

Year 5: Pneumatics - Sarcophagus

Key Questions
Who am I making the pneumatic product for? What is it being made for?

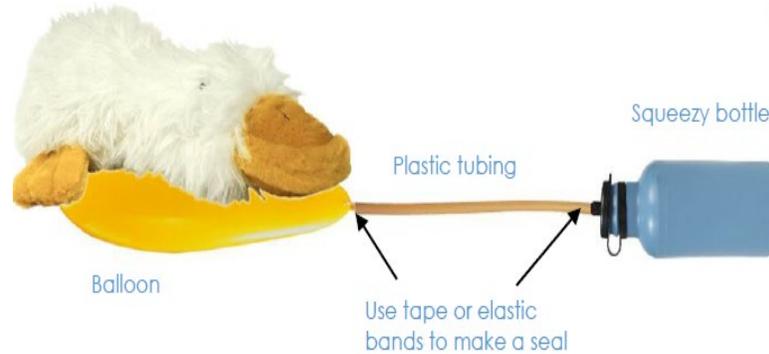
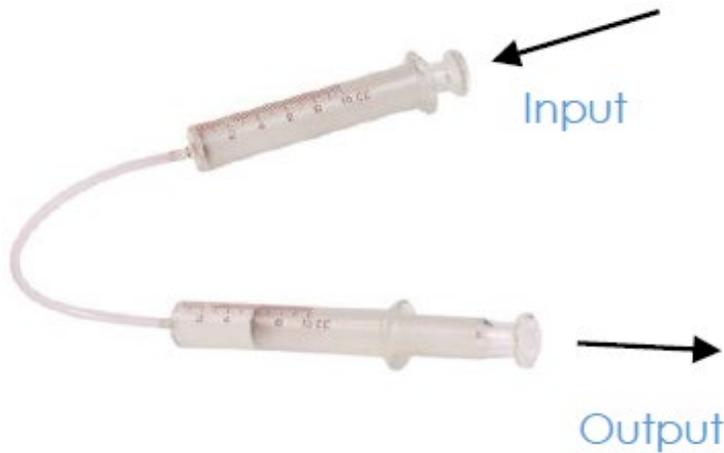
What should I already know?

D&T is a subject where you develop skills, knowledge and understanding to design and make functional products.

- Explored simple mechanisms, such as sliders and levers, and simple structures.
- Learnt how materials can be joined to allow movement.
- Joined and combined materials using simple tools and techniques.

What techniques will I use and which tools will I need?
Is my product fit for purpose?

Powerful Knowledge - examples of pneumatics



Interesting facts

Eating an apple is a more reliable method of staying awake than drinking a cup of coffee.



Glossary

Compressed	Something that is squashed, such as air in a tube.
Input	What goes into a system.
Output	What comes out of a system.
Pneumatic	A system that works using gases (air).
Pressure	The force used on an object or surface.
System	A set of related parts or components used to create an outcome. Systems have an input, process and an output. In a pneumatic system, the 'input movement' is where the user pushes.
Pivot	A point about which a lever turns.
Syringe	A tube with a nozzle and plunger for sucking and blowing air or liquids.



PNEUMATICS!



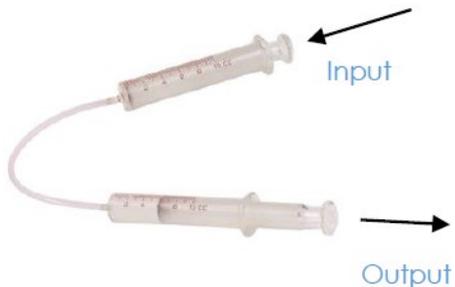
Year 5 Design & Technology Autumn 2 – Pneumatics

National Curriculum Objectives: <ul style="list-style-type: none"> - Generate realistic and appropriate 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. - Select from and use appropriate tools with some accuracy to cut and join materials and components such as tubing, syringes, and balloons. - Understand and use pneumatic mechanisms. - Evaluate their own products and ideas against criteria and user needs, as they design and make. 		Prior Objectives: <ul style="list-style-type: none"> • Explored simple mechanisms, such as sliders and levers, and simple structures. • Learnt how materials can be joined to allow movement. • Joined and combined materials using simple tools and techniques. 	
Lesson 1	Lesson 2	Lesson 3	Lesson 4
 Skill -  Knowledge - Research	 Skill - Focused skills  Knowledge - Research	 Skill - Focused skills  Knowledge -	 Skill - Focused skills  Knowledge -
<p>WALT: INVESTIGATIVE, DISASSEMBLY AND EVALUATIVE ACTIVITIES (IDEAS)</p> <p>WILF:</p> <ul style="list-style-type: none"> • Recognise that products are designed for a particular purpose and are suitable for different users; • Understand that a designer needs to consider appearance, function, cost and safety when designing products; • Recognise that many different materials can be used on a product e.g. a bag, some to stiffen, some to provide comfort and some for appearance. <p>Part 1</p> <ul style="list-style-type: none"> • Children 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. <i>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?</i> • Construct a simple pneumatic system asking the children to blow into a plastic food bag, with a book or soft toy placed on top of it. <i>What happens to the air when you blow into the bag? What happens when you let go? Can you lift a soft toy or a book?</i> 	<p>WALT: Perform focused practical tasks (FPTs)</p> <p>WILF:</p> <ul style="list-style-type: none"> • Build and explore a variety of pneumatic devices. • Demonstrate measuring, marking and assembling. <p>Part 2</p> <ul style="list-style-type: none"> • Demonstrate how to assemble the systems using syringes, tubing, balloons and plastic bottles. Introduce ways in which pneumatic systems can be used to operate levers. • Demonstrate the correct and accurate use of measuring, marking out, cutting, joining and finishing skills and techniques. • Provide the materials and ask the children to try out and draw the three systems they have been shown: a) Balloon connected to a washing-up liquid bottle. <i>What happens when you squeeze the bottle? What happens when you let go?</i> b) Two syringes of the same size connected together. <i>What happens when you press the plunger of one syringe down? How far does the other syringe move?</i> c) Two syringes of different sizes connected together. <i>How far do these syringes move</i> 	<p>WALT: Design and make a pneumatic mechanism for a given purpose</p> <p>WILF:</p> <ul style="list-style-type: none"> • To develop a design specification; • To communicate their ideas through drawings and modelling; • Organise and plan the order of their work, choosing appropriate materials, tools and techniques; • To construct products using permanent joining techniques; • Demonstrate how to achieve a quality product; <p>Part 3</p> <p>Plan:</p> <ul style="list-style-type: none"> • 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 e.g. what material can we use to create the sarcophagus? Does it have to be made of wood or would a cereal box or shoe box also work? Agree on design criteria that can be used to guide the development and evaluation of the children's products. 	<p>WALT: Evaluate our product</p> <p>WILF:</p> <ul style="list-style-type: none"> • to evaluate products identifying strengths and areas for development and carrying out appropriate tests. <p>Part 4</p> <p>Ask the children to evaluate their design product against the design specification. <i>What do the users think of their pop up page? Does their image draw the attention of the reader? How could they be made better? What would you change? What are you pleased with?</i></p> <p>With the class, the teacher models completing a 5-point scale, This scale will evaluate the children's' product against the original design criteria and assess how they feel that they did with their final outcome.</p>



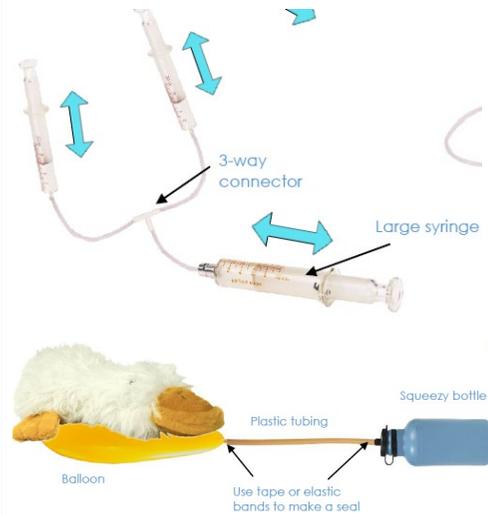
- Demonstrate lifting an object and ask the children to think about ways in which this might be used in a product. *Who might it be for? What is its purpose? What part moved and how did it move? What materials have been used? How effective do you think it is and why? What else could move?*

- Demonstrate a range of pneumatic mechanisms using prepared teaching aids including two syringes joined by plastic tubing; and using different sized syringes. Ask the children: *What happens when the plunger of one syringe is pressed in? Why do the syringes move at different speeds?* Note: take care as the syringe may come out with force. Discuss why, when pressing a large syringe, it can take time and feel 'squishy' before the smaller syringe is moved.



Recording:

when pressed? Examples of what children could make can be:



Note: take care as the syringe may come out with force. Also, producing WAGOLL's beforehand will give the children an idea of how the pneumatic mechanisms operate.

Recording:

Photo and video evidence would be beneficial for this lesson. Labelling diagrams would also be useful.

- Using annotated sketches and prototypes, ask the children to develop, model and communicate their ideas.



Make:

- Ask the children to consider the main stages in making before assembling high quality products, drawing on the knowledge, understanding and skills learnt through IDEAs and FPTs lessons.

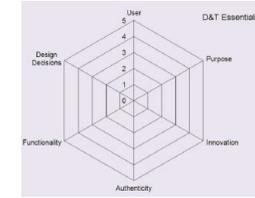
- Evaluate the final products against the intended purpose and with the intended user, drawing on the design criteria previously agreed.

Recording:

Children produce a design criteria, alongside a drawing of what their final product will look like. Photo and video evidence is strongly advised.

This session will need to be carried out over several lessons, as it involves the planning and making of their final product.

See below for an example of a 5-point scale:



Below the 5-point scale, children are prompted to further reflect their thoughts on their final product. For example, "I felt that my final product met the design brief because ...", "The materials that I used ...". Teacher can provide stem sentences to help children with their writing.

Recording:

5-point scale and recording in books.

<p>Video recording and/or completing a table in books. Children can also draw and label a diagram of their research.</p>	<p>This session can be carried out over two or more lessons, depending on the time it takes to complete all activities and embed the children's learning.</p>			
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Key Vocabulary:

components, fixing, attaching, tubing, syringe, plunger, split pin, paper fastener pneumatic system, input movement, process, output movement, control, compression, pressure, inflate, deflate, pump, seal, air-tight linear, rotary, oscillating, reciprocating user, purpose, function, prototype, design criteria, innovative, appealing, design brief, research, evaluate, ideas, constraints, investigate