Design and Technology – Year 5

Content- Structures- Frame Structures

Big Question: What makes a structure secure?

NC objectives - **areas of study**	End point of area of study	Vocabulary		
		Basic	Adventurous	Technical
Through a variety of creative and practical activities, pupils should be taught the knowledge, understanding and skills needed to engage in an iterative process of designing and making. They should work in a range of relevant contexts. When designing and making pupils should be taught to: -Use research and develop design criteria to inform the design of innovative, functional, appealing products that fit for purpose, aimed at a particular individual or groups. -Generate, develop, model and communicate their ideas through discussion, annotated sketches, cross-sectional and exploded diagrams, prototypes, pattern pieces and computer-aided design. -Select from and use a wider range of tools and equipment to perform practical tasks. -Select from and use a wider range of materials and components, including construction materials, textiles and ingredients, according to their functional properties and aesthetic qualities. -Investigate and analyse a range of existing products. -Evaluate their ideas and products against their own design criteria and consider the views of others to improve their work.	**<u>Structures</u>** Children understand and demonstrate how to design and create a 3D framework. They understand how to strengthen and stiffen a 3D framework. The children can use construction kits to explore the strength of a square-based framework and triangular based framework and discuss which is best for their product and explain why. Children know how to use tools and equipment such as junior hacksaws, g-clamps, bench hooks, square section wood, card, triangles and hand drills to construct wooden frames where appropriate. Children can accurately measure, mark out, cut, shape and join construction materials to make a framework. Children know and use relevant technical vocabulary linked to the designing, making and evaluating of their product. (See Tier 3 vocabulary) Children have developed their joining techniques and understand the difference between joining different types of materials – plastic straws or small pieces of wood.	Join, design brief, user, research, stiffen, strengthen, shape, paper, diagonal, horizontal, vertical,	Purpose, innovation, reinforce, stability, compression, strut, modelling, compression, tension, tie,	Frame structure, reinforce, triangulation, stability, temporary, permanent, specification, prototype, annotated sketch, , bench hooks, G-clamps, junior hacksaw, strut, tension,

-Understand how key events and individuals in design and technology have helped the shape world. -Apply their understanding of how to strengthen, stiffen and reinforce structures that are more complex. -Apply their understanding of computing to programme, monitor and control their products.				

Knowledge

Substantive Knowledge

Structures- concepts- Innovation

Lesson 1:

LO: To know portable and permanent frame structures.

(Retrieval from year 1 and 4- What is a free standing and shell structure?)

Children investigate and make annotated drawings of a range of portable and permanent frame structures, e.g. tents, bus shelters, umbrellas. Use photographs and web-based research to extend the range

e.g. *How well does the frame structure meet users' needs and purposes? Why were materials chosen? What methods of construction have been used? How has the framework been strengthened, reinforced and stiffened? How does the shape of the framework affect its strength? How innovative is the design? When was it made? Who made it? Where was it made?*

Children could research key events and individuals related to their study of frame structures e.g. Stephen Sauvestre – a designer of the Eiffel Tower; Thomas Farnolls Pritchard – designer of the Iron Bridge. They could also learn about locally important design and technology activity related to their project.

Appreciate designs around the world.

Lesson 2:

LO: To know what a bird hide is and know the key features.

Disciplinary Knowledge

Each lesson: Tell chn- Explain to the children that today we are going to be an architect. This will involve the children designing a stable structure that can fit a purpose. They will need to explore other structures to support whilst creating a new innovative product. Children may then think about becoming wildlife rehabilitator and research how they can support injured animals or birds in the school and have a positive impact on the environment.

Throughout the unit, children will be able to draw upon other subject disciplines such as Mathematics, Science and Art. This will include the following:

Spoken language – ask relevant questions, formulate and express opinions, give well-structured descriptions and explanations. Use strategies to build their vocabulary.

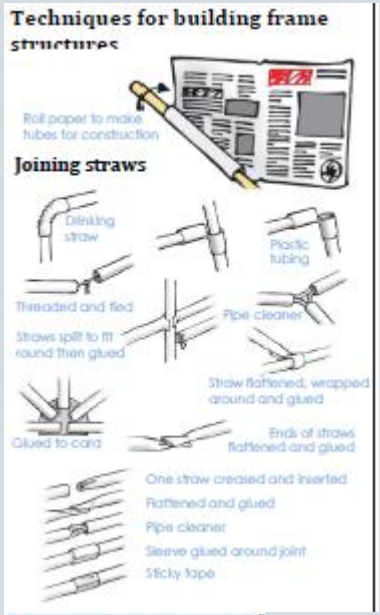
Art– use and develop drawing skills.

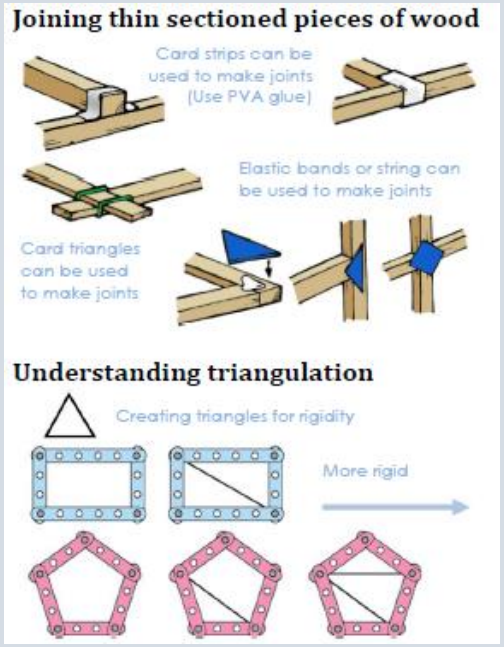
Mathematics – apply understanding and skill to carry out accurate measuring using standard units i.e. cm/mm. Recognise, describe and build simple 3-D shapes. Apply understanding and skill to carry out accurate measuring using standard units i.e. cm/mm.

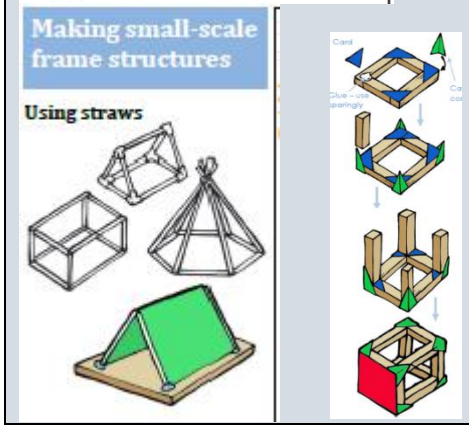
Children to be set the challenge of making a bird hide to use in the outdoor area. Children to know that a bird hide is a shelter, often camouflaged, that is used to observe wildlife, especially birds, at close quarters. Although hides were once built chiefly as a hunting aid, they are now commonly found in parks and wetlands for the use of bird watchers, ornithologists and other observers who do not want to disturb wildlife as it is being observed. Children to explore bird hides from the past but also how they used today and why. Link to whether these are portable or permeant frame structures. Children to be set the challenge of creating an innovative bird hide linking to environment needs. E.g. using to monitor or protect birds that are being attacked or harmed. Children to be set the challenge of creating a model bird hide that can be presented to a Dragon Den of expert. (Use Junior Dragon's Den video to introduce challenge if permitted- see you tube) Children to research bird hides- sketch and label key features that will support their design criteria. Children can begin to explore design process and what will be included in design criteria. Discuss the brief of designing and making a small-scale frame structuree.g. *Who is the intended user and what is the purpose of the frame structure?Will it be permanent, or can it be easily dismantled? What materials will you use? How will it be joined? How will it be reinforced? How will it be finished?* Children should be encouraged to generate innovative ideas, drawing on their research. Ask children to develop a simple design specification to guide their thinking. **<u>Lesson 3:</u>** **<u>LO: To understand how to strengthen, stiffen and reinforce 3D frameworks.</u>** **<u>LO: To understand how triangulation can strengthen frame structures.</u>** Children to understand that triangulation is the use of triangle shapes to strengthen a structure. Use a construction kit consisting of plastic strips and paper fasteners to build 2-D frameworks. Compare the strength of square frameworks with triangular frameworks. Ask the children to reinforce square frameworks using diagonals	Children to follow the four aspects of Design and Technology- research, design, make and evaluate whilst building upon technical knowledge to make their finished product.

to help develop an understanding of using triangulation to add strength to a structure.

Demonstrate how paper tubes can be made from rolling sheets of newspaper diagonally around pieces of e.g. dowel. Ask children to use these tubes and masking tape or paper straws with pipe cleaners to build 3-D frameworks such as cubes, cuboids and pyramids. *How could each of the frameworks be reinforced and strengthened?*







Lesson 4: **LO: To know how to accurately measure, mark out, cut, shape and join construction materials to make frameworks.** **LO: To know how to use tools following safety procedures correctly.** Demonstrate the accurate use of tools and equipment. Develop skills and techniques using junior hacksaws, G-clamps, bench hooks, square section wood, card triangles and hand drills to construct wooden frames, as appropriate. Demonstrate skills and techniques for accurately joining framework materials together e.g. paper straws, square sectioned wood. Ask children to practise these, mounting their joints onto card for future reference. **Lesson 5:** **LO: To know how to use finishing and decorative techniques suitable for the product they are designing and making.** Children to continue to make their bird hide using the knowledge taught from the beginning of the unit. Encourage children to talk through the making process and adapt where necessary. Children to add any finishing techniques or decorative elements to ensure the product meets the design criteria. **Lesson 6:** **LO: To know how to evaluate their finished product and understand how to identify strengths and areas of development.** They should regularly evaluate their work and their completed product, drawing on their design specification, and thinking about the intended purpose and user. Encourage children to evaluate each other's work and discuss strengths and areas of development. Evaluate created things.	

Concepts			
Functionality	**Authenticity**	**Innovation** When designing and making, pupils need some scope to be original with their thinking. Projects that encourage innovation lead to a range of design ideas and products being developed and are characterised by engaging open-ended starting points for learning. Demonstrate some originality when designing and making. Learn how to take creative risks. Understand the meaning of 'innovation' within design and technology. Understand how innovation is an important part of the process of designing and making products.	**Significance**

ASSESSMENT

KNOW MORE, REMEMBER MORE, DO MORE...

In this unit of learning, progress has been made when a learner knows more. This 'distance travelled' from the starting point is evidenced through them remembering more and doing more: in books, low stakes quizzes, retrieval, use of mind maps, answering the big question and being able to feel more confident about this unit.