

Resistant Materials

Intent:

To build resilient and independent learners who have the skills to overcome challenges, solve problems and apply practical skills to not only projects in lessons but in life outside of school. The resistant materials schemes builds learners confidence with using tools, machines and design to overcome difficulties in life by producing new innovative solutions to problems.

Context:

The use of tools and processes taught in resistant materials are not only taught to produce quality outcomes in lessons but to build learners who possess skills for life which will help with many areas of maintenance, DIY and problem solving in life after school.

The Big Picture—Intent:

To introduce and develop the practical skills and subject knowledge of all students through practical engagement. Students will complete topics and tasks linking to practical outcomes, designing and the design process. They will broaden their range of workshop skills and build confidence working with tools and equipment.

Year 7
RM

Content / Units	Skills	Knowledge	Prior—Y6	Next—Y8
Workshop Skills Desk Buddy Jigsaw Puzzle	Workshop Health and Safety Hand Tools -, tenon saw, coping saw, try square, marking out, sanding, cross filing, drilling, using PVA glue, dowel joints.	How to work safely in a workshop environment, how to select tools and use them effectively on specific tasks, how to develop work based on a specific criteria.	Transition projects introduce students to cutting simple shapes using junior hacksaws and coping saw, cross filing materials to smooth edges.	Working with woods, metals and plastics. Expanding the range of tools and machines used for manufacturing, increasing the range of techniques used in projects.

Implementation	Marches Futures Links	Summative Assessment
<ul style="list-style-type: none"> •Practical skills introduction, desk buddy mini desktop product practical, jigsaw puzzle project looking at joints, accurate cutting and complicated cuts using a scroll saw. •LORIC promoted through organizing of tasks, monitoring and use of tools and equipment, use of key words when communicating ideas, peer assessment and communicating feedback to others. •Independence and thinking sills will be developed with use of WAGOLL examples, asking students to look and find out about successes within the project shown by a range of examples, reading and using success criteria to make decisions as well as the use of displays and handouts with instructions to allow students to manage their own pace of working and work as independently as possible. •Home learning will be looking at background subject knowledge linked to the products, year 7 students will explore materials and their properties, revise tools and processes linked to projects for mini tests. •Revision is linked directly to tasks in practical lessons with links to technologystudent.com for homework revision tasks for prior learning before tests. •Department WAGOLL wall will be used to celebrate achievements of pupils making excellent progress as well as students attaining high grades. Work will be photographed and presented within the department as well as communication sent home to celebrate success through from of a department postcard. •Literacy developed through use and spelling of key words, numeracy developed through marking out and measuring 	<p>Exploration of social and moral decision linked to materials choices, waste material and the impact these choices has on the enviroment and others.</p> <p>Life skills and skills for job opportunites in related trades and manufacturing.</p> <p>Opportunities to make sustainable choices that affect the environment and make exciting and creative decisions.</p> <p>Life skills and opportunites to see where these skills will allow learners to complete DIY jobs around their own homes.</p> <p>Sustainability, decisions made in design to implement reduction of waste, recycling, and reduction of environmental impact. Developing understadng here looks to ensure a more sustainable future and educate pupils on they ways they can impact the plaet as they go through education and into jobs.</p>	<ul style="list-style-type: none"> • Skills test assessment • Project 1; Practical mid point assessment • Project 1; Practical final assessment • Project 2; Practical mid point assessment • Project 2; Practical final assessment. • Live tracking of data to inform intervention and praise at any point during the units.

Impact:

Students can work safely using hand tools (saws, files, sanding paper, tri square, steel rule) to produce high quality practical work, assess their practical work and understand the use of success criteria for producing a successful outcome.

To develop further, the skills used on a basic level project into a more demanding practical challenge, students will be challenged in year 8 to use the skills they have and interleave them into a range of new skills with a high level of demand. These skills will then be added to during each project to improve the students skill set and knowledge of processes.



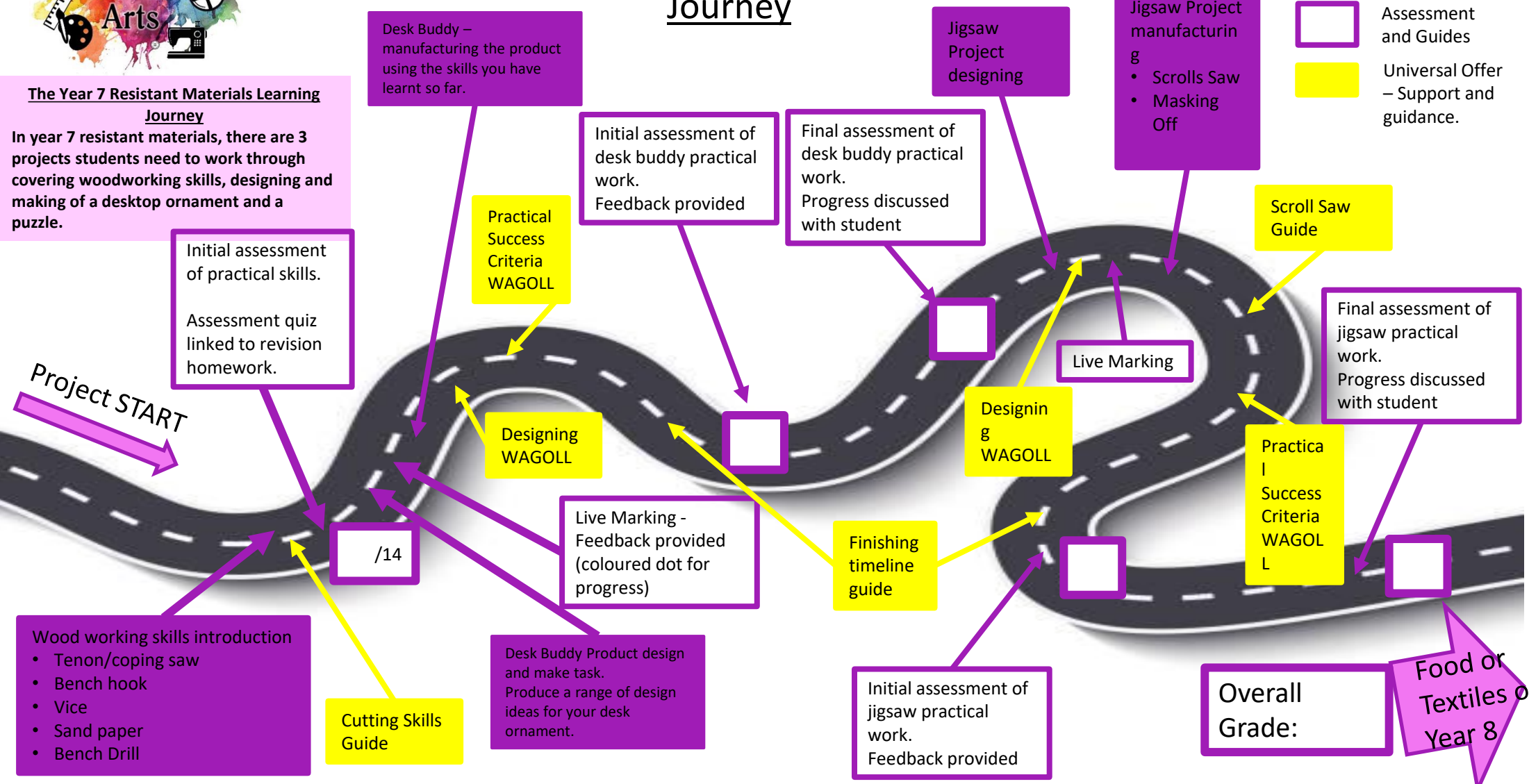
Year 7 – Resistant Materials Learning Journey

Key

- Course Info
- Assessment and Guides
- Universal Offer – Support and guidance.

The Year 7 Resistant Materials Learning Journey

In year 7 resistant materials, there are 3 projects students need to work through covering woodworking skills, designing and making of a desktop ornament and a puzzle.



The Big Picture—Intent:

Year 8 Resistant Materials aims to develop creative designing, the use of a larger range of new materials in projects and the exploration of a range of new skills. Students will encounter greater challenge than in year 7, use a larger range of skills and processes and be expected to produce work to a higher standard, driving progress towards GCSE Level skills.

**Year 8
RM**

Content / Units	Skills	Knowledge	Prior—Y7	Next—Y9
Biomimicry Design, Pewter Casting Acrylic Puzzle Game	Designing using inspiration, using templates for manufacturing, casting metals, carving, modelling, heating and moulding plastics, cross and draw filing, adhesives	The Casting Process, the key steps and processes associated with casting, Forming acrylic plastics and the processes associated with plastic forming and finishing. Designing from inspiration, the use of material to inspire unique and individual designs. Tools and processes; scroll saw, brazing heat, convection oven, line bender, materials composition and working properties.	Cutting, shaping and joining skills used with woods, surface finishing skills and design skills.	Designing to a brief, exploring innovation and problem solving, wood joints, hinges, adhesives for a range of materials, mechanical joints.

Implementation	Marches Futures Links	Summative Assessment
<ul style="list-style-type: none"> •The units explored in year 8 will contain exploration of a brief, each brief containing a different material area. Each project will focus on the 3 key skill areas for practical work (cutting, shaping and finishing). The three projects can be taught in any order allowing schemes to be structured around staffing and room availability. •The key skills will be explored, used and refined and grades will be awarded as progress is made through each of the key areas. •LORIC will be built into the projects by exploring students resilience when parts of work don't turn out as they had hoped, their determination to complete difficult tasks requiring good attention to detail and resilience. Communication and use of key words and terms will be required in all lessons and communicating ideas and problems to staff and peers will also be an important part of learners development. •Independence and thinking skills will be developed with use of WAGOLL examples, asking students to look and find out about successes within the project shown by a range of examples, reading and using success criteria to make decisions as well as the use of displays and handouts with instructions to allow students to manage their own pace of working and work as independently as possible. •Home learning will focus on the project materials and their sources, processing and uses in modern life, looking at more depth of knowledge and including some links to environmental factors and ethical choices when selecting materials. Revision is linked directly to tasks in practical lessons with links to technologystudent.com for homework revision tasks for prior learning before tests. •Repetition of skills and knowledge, key words and vocabulary used to strengthen examination knowledge. Skills and vocabulary developed in year 8 are leading into basic GCSE knowledge ready for options next year, students will be challenged to mark out using GCSE level tools and processes. 	<p>Materials choices linked to life, environment and social cultural and moral designing.</p> <p>Introducing pupils to a larger range of materials choices and with these, the decisions that affect, wildlife, planet resources, climate change and the cost of products.</p> <p>Life skills and developing their ability to work with a range of new processes potentially implementing them in DIY opportunities or linking them to trades and further opportunities in education.</p> <p>Creativity, problem solving, and resilience developed through all elements of the practical work. Showing strength in adversity required to learn from experiences. Opportunities to discuss and develop and young adults during these practical opportunities.</p>	<ul style="list-style-type: none"> • Skills test assessment • Live marking for project analysis and designing • Project; Practical mid point assessment • Project; Practical final assessment <p>(Repeat for each unit through year 8)</p> <ul style="list-style-type: none"> • Live tracking of data to inform intervention and praise at any point during the units.

Impact:

Pupils develop key workshop skills for working with woods, metals and plastics, their skill levels increase from year 7 with projects demanding more use of key measurements, technical skills and a range of new shaping skills used effectively when manufacturing.

Key vocabulary repertoire becomes broader with the introduction of new materials and processes, pupils are more familiar with working with a range of different materials and are ready to apply them to their year 9 open brief project.



Project A – Biomimicry Inspired Storage

Key

-  Course Info
-  Guides / Skills
-  Assessment Points

The Year 8 Learning Journey;
 In year 8 resistant materials, there are 3 projects students need to work through covering biomimicry designing, metal casting and acrylic forming. The order of the 3 projects is interchangeable.

Biomimicry Manufacturing

- Marking out
- Scroll saw and coping saw use
- Accurate cutting and following of marked lines
- Assembly and gluing
- Quality finishing and painting


Live marking feedback of design and thinking work.

Biomimicry Designing, Example/demo of design process.

Scroll Saw Guide


Finishing Skills Guide

Quality Control Timeline

Final assessment of practical work.

 Progress discussed with student

Making Improvements

Assessment Of Knowledge

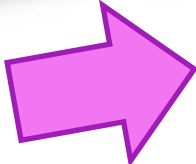

1st assessment of practical work.

 Feedback provided

Cutting Skills Guide

Cutting out natural shapes. Quality finishing of pine timber. Painting surface finish.

Introduction to Biomimicry

- Ross Lovegrove (product designer)
- The process of copying nature to design
- Creating a range of design ideas




Project B,
 Project C,
 Or Year 9 

Project START 

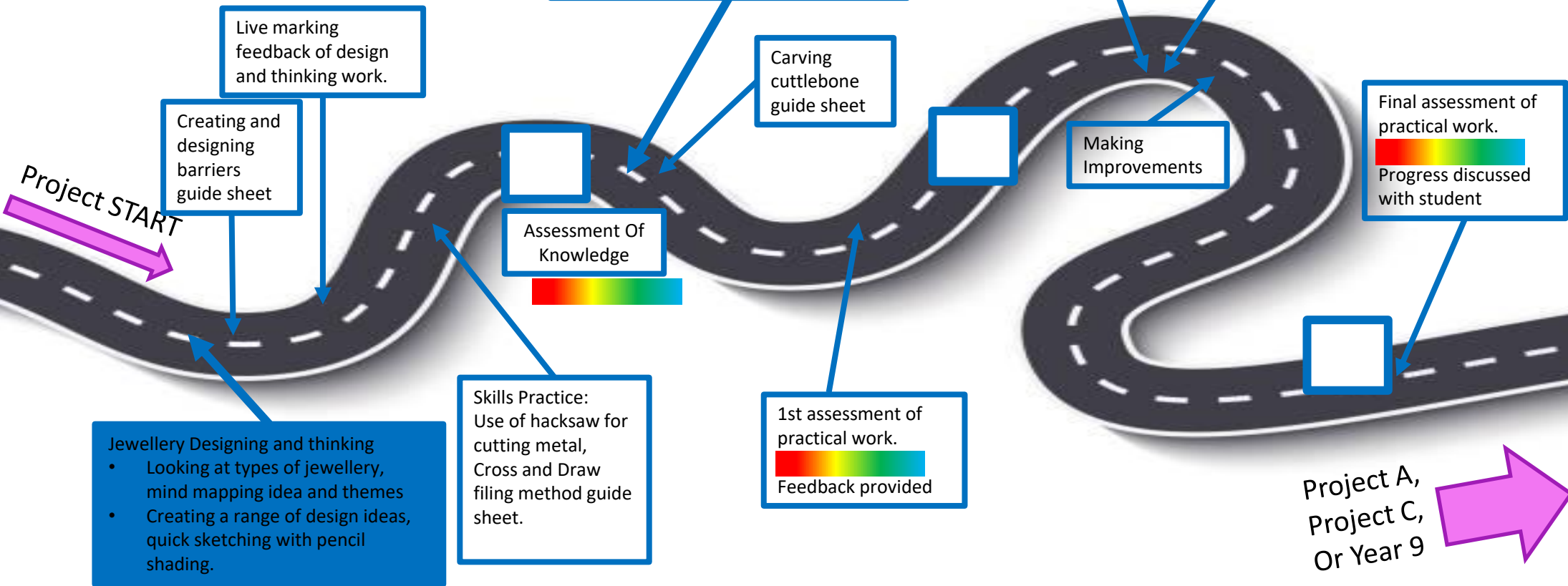


Project B – Metal Casting

Key

-  Course Info
-  Guides / Skills
-  Assessment Points

The Year 8 Learning Journey;
 In year 8 resistant materials, there are 3 projects students need to work through covering biomimicry designing, metal casting and acrylic forming. The order of the 3 projects is interchangeable.





Project C – Acrylic Plastic Forming

Key

-  Course Info
-  Assessment and Guides
-  Assessment Points

The Year 8 Learning Journey;
 In year 8 resistant materials, there are 3 projects students need to work through covering biomimicry designing, metal casting and acrylic forming. The order of the 3 projects is interchangeable.


Acrylic Puzzle Manufacturing

- Cut and form plastic sheets and lengths.
- Forming tools and processes
- Making a successful mould
- Press forming
- Cutting barriers
- Filing and finishing all parts

Finishing plastics, vinyl stickers
 polishing plastic surfaces

Finishing skills guide


Making Improvements

Final assessment of practical work.

 Progress discussed with student


Skills Practical
 Cutting acrylic
 Cross and draw filing
 Joining Acrylic (adhesives)
 Thermo and thermosetting plastics

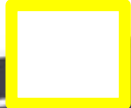
Live marking
 feedback of design and thinking work.

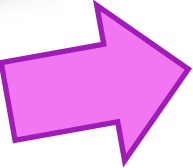
Creating and designing barriers
 guide sheet

Assessment (Quiz)


Cross and draw filing method guide sheet to support practical work.

1st assessment of practical work.

 Feedback provided



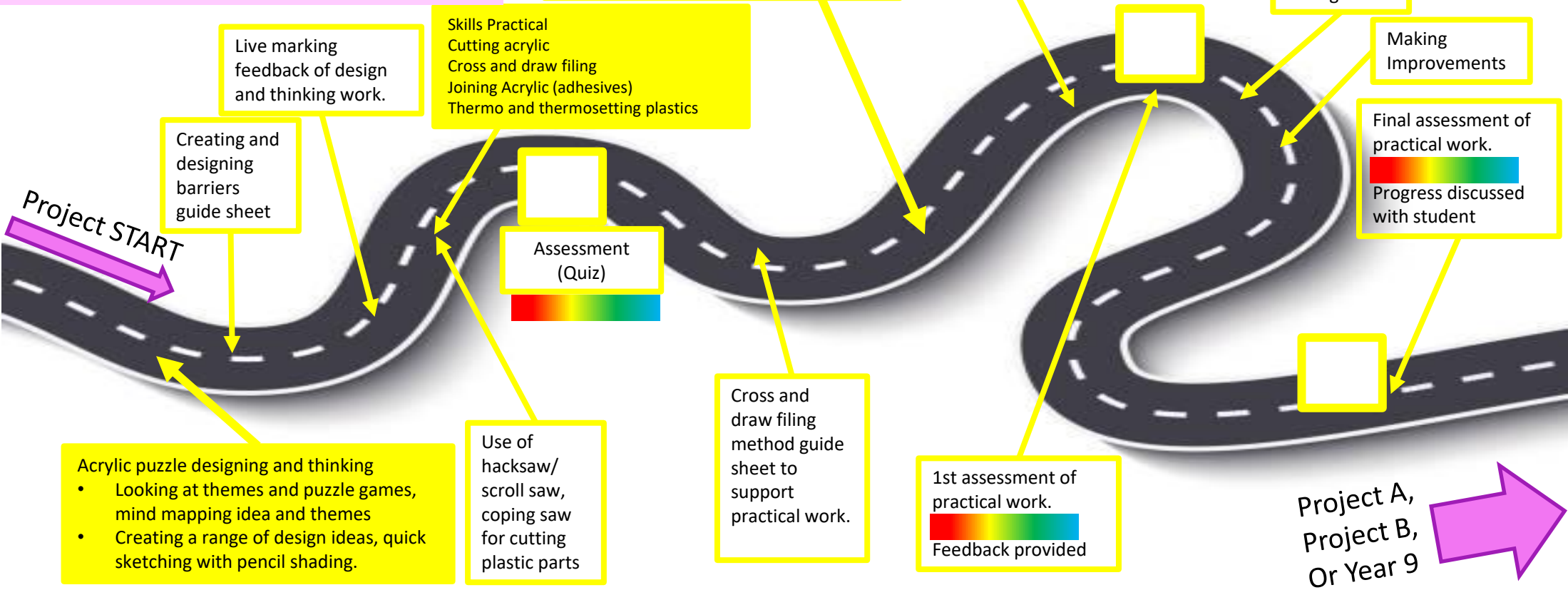
Project A,
 Project B,
 Or Year 9 

Acrylic puzzle designing and thinking

- Looking at themes and puzzle games, mind mapping idea and themes
- Creating a range of design ideas, quick sketching with pencil shading.

Use of hacksaw/ scroll saw, coping saw for cutting plastic parts

Project START 



The Big Picture—Intent:

Year 9 resistant materials looks to give students a more compact version of the experiences they would have if they chose GCSE DT as an option for year 10 and 11. The projects aim to explore designing and manufacturing in a more in-depth way compared to previous years and allow greater freedom to explore and be creative.

Year 9
RM

Content / Units	Skills	Knowledge	Prior—Y8	Next—Y10
Desktop Product Design	Designing to a brief, problem solving, modelling, adhesives, mechanical joining methods, surface finishes. Laser cutting, CAD and CAM.	Wood joints, adhesives, joining dissimilar materials, creative designing, designing to meet a brief, Technical drawing, why designers make models.	Working with acrylic, pewter and softwood pine. Carving moulds, casting, bending plastics and use of inspiration for designing	GCSE—Design Technology skills and knowledge in year 10. Use of key manufacturing skills in mini projects and covering key knowledge for examinations.
Implementation		Marches Futures Links		Summative Assessment
<p>Project will be organised into design tasks, exploration of project ideas, planning to manufacture and making project. Tasks to be assessed will be practical areas of skill and details of manufacturing. The project will start with an exploration of the problem and design ideas generation, the course then covers new key skills for a successful outcome; joints, hinges, adhesives, finishing and assembly methods are all covered to allow students to have the experiences needed to build a successful product.</p> <p>Resilience will be important due to the explorative nature of the subject, learning from mistakes and failure will be a big part of the designing and planning phases. Key words and communication in the workshop and problem solving will show good initiative.</p> <p>WAGOLL examples to support independence and clarity of aims, use of displays and supporting powerpoints to allow students to explore and stretch themselves within the project structure.</p> <p>The investigation section work will consist of research into areas of interest and problem-solving product ideas for around the home. Supporting decision making by carrying out research into various parts of a design or manufacturing process as needed.</p> <p>Quizzing and testing to look at key knowledge and ensure students have the foundations to build on to become more independent and well-rounded learners.</p> <p>Key skills to be revisited in demonstrations as the project progresses and in example work to ensure each skills importance and success criteria is shared before use.</p>		<p>Inclusivity in design and design choices. Pupils learn the value in meeting the needs of others as they explore a design and make task that is based around the needs of a client or customer.</p> <p>Opportunities for discussions about stereotyping, inclusivity, diversity and people opinions all developed from the design work produced and decisions made.</p> <p>Looking at how decisions make products successful, looking at how people are affected by design choices and the impact of these bad decisions.</p> <p>Opportunities to explore further the key points from year 7 and 8 as many of the futures and SMSC points are revisited by the style of the project and the design process that is followed through year 9.</p>		<ul style="list-style-type: none"> • Skills test assessment • Live marking for project analysis and designing • Project; Practical mid point assessment 1 • Project; Practical mid point assessment 2 • Project; Practical final assessment • Live tracking of data to inform intervention and praise at any point during the units.

Impact:

Pupils have a full picture of the elements of DT that make up the GCSE design technology course and are prepared for starting the course in year 10. Pupils are used to the demands of problem solving with an open design brief and are skilled up to allow independent working on the range of tasks and projects they will undertake in year 10.

Pupils have the skills to communicate ideas and develop ideas into a working solution to a problem, they also have experience of making informed decisions about materials, finishes and assembly methods needed to manufacture products.



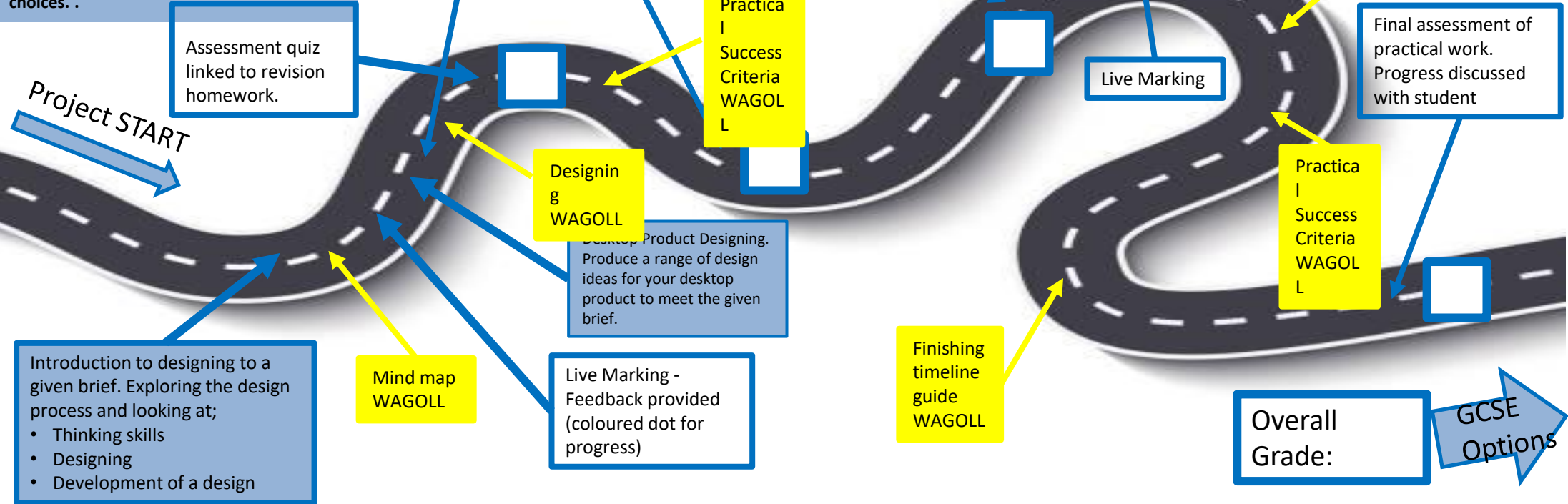
Year 9 – Design Technology Learning Journey

Key

- Course Info
- Assessment and Guides
- Universal Offer – Support and guidance.

The Year 9 Design Technology Learning Journey

In year 9 students are given the opportunity to explore product design and produce a product of their own choice to meet a design brief. The Units explore similar skills to the GCSE coursework tasks in year 11 and give students a taster of GCSE design tech to support their options choices. .



The Big Picture—Intent:

Cover theory topics required for GCSE design technology examination, key skills and knowledge to prepare for coursework assessment and examination technique to support pupils performance.

Year 10
RM

Content / Units	Skills	Knowledge	Prior—Y9	Next—Y11
Unit 1— tools, materials, joints and adhesives. Unit 2— CAD/CAM, electronics and moving parts. Unit 3—forming and shaping processes. Unit 4—Mini Design and make project. Unit 5—environment, product lifecycle Unit 6—research, investigation and analysis.	Designing / creative thinking CAD/CAM Electronics Problem solving Exam technique	The Casting Process, the key steps and processes associated with casting, Forming acrylic plastics and the processes associated with plastic forming and finishing. Designing from inspiration, the use of material to inspire unique and individual designs. Tools and processes; scroll saw, brazing heath, convection oven, line bender, materials composition and working properties.	Open Brief Design Project prepares students for GCSE design technology. The design process is covered in the desktop product as an introduction to the steps needed to complete the major project.	Major GCSE Project Investigation Research Designing Developing Manufacturing Evaluation

Implementation	Marches Futures Links	Summative Assessment
<ul style="list-style-type: none"> The year 10 course for GCSE design technology consists of units of work linked to key skills needed for the GCSE major project, examination preparation and key subject knowledge for independent working. The course is broken down to cover key elements of the course that will allow students to complete their coursework to a high standard, independently, as well as covering key knowledge in preparation for their end of year 11 exams. Rules, routines and success criteria for the course are shared at the start and are maintained to ensure pupils work safely and achieve maximum marks for that elements of the course, pupils working safely and independently allows access to higher marks. Pupils are given the opportunities to explore, be creative and develop organisation skills and use their initiative to solve problems and present their work. LORIC skills are a large part of success in GCSE design technology with the course comprising of a range of aspects that link to these life skills. 	Materials choices linked to life, environment and social cultural and moral designing. Introducing pupils to a larger range of materials choices and with these, the decisions that affect, wildlife, planet resources, climate change and the cost of products. Inclusivity and diversity in design and target markets, introducing students to stereotypes, the impact on people. Inclusivity in design and design choices. Pupils learn the value in meeting the needs of others as they explore a design and make task that is based around the needs of a client or customer. Opportunities for discussions about stereotyping, inclusivity, diversity and people opinions all developed from the design work produced and decisions made.	<ul style="list-style-type: none"> Pupils will be graded on performance over all units in year 10 using GCSE marking criteria. End of unit tests, 1,2,3,4,5,6 to be completed at the end of each half term. Assessment questions taken from exam papers to test subject knowledge. Live tracking of data to inform intervention and praise at any point during the units.

Impact:

The high quality manufacturing skills, key knowledge linked to tools, materials and assembly are taught and clear for pupils to use in examination questions and assessments. Pupils can work independently on a range of task linked to high quality outcomes for the GCSE major project, they can select materials and tools appropriately ,

The Big Picture—Intent:

Pupils to apply their knowledge and skills to the GCSE major project with the aim of achieving the highest grade possible for the course. Pupils goals include examination performance, achieving as high a grade as possible on the mock exams and ultimately the final examination. As well as producing a working prototype of a product they have designed and worked on as independently as possible.

Year 11
RM

Content / Units	Skills	Knowledge	Prior—Y10	Next—year 12
GCSE Major Project Unit 1: Analysis Unit 2: Investigation Unit 3: Designing Unit 4: Manufacturing Unit 5: Testing and evaluation	Analysing and designing commercially viable products Creating creative designs Developing and modelling Evaluating progress of a design Testing a final product for suitability.	What is a design brief and specification How to follow the design process and apply it to the designing and manufacturing How to develop, evaluate and test a working commercially viable product.	Skills and technical practical knowledge covered to prepare students for completing practical assessments. Theory knowledge covered to prepare students for summer examinations in year 11	Pupils can use the skills and technical knowledge to move on to A-level product design and develop further their knowledge of manufacturing, materials and processes.

Implementation	Marches Futures Links	Summative Assessment
<p>Pupils to work through all the units of the major project demonstrating the skills and completing the tasks required and listed in the NEA specification.</p> <p>Pupils to demonstrator LORIC skills in numerous ways through the year; organisation for managing their workload with the larger project and meeting deadlines with completed work. Resilience to overcome difficulties when problem solving or receiving constructive feedback as well as any potential difficulties with manufacturing. Initiative for making informed and independent choices about the design of the product as well as materials, tools and processes used in its manufacture.</p> <p>The course is delivered following the design process to cover all the key steps outlined in the course marking scheme, pupils to complete A3 electronic portfolios following the unit order above, key areas of research and design are covered before manufacturing a final product as independently as possible using the tools and materials available in the controlled assessment lessons.</p>	<p>Developing and focusing upon the moral dilemmas raised in designing and making new products teaches students about the people impacted by design decisions both good and bad. Exploring these topics allows students to gain an understanding of the wider impacts on the environment when designing and making new products and expect them to carefully consider the materials & components they will use when designing and making.</p> <p>Social development and communication is a key feature of all design & technology lessons. We teach the concept of self-regulation to ensure that students accept responsibility for their behaviour and the safety of others. Developing this thought process is vital to success in further education and employment opportunities.</p> <p>Pupils looks at sustainability, product life cycles, waste, reducing and recycling as part of the design process, these topics develop a wider understanding of the work, producing well rounded learners with an interest in others, the way they can impact others and the world around them along with the knowledge to make good life choices and help shape their futures.</p>	<ul style="list-style-type: none"> Unit 1,2,3,4 and 5 Assessment using NEA marking criteria Examination question paper marking for mock exams as well as assessment of individual topic questions interleaved into coursework scheme. Live tracking of data to inform intervention and praise at any point during the units.

Impact:

Pupils are skilled and have the knowledge which prepares them for further education in design technology. GCSE Outcomes are completed to a high standard demonstrating enough skills for pupils to achieve their minimum grade or better in the course. Supporting knowledge is covered to allow pupils to achieve in their end of year examinations, the answer questions confidently with good examination technique.

Pupils are prepared with skills for potential employment opportunities as an apprentice or for collage courses in further education.

Glossary of Key Terms:

Assessment Acronyms

- NEA – Non Examination Assessment (Coursework)
- BRAG – Assessment colours, Blue, Red, Amber and Green (Blue 2 grades over minimum grade, green 1 grade over, amber on, red below minimum grade).