

Topic: Mechanisms - Make a slingshot car

National Curriculum Objectives which are covered in this unit:

Design

Pupils should be taught 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.
- Generate, develop, model and communicate their ideas through discussion, annotated sketches, cross-sectional and exploded diagrams, prototypes, pattern pieces and computer-aided design.

Make

Pupils should be taught to:

- 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

Pupils should be taught to:

- Investigate and analyse a range of existing products.
- Understand how key events and individuals in design and technology have helped shape the world.
- Evaluate their ideas and products against their own design criteria and consider the views of others to improve their work.

Technical knowledge

Pupils should be taught to:

- 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].

Lesson sequence - include the key concept, L.O. and brief description of lesson

<p>WALT: build a car chassis.</p> <p>Using a range of materials, children follow instructions to make the chassis of their car and the slingshot launch mechanism, learning that their slingshot cars work by storing kinetic energy in the elastic band before it launches.</p> <p>Success criteria</p> <ul style="list-style-type: none"> • I understand that car designs have developed over many years. • I know that a chassis is the frame of a car on which everything else is built. • I know that all moving things have kinetic energy. • I know that kinetic energy is the energy that something (an object or person) has by being in motion, e.g., the energy that a swing has to keep moving; any object in motion uses kinetic energy. <p>Pupils with secure understanding indicated by: ability to work independently to produce an accurate, functioning car chassis.</p> <p>Pupils working at greater depth indicated by: making a high quality and functioning car chassis by implementing neat angles and secure glueing/assembly. Adding additional strengthening features to their design. An awareness that weight affects the speed an object can travel at.</p>	<p>WALT: design a shape that reduces air resistance.</p> <p>Understanding that the shape of a car body can either increase or decrease the speed it travels, children design car bodies to cover their chassis from Lesson 1.</p> <p>Success criteria</p> <p>I can design a suitable car body to cover my chassis by:</p> <ul style="list-style-type: none"> • Drawing a net to create a structure from. • Choosing shapes that increase or decrease the speed of the car as a result of air resistance. • Adding graphics to personalise my design. <p>Pupils with secure understanding indicated by: designing a shape that is suitable for the project and making some attempt to reduce air resistance through the design of the shape.</p> <p>Pupils working at greater depth indicated by: designing a sophisticated shape that fully embraces the concept of reducing air resistance. Including sophisticated graphic design on the product.</p>	<p>WALT: make a model based on a chosen design.</p> <p>Children make the nets for their car bodies based on their designs, adding the graphics and tabs that will attach to the chassis.</p> <p>Success criteria</p> <p>I can make the body of my car by:</p> <ul style="list-style-type: none"> • Remembering that nets are flat shapes that can be turned into 3D structures. • Measuring, marking and cutting the panels (nets) against the dimensions of my chassis. • Including tabs on my net so I can secure them to the panels of my chassis • Decorating the panels. <p>Pupils with secure understanding indicated by: producing panels that will fit the chassis and can be assembled effectively using the tabs they have designed.</p> <p>Pupils working at greater depth indicated by: producing the above neatly and accurately with a more sophisticated shape and graphic design.</p>	<p>WALT: assemble and test my completed product.</p> <p>After attaching the nets that they made in Lesson 3, children carry out time trials and other competitions to test and compare their cars.</p> <p>Success criteria</p> <ul style="list-style-type: none"> • I can assemble the panels of the body to the chassis correctly. • I can remember that smaller shapes create less air resistance and can move faster through the air. • I can evaluate the speed of my design based on the understanding that some cars are faster than others as a result of the following: <ul style="list-style-type: none"> • Body shape. • Stored energy in the elastic band. • Accuracy of the angle in the chassis and axle.` <p>Pupils with secure understanding indicated by: constructing the car bodies effectively. Conducting the trial accurately and drawing conclusions and improvements from the results.</p> <p>Pupils working at greater depth indicated by: constructing the car bodies independently and to a high-quality finish. Testing a wider range of features of the vehicles and therefore drawing on a wider range of conclusions as to the ways their cars could be improved.</p>
<p><u>Prior learning</u></p> <p><i>List year groups and topics with connected learning</i></p>	<p>Year 2 Mechanisms: Fairground wheel</p>		
<p><u>Future learning</u></p> <p><i>List year groups and topics with connected learning</i></p>	<p>Year 6 Mechanical systems: Automat toy</p>		
<p><u>Key vocabulary to be explicitly taught</u></p>	<p>chassis energy kinetic mechanism air resistance design structure graphics research model template</p>		

<u>Cross-curricular links</u>	
<u>Enrichment</u> <i>Give visit/visitor/first hand experience and focus</i>	
<u>Useful websites/resources</u>	<u>Knowledge organiser: DT - Y4 Making a slingshot car</u> <u>Vocabulary display: Mechanical Systems: Making a slingshot car</u>