

## Medium Term Plan: Supporting Implementation of LTP/Progression Grid

Subject: DT- Pneumatics and hydraulic systems Year: B (LKS2 - Spring)

NC/PoS:

- To 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
- To generate, develop, model and communicate their ideas through discussion, annotated sketches and prototypes
- To select from and use a wider range of tools and equipment to perform practical tasks accurately
- To select from and use a wider range of materials and components according to their functional properties and aesthetic qualities
- To investigate and analyse a range of existing products
- To evaluate their ideas and products against their own design criteria and consider the views of others to improve their work
- To apply their understanding of how to strengthen, stiffen and reinforce more complex structures

Prior Learning (what pupils already know and can do)

- Children know how to design a mechanical system using sliders and levers.
- Children know how to design and make simple structures.
- Children know how to draw an annotated sketch of a mechanical system and can label it with materials and equipment.
- Children know how to make a prototype of a mechanical system using paper/card and can identify the input, output, fixed and moving parts.
- Children know how to select from PVA glue, glue sticks, paper clips, split pins and scissors to cut and join materials (card and cardboard).
- Children know if their moving product is appealing and suitable for the intended user and purpose.
- They know how to listen to other' views and can offer a way to improve their product.

End points (what pupils MUST know and remember)

- Children know how to design a product using pneumatics or hydraulics
- Children know how to draw an annotated sketch of a pneumatics system.
- Children know how to use scissors to cut cardboard and rulers to measure out the sizes they require.
- Children know how to choose from and use cardboard, syringes and plastic tubing to make a functional 'bust' of a chosen creature and ensure it is aesthetically pleasing.
- Children know that real life products that use hydraulic systems to create movement.

Key Vocabulary

pneumatic system, hydraulic system, pressure, inflate, deflate, pump, seal, air-tight, evaluate

Session 1:

Evaluating existing products

- Children are to investigate, analyse and evaluate familiar objects that use air to make them work e.g. bicycle pump, balloon, inflatable swimming aids, foot pump for inflating an air bed.
- Introduce John Boyd Dunlop and discuss the invention of the pneumatic tyre and the impact it had on our lives.
- Discuss: What does the air do? How has it been used in the design of these products? How can air be used to move heavy objects? How do they inflate/deflate?

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- Explore objects that use hydraulic systems to make them work e.g. dump truck, bulldozers, theme park rides.
- Discuss: What does the water do? How has it been used in the design of these products? How can water be used to move heavy objects?
- Why might one object use air but another one use water? What differences are there between the two systems?

Vocab: Pneumatic system, hydraulic system, inflate, deflate

### Session 2:

#### Practising skills

- Demonstrate how to assemble the systems using syringes, tubing, balloons and plastic bottles. What happens when you squeeze the bottle? What happens when you let go? What happens if you apply more or less pressure? Compare the difference between air and water. Ensure the children are aware that the seal needs to be air tight for the pump to work.
- Introduce ways in which pneumatic and hydraulic systems can be used to operate levers.
- Demonstrate the correct and accurate use of measuring, marking out, cutting, joining and finishing skills and techniques.

Vocab: Pneumatic system, hydraulic system, inflate, deflate, pump, seal, air tight, pressure

### Session 3:

#### Designing

- Children to design a creature head using annotated sketches. Children should decide between a hydraulic or pneumatic system to move their creature head.
- Children to label the system used and any other resources or tools that they will use.
- Ensure design brief is followed.
- Innovation: Have you considered how to make the project different and better than others of the same kind?
- Individual liberty – children are encouraged to make their products different and unique.
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Vocab: Pneumatic system, hydraulic system

### Session 4:

Making - DT consultant to support with this section and provide high quality resources.

- Children to follow designs to choose appropriate resources and tools to create a creature head with a hydraulic or pneumatic system.
- Children will accurately measure, mark out, score, cut, shape and join their mechanical systems using card, PVA glue, glue sticks, elastic bands and scissors
- Children will use finishing and decorative techniques suitable for the product they are designing and making in order to make it appealing.
- Resilience – during the entire making process, we discuss keeping on trying and never giving up even if the task gets tricky.

Vocab: Pneumatic system, hydraulic system

### Session 5:

#### Evaluating

- Evaluate their products against their design specification, intended user and purpose, identifying strengths and areas for development.
- Carry out appropriate tests – Does the mechanical system move in the intended direction?
- Functionality: Does the product work for the intended purpose? Does it move effectively? Is the product appealing to the eye?
- Honesty – during the evaluation stages discuss being honest with ourselves (self-reflection)

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and others to ensure we can improve ourselves and our work.

Vocab: evaluate

Future learning this content supports:

UKS2 – mechanical systems – pulleys or gears

UKS2 - CAMs