Year 7 – Marble Maze Overview

(Intent, Implementation, Impact)

Intent

The intent of the Y7 Marble Maze DT unit is to provide students with a comprehensive introduction to the design and technology curriculum, developing both theoretical knowledge and practical skills. Students are guided through the full design cycle, from investigation and planning to making, testing, and evaluating a product. The unit aims to foster creativity, problem-solving, and iterative thinking, encouraging students to make informed design decisions while considering functional materials and user needs.

A strong focus is placed on health and safety, ensuring students understand safe tool use, workshop procedures, and personal responsibility. Alongside technical skills, the unit explicitly develops students' moral, social, cultural, and emotional (SMSC) understanding, as well as disciplinary vocabulary (UTV), embedding transferable skills such as collaboration, communication, resilience, and critical reflection.

Learning is contextualised in real-world applications, linking DT and construction principles to everyday life and providing a foundation for future study in Pearson Product Design and Eduqas Construction GCSE courses.

Implementation

The unit is delivered over nine progressive lessons, each building on the previous, ensuring a coherent learning journey. Students begin with health and safety and a baseline assessment before moving into the design brief and specification, followed by design and planning using the iterative design process. Practical skills are developed through material preparation, cutting, shaping, vacuum forming, and mould making, culminating in packaging design, quality assurance, and presentation. The unit concludes with an independent summative assessment that tests both theoretical knowledge and practical skills learned throughout the project.

Teaching combines demonstrations, guided practice, practical tasks, and independent work, with clear links to GCSE expectations. SMSC and UTV elements are embedded within each lesson, supporting moral responsibility, social collaboration, cultural awareness, and emotional growth. Differentiation is provided through scaffolded templates, visual aids, and step-by-step guidance, while extension tasks challenge higher-attaining students. Resources include workshop tools, PPE, materials (wood, plastics, card), design templates, and planning and evaluation worksheets.

Impact

By the end of the unit, students will have developed a broad range of practical and theoretical DT skills, from safe tool use to advanced shaping and forming techniques. They will be able to plan, design, make, and evaluate a product independently, applying knowledge of materials, mechanisms, and processes in a structured and iterative manner.

Students will also demonstrate growth in SMSC and UTV skills, taking responsibility for safety, working collaboratively, appreciating diverse approaches, and gaining confidence in practical problem-solving. The independent summative assessment allows students to showcase their ability to apply knowledge and skills across the entire design cycle.

The unit ensures that learning is transferable to real-world contexts, providing a solid foundation for GCSE study while fostering resilience, creativity, critical thinking, and reflective practice. Overall, students will leave the project not only with a completed marble maze but with the confidence, knowledge, and skills to progress effectively in design and technology.

Programme Of Study: KS3 – Marble Madness Maze

Year 7: Topic List

Topic 1: Marble Madness Maze

1. Health and Safety/Baseline Assessment
2. Design Brief and Specification
3. Design and Planning
4. Material Preparation and Cutting
5. Cutting and Shaping
6. Vacuum Forming and Mould Making
7. Package Design and Making
8. Quality Assurance and Presentation
9. SUMMATIVE ASSESSMENT

		Topic	Lesson Objective	SMSC	UTV	PREVIOUS LEARNING	Homework	Linking to Everyday Life	GCSE LINK	
Marble Madness Maze										
1	N/A	Baseline Test & Health and Safety	**Knowledge: Understand the importance of health and safety in a DT workshop and be able to identify common hazards and control measures.** **Skills: Demonstrate correct use of PPE and safe working practices to protect yourself and others in the workshop.**	**Moral**: Take responsibility for your own safety and that of others. **Social:** Work safely with others and communicate effectively in practical tasks. **Cultural:** Appreciate safety standards in different workplaces and contexts. **Emotional:** Build confidence and reduce anxiety in practical environments.	**Tier 2:** Safety, Responsibility, Awareness **Tier 3:** PPE, Hazard, Risk Assessment, Workshop Protocol	Students should have basic experience of following safety rules and handling simple tools in practical lessons from KS2.	Safe Working in Design & Technology	Teaches students the importance of personal hygiene in food preparation, ensuring they understand how to handle food safely to prevent contamination and foodborne illnesses.	**Pearson Product Design:** Health & safety, safe working practices, tool use, risk assessment. **Eduqas Construction:** Safe working, hazard identification, PPE, and site awareness.	Link to BT Link to Less on
2	Empathize	Design Brief and Specification	**Knowledge: Understand the purpose of a design brief and specification and how they guide the product development process.** **Skills: Create a clear design brief and specification that outlines requirements, constraints, and success criteria for the marble maze.**	**Moral:** Make responsible design decisions that consider user needs and safety. **Social:** Work collaboratively to discuss and refine ideas. **Cultural:** Recognise how designs may meet different cultural or user needs. **Emotional:** Develop confidence in communicating and documenting design ideas**.**	**Tier 2:** Design, Requirements, Constraints **Tier 3:** Specification, Brief, Success Criteria, User Needs	Students should understand basic workshop rules and have identified hazards from Lesson 1.	Design Briefs and Specifications	Design briefs and specifications are used in real-world products, construction projects, and engineering to ensure successful outcomes.	**Pearson Product Design:** Writing design briefs and specifications to guide development. **Eduqas Construction:** Planning and documenting design requirements for practical projects**.**	Link

3	Define Ideate	Design and Planning	**Knowledge: Understand the iterative design process and how to develop, test, and refine design ideas while considering functional materials and features (FM).** **Skills: Produce annotated sketches and a detailed step-by-step plan, incorporating iterative improvements and selecting appropriate materials and mechanisms for the marble maze.**	**Moral:** Make responsible design decisions that prioritise functionality and user safety. **Social:** Collaborate effectively to refine ideas and give/receive constructive feedback. **Cultural:** Recognise how designs can meet different cultural or user requirements. **Emotional:** Build confidence through refining and improving your own and others' designs.	**Tier 2:** Plan, Sketch, Annotate, Refine **Tier 3:** Iterative Design, Production Plan, Materials Selection, Mechanism	Builds on Lesson 2 by taking the design brief and specification and turning it into detailed ideas and a structured production plan.	Design & Planning	Iterative design and planning are used in real-world engineering, construction, and product development to test, improve, and ensure functional outcomes.	**Pearson Product Design:** Iterative design process, annotated sketches, planning, and materials selection. **Eduqas Construction:** Planning construction methods, selecting materials and mechanisms, and testing functional designs.	Link
4	Prototype	Material Preparation and Cutting	**Knowledge:** Understand the properties of materials being used and the safe techniques for measuring, marking out, and cutting. **Skills:** Accurately measure, mark, and cut materials using hand tools and machinery safely to prepare components for the marble maze.	**Moral:** Take responsibility for safe tool use and careful handling of materials. **Social:** Work considerately with others, maintaining safe zones and sharing equipment appropriately. **Cultural:** Appreciate traditional and modern material preparation techniques used in different industries. **Emotional:** Build confidence in handling tools and preparing materials independently	**Tier 2:** Measure, Mark, Cut, Prepare **Tier 3:** Material Properties, Hand Tools, Machine Tools, Safety Protocols	Builds on Lesson 3 by taking the planned designs and preparing the required materials accurately for construction	Types of Wood	Measuring, marking, and cutting materials accurately is essential in construction, engineering, furniture making, and many DIY projects.	**Pearson Product Design:** Safe handling and preparation of materials, understanding material properties, and accurate cutting techniques. **Eduqas Construction:** Measuring, marking, and cutting materials safely for construction projects.	Link

5	Prototype	Cutting and Shaping	**Knowledge: Understand techniques for cutting and shaping materials safely and accurately, including the use of hand and machine tools.** **Skills: Apply cutting and shaping techniques to create the marble maze components according to the design plan.**	**Moral:** Take responsibility for using tools safely and maintaining a tidy workspace. **Social:** Collaborate and support peers while sharing tools and equipment safely. **Cultural:** Appreciate traditional and modern techniques used in shaping materials across different industries. **Emotional:** Develop confidence and independence in practical skills.	**Tier 2:** Cut, Shape, Adjust **Tier 3:** Hand Tools, Machine Tools, Material Properties, Tolerances	Builds on Lesson 4 by transforming prepared materials into accurately shaped components ready for assembly.	Cutting and Shaping Materials	Cutting and shaping materials is essential in construction, carpentry, product design, and various engineering projects.	**Pearson Product Design:** Safe and accurate use of hand and machine tools, understanding tolerances and material manipulation. **Eduqas Construction:** Cutting and shaping materials safely for construction and structural projects.	Link
6	Prototype	Vacuum Forming and Mould Making	**Knowledge: Understand the process of vacuum forming and how moulds are used to shape materials safely and accurately.** **Skills: Create a mould and use vacuum forming techniques to produce components for the marble maze.**	**Moral:** Follow safety procedures responsibly when using heating equipment and vacuum forming tools. **Social**: Collaborate effectively, helping peers safely use equipment and share resources. **Cultural**: Appreciate how vacuum forming and mould-making are used in different industries and cultural contexts. **Emotional:** Build confidence in using new equipment and practical manufacturing techniques.	**Tier 2:** Form, Shape, Mould **Tier 3:** Vacuum Forming, Thermoplastics, Mould Making, Heating Equipment, Material Properties	Builds on Lesson 5 by taking shaped components and applying advanced forming techniques to produce finished parts for assembly.	Types of Plastics	Vacuum forming and mould making are widely used in product design, packaging, toys, and construction for producing accurate, repeatable shapes.	**Pearson Product Design:** Thermoforming techniques, mould making, and safe handling of plastics. **Eduqas Construction:** Using forming and shaping techniques safely, understanding material properties, and producing repeatable components.	Link

7	Prototype	Package Design and Making	**Knowledge: Understand the purpose of packaging, including protection, presentation, and user information.** **Skills: Design and construct a package that safely contains the marble maze and meets the design requirements.**	**Moral:** Consider environmental impact and sustainability when choosing packaging materials. **Social:** Collaborate and communicate effectively when sharing materials and equipment**.** **Cultural:** Appreciate packaging design practices in different industries and cultures. **Emotional**: Gain confidence in producing a visually appealing and functional product	**Tier 2:** Protect, Present, Contain **Tier 3:** Packaging Design, Structure, Sustainability, Prototype	Builds on Lesson 6 by taking the completed maze components and designing a suitable package for storage, transport, and presentation.	Package Design	Packaging is used in retail, logistics, and product design to protect items, attract customers, and provide information.	**Pearson Product Design:** Designing and producing packaging that meets functional and aesthetic requirements. **Eduqas Construction:** Understanding protective structures, materials selection, and functional design for products.	Link
8	Test	Quality Assurance and Presentation	**Knowledge: Understand the principles of quality assurance, testing, and evaluating a finished product.** **Skills: Test the marble maze against design specifications, identify improvements, and present the final product professionally.**	**Moral:** Take responsibility for producing a high-quality and safe product. **Social**: Work cooperatively when demonstrating and evaluating products with peers. **Cultural:** Appreciate different presentation standards and expectations in professional and cultural contexts. **Emotional:** Build pride and confidence in completing and presenting a practical project.	**Tier 2:** Test, Evaluate, Present **Tier 3:** Quality Assurance, Specification, Functionality, Improvement, Feedback	Builds on Lesson 7 by evaluating the finished marble maze and packaging against the design brief and specification.	Design that changed the world : Designer / Inventor – Alan Turing	Quality assurance and presentation are essential in manufacturing, retail, engineering, and product design to ensure products are safe, functional, and appealing.	**Pearson Product Design:** Testing, evaluating, and improving products; presenting outcomes effectively. **Eduqas Construction:** Checking quality, functionality, and compliance with specifications; professional presentation of finished projects.	Link

9		Cumulative Assessment of Knowledge and Skills	**Knowledge: Demonstrate individual understanding of all DT topics covered, including health & safety, design briefs, specifications, planning, material preparation, shaping, vacuum forming, packaging, and evaluation.** **Skills: Apply all practical and theoretical skills independently to complete tasks, solve problems, and evaluate outcomes against the original specifications.**	**Moral:** Take personal responsibility for learning and demonstrating skills accurately. **Social:** Maintain independence while respecting classroom procedures during assessment. **Cultural:** Recognise that quality standards and expectations may vary across professional and cultural contexts. **Emotional:** Develop confidence, resilience, and self-reliance through independent assessment.	**N/A**	Builds on all previous lessons by requiring students to independently apply knowledge and skills from every stage of the project.		Independent testing mirrors real-world scenarios where designers, engineers, and builders are individually accountable for producing and evaluating work to specification	**Pearson Product Design**: Individual application of all design and make processes, evaluating products against specifications. **Eduqas Construction:** Applying cumulative skills independently to assess quality, safety, and functionality in construction projects.	Link