

Alder Coppice Primary School — Knowledge Organiser

Design & Technology

Year: 4

Unit 1: Mechanics - Cams

Links to: Previous Mechanics Units

Subject Vocabulary:

Design - a picture to show what something will look like

Plan – a picture or words to show how something will be made

Function - what the object is for

Product - the object made

Join- where materials meet

Materials - things to be used to

Tools – something to help get the job done

Evaluate - does the product work

Test - find out if the product works

Test criteria – ways to test products linked to their design purpose and how effective they are.

Skills & Enquiry:

Communication - ideas, observations, comparisons, preferences

To manipulate materials and use tools

To generate ideas for design

To select materials for a purpose

To select appropriate tools/ techniques to shape and join

To investigate basic mechanisms and the effects on motion

What I Should Already Know:

To know that a mechanism provides movement

To know what a wheel mechanism is

To know what a simple lever is

To know what a slider mechanism is and how it works.

To know what an axle is and how it works

How mechanisms such as sliders, flaps, hinges and levers and linkages function

What I should know by the end of the Unit:

To know what gears and cam s are and how they work

To know what that mechanisms need an input of force to create the output of motion

To know how to create movement using cams

Know that a cam will change rotary motion into linear motion.

To know how different shaped cams produce different movements.

Know how to explain the relationship between a cam and a follower.

To name some different types of motion

Unit Specific Vocabulary:

Mechanism – something that can be used in a product to make movement.

Gear – a wheel or cog with teeth that increases the force needed to push or pull something.

Cogs- a tooth on the rim of a wheel or gear

Cams - a rotating or sliding piece in a mechanical linkage used to transform rotary motion into linear motion or vice versa.

The **eccentric cam** – this rotates as it is fixed to the axle which is turned by the handle.

The **follower cam** – the eccentric cam causes the follower to move up and down (linear) and rotate.

Motion – the movement

Bearing - part of a machine that allows one part to rotate or move

Types of Motion

Linear motion- movement along a line

Rotary motion – movement around a fixed point

Oscillating – backwards and forwards in an arc (e.g. a lever)

Reciprocating – backwards and forwards in a straight line (e.g. a slider)

Input – what is put in

Output – what is produced (the amount of movement)

Force – a push or pull that can create movement

Designing

How do gears and cams work?

Gears

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.



Cams

A cam mechanism has 3 parts - a cam, a slide and a follower

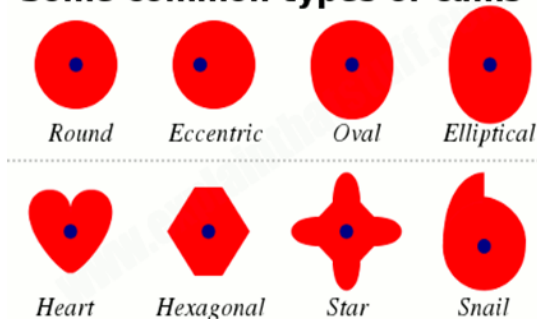
When the cam rotates, the follower moves up and down in a linked motion

The motion of the follower moves up and down in various ways depending on the shape of the cam

Some common types of cams

www.explainthatstuff.com

- go up (rise)
- go down (fall)
- stay still (dwell)



Making

- Functional considerations:

The toy needs to be able to move in a linear motion. The movement must be noticeable and smooth.

- Aesthetic consideration – the toy needs to be themed for a small child.
- Motion direction



Consider the cam shape required for the desired motion



Linear motion - in a straight line



Rotary motion - turning in a circle

Evaluating - Things to consider

- How well does your mechanical system work?
- Does it move smoothly?
- How could it do this more effectively?
- Does it meet its purpose?
- How did you make your frame strong and durable?
- How could you make it more stable?
- Which materials did you use?
- Why did you make these choices?
- How does your product look?
- How could it look more appealing?

