YEAR 5 D.T: MECHANISMS – PULLEYS AND GEARS KNOWLEDGE ORGANISER

Overview

Gears and Pulleys

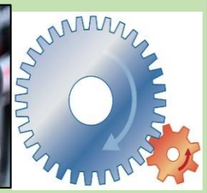
Mechanisms are the parts that make something work.

-Mechanisms are all around us. A set of related mechanisms used to create movement is called a mechanical system.

-Gears are toothed wheels (cogs) that lock together and turn one another. When one gear is turned the other turns as well.

The wheels are usually different sizes, so that one gear speeds up to slow down the next gear. They therefore increase the power of a turning force.

-Pulleys are like gears, but the wheels do not lock together. The wheels are instead joined together by a drive belt. Pulleys can be used to affect the speed, direction or force of a movement.



Example Mechanisms

	Flag/Flagpole	-A flag being raised/ lowered on a flagpole is a prime example of a pulley mechanism in action. The rope or belt pulled by the user fits into a groove in wheels at the top and bottom of the flagpole. This switches the direction of the force needed to lift/ lower the flag up and down the post.
	Can Opener	-A can opener is an example of a gear mechanism in action. When you turn the handle, it turns a small, round, metal traction gear. The notches in the gear allow it to grip onto the lip of the can. As the wheel moves around the rim of the can, the cutting wheel on the other side of the lip opens the can.
	Bicycle Gears	-Bicycle gears are an example of a multiple gear and pulley mechanism in action. The size of the gears (and number of teeth) determines how many times the rear wheel turns for every pedal stroke. A lower, easier gear (small chain ring, big cog) helps the user to accelerate faster, whilst a higher, harder gear (big chain ring, small cog)

Designing

Below are some of the main considerations of a design process for a toy vehicle.

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.

Gears and Pulleys

-The vehicle can run using either a gear or pulley mechanical system.

-In either case, you need to understand the ratio (how often larger wheels turn in relation to smaller pulleys). With gears, this can be done by counting the number of teeth (see right).

No.Teeth	Ratio (spins)
8 and 16	2 : 1
8 and 24	3 : 1
24 and 24	1 : 1
8 and 40	5 : 1

As a part of the design process, you should be able to sketch and annotate different ideas. You should also be able to plan the main stages of making, using either a checklist, a storyboard, or a flowchart.

Key Vocabulary

Mechanism

Mechanical System

Gear

Pulley

Lever

Cogs

Force

Drive Belt

Driver

Follower

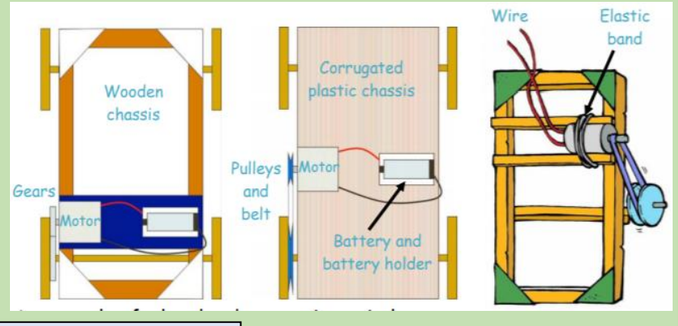
Motor Spindle

Making & Evaluating

Making - Mechanical System

-In order for the vehicle to move, it is essential that the mechanical system is planned effectively, and include an input, a 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 motor spindle Motor spindles can attach the motor to the gears/ pulley system (process)., which in turn propels the axles and/or wheels to move the vehicle forwards/ backwards (output).



Evaluating

-How well does your mechanical system work? Does it move smoothly?

-Does it meet its purpose?

-What would your audience think about your product? What would they like about it? What would they not like?

-What problems did you face in constructing your mechanical system? What changes did you need to make? What could you still improve about your product? How would you do things differently next time?

Health and Safety

-Remove any jewellery and tie back long hair. Wear an apron.

-Follow guidelines for working with electrical equipment.

-Walk safely and calmly around the classroom/ workshop.

Keep your work area and floor area clear – keep your belongings well clear.

Follow the teacher's instructions for using equipment carefully.

Make sure that you are wearing the correct equipment for tasks.

Return all equipment to the correct zoned areas of the classroom/ workshop.

Report all spillages & clean up properly after yourself.