engineering</i></b></p>	<p><b>RO38 – Topic 3 content</b></p> <p><b>Freehand sketching</b></p> <ul style="list-style-type: none"> <li>• Isometric</li> <li>• Oblique</li> <li>• Orthographic drawings</li> <li>• Exploded views</li> <li>• Assembly drawings</li> <li>• Block diagrams</li> <li>• Flowcharts</li> <li>• Circuit diagrams</li> <li>• Wiring diagrams</li> </ul>	<p>Uses a <b>comprehensive</b> range of techniques. Extensive evidence of analysis of design proposals that are <b>fully</b> annotated. Justification demonstrating a <b>detailed</b> understanding of needs and wants of the client/ user.</p> <p><b>RO38 – Topic 3 assessment</b></p> <p>Lesson assessment Mock examinations External examinations</p>	<p>environment, cultures and the work of past and present designers, and their achievements, will develop the students’ understanding of their own potential and the measures, skills and knowledge necessary to succeed. Engineering develops cultural awareness through studies into specific topics such as consumer driven demand, designing for manufacture &amp; production, and the impact of designs on the environment.</p>
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Engineering Design (Cambridge National – certificate)				
Year 10				
	Topic / Theme	Knowledge and Skills	Assessment	Cultural Capital Independent Learning
Autumn – Term Two	<p><b>The RO39 coursework unit</b> 60 marks (30%) (Communicating Designs)</p> <p><b>RO39 - Topic area (1b):</b> Use freehand sketching techniques to present your developed concept for the remote control</p> <p>Use annotation and labelling techniques to explain your concepts</p> <p>Produce 2D and 3D sketches of your developed concept using suitable methods</p> <p>Explain how it meets the design specification.</p>	<p><b>RO39 coursework unit (designing)</b> This topic is a coursework unit. Students will develop knowledge and understanding of how to communicate design ideas through hand rendering and computer-based techniques.</p> <p>Students will learn to generate design ideas using detailed hand rendering presentation techniques, including sketches in 2d and 3d. Students will learn how to add dimensions and gain skills in annotation and labelling techniques, such as showing key features, functions, dimensions, materials, construction/manufacture methods.</p>	<p><b>RO38 assessment criteria</b></p> <p><b>Band (1)</b> Produces a <b>basic</b> freehand sketch of design proposal. <b>Brief</b> explanation of the key features of a design proposal with <b>limited</b> annotation. <b>Limited</b> consideration of the design specification.</p> <p><b>Band (2)</b> Produces <b>adequate</b> freehand sketches of design proposal. <b>Adequate</b> explanation of the key features of a design proposal with <b>some</b> annotation. <b>Some</b> consideration of the design specification.</p> <p><b>Band (3)</b> Produces <b>comprehensive</b> freehand sketches of design proposal. <b>Detailed</b> explanation of the key features of a design proposal that is <b>fully</b> annotated. <b>Fully</b> considers the design specification.</p>	<p>Enrichment of knowledge in a design context is achieved using a variety of methods and solutions including the use of computer aided design and the application of geometry in R107.</p> <p>Students will gain an awareness of how the designs and work of individuals influence and reflect society, different cultures and social economic groups. Research into concepts, the environment, cultures and the work of past and present designers, and their achievements, will develop the students' understanding of their own potential and the measures, skills and knowledge necessary to succeed.</p>



		<p>Product disassembly</p> <p>Production of an engineering design specification</p> <p>Generation of design ideas by sketching and modelling</p>		
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**Engineering Design** (Cambridge National – certificate)  
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Spring – Term Three	<p><b>The RO39 coursework unit</b> 60 marks (30%) (Communicating Designs)</p> <p><b>RO39 - Topic area (2): Manual Production of Engineering Drawings</b></p>	<p><b>RO39 coursework unit (designing)</b></p> <p>Knowledge of 3rd angle orthographic projection drawing that includes a range of dimensions</p> <p>Knowledge of assembly drawings</p> <p>Knowledge of appropriate assembly drawing techniques</p>	<p><b>RO38 assessment criteria Topic area (2)</b></p> <p><b>Band (1)</b> Produces a <b>basic</b> orthographic drawing. Produces an assembly drawing that is <b>limited</b> in detail. Production of drawings is <b>dependent</b> upon assistance or help from other sources.</p> <p><b>Band (2)</b> Produces an <b>adequate</b> and accurate orthographic drawing. Produces an assembly drawing with <b>some</b> detail.</p>	<p>As above, in addition, in the R107 Unit, students will focus on the use of computer aided design applications and the use of this form of technology in industry, including study of career pathways in this sector. Students will gain understanding of how different design drawings relate to various sectors of industry, and how the</p>

	<p><b>The RO38 examination unit</b> 80 marks (40%)</p> <p><b>Topic (2) Designing Processes</b></p> <p><b>1.2.2 Make and evaluate:</b> The reasons for the use of</p>	<p><b>RO38 – Topic 1 content</b></p> <p>The reasons for the use of modelling to test proportions to test scale to test function</p> <p>Virtual modelling of the design idea Physical modelling of the design idea Manufacture or modification of the prototype comparison of the model or prototype against the requirements of the design brief and specification</p>	<p>Drawings are produced with <b>some</b> assistance or help from other sources.</p> <p><b>Band (3)</b> Produces a <b>comprehensive</b> orthographic drawing. Produces a <b>fully</b> detailed assembly drawing. Drawings are produced <b>independently</b>.</p> <p><b>RO38 – Topic 1 assessment</b></p> <p>Lesson assessment Mock examinations External examinations</p>	<p>emergence of computer aided design &amp; manufacture has impacted on society and the types of skills required for the future.</p>
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	<p><b>Topic (3.2) Working Drawing</b></p>	<p>2D engineering drawings using third angle orthographic projection</p> <p>Standard conventions title block metric units of measurement, scale, tolerance</p> <p><b>Standard conventions for dimensions:</b> linear measurements radius diameter surface finish</p> <p><b>Meaning of line types:</b> outlines hidden detail centre line projection dimension leader line</p>	<p>To include: standard conventions in BS 8888 and how these are applied</p> <p><b>RO38 – Topic 3 assessment</b></p> <p>Lesson assessment Mock examinations External examinations</p>	
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	Summer – Term Four	<p><b>The RO39 coursework unit</b> 60 marks (30%) (Communicating Designs)</p> <p><b>RO39 - Topic area (3): Use of Computer Aided Design (CAD)</b></p>	<p><b>RO39 coursework unit (designing)</b></p> <p>Knowledge of using CAD to produce 3D virtual models and how to add rendering, textures, dimensioning and assembly views.</p>	<p><b>RO38 assessment criteria Topic area (3)</b></p> <p><b>Band (1)</b> Use of CAD to produce a <b>simple</b> model of the design proposal. A <b>simple</b> 3D virtual model consisting of a very limited number of components. Production of a 3D virtual model is <b>dependent</b> upon assistance</p> <p><b>Band (2)</b> Use of CAD to produce an <b>adequate</b> model of the design proposal. An <b>adequate</b> 3D virtual model consisting of some components. Production of 3D virtual model is produced with <b>some</b> assistance or help from other sources.</p> <p><b>Band (3)</b> Use of CAD to produce a <b>complex</b> model of the design proposal. A <b>detailed</b> 3D virtual model consisting of many components. 3D virtual models are produced <b>independently</b>.</p>



	<p><b>The RO38 examination unit</b> 80 marks (40%)</p> <p><b>Topic (3) Using CAD processes</b></p>	<p><b>Topic (3) Using CAD processes</b></p> <p>Advantages and limitations of using CAD drawing software compared to manual drawing techniques</p>	<p><b>RO38 – Topic 3 assessment</b></p> <p>Lesson assessment Mock examinations External examinations</p>	<p>experiences, which are designed to appeal to girls in particular to address issues of gender stereotyping and encourage future pathways and employment in areas with gender disparity. In <b>Engineering</b>, enrichment of knowledge in a practical context is achieved using a variety of equipment and materials including laser cutters, CNC vinyl cutters, centre lathes, industrial machinery and specialist tools linked to trades. Students will develop knowledge of digital design and how the use of computer aided design (CAD) is used to develop solutions and design ideas. They will gain specific transferable skills using CAD applications</p>
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Summer – Term Five	<p><b>The RO38 examination unit</b> 80 marks (40%)</p> <p><b>Topic (2) How Manufacturing considerations affect Design</b></p>	<p><b>Topic (2.2) content</b></p> <p><b>Scale of manufacture:</b> one-off batch mass</p> <p>Material availability and form</p> <p><b>Types of manufacturing processes:</b> wasting shaping forming joining finishing assembly</p> <p>Production costs labour capital cost</p>	<p><b>RO38 – Topic 2 assessment</b></p> <p>Lesson assessment Mock examinations External examinations</p>	<p>Students are expected to plan &amp; manufacture products independently with varying degrees of innovation and flair. They will develop problem solving skills through independent learning in both a design and practical context, which will enrich the potential of all students by providing valuable skills and the mind-set to progress independently, especially in terms of future pathways and employment. Research into materials, concepts and the work of past and present designers will develop the students’ ability to work independently.</p>

	<p><b>The RO38 examination unit</b> 80 marks (40%)</p> <p><b>Topic (2) How Manufacturing considerations affect Design</b></p> <p><b>2.3 Influences on engineering product design</b></p>	<p><b>Topic (2.2) content</b></p> <p>Market pull and technology push British and International Standards Legislation Planned obsolescence Sustainable design (6Rs) Rethink Reuse Recycle Repair Reduce Refuse</p> <p>Design for the circular economy</p>	<p><b>RO38 – Topic 2 assessment</b></p> <p>Lesson assessment Mock examinations External examinations</p>	<p>Students are provided with opportunities to experience and gain skills in the use of equipment such as power machinery and specialist hand tools used in many areas of employment. Students will be able to develop knowledge in use of computer aided control equipment and robotics to manufacture products, and to develop an understanding of how everyday products are manufactured in industry.</p>
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Summer – Term Six	Topic / Theme			Cultural Capital Independent Learning
		<p><b>The RO38 examination unit</b> 80 marks (40%)</p> <p><b>Topic (2) How Manufacturing considerations affect Design</b></p> <p><b>2.1 Types of criteria included in an engineering design specification</b></p>	<p><b>Topic (2.1) content</b></p> <p>Needs and wants Quantitative and qualitative criteria Reasons for the product criteria included in the design specification (ACCESS FM): Aesthetics Cost Customer Environment Size Safety Function Material Manufacturing</p>	<p><b>RO38 – Topic 2 assessment</b></p> <p>Lesson assessment Mock examinations External examinations</p>

	<p><b>The RO38 examination unit</b> 80 marks (40%)</p> <p><b>Topic (2) How Manufacturing considerations affect Design</b></p> <p><b>2.2 How manufacturing considerations affect design</b></p>	<p><b>Topic (2.2) content</b></p> <p>Scale of manufacture: one-off batch mass</p> <p>Material availability and form Types of manufacturing processes: wasting shaping forming joining finishing assembly</p> <p>Production costs labour capital cost</p>	<p><b>RO38 – Topic 2 assessment</b></p> <p>Lesson assessment Mock examinations External examinations</p>	<p>experiences, which are designed to appeal to girls in particular to address issues of gender stereotyping and encourage future pathways and employment in areas with gender disparity. In Engineering, enrichment of knowledge in a practical context is achieved using a variety of equipment and materials including laser cutters, CNC vinyl cutters, centre lathes, industrial machinery and specialist tools linked to trades. They are taught to reflect on the users of products and how users’ views, beliefs and social-economic status often determine the type of product conceptualised, and why.</p>
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