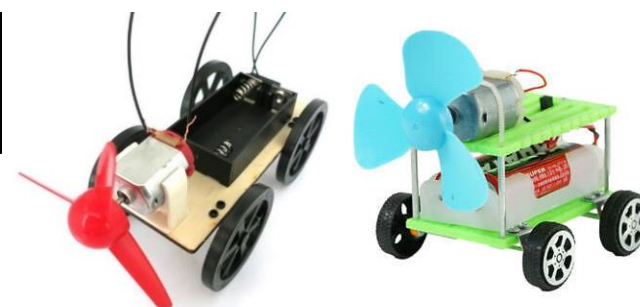


## DT Knowledge Organiser – Mechanical and Electrical Systems. Upper KS2: Year 6

**Opportunities for teaching Diversity, Equality & Cultural Capital:**  
 Visit the Scarborough Fair Collection to look at different modes of vintage transport from steam engines to cars & buses etc.



### Key Knowledge about Mechanisms

Scientists, designers and engineers work together to invent and build machines that improve our lives.

A **mechanical system** is a **set of components**, physical parts, that **convert an input force into an output motion**. When designing an electronic or mechanical system, it is important to know what you want that product or machine to do - the 'output'.

Mechanical systems need an **input**, something that starts a series of actions.

The series of actions is called a **process**.

The movements from the process lead to the **output** – the desired result.

#### Fun Fact 😊

In 2008 German students built a wind powered car: the Ventomobile. It had 3 wheels and a two-meter wind turbine with two blades on the top.



While it could not reach great speeds, it worked surprisingly well and ran entirely on wind power.

**What would you invent?**

### What you will have learnt by the end of this unit.

- ❖ To apply their understanding of structure and materials, to monitor and control products
- ❖ To produce detailed designs which have developed through a range of ideas, including cross-sectional and exploded diagrams
- ❖ To work with a range of tools, materials and equipment, showing an understanding of functional properties and aesthetic qualities
- ❖ To identify and solve design problems

### What you have already learnt in Yr5.

- To use prototypes and pattern pieces to communicate their ideas
- To select from a wide range of materials based on their appropriateness for the purpose and their aesthetic qualities
- To investigate and analyse a range of existing products
- To assemble components to make a working model.
- To use different tools and equipment safely.
- To understand and use mechanical systems in their products.

### Recall and Remember:

Mechanical systems, including those with electrical components have at least three elements: input, process and output.

- The **input** part is any type of motion or force that drives, starts, the mechanical system. This could be power from an electrical source i.e. a battery or a physical force i.e. the wind
- The **process** part of the system is where mechanisms convert the input motion and force into an output motion and force.
- The **output** is whatever happens as a consequence of the movement and force of the mechanism.

Friction, the force between two surfaces moving or sliding across each other always slows a moving object down.

#### Quick Quiz

*What are the 3 parts of a mechanical system?*

*Can you name 2 different types of input?*

*What is friction? What effect does it have on moving objects?*

*Can you explain what a cross sectional diagram is and why these are used within the design process?*

### Key Designing Skills I will learn/use

Think about the design criteria – what are you aiming to build? What is the purpose?

**Chassis, Axle, Wheels:** You will need to draw on your prior knowledge of chassis, axle and wheel systems. The chassis is the frame or base on which the vehicle is built. The chassis should include axle holders. Your axle needs to be strong enough to hold the wheels, and fit freely in the axle holder. Consider the materials of your wheels and axels and if you are going to use free axels with fixed wheels or fixed axels with free wheels.

**Sail power:** Investigate different sizes, shapes and materials for your sail to decide what will enable the vehicle to move forward most effectively.

**Wind Turbines:** Consider how to attach the wind turbine to your chassis so the wind energy generated from the blades can be used to power the car mechanism.

As part of the process, you should be able to sketch and annotate different ideas using cross sectional diagrams.

### Key Building & Evaluating Skills I will learn/use

#### Building:

Consider the weight of the component parts and how this may affect how well the car moves. Think about how to reduce friction on the wheels.

In order for the vehicle to move, it is essential that the mechanical and electrical systems work together effectively; include an input process, and an output. e.g. Batteries hold stored power, accessed by using a switch (input) to enable a motor to set in motion the wind turbine blades

#### Evaluating:

How well does your mechanism work? Does it meet its purpose?

Did you make your car mechanism to reduce friction?

Does the wind turbine power the car effectively?

Which materials did you use? Why did you make these choices?

What could you still improve about your product?

How would you do things differently next time?

### Key Vocabulary

Mechanism	The moving parts that make an object function
Chassis	The base on which a vehicle is built
Wheel	A circular object that revolves on an axle
Axle	A rod or spindle passing through the centre of a wheel
Dowel	A peg or rod used for holding components of a structure.
Friction	Resistance an object meets when moving over another
Battery	A container within which chemical energy is converted into electricity and used as a source of power.
Turbine	A rotating machine that transfers kinetic energy from the wind into mechanical energy.
Kinetic energy	The energy an object has due to its motion/movement
Design	To plan a project to make a new structure or product.
Experiment	Try out new ideas and methods.
Technique	Use a particular method or skill.
Refine	Make changes which improve the structure or function of the final product.
Critique	Express an analysis of the merits and faults of a product

### My skills and Knowledge that I may use from other subjects

- Apply Scientific knowledge of Forces & Electricity to DT products.
- Apply measuring skills and understanding of fair testing to DT.

### What you will have you learnt by the end of UKS2

To consider a range of ideas or alternative plans after collecting information from different sources.

To produce and/or follow a detailed, step-by-step plan.

To draw technical labelled diagrams of my design or product.

To draw cross sectional diagrams of my product.

To use a range of tools and equipment competently.

To suggest improvements to my own work and that of others.

To refine my design and/or product to improve its functionality.

To evaluate appearance and function against original criteria.