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| **Project Purpose – Design, make and evaluate a Christmas card with moving parts for a family member** |
| **National Curriculum Objectives** | **Declarative Knowledge** | **Procedural Knowledge** |
| Pupils should be taught to:**Design*** use research and develop design criteria to inform the design of innovative, functional, appealing products that are fit for purpose, aimed at particular individuals 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

**Make*** select from and use a wider range of tools and equipment to perform practical tasks [for example, cutting, shaping, joining and finishing], accurately
* 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

**Evaluate*** 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
* understand how key events and individuals in design and technology have helped shape the world

**Technical knowledge*** apply their understanding of how to strengthen, stiffen and reinforce more complex structures
* understand and use mechanical systems in their products [for example, gears, pulleys, cams, levers and linkages]
* understand and use electrical systems in their products [for example, series circuits incorporating switches, bulbs, buzzers and motors]
* apply their understanding of computing to program, monitor and control their products.
 | **Investigative and Evaluative Activities**• Children investigate, analyse and evaluate books and, where available, other products which have a range of lever and linkage mechanisms.• Use questions to develop children’s understanding e.g. *Who might it be for? What is its purpose? What do you think will move? How will you make it move? What part moved and how did it move? How do you think the mechanism works? What materials have been used? How effective do you think it is and why? What else could move?* **Focused Tasks****•** Demonstrate a range of lever and linkage mechanisms to the children using prepared teaching aids.• Use questions to develop children’s understanding e.g. *Which card strip is the lever? Which card strip is acting as the linkage? Which part of the system is the input and which part the output? What does the type of movement remind you of? Which are the fixed pivots and which are the loose pivots?*• Demonstrate the correct and accurate use of measuring, marking out, cutting, joining and finishing skills and techniques.• Children should develop their knowledge and skills by replicating one or more of the teaching aids.**Design, Make and Evaluate**• Develop a design brief with the children within a context which is authentic and meaningful.• Discuss with children the purpose of the products they will be designing and making and who the products will be for. Ask the children to generate a range of ideas, encouraging creative responses. Agree on design criteria that can be used to guide the development and evaluation of the children’s products.• Using annotated sketches and prototypes, ask the children to develop, model and communicate their ideas.• Ask the children to consider the main stages in making before assembling high quality products, drawing on the knowledge, understanding and skills learnt through IEAs and FTs.• Evaluate the final products against the intended purpose and with the intended user, drawing on the design criteria previously agreed. | **Designing**• Generate realistic ideas and their own design criteria through discussion, focusing on the needs of the user.• Use annotated sketches and prototypes to develop, model and communicate ideas.**Making**• Order the main stages of making.• Select from and use appropriate tools with some accuracy to cut, shape and join paper and card.• Select from and use finishing techniques suitable for the product they are creating.**Evaluating**• Investigate and analyse books and, where available, other products with lever and linkage mechanisms.• Evaluate their own products and ideas against criteria and user needs, as they design and make.**Technical knowledge and understanding**• Understand and use lever and linkage mechanisms.• Distinguish between fixed and loose pivots.• Know and use technical vocabulary relevant to the project. |
| **Prior Learning** | **Key Questions** | **Future Learning** |
| **Children should:**• Explored and used mechanisms such as flaps, sliders and levers.• Gained experience of basic cutting, joining and finishing techniques with paper and card. | What types of levers and linkage mechanisms can you describe?Which did you use?What is a fixed and a loose pivot?What did you learn from your prototype? | **In Year 5 Children will:** |
| **Vocabulary** | **Key Competencies** | **Curriculum Links** |
| mechanism, lever, linkage, pivot, slot, bridge, guidesystem, linear, rotary, oscillating, prototype, design criteria | problem**-**solving teamwork negotiation consumer awareness organisation motivation persuasion leadership perseverance | **Mathematics** – use the vocabulary of position, direction and movement. Use a ruler to measure to the nearest cm, half cm or mm.**Spoken language** – ask relevant questions to extend knowledge and understanding. Build their technical vocabulary.**Art and design** – use colour, pattern, line, shape. |
| **Resources/Consumables** | **Health and Safety** | **Key Designers/ Enterprise Links** |
| books and other products with lever and linkage mechanismslever and linkage teaching aidscard strips, card rectangles, paper, masking tape, paper fasteners, paper binders, stick glueleft/right handed scissors, cutting mats, card drill, finishing media and materials  | 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. | Look at local crafters. Etsy etc.Search shop luxury cards with moving parts. |