St James' Church of England Primary School
Design & Technology Overview Sheet

Year 3 – Mechanical Systems: Pneumatic Toys

Rationale: Pupils who are **secure** will be able to:

- Draw accurate diagrams with correct labels, arrows and explanations.
- Correctly identify definitions for key terms.
- Identify five appropriate design criteria.
- Communicate two ideas using thumbnail sketches.
- Communicate and develop one idea using an exploded diagram.
- Select appropriate equipment and materials to build a working pneumatic system.
- Assemble their pneumatic system within the housing to create the desired motion.
- Create a finished pneumatic toy that fulfills the design brief.

Learning Objectives:

- 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
- Understand and use mechanical systems in their products, for example, gears, pulleys, cams, levers and linkages
- Evaluate their ideas and products against their own design criteria and consider the views of others to improve their work
- 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

Overview:

Lesson 1: Exploring pneumatics – To understand how pneumatic systems work

Lesson 2: Designing a pneumatic toy – To design a toy that uses a pneumatic system

Lesson 3: Making pneumatic toys – To create a pneumatic system

Lesson 4: Decorating and assembling my toy – To test and finalise ideas against design criteria

Cross Curricular Links

Resources

• Balloon • Tape • Small, lightweight, toy • Syringes: two the same size and one of a different size • Tubing to connect the syringes (40-50cm lengths of plastic tubing, approximately 5mm diameter) • Mild disinfectant • Pre-made linkage systems • Masking tape • A few books • Some sandwich bags • A box with a hinged lid • Check links:'STEM Inventions- Pneumatic design' on VideolinkIkea design examples on link: 'IKEA- Mammut children's table assembly' and 'IKEA- Anil in are stationary holder assembly' • Equipment: Syringes Tubes Connectors Balloons Bottles Tape Elastic bands Glue Scissors Pencils Paper fasteners or split pins Packaging and recycled materials: egg cartons, tissue/shoe boxes Materials to make the pneumatic toys: card, straws, pipe cleaners, cotton wool, buttons, bottles, socks, plastic bags, stuffing, etc

Impact/Assessment

Most Children will: • Drawing accurate diagrams with correct labels, arrows and explanations and correctly identifying definitions for key terms. • Identifying five appropriate design criteria, communicating two ideas using thumbnail sketches and communicating and developing one idea using exploded diagrams. • Selecting appropriate equipment and materials to build a working pneumatic system and assembling it within the housing to create the desired motion. • Creating a finished pneumatic toy that fulfils the design brief.

More Able Children will: • Identifying and explaining how objects and materials can move using trapped air (pneumatics) and incorporating this into a detailed drawing. • Producing accurate and detailed designs with all parts and materials labelled. • Creating a more complex system of pneumatics and linkages, which is functional, neat and stable; using materials creatively. • Creating a sophisticated pneumatic system with linkages and decorative housing, showing creative use of materials and attention to detail.