



Year 9 Curriculum Overview: Engineering Design



	Topics/ content outline:	Powerful Knowledge (key concepts, skills)	What will you be assessed on?	How can you help at home?
Autumn Term	Bench Hook Project 1. Orthographic drawing 2. Measuring and marking up 3. Timber processing through subtraction (cutting and sanding) 4. Timber processing through subtraction (drilling) 5. Material finishes 6. Oblique drawing 7. Engineering Drawing 8. 3D CAD	• Working drawings : Understanding and be able to follow 3rd angle orthographic drawings to guide manufacture. • Timber manufacturing knowledge: Marking up, sawing by machine and hand, sanding by machine and hand, drilling and assembly using standard components, applying a surface finish. • Oblique drawing: Being able to produce freehand sketches and engineers' drawings using oblique technique. Specific Keywords; Pilot hole, clearance hole, countersink, quality control, plywood, tolerance, orthographic drawing oblique drawing, computer aided design (CAD), work plane, extrude, dimensions.	Low Stake Test (LST) on several areas Self-assessment of cutting and drilling. Teacher Assessment of the assembled bench hook. End of project test	Resources for the bench hook project are stored in Showbie / 99/Engineering/1. Bench Hook Check class charts for homework and teacher comments. Encourage revision for the LST's & end of project test. Pupils to develop their revision skills to suit their learning style Encourage sketching practise Encourage On-shape (3D CAD) practice.
Spring Term	Coat Hook Project 1. Design Brief and specification 2. Applied maths 3. Design ideas 4. Orthographic drawings 5. Using drilling Jigs 6. Cutting and shaping materials 7. Machining 8. Assembly & finishing 9. 3D CAD	• Design Brief and specification: Understanding the requirements of a design brief and specification. • Applied maths: Using algebra to calculate lengths based on equal spacings • Manufacturing knowledge: Marking up, cutting & shaping, drilling pilot clearance and countersink holes. • Scales of production: Know the scales of production & how it they effect the production method. • Engineers drawing: How to accurately produce orthographic drawings, Specific Keywords; Design Brief, design specification, scales of production, Jigs, applied maths, ellipse templates, Router, chamfer, fillet, rendering, orthographic drawing. Lathe	Low Stake Test (LST) on several areas Teacher assessment of Orthographic drawing Self-Assessment of the 3D Outcome End of project test	Resources for the coat hook hook project are stored in Showbie / 99/Engineering/2. Coat Hook If you are asked to be a client, please support your child by providing feedback. Encourage sketching practise Encourage On-shape (3D CAD) practice. Encourage revision for the LST's & end of project test.
Summer Term	Desk Tidy Engineering Design 1. Brief and specification 2. Isometric sketching 3. Line enhancement and rendering techniques 4. Annotation and labelling 5. Development drawings 6. Engineers Drawings 7. 3D CAD modelling 7. Prototyping	• Design Brief and specification: understanding the requirements of a design brief and specification • Isometric Sketching: understand the rules for isometric drawing and be able to used it generate design ideas including line enhancement and rendering. • Engineers drawing: be able to use drawing equipment to produce accurate engineers' isometric drawings. • 3D CAD; be able to create and evaluate a 3D CAD model which includes several parts mating constraints. • Prototyping; understand the importance of prototyping and be able to use modelling techniques effectively. Specific Keywords: Isometric drawing, construction lines, crates, compound shapes, OCR Marks criteria, Exploded view.	Low Stake Test (LST) on several areas Teacher Assessment of design ideas against KS4 marks criteria Self-assessment of Engineers Drawings against KS4 marks criteria Peer assessment of 3D CAD outcome against KS4 marks criteria End of project Knowledge test.	Resources for the Desk tidy project are stored in Showbie / 99/Engineering/3. Desk tidy Encourage revision for the LST's & end of project test. Pupils to develop their revision skills to suit their learning style Encourage sketching practise Encourage On-shape (3D CAD) practice.



Year 10 Curriculum Overview: **Engineering Design**



	Topics/ content outline:	Powerful Knowledge (key concepts, skills)	What will you be assessed on?	How can you help at home?
Autumn Term	R38- Principles of Engineering Design 1. Types of drawings 2. Working Drawings R039-Non-Exam Assessment (NEA) 3. Sketches for a design idea. 4. Annotation and labelling 5. Design Development 6. 3 rd Angle orthographic projection.	R38- Principles of Engineering Design Learn about and understand the different types of drawing used in the development of engineer's products. Know the conventions used for engineers working drawings and be able to interpret them. R039-Non-Exam Assessment (NEA) Be able to use a range of freehand sketching techniques to generate concepts. Use line enhancement & rendering techniques to enhance design ideas and annotation and labelling to explain the concepts. Use isometric sketching to develop a design idea to meet the requirements of a given design specification..	Regular low stakes tests NEA Task 1- Design Ideas R39 NEA task 2- Development drawings R39 NEA Task 3A Orthographic drawing	Purchase the course revision guide/workbook for your child on parent pay. Make sure they have a pencil case with correct stationary (pencil, sharpener, eraser, black or blue biro, fine liner pen) Encourage your child to attend Engineering After school intervention sessions. Encourage your child to do practice sketching at home to prepare for the Non exam assessments
Spring Term	R38- Principles of Engineering Design 1. Using 3D CAD 2. Stages involved in design strategies R39 Non-Exam Assessment (NEA) 3. Assembly drawings 4. Creating parts using 3D CAD 5. Creating 3D CAD assemblies	R38- Principles of Engineering Design Understand the fundamental principles of 3D CAD software (sketches, axis, workplanes, extrusions, parts, assemblies, simulations) Understand the advantages and limitations of using CAD softw are compared to manual drawing techniques. R039-Non-Exam Assessment (NEA) Be able to create engineers' assembly drawings (Isometric drawings, exploded views, section drawings) to develop and explain a design. Be able to use 3D Cad softw are to produce parts to scale and produce an assembled CAD model for their developed design proposal.	Regular low stakes tests R39 NEA Task 3B – Assembly Drawings R39 NEA Task 4 3D CAD Parts and Assemblies	Encourage your child to attend Engineering After school intervention sessions when requested. Encourage your child to practice using On-shape (3D CAD) on their i-pad to help with the NEA tasks. Encourage revision using the resources on Showbie for the low stake tests
Summer Term	R38- Principles of Engineering Design 1. Stages of the iterative design process R40 Modelling Design ideas 2. Creating a 3D CAD model 3. Simulating the operation of the product using CAD software	R38- Principles of Engineering Design 1. R40 Modelling Design ideas Be able to produce an accurate 3D CAD model from a given working drawing and specification. Be able to use 3D CAD softw are to simulate the operation of the product.	Regular low stakes tests R40 NEA Task 3 – Virtual CAD Modelling Unit R38 content - Mock Exam	Encourage your child to attend Engineering After school intervention sessions when requested. Encourage your child to practice using On-shape (3D CAD) on their i-pad to help with the NEA tasks. Encourage revision using the resources on Showbie for the Y10 R38 Mock exam



Year 11 Curriculum Overview: **Engineering Design**



	Topics/ content outline:	Powerful Knowledge (key concepts, skills)	What will you be assessed on?	How can you help at home?
Autumn Term	R38- Principles of Engineering Design 1. Methods of evaluating designs • Production of models • Qualitative evaluation • Ranking Matrices • Quality function deployment R40 Modelling Design ideas 2. Product analysis 3. Product disassembly	R38- Principles of Engineering Design Learn how design ideas can be evaluated and improved as part of the iterative process. R040- Non-Exam Assessment (NEA) Be able to apply their theoretical understanding to carry out effective product analysis & evaluation of products. Be able to analysis existing products through disassembly (reverse engineering).	Regular low stakes tests R40 NEA Task 1- Product Analysis R40 NEA task 2-Product disassembly	Purchase the course revision guide/workbook for your child on parent pay if you did not do so in Y10. Make sure they have a pencil case with correct stationary (pencil, sharpener, eraser, black or blue biro, fine liner pen) Encourage your child to attend Engineering after school intervention sessions. Encourage revision using the resources on Showbie for the low stake tests
Spring Term	R38- Principles of Engineering Design 1.Criteria included in an engineering design specification 2. How manufacturing considerations affect design 3. Wider influences on engineered product design R40 Modelling Design ideas 4. Physical modelling • Production planning • Risk assessments	R38- Principles of Engineering Design To know what drives the development of new products and about all the aspects which need to be considered when developing a specification for a new product. Understand the significant manufacturing processes and how their constraints impact on the design of new products. R040-Non-Exam Assessment (NEA) Be able to apply their theoretical understanding of manufacturing processes in to plan the manufacture of a complex product based on a given working drawing. Be able to identify potential hazards and associated risks and produce risk assessments to manage the risks.	Regular low stakes tests R40 NEA Task 1- Product Analysis R40 NEA task 2-Product disassembly	Encourage your child to attend Engineering After school intervention sessions when requested. Encourage your child to practice using On-shape (3D CAD) on their i-pad to help with the NEA tasks. Encourage revision using the resources on Showbie for the low stake tests
Summer Term	R38- Principles of Engineering Design Recap and revise of: 1. Design Processes 2. Design Requirements 3. Communicating Design outcomes 4. Evaluating Design ideas	R38- Principles of Engineering Design To recap and review all of the four topic areas in preparation for the R038 external exam. To develop effective revision & examination strategies.	Practice R38 Exam Questions R038 External Exam- A 1 hour 10 minute exam which counts for 40% of the overall grade.	Help your child to plan a revision timetable. Encourage revision using the resources on Showbie, their notes and the revision guide to fully prepare for the final R038 exam.