

Progression Grid 2023: Engineering

Pre Year 7						
Design and Technology is studied in primary school as part of the curriculum and through project/topic areas, however time spent on this can be limited and varies between schools. However, pupils will have an experience of designing, making, using different material and equipment's and presenting ideas. All off this supports the curriculum in year 7, with year 7 developing and building on these basic skills and knowledge.						
Year 7						
	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Topic/Focus	Design and Make project: Aerodynamics and Biomimicry – Water Transport For most students this is their first experience of a DT workshop and making products using tools and machinery. The project introduces students to a design challenge that looks at producing a creative outcome that is strongly link to our maritime curriculum. Using a variety of materials and being influence by aerodynamics and biomimicry, students will design make and test a water vehicle. A basic framework for the design will be given to students but students have flexibility to be creative and develop their design ideas. Students learn through a variety of techniques such as brain storming, class discussions, idea development and modelling. They will have templates to follow and a structured plan of manufacture. Written work is recorded in an exercise book. Their work will be assessed by practical observations of the skills they have learnt and recorded in their books and their practical outcome. <i>Students will also learn the fundamentals of health and safety in the workshop and will build on these throughout the three years as they develop skills and have access to more tools and machines.</i>					
Sequencing	Focus - Introduction Brief, analysis, understanding of the topic What is a specification? Who does it impact? Identifying key information Initial discussions	Focus - Explore Research Understanding Developing knowledge Inform decisions	Focus - Create Design ideas Problem solving Sketching Developing ideas	Focus - Model Sketch modelling Prototyping Practical skills Materials Tools Equipment Health and safety Development	Focus - Consolidate Testing Did it meet the brief? Development Improvement Reflection Expansion Evaluation Revisiting	Extension Activity Keyring fob design inspired by nature Onshape TechSoft 2D
Extended Learning	Investigation Task – Health and safety quiz and challenge. After school STEM club – boat building Working with local companies	Investigation task – how to write a specification	Investigation task – how do I finish my product?	How is my product aerodynamic? How is my product inspired by biomimicry?	How does my project meet the brief?	Homework schedule 1. Biomimicry and aerodynamics inspiration mood board 2. Local Industry 3. Local industry 2 4. Boat design
Formal Assessment	End of Project Review - Including practical skills assessment and presentation of work, knowledge assessment mat.					
Project Length	8-10 weeks					

Progression Grid 2023: *Engineering*

Year 8						
	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Topic/Focus	<p>Design and Make Project – Sea Plastics and lighting Students return in Year 8 to develop their skills and learn a new range of skills through another design and make project with a strong maritime link. Again, students will create a product in response to a challenging and relevant design brief. Using sea plastic as a focus for the design outcome, student will design and make a piece of lighting that will combine different materials and practical understanding. It will develop and expand on their knowledge from year 7 and introduce new materials and electronics. They will build cross curricular knowledge when looking at sea plastic and its impact on their local and global environment. They will understand the potential of turning plastic waste in to useable products and</p> <p>Students will also be introduced to graphic design using the latest technology and learn how to bring their ideas to life using illustrator and the laser cutter.</p> <p>Students will also be introduced to metalwork through a short two lesson project where they will create a name tag. They will explore a range of metals and how to cut and shape metal. Their work will be assessed by practical observations of the skills they have learnt and recorded in their books.</p> <p>Key ideas – research, design, oracy (whole class discussions and analysis), development, CAD/CAM, H&S, finishing techniques.</p> <p><i>Students will develop their understanding of health and safety in the workshop and will build on these throughout the three years as they develop skills and have access to more tools and machines.</i></p>					
Sequencing	<p>Focus - Introduction Brief, analysis, understanding of the topic What is a specification? Who does it impact? Identifying key information Initial discussions</p>	<p>Focus - Explore Research Understanding Developing knowledge Inform decisions</p>	<p>Focus - Create Design ideas Problem solving Sketching Developing ideas</p>	<p>Focus - Model Sketch modelling Prototyping Practical skills Materials Tools Equipment Health and safety Evaluation Development</p>	<p>Focus - Consolidate Testing Did it meet the brief? Development Improvement Reflection Expansion Evaluation Revisiting</p>	<p>Extension Activity Metal name tag They will explore a range of tools and machinery to build skills ready for year 9, developing understanding ready for year 9.</p>
Extended Learning	<p>Global impact – how can we help the bigger problem? Links to local companies Bottle lid drive</p>	<p>What does the future look like? What will we do without plastics?</p>	<p>How many plastics have I used today?</p>	<p>One thing I could do differently challenge?</p>	<p>Alternative materials.</p>	<p>Homework schedule 1.The impact of sea plastics - Mood board 2. Impact of plastics 2 3. What can I do? 4. Lighting and my light</p>
Formal Assessment	End of Project Review - Practical skills assessment and presentation of work, knowledge assessment mat.					
Project Length	8-12 weeks					

Progression Grid 2023: *Engineering*

Year 9						
	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Topic/Focus	<p>Design and Make Project – Sound and Amplification. Producing a speaker. Coastal warning systems, how sound travels through different environments</p> <p>Students return in Year 9 to create a product around the theme of sound and amplification, with a specific focus on the maritime industry and how sound is used. In year 9 students have more freedom to explore design and engineering, they will develop a basic brief and have the option to select their own materials to create their design solution. Students will develop theory electronics skills learnt in year 8 and learn how to assemble and solder a circuit board. Alongside this they will learn how to amplify sound and create a sound system based on their knowledge and understanding. Case studies will look at how the maritime industries use sound for rescues and warning systems. Workshop machines and tools will be explored further, with health and safety underpinning students learning. This experience will enrich students experience of the subject and give student the knowledge of what to pick at KS4 and what engineering and design can offer. This project continues to develop students understanding to of CAD & CAM and builds directly to the understanding of working with materials and processes. It makes students think about whether they are wanting to continue with design and engineering in year 10 and wide range of resources they have access to. <i>Students will develop their understanding of health and safety in the workshop and will build on these throughout the three years as they develop skills and have access to more tools and machines.</i></p>					
Sequencing	<p>Focus - Introduction</p> <p>Brief, analysis, understanding of the topic</p> <p>What is a specification?</p> <p>Who does it impact?</p> <p>Identifying key information</p> <p>Initial discussions</p>	<p>Focus - Explore</p> <p>Research</p> <p>Understanding</p> <p>Developing knowledge</p> <p>Inform decisions</p>	<p>Focus - Create</p> <p>Design ideas</p> <p>Problem solving</p> <p>Sketching</p> <p>Developing ideas</p> <p>Sketch Modelling</p>	<p>Focus - Model</p> <p>Sketch modelling</p> <p>Prototyping</p> <p>Practical skills</p> <p>Materials</p> <p>Tools</p> <p>Equipment</p> <p>Health and safety</p> <p>Evaluation</p> <p>Development</p>	<p>Focus - Consolidate</p> <p>Testing</p> <p>Did it meet the brief?</p> <p>Development</p> <p>Improvement</p> <p>Reflection</p> <p>Expansion</p> <p>Evaluation</p> <p>Revisiting</p>	<p>Extension Activity</p> <p>Onshape</p> <p>TechSoft 2D</p> <p>3D printing parts</p> <p>Vacuum forming parts</p>
Extended Learning	How do we find people that are lost?	How does sound travel through water?	CAD drawing – Onshape/Techsoft 2D/ Illustrator	Range of materials, exploring smart materials. Combing materials	Testing the sound, different materials, different amplification, different ways to make sound travel (eg different holes drilled in materials, different sizes)	<p>Homework schedule</p> <ol style="list-style-type: none"> Moodboard How is sound used at sea? Electronic components Design a rescue system
Formal Assessment	End of Project Review - Practical skills assessment and presentation of work, knowledge assessment mat.					
Project Length	8-12 weeks					

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Year 10										
Qualification	WJEC L1/2 Award in Engineering									
½ Term	1	1	2	2	3	3	4	4	5	6
Topic	Materials WJEC 3.2 Engineering materials Properties Applications	Materials WJEC 3.2 Engineering materials Metals Polymers Smart materials	Processes WJEC 3.3 Engineering processes and methods	Processes WJEC 3.3 Engineering processes and methods	Solving problems WJEC 3.4 Solving engineering problems	Solving problems WJEC 3.4 Solving engineering problems	Engineered World WJEC 3.1 Engineering Achievements	Engineered World WJEC 3.1 Engineering Achievements	Mock coursework WJEC Unit 1 & 2 Clamp	Mock Coursework WJEC Unit 1 & 2 Clamp
H&S	Health and Safety - Under pins all learning									
Practical Focus	Workshop skills - Reset Basic Skills (toolbox) Metal work (TAG) Tool Making	Developing Metalwork skills Tag Tool making Cutting Shaping Measuring	Developing Metalwork skills Metal work (Machining) Lathe work Centre punch Lamp Project	Developing Metalwork skills Metal work (Machining) Milling Centre punch Lamp project	CAD/CAM Laser cutting, 3D printing Onshape	CAD/CAM Laser cutting, 3D printing Onshape	Electronics Lighting Project Electronics Circuit boards	Electronics Lighting Project Electronics Circuit boards	Mock coursework Previous brief	Mock Coursework Previous brief
Sequencing	Focus - Basic skills, developing skills Foundations of theory	Focus - Applying Skills Demonstrating in depth knowledge	Focus Basic skills (machining) Foundations of engineering processes	Focus – Applying Skills Demonstrating in depth knowledge	Focus – Basic CAD/CAM skills Learning the fundamentals of CAD/CAM Solving Problems	Focus – Applying skills Demonstrating in depth knowledge solving problems	Focus – Application of 3.2, 3.3 and 3.4 Basic knowledge of engineering achievements.	Focus – Independent application of 3.2, 3.3 and 3.4 Demonstration of in-depth knowledge of 3.1 .	Focus – Mock coursework following mark scheme Application of knowledge/skills	Focus – Mock coursework following mark scheme Application of knowledge/skills
Extended Learning	Physical testing of materials	Range of tools Smart materials	Higher level maths	Extension of skills CNC machines	3D Printing and laser cutting	3D Printing and laser cutting	Complex circuits Programming	Complex circuits Programming	Coursework linked tasks (exploring different ways)	Coursework linked tasks (exploring different ways)
Formal Assessment	EoT test or Assessment mat Skills test	EoT test or Assessment mat Skills test	EoT test or Assessment mat Skills test	EoT test or Assessment mat Skills test	EoT test or Assessment mat Skills test	Mock exam Unit 3	EoT test or Assessment mat Skills test	EoT test or Assessment mat Skills test	Exam Unit 3	Coursework marked

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Year 11							
Qualification	WJEC L1/2 Award in Engineering						
Term (half terms)	1	2	3	4	5		
Theory topic	3.2 Engineering materials	3.3 Engineering processes and methods	3.4 Solving engineering problems	3.1 Engineering Achievements	Recap – revision/past exam papers		
Coursework	Unit 2 (Submit Dec)	Unit 2	Unit 1	Unit 1	<i>submitted</i>		
Sequencing	3.2.1 Understanding materials 3.2.2 Material properties 3.2.3 Testing materials <i>Supports unit 2</i>	3.3.1 Engineering Processes 3.3.2 Application of processes 3.3.3 Safe working practices <i>Supports unit 2</i>	3.4.1 Mathematical techniques for solving problems 3.4.2 Understand and produce engineering drawings <i>Supports unit 1</i>	3.1.1 Engineering developments 3.1.2 Engineering achievements 3.1.3 Environmental issues affecting engineering applications.	3.1, 3.2, 3.3, 3.4		
Extended Learning	After school club Period 6 Development of knowledge organisers Work experience, trips, maritime curriculum opportunities						
Formal Assessment	Unit 2 – Internally assessed. EoT test	Unit 2 – Internally assessed. EoT test/mock	Unit 1 – Internally assessed. EoT Test	Unit 1 – Internally assessed Mock	Past exam questions	Past exam questions	Resit unit 3
Post Year 11							
Further Education/training in: Engineering L3 or Apprenticeship					Employment in: Engineering sector		