Short-Term Design & Technology Lesson Plan

- Teacher: Mr Benjamin
- **Subject:** Design and Technology
- **Key Stage:** Upper Key Stage 3 (Year 9)
- **Unit Title:** Introduction to Materials & Manufacturing: The Small Stool Project
- **Duration:** 4-6 lessons (pending on skill level)
- **Context:** This unit introduces students to common workshop materials and a range of hand-tool manufacturing techniques. The final outcome is a small, functional product with a focus on structural joinery.

Lesson Objectives

By the end of this unit, students will be able to:

- Identify and describe the properties of common materials (e.g., natural wood, manufactured board).
- Safely and accurately use a range of basic hand tools such as a tenon saw and coping saw.
- Apply a specific manufacturing process to create a strong, functional joint.
- Explain the link between a material's properties and its suitability for a given product's structure.

Resources

- **Classroom:** Whiteboard, projector, material samples (wood, manufactured board).
- **Workshop:** Workbench, vices, G-clamps, safety goggles.
- **Materials:**
    - **Wood:** Offcuts of pine or similar softwoods for legs and rails.
    - **Manufactured Boards:** Plywood or MDF offcuts for the seat.
    - **Fasteners:** Wood glue.
- **Tools:**
    - **Cutting:** saws, coping saws.
    - **Shaping/Finishing:** Chisels, mallets, sandpaper or sanding machine (various grades), rasps.
    - **Joining:** Hammers, drills (cordless).

Lesson Sequence

Lesson 1 & 2: Material Investigation & Tool Safety

- **Introduction :**
  - **Starter:** Display a variety of objects with different joints (e.g., a chair, a box, a picture frame). Ask students to identify how the parts are connected and why the chosen method makes the object strong.
  - **Main Task:** Introduce the project brief: "Design and make a small, functional stool. It must use at least two different materials and a strong **wood joint** to connect the legs and rails."
- **Main Activities :**
  - **Material Exploration:** In small groups, students handle and examine different material samples (pine, MDF, plywood). They discuss and document the properties of each material, specifically focusing on strength and stability.
  - **Tool Demonstration:** The teacher demonstrates the safe and correct use of the required hand tools, with a strong emphasis on the **tenon saw** and **chisel** for creating joints. Emphasize safe clamping and personal protective equipment (PPE). Students practice using the tools on scrap material.
- **Plenary :**
  - **Class Discussion:** Review the properties of the materials. Introduce some common joints, like the **housing joint** or **bridle joint**, and discuss their strengths. Ask students to predict which joints would be best for a stool.

Lesson 3&4: Measuring & Cutting Joints

- **Introduction :**
  - **Starter:** Review tool safety and the importance of accurate measurements for a tight-fitting joint. Show an example of a well-made joint and a poorly made one to highlight the importance of precision.
- **Main Activities :**
  - **Design & Marking Out:** Students are provided with a simple plan for the stool, which includes a specific joint (e.g., a bridle joint). They must measure and mark out the legs and rails on their chosen wood, carefully marking the lines for the joint.
  - **Cutting:** Under supervision, students use saws to cut the pieces for the stool's frame. They then carefully use the saw and chisels to cut the specific joint.
- **Plenary):**
  - **Peer Check:** Students exchange their cut pieces with a partner to check for accuracy and a snug, precise fit of the joint before the next stage.

Lesson 5&6: Assembly & Finishing

- **Introduction :**
  - **Starter:** The teacher demonstrates how to perform a "dry fit" of the stool frame without glue. Explain the importance of checking that all the joints are square before final assembly.
- **Main Activities :**
  - **Assembly:** Students apply wood glue to the joints and carefully assemble the stool frame, clamping the pieces together to create a strong, permanent bond.
  - **Finishing:** Once the glue has set, students use sandpaper to smooth all the edges and faces of their product. This step highlights the importance of a good finish in manufacturing.
  - **Final Touches:** They can then attach the seat using glue or screws.
- **Plenary :**
  - **Final Review:** Students reflect on the materials and manufacturing processes they used. They answer questions like, "What was the most difficult part of making the joint?" or "How did the properties of the material affect the way you worked with it?"

Assessment

- **Formative:** Teacher observation, safety checks, and review of in-class work.
- **Summative:**
  - Practical skill in measuring, cutting, and joining materials.
  - The quality and accuracy of the final product, especially the joints.
  - The student's ability to articulate their understanding of material properties and manufacturing processes.

Differentiation

- **Support:** Students can be given pre-cut pieces to assemble, focusing solely on the joining and finishing aspects. They can also focus on a simpler joint, like a butt joint reinforced with screws.
- **Challenge:** Students can be asked to design their own stool from scratch, considering more complex joints like a finger joint or a rebate joint.