

ks4 Engineering Design

Knowledge:

- Be able to identify or recognise a given item, for example on a diagram
- Use direct recall to answer a question, for example the definition of a term.

Understanding:

- To assess and evidence the perceived meaning of something in greater depth than straight identification or recall.

Understanding will be expressed and presented using terms such as: how; why; when; reasons for; benefits and drawbacks of; advantages and disadvantages of; purpose of; suitability of; recommendations for improvement; pros and cons; appropriateness of something to/in different contexts.

Acquire	Exam component R038	Coursework 1 R039 Desk tidy	Coursework 2 R040 Speaker project
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	• Understand the stages involved in design strategies • The context in which each strategy might be applied • Stages of the iterative design process, and the activities carried out within each stage of this cyclic approach. • Principles of engineering design Make and evaluate: • Types of criteria included in an engineering design specification • How manufacturing • Scale of manufacture • Types of manufacturing processes • considerations affect design • Influences on engineering product design • Design for the circular economy • Types of drawing used in engineering • Working drawings • Standard conventions for dimensions • Principles of engineering design • Representations of mechanical • Using CAD drawing software • Methods of evaluating design ideas • Methods of evaluating a design outcome • Understand the difference between need and want • Know the difference between qualitative and quantitative data. • Know the difference between market pull and technology push. • Understand different types of legislations.	• Principles of engineering design Make and evaluate: • Types of criteria included in an engineering design specification. • How manufacturing considerations affect design • Influences on engineering product design • Types of drawing used in engineering • Working drawings • Principles of engineering design • Using CAD drawing software • Methods of evaluating design ideas • Modelling methods • Methods of evaluating a design outcome • ACCESS FM and their reference to products • How to create a basic specification with some justification • Understanding of the 6Rs and links to a product • Batch production and its link to scale of manufacture. • Knowledge of types of manufacturing processes and its application. • Some understanding of how to analyse an existing product. • Primary and secondary research. • Understand how to analyse a design brief. • Develop a customer profile to identify needs and wants for the TMG.	• The stages involved in design strategies • Stages of the iterative design process, and the activities carried out within each stage of this cyclic approach. • Using CAD drawing software • Methods of evaluating design ideas • Modelling methods • Methods of evaluating a design outcome • ACCESS FM and their reference to products • How to create a basic specification with some justification • Understanding of the 6Rs and links to a product • Batch production and its link to scale of manufacture. • Knowledge of types of manufacturing processes and its application. • Some understanding of how to analyse an existing product. • Primary and secondary research. • Understand how to analyse a design brief. • Understand quantitative and qualitative data •
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Apply	● Demonstrate the following knowledge through mind mapping, discussion, investigating the following; ○ Linear design ○ Iterative design ○ Inclusive design ○ User-centred design ○ Sustainable design ○ Ergonomic design ● Be able to apply advantages and disadvantages of each design strategy. ● Be able to mind map the brief. ● Conduct primary research and secondary ● Investigate existing products and provide a comparison. ● Create tables, charts and collect anthropometric data. ● Use ACCESS FM to analyse existing products. ● Create an engineering design using a specification ● Sketch and model ideas ● Discuss needs and wants of a target market group ● When comparing products, create ranking matrices. ● Apply quantitative and qualitative data to a product ● Apply the 6Rs to a design idea and annotate potential developments and improvements. ● Make accurate inferences ● Research and analysis ● Disassembly of a product ● Developing questionnaires and surveys	● Researching primary and secondary information with strong links to ACCESS FM when investigating a product or TMG. ● Justify key points to make strong links to coursework. ● Practical application ● Independently carry out practical activity in a safe working environment. ● Evaluate key findings and provide opportunity to understand future modifications and developments. ● Ally knowledge of British Standards, United Kingdom Conformity Assessed (UKCA). ● Identify legislation related to health and safety regulation and risk assessment ● List the advantages and disadvantages of a range of drawing techniques. ● Be able to design a 2D drawing as well as a 3D drawing using CAD and CAM with independence. ● Apply drawing conventions to drawings and product parts and materials lists. ● Be able to apply a range of finishes to drawings and line types. ● Model ideas in a range of materials safely and material that is appropriate. ● Be able to list the advantages and limitations of each technique.	● Create a picture flow chart from start to finish of the modelling process. ● Create a quantitative comparison with the design brief and the specification. ● List the potential modifications and improvements of the final idea. ● Create graphs and pie charts to show analysis on a visual platform. ● Develop designs and showcase in a range of formats with confidence and accurately. ● Assess the advantages and disadvantages ● Understand and apply the knowledge of strengths and weaknesses ● Create a ranking matrix and evaluate findings ● Create a product that is made to a high quality standard ● Use knowledge of types of production to link to batch production ● Disassemble a product and annotate the manufacturing process, materials and the link to industry for each component ● Analyse a product against ACCESS FM ● Use Autodesk or shpr.3D to create a replica of the image provided ● Create an exploded image of the final product ● Work with a 3D printer and associated software to create a final product
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Vocab	• Threads • holes • chamfers • countersinks • knurls • Production of models • Qualitative comparison with the design brief & spec. • Ranking matrices • Quality Function Deployment (QFD) • Types of production • Coping saw • Fret saw • Bench hook • Sharp pencil • Steel rule • Try square • Pine • Plywood • Panel pins • Centre punch • Softwoods • Hardwoods • Manufacture boards • Template • Pin hammer	• Bench vice • Hazard • Prevention • Belt sander • designing • drawing • two point perspective • isometric • 3D • 2D • CAD • CAM • across flats • centre line • diameter • drawing • material • square • Freehand sketching • Isometric • Oblique • Orthographic drawings • Exploded views • Assembly drawings • Block diagrams • Flowcharts	• diameter • surface finish Meaning of line types: • outlines • hidden detail • centre line • projection • dimension • leader line • Circuit diagrams • Wiring diagrams • title block • metric units of measurement • scale • tolerance Standard conventions; • linear measurements • radius
Assessment	Exam questions at the start of lessons Questioning, Self and Peer assessment FAR Marking – theory and practical tasks December Mock 1 March Mock 2 End of year assessment (covering theory and coursework application)	Coursework deadline October 2024 Questioning, Self and Peer assessment FAR Marking – theory and practical tasks	Coursework deadline February 2025 Questioning, Self and Peer assessment FAR Marking – theory and practical tasks