Knowledge Organiser

Subject: Design & Technology Unit: Shelters

Overview:
Children will be learning about shelters and how they are made. They will be carrying out experiments and tests to be able to select suitable materials and joining techniques for strength. The children will be making their own shelter and evaluating how successful they are.

What should I already know?	Vocabulary:	
Design • Can test the effectiveness of different beam designs by constructing two identical beams which can support a flat card deck. • Can investigate the effectiveness of arches of different shapes and sizes in spreading the load on bridges. • Can design a prototype for a new bridge based on a design brief. • Can state reasons why they have chosen a particular bridge design. • Can suggest some alternative designs and discuss the benefits/drawbacks • Can identify the parts of the process that will be easy and more challenging. • Identify how they can overcome challenges (ask for help). • Can explain their design, the reasons for it, the techniques they will use and the process they will need to undertake to make their product **Make** • Can build a range of bridges: truss, arch and a model suspension bridge. **Working with tools** • Can independently organise appropriate equipment and materials needed. • Can use a range of tools and equipment with good accuracy and effectiveness, within established safety parameters e.g., art straws, sticky tape, string, card, paper, glue, scissors; sets of weights; toy cars; • Measure and cut precisely to millimetres. **Evaluate** • Can develop own designs through reflection and evaluation of others products	investigate range stability architectural  foundation purpose components precision refine	To make a detailed inquiry a wide variety of something a situation which is unlikely to move or change relating to the art or practice of designing and constructing buildings the lowest load-bearing part of a building, typically below ground level for a particular function parts which link together to make a whole with the greatest of accuracy

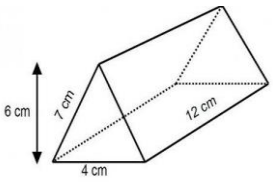
- Can analyse a prototype by asking questions that are based on the design criteria.

Technical Knowledge

- A beam is a length of sturdy material that has been cut and shaped to span a gap or support a floor or roof
- Beams are formed into different shapes for different purposes.
- The deck is the flat surface of a bridge. A smooth, flat deck allows wheeled vehicles to cross.
- Side sections of bridges (parapets) make the bridge more sturdy
- Pillars allows bridge builders to span bigger gaps. When a bridge spans a river, the pillars stand on man-made islands so they do not wash away.
- Steel and concrete are often used in the construction of modern bridges. Beams and pillars made of these materials can be made much bigger, longer and stronger
- Steel girders are often used in bridge construction. Tubular steel in different shapes is also used frequently
- The Millennium Footbridge in London stands on foundations called piers
- A truss is made up of several beams connected together in different ways. Trusses enable longer, stronger bridges.
- A bridge deck runs through, or on top of the trusses
- Gravity is a downward force acting on bridges. This downward force pulls down on the beams and decks, causing them to squeeze, stretch, twist and bend
- Trusses help strengthen bridges by distributing the weight along its length and transferring the compression forces down through the pillars and abutments
- Lattice truss, Warren truss and Pratt truss are commonly used in bridge design.
- Until developments in technology and engineering meant that engineers could construct large beams made of iron, long bridges were made with brick or stone arches.
- In the past, stone arches were used to build long bridges. Arches help to spread the load by changing the direction of the compression forces caused by

textiles

triangular prism



test

waterproof

evaluate

finishing technique

to make smaller changes to make something even better

materials which are fabric or woven

to check to see how good the product this

impervious to water

to make a balanced judgement based on asset of criteria

a specific procedure sued to finish a product (varnish, sand, knot)

the weight of the bridge itself and the weight of the objects crossing • Suspension bridges are different to many other bridge designs because they spread out the weight of the bridge and the traffic crossing it in a different way. Suspension bridges use tension forces, pulling rather than pushing. • Modern engineering means that huge suspension bridges can be built. Thick, heavy, twisted steel cables transfer the weight of the bridge to the vertical columns. Their weight means they have to hang in long loops between the columns. The cables are anchored at either side of the bridge deep into hard rock or into tonnes and tonnes of poured concrete. Because the columns of suspension bridges can withstand huge compression forces, they can be built with long decks and big gaps between them. Another advantage is that the deck can be hung high above the gap it is spanning, unlike other bridge designs • Technical drawings and models are often drawn and built to a scale that is smaller than the final product.		
What will I know by the end of the unit?		
Design • Can compare different shelters using the following criteria: - o Type and purpose o Materials/components used o Function of each part o Temporary/permanent • Can experiment with different techniques to gather ideas for use in their own work: - o how best to join materials together to create a structure o how to reinforce these structures to make them stronger o Can carry out tests to determine whether different fabrics are suitable for a shelter o are they water resistant o are they strong enough o are they easy to attach to other materials • Can use a range of information to inform their design for a shelter for a particular purpose. Design to state: -		

○ What kind of shelter ○ Who it is for ○ Purpose of the shelter ○ How it will be made ○ Materials, joining and strengthening techniques ○ Precise measurements • Can articulate that they have considered the use of the product when selecting materials • Can talk through how they will construct their design, justifying choice, stating the following: ○ Materials needed ○ Steps to take and in what order ○ How the shelter will be made as per the plan ○ How a sturdy and strong shelter will be achieved ○ What you will do if something goes wrong. ○ How you will ensure that the shelter is made to a high standard. • Can draw a scaled diagram of their shelter **Make** • Make separate elements of a model before combining into the finished article • Can work within constraints • Can follow their design to create a shelter: - ○ working appropriately with a range of materials and techniques ○ using finishing techniques to ensure that their finished product is as good as it can be • Can demonstrate how their product is strong and fit for purpose **Working with tools** • Can choose appropriate tools and equipment and use them effectively: ○ straws, sculpture wire, paper, card, pipe cleaners, fabrics, dowelling ○ sticky tape, scissors, staplers, blu-tack • Work within health and safety rules when working with materials such as scissors and other sharp objects • Measure and cut out in precise detail. **Evaluate** • Test and evaluate commercial/other products using criteria: - ○ Is it fit for purpose? ○ What would improve it?		

○ Would different resources have improved their product? ○ Would they need more or different information to make it even better? ○ Does their product meet all design criteria? • Can say how they are going to use this information in their own designing. • Can share models and objectively evaluate them using these prompts: ○ How well does your product fit the design criteria and the intended purpose? ○ Is it sturdy? ○ Are the joins secure? ○ What is successful about it? ○ Is there anything that could be improved upon for next time? • Understand that all finished products, no matter how good, can be improved in some way **Technical Knowledge** • Know the following strengthening methods: - ○ inserting sculpture wire or pipe cleaners into a straw before using it ○ creating a triangle shape in corners ○ rolling paper into tubes		