

Mendell Primary School

Aspire Challenge Achieve



Medium Term Plan Design Technology

Year Group: 1	Term: Summer 1 2022	Teacher: Nicole Morning	Subject lead: Catherine O'Neill Edwards	Overview: Structures - Freestanding Structures Design, make and evaluate a structure for Humpty Dumpty	Key End Points: By the end of this unit children will - Know what a structure is - Know some famous structures - Know what a frame structure is - Know which brick pattern is the most stable	
Links to other learning: Maths – 2D & 3D shapes	Relevant Prior Learning: -	Future Learning:	High Quality Text: 'Humpty Dumpty' BSL Hands on Songs (learn British Sign Language at the same time)	Risk Assessment: -	Teacher CPD: Please read the DATA project on a page sheets attached at the end of this plan prior to teaching.	
<u>Learning Intention</u>	<u>Lesson Outline (Key Questions in colour)</u>			<u>Resources</u>	<u>Vocabulary</u>	<u>Lowest 20% Adaptations</u>
I know what a structure is I can say which wall pattern is the strongest	<p>This is a DT lesson. In DT we design and make to solve problems</p> <p>https://classroom.thenational.academy/lessons/what-is-a-structure-6gw3jd?activity=video&step=1 Introduction video to structures. Start video at 2m 22 seconds At 'talk time' pause to discuss bridges. Also take children out to the play area to look at the rope and slat bridge we have in our outdoor play area. How is it secure? How do the sides stay up? What stops the slats falling from the rope? Why haven't the ropes snapped? Children can write their thoughts around a photograph of this which could be taken and printed up before the lesson</p> <p>In the video where the teacher gives a definition of a structure pause the video and look at the following: What is a structure? different parts or materials used to make a 3d model Repeat 3 times in different voices (high, low, squeaky) and again throughout lesson</p> <p>When the video is paused to record free-standing structures, children do this in books. Use free standing structures work sheet. There is a power point slide of the famous free standing structures from around the world and labels, children match these and stick in books (pre-cut before lesson to save time) and children can draw and label the structures from the school site.</p> <p>When asked to, allow children time to experiment making cylinders with paper (don't go back to this video again):</p> <ul style="list-style-type: none"> • Aim: to make it stand up by itself • Tall 			IAW Free standing structures worksheet Famous freestanding structures from around the world printed and pre-cut prior to lesson Several pieces of paper each (these can be pre-used scrap paper) Sellotape with/without dispensers Scissors	Structure Freestanding Hollow Wall pattern	

	<ul style="list-style-type: none"> • Short • Wide • Narrow <p>So far we have looked two types of structures: bridges and free-standing buildings. Now we are going to look at a third type of structure. What is a structure? different parts or materials used to make a 3d model.</p> <p>The next type of structure we are going to look at are walls. Did you know there are famous walls around the world? Let's look at some of them (go through wall PowerPoint) For each ask</p> <ul style="list-style-type: none"> - What is the name of the wall? - Have you heard of it? - Where is it? • Great Wall of China – China • Hadrian's Wall – UK (North England) • Wall of Sacsayhuaman – Peru, South America • Humpty Dumpty's Wall - unknown <p>Look at slide 5 (possibly print up slide 5 for children if difficult to see on IAW) and ask them to look closely at the walls especially the patterns. What do they notice?</p> <p>Look at slide 6, here are some more brick patterns, what do you notice?</p> <p>Through discussion draw out:</p> <ul style="list-style-type: none"> - there are lots of rows - the walls are stable (strong) and free standing. - One of the patterns shows a wide end of the brick then the narrow end of the brick (it might be worth showing this with Duplo) - Where the row above goes, the brick overlaps the joints. This is clear to see on the next slide in the PowerPoint <p>Look at the differences between the staggered wall joints and the single file columns. For the rest of the lessons children are going to use Duplo/ Lego / building blocks to make two walls – one staggered joint and one single file columns. They are then going to test which is the most stable (strong).</p> <p>We will test in 2 ways, by gently pushing and by rolling a tennis ball at it gently. Children should build their walls using the Lego mat/board so the wall is connected to the wider surface area. Before allowing children to start, ask them to predict which of the wall designs will be the strongest/most stable and why. Capture these ideas on post-it notes.</p> <p>Children experiment – take photographs for books.</p> <p>Exit pass: Children record in books which wall was the most stable (strongest) –<i>the staggered wall joint is the strongest.</i></p>	<p>Masking tape</p> <p>Duplo, Lego, range of building blocks</p>		
<p>I know what a frame structure is</p> <p>I can make a stable frame structure by using joints</p>	<p>This is a DT lesson. In DT we design and make to solve problems</p> <p>Recap on prior learning: What is a structure? different parts or materials used to make a 3d model</p> <p>https://classroom.thenational.academy/lessons/designing-a-structure-cmr6ac?activity=video&step=1m</p> <p>Start lesson at 3m 5 seconds. Pause at 5m 37 seconds</p> <p>What is a frame structure? A structure that uses thin components that are joined together to make a frame. Repeat this several times in different voices and throughout the lesson</p> <p>Restart video and pause at 9m 55</p> <p>Now allow children to use art straws to create shapes:</p> <ul style="list-style-type: none"> - Square - Rectangle - Triangle 	<p>Paper straws</p> <p>Art straws</p> <p>Blue tack</p> <p>Scissors</p> <p>Maing tape</p>	<p>Frame</p> <p>Stability components</p> <p>join</p> <p>Structure</p> <p>Free standing</p>	

	<p>- Circle Use blue tack to hold corners together. Ensure for square that each side is the same length and in a rectangle there are pairs of sides that are equal length. These can be stuck in the children's books.</p> <p>Now restart the video at 12m 39 seconds Pause at 13m 10 to look at the frame structures, this is also a good time to go out to the lay are on the school grounds and see what shapes can be seen on any of the frame structures. Restart video and pause when it says to practice making joins (joining two straws together and making a triangle) this needs art straws and masking tape. These can be stuck in to books.</p> <p>Pause video at 20m 52 seconds. Give children a piece of card each (white and thick) ask children to draw and label their design first then allow the, to create their frame structure, taping it to the card as the teacher in the video did. Ensure you get a photograph of each child's creation before the lesson finishes as these can go in books as evidence (keep the designs to go in books as well). Watch the end of the video.</p> <p>Recap: What is a structure? different parts or materials used to make a 3d model What is a frame structure? A structure that uses thin components that are joined together to make a frame.</p>			
<p>I can use joining techniques to create a stable free standing structure</p>	<p>This is a DT lesson. In DT we design and make to solve problems</p> <p>Recap: What is a structure? different parts or materials used to make a 3d model What is a frame structure? A structure that uses thin components that are joined together to make a frame.</p> <p>What is a free standing structure? A structure that stands up by itself and is stable</p> <p>https://classroom.thenational.academy/lessons/cutting-and-joining-c4t66t?activity=video&step=1 Start video at 2m 34 seconds. Pause at the talk task, encourage children to discuss ideas for a 'free standing structure'. Encourage children sketch their ideas in their book and label them perhaps giving each a title. Finishing techniques can then be discussed and children write down the finishing techniques they want to use on a posit it note (these could include feathers, sequins, glitter, pipe cleaners, fabric squares, pictures from magazines, paint).</p> <p>Restart video then pause at independent learning. Children make their free standing structure (if they wish to change their design they can). Children should focus firstly on building the structure using joining techniques and ensure is it free-standing and stable. Then, children can work on their finishing techniques.</p> <p>Ensure finished products are photographed and printed to go in children's books.</p> <p>Restart video then recap: What is a free standing structure? A structure that stands up by itself and is stable</p>	<p>Range of reclaimed materials (these will need collecting in advance e- ask parents via dojo and staff) including cylinders (toilet rolls and kitchen roll tubes)</p> <p>Masking tape, pritt sticks</p> <p>Coloured paper Card Glitter Paint Pens Sequins Feathers Magazines Fabric scraps</p>	<p>Fix Free standing Base Join stability</p>	
<p>I can evaluate my structures</p>	<p><i>Finish off free-standing structures in this lesson if more time is needed.</i></p> <p>This is a DT lesson. In DT we design and make to solve problems</p>	<p>Evaluation sheets</p> <p>Small photographs of their free standing</p>	<p>Evaluate Improve change</p>	

	<p>Recap: What is a structure? Different parts or materials used to make a 3d model What is a frame structure? A structure that uses thin components that are joined together to make a frame. What is a free standing structure? A structure that stands up by itself and is stable</p> <p>We have learned a lot during this unit however, there is a really important part of DT that we have missed out. Can anyone think what we haven't done? We have designed, we have learned skills, we have made our products.... We haven't evaluated. Why do we evaluate our work in DT? To make the products the best they can be and say what changes could make it even better. Children complete evaluation sheets – scribe for children if needed as it is more important to capture their evaluations than their writing ability.</p>	structure and frame structure		
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1. Year Groups
Years
1/2

2. Aspect of D&T Structures

Focus
Freestanding structures

3. Key learning in design and technology

Prior learning

- Experience of using construction kits to build walls, towers and frameworks.
- Experience of using of basic tools e.g. scissors or hole punches with construction materials e.g. plastic, card.
- Experience of different methods of joining card and paper.

Designing

- Generate ideas based on simple design criteria and their own experiences, explaining what they could make.
- Develop, model and communicate their ideas through talking, mock-ups and drawings.

Making

- Plan by suggesting what to do next.
- Select and use tools, skills and techniques, explaining their choices.
- Select new and reclaimed materials and construction kits to build their structures.
- Use simple finishing techniques suitable for the structure they are creating.

Evaluating

- Explore a range of existing freestanding structures in the school and local environment e.g. everyday products and buildings.
- Evaluate their product by discussing how well it works in relation to the purpose, the user and whether it meets the original design criteria.

Technical knowledge and understanding

- Know how to make freestanding structures stronger, stiffer and more stable.
- Know and use technical vocabulary relevant to the project.

4. What could children design, make and evaluate?

enclosures for farm or zoo animals
playground/park/garden furniture
bridge for Billy Goats Gruff playground equipment
furniture for the Three Bears other – specify

7. Links to topics and themes

Traditional Tales Nursery Rhymes
Buildings Healthy living Farming
Our School Myself Animals
Parks and Playgrounds other - specify

5. Intended users

themselves school community friends
children of different ages general public
older people story characters teddy animal
other – specify

8. Possible contexts

imaginary story-based classroom school
grounds gardens local community leisure
health environment other - specify

6. Purpose of products

imaginary role-play pleasure
rest recreation health leisure
other – specify

9. Project title

Design, make and evaluate a _____ (product) for _____ (user) for _____ (purpose).
To be completed by the teacher. Use the project title to set the scene for children's learning prior to activities in 10, 12 and 14.

10. Investigative and Evaluative Activities (IEAs)

- Go on a walk and/or look at photographs of the local area to explore structures such as playground equipment, street furniture, walls, towers and bridges e.g. *What are the structures called and what is their purpose? Who might use them? What materials have been used? Why have these been chosen? How have the parts been joined together? How have the structures been made strong enough? How have they been made stable?*
- Where possible, ask the children to draw or photograph the structures they have been exploring and label with the correct technical vocabulary in relation to the structure, materials used and shapes e.g. wall, tower, framework, base, joint, metal, wood, plastic, brick, triangle, square, rectangle, cuboid, cube.

12. Focused Tasks (FTs)

- Demonstrate measuring, marking out, cutting, shaping, joining and finishing techniques with a range of tools and new and reclaimed materials that children are likely to use to make their structures. Discuss the suitability of materials for their products according to their characteristics.
- Ask the children to build and explore a variety of freestanding structures using construction kits, such as wooden blocks, interconnecting plastic bricks and those that make frameworks e.g. *How can you stop your structures from falling over? How they can be made stronger and stiffer in order to carry a load? Children could make models of the structures they have seen in school and the local area.*
- Ask children to fold paper or card in different ways to make freestanding structures, using masking tape where necessary to make joints. Encourage them to think about how folding materials can make them stronger, stiffer, stand up and be more stable e.g. *Can they support an object on top of their structures without it falling over or breaking?*

14. Design, Make and Evaluate Assignment (DMEA)

- Discuss with the children what structure they will be designing, making and evaluating e.g. *Who will your product be for? What will be its purpose? What materials will you use? How will you make it strong and stable?*
- Generate some simple design criteria with the children e.g. the structure should stand up on its own, it should be strong enough to carry Teddy.
- Encourage the children to develop their ideas through talking, drawing and making mock-ups of their ideas with construction kits and other materials.
- As a whole class, plan the order in which the structures will be made. Children could make their final products from construction kits, new and reclaimed materials or any combination of these, according to their characteristics.
- Ask children to evaluate their developing ideas and final products against original design criteria.

11. Related learning in other subjects

- **Geography** – use simple fieldwork and observational skills to study the geography of their school and its grounds and the key physical features of its surrounding environment.
- **Spoken language** – participate in discussion about various structures, taking turns and listening to what others say. Ask relevant questions to extend their knowledge and understanding. Build technical vocabulary.

13. Related learning in other subjects

- **Mathematics** – use appropriate standard and non-standard measures. Recognise and name common 2-D and 3-D shapes.
- **Science** – think about the properties of materials that make them suitable or unsuitable for particular purposes.
- **Spoken language** – ask relevant questions to extend their knowledge and understanding. Build technical vocabulary.

15. Related learning in other subjects

- **Spoken language** – ask relevant questions to extend their knowledge and understanding. Build technical vocabulary. Use spoken language to develop understanding through imagining and exploring ideas.
- **Art and design** – use colour, pattern, line, shape. Use and develop drawing skills.
- **Science** – think about the properties of materials that make them suitable or unsuitable for particular purposes.

16. Possible resources

photographs of various structures
construction kits that can be used to construct freestanding structures e.g. walls, towers, frameworks
paper, card, plastic sheet, paper and plastic straws, pipe cleaners
reclaimed materials including small containers, card boxes, cotton reels
string, masking tape
PVA glue, Plasticine, left/right handed scissors, hole punch, stapler
finishing media and materials

17. Key vocabulary

cut, fold, join, fix
structure, wall, tower, framework, weak, strong, base, top, underneath, side, edge, surface, thinner, thicker, corner, point, straight, curved
metal, wood, plastic
circle, triangle, square, rectangle, cuboid, cube, cylinder
design, make, evaluate, user, purpose, ideas, design criteria, product, function

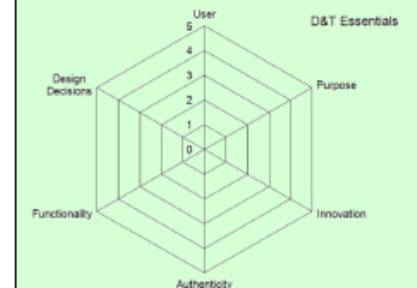
18. Key competencies

problem-solving teamwork negotiation
consumer awareness organisation motivation
persuasion leadership perseverance
other – specify

19. Health and safety

Pupils should be taught to work safely, using tools, equipment, materials, components and techniques appropriate to the task. Risk assessments should be carried out prior to undertaking this project.

20. Overall potential of project



Instant CPD



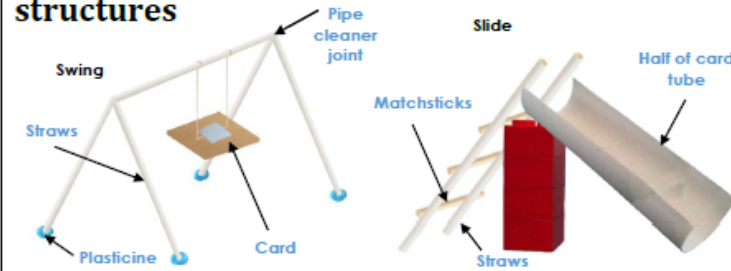
Tips for teachers

- ✓ Create a PowerPoint or range of pictures showing a variety of freestanding structures relevant to the product the children are designing and making.
- ✓ Exploring structures in the local area provides a good opportunity to develop children's observational drawing.
- ✓ Create and display a word bank of relevant technical vocabulary in the classroom.
- ✓ Ensure that work with construction kits and materials builds on children's prior experience in the Early Years Foundation Stage (EYFS).
- ✓ Ensure that different types of construction kits are available for children to explore through focused tasks.
- ✓ It is perfectly acceptable for children's final products to include both construction kits and consumable materials.
- ✓ Demonstrate measuring, marking out, cutting, joining and strengthening techniques and provide help sheets showing instructions for the children to practise independently.
- ✓ Prior to producing their designs, have a range of materials available for children to access and create models.

Useful resources at www.data.org.uk

- [Door hinges helpsheet](#)
- [Let's Get Building and Using Construction Kits Effectively](#)
- [Chairs for Three Bears](#)
- [Hinges and Catches](#)
- [Bird Hide Design and Make Challenge \(Yrs 5-6\)](#)
- [Working with paper straws \(Yrs 3-4\)](#)

Techniques for assembling freestanding structures

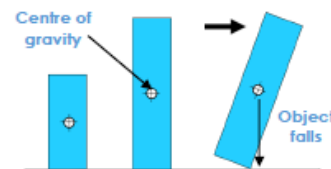
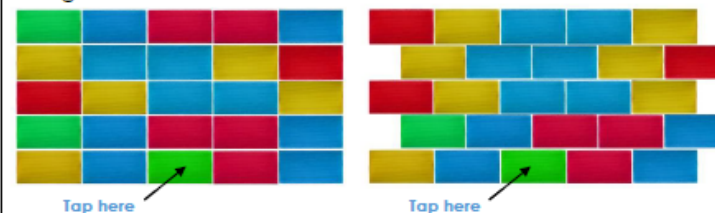


Show children how to join sheet materials and reclaimed boxes together using different tapes and glues.

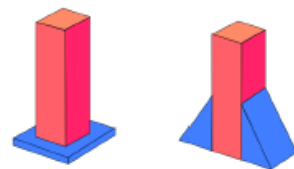


Technical knowledge and understanding

Build walls with these different patterns. Tap away the centre brick in the bottom row of each wall in turn. What happens? Which wall is the strongest?



As a freestanding structure becomes taller its centre of gravity rises. Stability in a structure can generally be increased by making the base wider, making the base heavier or adding buttresses. Ask the children to build and explore a variety of freestanding structures through focused tasks. Use a range of construction kits.



Wider bases and buttresses for stability

Designing, making and evaluating a strong chair for Baby Bear

An iterative process is the relationship between a pupil's ideas and how they are communicated and clarified through activity. This is an example of how the iterative design and make process might be experienced by an individual pupil during this project:

THOUGHT	ACTION
What sort of chair shall I make? Who is it for and what is it for?	Choose an appropriate soft toy Generating ideas through talking and drawing based on own experiences.
How can I make sure it is strong, stiff and stable?	Developing ideas using construction kits to create mock-ups.
Which joining techniques will work best for the chair?	Exploring and evaluating joining techniques.
What media, materials and kits will I use?	Exploring and evaluating construction kits, new and reclaimed materials.
What shall I do first? What tools and techniques will I use? What materials shall I use?	Selecting from a range of tools, techniques and materials Explaining choices.
More thoughts... judging, planning, generating new ideas.	More actions... making, testing, modifying.
Will the chair meet the needs of the user and achieve its purpose?	Evaluating the chair with a soft toy and against design criteria.

Glossary

- **Freestanding structure** – a structure that stands on its own foundation or base without attachment to anything else.
- **Frame structure** – a structure made from thin components e.g. tent frame.
- **Shell structure** – a hollow structure with a thin outer covering.
- **Stability** – in relation to a freestanding structure, the extent to which it is likely to fall over if a force is applied.
- **Buttress** – a structure added to a wall, tower or framework to make it more stable and/or reinforce it.
- **Brick bonding** – arranging bricks in a wall to improve the performance of the structure or improve its appearance.
- **Mock-up** – 3-D representation of a product.