

**WIND ENERGY IS
INEXHAUSTIBLE AND
INFINITELY
RENEWABLE. IT'S
SIMPLE BUT IT'S
TRUE.**

DT Knowledge Organiser – Mechanical Systems

Lower KS2: Year 4

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.

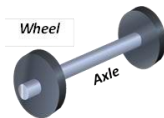


Key Knowledge about Mechanisms

Mechanisms are the parts that make something work.

Mechanisms are all around us! Most objects that help us in our lives are made up of different mechanisms.

Wheels are circular objects that roll on the ground, helping vehicles and other objects to easily move.



Axles are rods that help wheels to rotate.

The wheel can either rotate freely on the axle, or be attached to (and turn with) the axle.

A mast is the tall upright post that supports the sail. It may have a horizontal crossbar to which the sail is attached.



Fun Fact



Mercedes Benz have designed a prototype car they call Formula Zero. It is powered by the wind and 4 electric motors on each hub. The aim is a to race cars which use natural forces and are energy efficient.

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

- ❖ To understand and use mechanical systems in their products
- ❖ To develop design criteria, based on research, to design functional, appealing products aimed at individuals or groups
- ❖ To select from a wide range of tools and materials to ensure a high-quality finish
- ❖ To consider the views of others to evaluate their work and make improvements based on this.

What you have already learnt in Yr3.

- To apply understanding of how to strengthen, stiffen and reinforce more complex structures
- To use simple research methods to inform the design of products
- To select from a wider range of tools and equipment to perform practical tasks with increasing accuracy
- To select from and use a wider range of materials and components according to their properties
- To evaluate their ideas and products against their own design criteria to make improvements

Recall and Remember:

Wind power is a renewable source of energy, which means that it will not run out.

Linear motion means moving in a straight line.

Friction is a force between two surfaces that are moving or sliding across each other.

Friction always **works in the opposite direction** to the direction in which the object is moving, or trying to move.

Friction always **slows** a moving object down.

Air resistance is type of friction caused by air pushing against any moving object.

Quick Quiz

What practical mechanical purposes can wind be used for?

What are component parts?

What is friction?

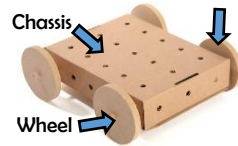
Can you explain why engineers build and trial prototypes as part of the design process?

Key Designing Skills I will learn/use

You need to think about who your product is for – what is its purpose and who is going to use it?

Chassis: The chassis is the frame or base on which the vehicle is built.

A chassis should be strong and rigid enough to hold the vehicle. The chassis should include axle holders. These need to be designed so that the axles do not have too much friction against them.



Axle: Consider what you will make your axle from. It needs to be strong enough to hold the wheels, and fit freely in the axle holder.

Wheel: Consider whether your wheels will be fixed to the axle, or free. If fixed, they need to be firmly attached. If not, they need a stopper to prevent them from falling off. Some materials allow the wheel to move more freely on surfaces.

Key Building & Evaluating Skills I will learn/use

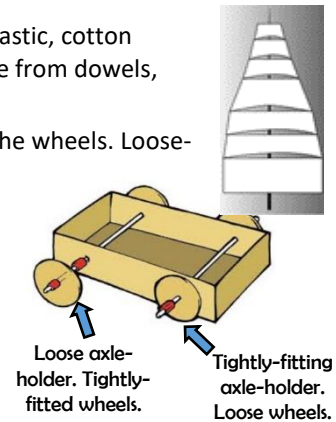
Building:

Wheels could be made from wood, card, MDF, plastic, cotton reels, or foam-covered reels. Axles could be made from dowels, skewers or paper sticks.

Free Axles = Fixed Wheels. The axles move with the wheels. Loose-fitting axle-holder, tightly fixed wheels.

Fixed Axles = Free Wheels. The axles will remain fixed to the chassis. The wheels move alone. Tight-fitting axle-holder, loose-fitting wheels.

Sail: Consider the size and material of your sail, how to secure it to the mast and how to secure the mast to the chassis.



Evaluating:

How well does your mechanism work? Does it move using wind-power?

Does it move smoothly? Does it meet its purpose?

How did you prevent any unwanted friction? Did this affect the mechanism?

What could you do to improve your design or mechanism?

Key Vocabulary

Mechanism	The moving parts that make an object function
Wheel	A circular object that revolves on an axle
Axle	A rod or spindle passing through the centre of a wheel
Gear	A wheel with cogs on.
Horizontal	A line or object that is level from right to left
Vertical	A line or object that is straight from top to bottom
Rotate	To spin around a central point
Transfer	To move from one place to another
Rigid	Firmly fixed, stiff
Stable	Not likely to fall or give way
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.
Develop	Show improvement and change.
Evaluate	Express an opinion of the merits and faults of a final product.
Present	Show & demonstrate a piece of work so it can be appreciated by an audience.

My skills and Knowledge that I may use from other subjects

- Apply measuring skills and understanding of fair testing to DT.
- Develop scientific knowledge of friction and air resistance.

What you will have you learnt by the end of LKS2

To show that my design meets some set criteria.

To follow a step-by-step plan, choosing the right equipment and materials.

To design a product and make sure that it looks attractive.

To select the most appropriate tools and techniques for a given task.

To work accurately to measure, make cuts and holes.

To use adhesives to secure materials together securely.

To design fair tests to evaluate my models/prototypes.

To draw labelled diagrams of my models.

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