



Knowledge and Skills Mind Map (DT)

Year 5 — Autumn Term

Knowledge - 
Skill - 

Prior Learning:

- **Year 1 Autumn:** Freestanding Structures (Built a bridge for Billy Goats Gruff)
- **Year 3 Spring:** Shell Structures (Structure to protect Egyptian canopic Jar)

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Structures:

Frame Structures

'Can I design, make and evaluate a model Anderson Shelter?'

1. Can I investigate and evaluate a range of frame structures?

- **Prior Knowledge:** (Year 3 Spring): Know that structures can be made stronger, stiffer and more stable.
- **Vocabulary:** frame structure, strengthen, stiffen, reinforce, triangulation, stability, join, temporary, permanent
- Know that frame structures are made from a skeleton of joined parts
- Know that structures are designed for a specific user and purpose
- Know that structures can be strengthened through triangulation, reinforcement and material choice
- Know that shape affects stability, with triangles providing more strength than squares
- Know that existing products can be analysed to understand how and why they work

Task: Explore a range of structures (e.g. tents, bus shelters, playground equipment), guiding discussion on who the structure is for (e.g. campers needing shelter, passengers waiting for transport, children playing) and its purpose, materials and stability, including how these features could be recreated using classroom materials such as wood, card or dowel. In books, children draw an annotated sketch of one structure, labelling: the materials used (e.g. metal poles, fabric), the types of joins (e.g. fixed, hinged), and features that strengthen or stabilise the structure (e.g. triangular supports, wide base), with brief explanations such as "triangles make the frame stronger" or "a wide base helps stop it tipping."

Designing:

- Generate and clarify ideas through discussion to identify effective structural features
- Use annotated sketches to develop and communicate ideas

Evaluating:

- Investigate and evaluate a range of existing frame structures
- Consider how well they meet user needs and purposes

Technical Knowledge:

- Understand how to strengthen, stiffen and reinforce 3-D frameworks
- Know and use technical vocabulary relevant to the project

2. Can I understand how to strengthen, stiffen and reinforce frameworks?

- **Prior Knowledge (last lesson):** Know that different frame structures have features that make them stable and suitable for a purpose.
- **Vocabulary:** triangulation, reinforce, stiffen, strengthen, framework, joint, stability, prototype
- Know that frameworks can be strengthened by adding extra supports
- Know that triangulation strengthens structures by spreading forces and reducing movement
- Know that stiffening reduces bending and helps a structure keep its shape
- Know that strong and secure joints improve the overall stability of a structure
- Know that prototypes can be used to test and improve the strength of a design

Task: Explore ways of strengthening structures by building simple frameworks using materials such as square dowel, straw and sticks/card, guiding discussion on what makes a structure strong for a small model (e.g. adding triangles, securing joints firmly with glue/tape/ fixed joints) and what causes weakness (e.g. loose joints, square shapes). In books, children draw and annotate two simple framework designs (e.g. a square frame and a triangular frame), labelling the structure and explaining which is stronger and why, including notes such as "triangles make the structure rigid," "this joint is weak because it moves," or "adding a diagonal support improves stability."

Designing:

- Generate, develop and model innovative ideas through discussion and prototypes
- Use annotated sketches to develop and communicate ideas

Evaluating:

- Investigate and evaluate how different framework designs perform
- Identify strengths and areas for development through testing

Technical Knowledge:

- Understand how to strengthen, stiffen and reinforce 3-D frameworks
- Know and use technical vocabulary relevant to the project



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3. Can I investigate and evaluate an Anderson shelter and its design features?

- **Prior Knowledge (last lesson):** Know that frameworks can be strengthened using triangulation and secure joints.
- **Vocabulary:** Anderson shelter, corrugated, steel, frame, reinforce, stability, structure, protective,
- Know Anderson shelters were to protect people during air raids in WWII
- Know that Anderson shelters used a curved corrugated shape to help deflect force and improve strength
- Know that materials such as steel were chosen for strength and durability
- Know that the structure was partially buried to improve protection and stability
- Know that design features are chosen to meet a specific user need and purpose

Task: Explore examples of Anderson shelters using images and discussion, identifying who they were for (e.g. families needing protection during air raids) and their purpose. Guide discussion on key features such as shape, materials and how the structure was strengthened and stabilised. In books, children draw and annotate an Anderson shelter, labelling: the curved shape, materials (e.g. metal/steel), how it is positioned in the ground/base, and features that improve strength and protection, with explanations such as “the curved shape helps spread force” or “being partly underground increases stability.”

Designing:

- Carry out research into user needs and existing products
- Use annotated sketches to develop and communicate ideas

Evaluating:

- Investigate and evaluate a range of existing frame structures
- Consider how well the Anderson shelter met its user needs and purpose

Technical Knowledge:

- Understand how to strengthen, stiffen and reinforce 3-D frameworks
- Know and use technical vocabulary relevant to the project

4. Can I develop a simple design specification for an Anderson shelter?

- **Prior Knowledge (last lesson):** Know Anderson shelters were designed with specific features to provide protection and stability.
- **Vocabulary:** design specification, user, purpose, criteria, constraints, annotated sketch, structure, materials
- Know that a design specification outlines what a product must do and include
- Know that designs must meet the needs of a specific user and purpose
- Know that constraints such as size, materials and time must be considered
- Know that ideas can be developed through annotated sketches and discussion
- Know that design decisions should be based on research and understanding of existing products

Task: Introduce task: creating a small-scale Anderson shelter (approx. 20cm × 20cm on a 30cm × 30cm base), identifying the user (e.g. a WWII family needing protection) and purpose (to provide a stable, protective structure). Guide children to develop simple design criteria such as strong, stable, able to stand independently, and suitable for available materials (e.g. dowel, card). In books, children write a short design specification (e.g. must be stable, must include a curved or reinforced structure, must fit the base size, must use available materials), then produce an annotated sketch of their shelter, labelling materials, joins and features that will strengthen and stabilise it, with explanations such as “triangular supports will strengthen the frame” or “a wide base will improve stability.”

Designing:

- Develop a simple design specification to guide the development of ideas and products. Take account of constraints including time, resources and cost
- Generate, develop and model innovative ideas through discussion and annotated sketches
- Use annotated sketches to develop and communicate ideas

Evaluating:

- Consider how designs meet the intended user and purpose
- Use design criteria to guide decisions

Technical Knowledge:

- Understand how to strengthen, stiffen and reinforce 3-D frameworks
- Know and use technical vocabulary relevant to the project



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5. Can I plan, make and evaluate a small-scale Anderson shelter?

- **Prior Knowledge:** Know that a design specification helps guide the design of a structure using suitable materials and features.
- **Vocabulary:** plan, measure, mark out, cut, join, assemble, reinforce, evaluate, stability, function
- Know that a clear plan helps ensure a structure is made accurately and successfully
- Know that accurate measuring and marking out ensures parts fit together correctly
- Know that careful cutting and shaping improves the overall quality of the structure
- Know that strong and secure joints are essential to keep the structure stable
- Know that frameworks can be reinforced during making to improve strength
- Know that materials must be selected and used appropriately for their purpose
- Know that steps should be followed in order when making to achieve the best outcome
- Know that structures can be tested to check stability and effectiveness
- Know that products should be evaluated against the design specification, user and purpose

Task: Recap the design specification and explain the expectation to create a small-scale Anderson shelter (approx. 20cm × 20cm on a 30cm × 30cm base) using classroom materials such as dowel, card and glue. Support children in creating a simple step-by-step plan, identifying tools, materials and key stages (e.g. build frame, reinforce, add covering). Children then construct their shelters, focusing on accurate measuring, cutting and secure joining. Once complete, test structures for strength and stability. In books, children write a short evaluation describing how well their shelter meets the design specification, what works well (e.g. “the triangular supports made it stable”) and what could be improved (e.g. “stronger joints would stop movement”).

Designing:

- Generate, develop and model innovative ideas through discussion and prototypes
- Use annotated sketches to develop and communicate ideas

Making:

- Formulate a clear plan, including a step-by-step list of what needs to be done and lists of resources to be used
- Competently select from and use appropriate tools to accurately measure, mark out, cut, shape and join construction materials to make frameworks
- Use finishing and decorative techniques suitable for the product they are designing and making

Evaluating:

- Critically evaluate their products against their design specification, intended user and purpose
- Identify strengths and areas for development, and carry out appropriate tests
- Technical Knowledge:
 - Understand how to strengthen, stiffen and reinforce 3-D frameworks
 - Know and use technical vocabulary relevant to the project