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| **Year 4** |
| **Pop up books**  |
| **Links made with other subjects** | Science: The water cycleGeography: Rivers History: WW2Mathematics: Measurement, geometry, position and directionEnglish: Where possible, link this unit to a text being studied, identifying an audience and purpose. Oracy: encourage pupils to review their progress orally. Art: Drawing |
| **The BIG Question** | Can a book come to life?  |
| **The BIG Outcome** | To create a book with at least one moving feature using a lever, slider, paper spring, lift u flap or rotator.  |
| **DT objectives**(link to NC)  | **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.
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| **Prior knowledge**What prior knowledge is needed for children to be successful in this unit?  | This unit builds on what the children learnt in Year 1, exploring moving pictures including levers and sliders. In addition, pupils will have learnt about hinges in Year 3. They will have had experience and practice of using different joining and cutting techniques with paper and card.  |
| **Future learning**Consider the conceptual knowledge within a subject that pupils need for future learning not just the recall of facts but the importance of concepts | This unit gives prior knowledge to:Y5 – Design and make a moving vehicle using a batteryY6 – Design and make a fairground using electronic systems |
| **Resources** | * a collection of books which have pop-up and moving parts;
* other products which include linkages *e.g. toys, squeezy kitchen mops;*
* examples of pop-up and moving mechanisms made beforehand;
* squared paper, coloured paper and card, paper fasteners or binders, paper straws;
* PVA glue, glue sticks, masking tape;
* thick corrugated card and drawing pins for modelling ideas;
* scissors, craft knives, cutting mats, safety rulers, hole punch, wavy line cutters, perforation cutters.
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| **Vocabulary/ Glossary** | **General:** Design, evaluate, refine, explore, improvement, tools equipment **Designing:** Model, plan, fit for the purpose, product**Making:** Fold, adhesive, scoring, cutting, joining, temporary fixing, permanent fixing cutting, shaping, joining, finishing, **Knowledge and understanding:** Linkage, lever, pivot, flexible, shape, joint, hinge, area, surface, covers**Types of movement**: Rotary, linear mechanism, slider, wheels, pop-up |
| **Knowledge** | The knowledge that children will learn and remember:* know how lever and linkages systems work and can explain how they function;
* know the difference between different mechanisms:a box fold, mouth fold, slider, lift up flap, rotator and paper spring in an existing product;
* know how to use appropriate technical vocabulary to describe materials and mechanisms;
* know how to measure, mark out, cut and shape a range of materials, using appropriate tools, equipment and techniques;
* know how to join and combine materials and components accurately in temporary and permanent ways;
* know how simple mechanisms can be used to produce different types of movement;
* know how to develop and communicate aspects of their design;
* to understand the importance of planning as a process and discuss this;
* know how to use materials, equipment and processes to arrive at an end product;
* know how to identify aspects of their design that they could have improved upon demonstrate an understanding of the process of evaluation.
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| **SEND expectations** | The knowledge that children will learn and remember:* know how lever and linkages systems work.
* know the difference between different mechanisms: *a* box fold, mouth fold, slider, lift up flap, rotator and paper spring *in an existing product.*
* Know how to use appropriate technical vocabulary to describe materials and mechanisms.
* know how to measure, mark out, cut and shape a range of materials, using appropriate tools, equipment and techniques.
* know how to join and combine materials and components in temporary and permanent ways.
* know how simple mechanisms can be used to produce different types of movement.
* know how to use materials, equipment and processes to arrive at an end product.
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**Suggestions**

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| **Questioning**Questions you can pose to deepen, consolidate and challenge pupil’s understanding  | 1. Who is your book for? (audience)
2. What is the purpose of your book? (persuade, inform, entertain)
3. What is your book about? (theme/ topic area)
4. How will illustrations and text be used to (persuade, inform, entertain) your reader?
5. Which parts of your book will move? Why have you chosen these?
6. Which mechanisms (box fold, mouth, slider, lift up flap, rotator and the paper spring) will you use?
7. Which mechanisms will you choose to create your moving parts?
8. Does your product do what you intended it to do? (fulfil its purpose)
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| **Websites** | * Teachwire (medium term plan linked to pop-up books / free sign up required). <https://www.teachwire.net/teaching-resources/dt-projects-ks2-how-to-make-a-pop-up-book/>
* Primary solutions in Design Technology (medium term plan / resources linked to pop-up books)

<https://dandtfordandt.files.wordpress.com/2013/01/popupbooky4.pdf> * Useful knowledge organiser showing the different folds. <https://www.gamlingayvp.org/download.php/DT%20LKS2%20-%20mechanisms%20pop%20up%20books>
* PlanBee (resources / PowerPoints / cost)

<https://planbee.com/products/storybooks>  |
| **Suggested activities** | Provide a collection of products e.g. books and greetings cards with pop-up and moving parts for children to investigate. Discuss the designs with the children. Why do you like / dislike them? What is moving? In what way does it move? Why are moving parts used? How are the mechanisms made? How do they work? How many different parts does it have? What movement is produced? Why has that mechanism been used? How are the moving parts joined together?Discuss the processes used to decorate the cover and pages of the books, identifying the simplicity or complexity of the designs.Discuss the wording, layout and style of the text used on the cover and throughout the books.Using prepared examples, explain to the children how different types of pop-up, moving and linkage-type mechanisms can be created.Demonstrate and allow the children to try out different fonts, some simple graphics and / or collage ideas which might be suitable for decorating the cover and pages of their books.Demonstrate skills e.g. accurately measuring, marking out, cutting, folding, scoring, using a hole punch, using paper clips, using glue and tape.Children could model different types of pop-up mechanisms using paper, masking tape and glue.Children could model different types of moving and linkage-type mechanisms using strips of card, pieces of corrugated card, paper fasteners and drawing pins or map pins.Explain to the children that their task is to design and make a storybook with moving parts. The pages of the book are to incorporate mechanisms e.g. pop-up, sliding parts and linkages. Ask the children to think carefully about the type of book they might make. Who will use it? What will be the storyline? Why will moving parts be useful in the story? What type of mechanisms may be included?The children will need to decide how many pages their book will have, and how the pages and cover are to be assembled. The children should make an outline plan with drawing or writing to show who will do each task and the order in which they intend to make the book. Encourage the children to keep their designs as simple as possible but encourage a high-quality finish. Encourage them to model their ideas e.g. making paper models of pop-up designs and card strips attached to corrugated card for linkage-type mechanisms. Evaluate the books in use, highlighting strengths and discussing improvements that could be made. Ask them to compare their products with commercially made ones. |