**DT Spring 1 – Structures and mechanism**

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| **EYFS** | **Year 1/2** | **Year 3** | **Year 4** | **Year 5** | **Year 6** |
| **Intent**Children will learn and explore how they can express their own ideas using a range of art forms and effects, both on their own and in collaboration with peers/adults. The children will continue to experience different textures, develop an understanding of how things are used and the effects they give and manipulate different materials using their hands.  | **Intent structures:** Children will produce a finished chair structure and evaluate its strength, stiffness and stability.**Intent mechanisms:**Explore levers, linkages and pivots through existing products and experimentation, use this research to construct and assemble a moving monster.Example theme: Moving monsters. Alternative theme: [Easter – Mechanical animals](https://www.kapowprimary.com/theme/easter-mechanical-animals/) | **Intent structures:** Identify and learn about the key features of a castle, before designing and making a recycled-material castle (structure).**Intent mechanisms:**Exploring pneumatic systems, the children will apply their understanding to design and create a pneumatic toy using different types of diagrams. | **Intent structures:** Investigate and model frame structures to improve their stability, then apply this research to design and create a stable, decorated pavilion.**Intent mechanisms:**Making and designing mechanical cars that use different methods of movement or creating and developing a car with a working slingshot mechanism. | **Intent structures:** Test and analyse various types of bridge to determine their strength and stability. Explore material properties and sources, before marking, sawing and assembling a wooden truss bridge.**Intent mechanisms:**Creating a functional pop-up book using levers, sliders, layers and spacers to create paper-based mechanisms. | **Intent structures:** Research existing playground equipment and their different forms, before designing and developing a range of apparatus to meet a list of specified design criteria.**Intent mechanisms:**Developing a functional automata window display, this unit offers clearer video instruction, opportunities to interpret exploded diagrams and additional time to explore different cam shapes and make design choices that impact the final product. |
| **Sequence of learning:**1. Can I use a variety of resources, tools and artistic effects to design and create a police car and a fire engine, both on paper and using junk modelling materials?
2. Can I use a variety of artistic effects to create a Winter themed collage, working both independently and collaboratively?
3. Can I practice weaving techniques to design a woven emergency vehicle, creating a checkered pattern?
4. Can I explore how to use scissors more confidently when creating emergency worker hats out of paper plates?
5. Can I use a variety of tools and explore various artistic effects to create a whole class ‘Chinese New Year’ dragon?
6. Can I use a variety of tools and attaching techniques to prepare ribbon and card to design Chinese lanterns?
7. Can I choose from various artistic effects to create a Chinese blossom tree?
8. Can I use pipettes and straws to experiment mixing primary colours when I create my own Chinese dragon scale? Can I broaden my use of the language of colour – bright, light, lighter, darker?
9. Can I make my own lifeboat exploring water resistant and water proof materials?
10. Can I make bread by following instructions and completing the steps in order? Can I combine the ingredients and prepare the dough?
11. Can I construct sandwiches by following step-by-step instructions?
 | **Sequence of Lessons structures:****1: Exploring stability**Can I explore the concept and features of structures and the stability of different shapes?**2: Strengthening materials**Can I understand that the shape of the structure affects its strength?**3: Making baby bears chair**Can I make a structure according to design criteria?**4: fixing and testing Baby bear’s chair**Can I produce a finished structure and evaluate its strength, stiffness and stability?**Sequence of Lessons mechanisms:****1: Exploring sliders and movements**Can I explore making mechanisms?**2: Design**Can I design a moving storybook?**3: Construction** Can I construct a moving picture?**4: Testing and evaluating**Can I evaluate my finished product? | **Sequence of Lessons structures:****1: Features of a castle**Can I recognise how multiple shapes (2D and 3D) are combined to form a strong and stable structure?**2: Designing a castle**Can I design a castle?**3: Nets and structures**Can I construct 3D nets?**4: Building a castle**Can I construct and evaluate my final product?**Sequence of Lessons mechanisms:****1: Exploring pneumatics** Can I explore how pneumatic systems create movement within mechanisms?**2: Drawing Diagrams**Can I use different types of diagrams to summarise information?**3: Designing a pneumatic toy**Can I design a toy that uses a pneumatic system?**4: Making a pneumonic toy** Can I create a pneumatic system for a moving toy?**5: Finishing the toy**Can I test and finalise ideas against design criteria? | **Sequence of Lessons structures:****1: Exploring frame features**Can I create a range of different shaped frame structures?**2: Designing a pavilion**Can I design a structure?**3: Pavilion frame**Can I build a frame structure?**4: Pavilion cladding**Can I add cladding to a frame structure?**Sequence of Lessons mechanisms:****1: Chassis and launch mechanism**Can I build a car chassis?**2: Designing the car body**Can I design a shape that reduces air resistance?**3: Making the car body**Can I make a model based on a chosen design?**4: Assembly and testing**Can I assemble and test my completed product? | **Sequence of Lessons structures:****1: Arch and beam bridges**Can I explore how to reinforce a beam (structure) to improve its strength?**2: Spaghetti truss bridges**Can I build a spaghetti truss bridge?**3: Building bridges** Can I build a wooden truss bridge?**4: Finalising bridges**Can I complete, reinforce and evaluate my truss bridge?**Sequence of Lessons mechanisms:****1: Pop-up book page design**Can I design a pop-up book?**2: Making my pop-up book**Can I follow my design brief to make my pop-up book?**3: Using layers and spacers**Can I use layers and spacers to cover the working of mechanisms?**4: Writing and illustrating**Can I create a high-quality product suitable for a target user? | **Sequence of Lessons structures:****1: Design a new playground**Can I design a playground with a variety of structures?**2: Building structures**Can I build a range of structures?**3: Perfecting structures**Can I improve and add detail to structures?**4: Playground landscapes**Can I create a surrounding landscape?**Sequence of Lessons mechanisms:****1: Automata**Can I create design criteria to meet a user’s needs?**2: Frame assembly**Can I use an exploded diagram to assemble a frame?**3: Experimenting with cams:**Can I explore a mechanism to inform a design decision**4: Finishing touches**Can I evaluate a completed design? |
| **Key Vocabulary**  | **Key Vocabulary** axledesign criteriainputlinkagemechanicaloutputpivotwheeldesign criteriaman-madenaturalpropertiesstructurestableshapemodeltest | **Key Vocabulary:** 2D3Dcastledesignkey featuresnetscoringshapestablestiffstrongstructuretabdiagramevaluatefeedbackhousinglinkagemechanical systemmechanismpivotpneumatic systemthumbnail sketch | **Key Vocabulary** bearingchassisforcemachinemechanismprototypetarget audience3D shapescladdingdesign criteriainnovativenaturalreinforcestructure | **Key Vocabulary:** criteriadesigninputmechanismmodelmotionreinforceresearchaccuracyaestheticsarch bridgeassemblebeam bridgebench hook/vicecorrugationevaluatefactorshardwoodjointslaminationmark outmaterial properties | **Key Vocabulary:** apparatusdesign criteriaequipmentplaygroundlandscape featurescladdingaccurateautomataaxlebench hookcamcam profilecomponentcross-sectional diagramdiagramdowelevaluateexploded diagramfollowerform |
| **Impact** | **Impact mechanisms**After learning the terms: pivot, lever and linkage, pupils design a monster that will move using a linkage mechanism. Pupils practise making linkages and experiment with various materials to bring their monsters to life.**Impact structures**Using the tale of Goldilocks and the Three Bears as inspiration, pupils help Baby Bear by making him a brand new chair, exploring different shapes and materials. When designing the chair, they consider his needs and what he likes. | **Impact mechanisms**Design and create a toy with a pneumatic system, learning how trapped air can be used to create a product with moving parts. Pupil are introduced to thumbnail sketches and exploded diagrams.**Impact structures**Learning about the features of a castle, pupils design and make one of their own. They will also be using configurations of handmade nets and recycled materials to make towers and turrets before constructing a stable base. | **Impact mechanisms**Transform lollipop sticks, wheels, dowel and straws into a moving car. Pupils use a glue gun to construct, make the launch mechanism, design and create the chassis of a vehicle using nets.**Impact structures**Exploring pavilion structures, learning about what they are used for and investigate how to create strong and stable structures before designing and creating their own pavilions, complete with cladding. | **Impact mechanisms**Create a four-page pop-up story book design, incorporating a range of functional mechanisms that use levers, sliders, layers and spacers to give the illusion of movement through interaction.**Impact structures**After learning about various types of bridges and exploring how the strength of structures can be affected by the shapes used, create their own bridge and test its durability - using woodworking tools and techniques. | **Impact mechanisms**Use woodworking skills, pupils construct an automata; measuring and cutting their materials, assembling the frame, choosing cams and designing the characters that sit on the followers to form an interactive shop display.**Impact structures**Design and create a model for a new playground featuring five apparatus, made from three different structures. Using a footprint as the base, practise visualising objects in plan view and get creative including natural features. |