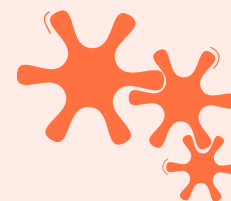


Spirit of Innovation

STEAM Resources



Engineering

Year Two

Levers, Wheels and Axles

In a Spin

Links

Resources

Design

- Design purposeful, functional, appealing products for themselves and other users based on design criteria
- Generate, develop, model and communicate their ideas through talking, drawing, templates, mock-ups and, where appropriate, information and communication technology

Make

- Select from and use a range of tools and equipment to perform practical tasks [for example, cutting, shaping, joining and finishing]
- Select from and use a wide range of materials and components, including construction materials, textiles and ingredients, according to their characteristics

Evaluate

- Explore and evaluate a range of existing products
- Evaluate their ideas and products against design criteria

Technical knowledge

- Build structures, exploring how they can be made stronger, stiffer and more stable
- Explore and use mechanisms [for example, sliders, wheels and axles], in their products.

- Scissors
- Glue
- Sticky tape
- Cardboard
- Paper
- Split pins
- Pegs
- Dowel
- Drinking straws
- String
- Boxes
- Lolly sticks
- Wooden wheels
- Cardboard wheels
- Plastic wheels
- Hole punch
- Plastic gears
- Levers PowerPoint ([Download](#))
- Levers Templates ([Download](#))
- Blueprint Design Sheet ([Download](#))

Skills

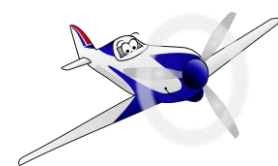
- Working as an individual
- Working as a pair
- Communicating ideas
- Selecting suitable tools and materials
- Understanding levers and their outputs
- Demonstrate and range of joining techniques
- Improving and evaluating designs

Questions

- What lever set up are you going to use?
- Will you make your own design or use a template?
- What are you going to make?
- What materials are you going to use?
- What tools will you require? Why?
- What will you use to join each material? Why?
- How will you make the image/propeller/wheels move?



PIONEERS OF POWER



- Are you going to use gears to make the axle turn the propeller?

Activity

Activity One

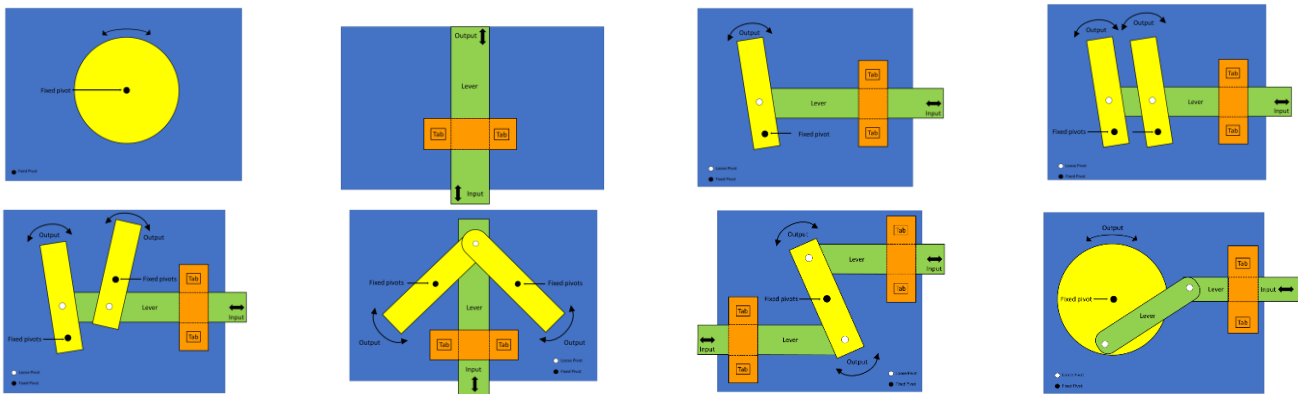
Individual/Pairs
(40 - 60mins)

Lever PowerPoint ([Download](#))

This is an introduction to simple levers, links and new vocabulary. Pupils to discuss the input and output of each lever arrangement.

Teacher to provide card, scissors and split pins to allow the pupils to experiment with the different lever set ups.

Pupils to design a moving image based on the Spirit of Innovation Project. Examples have been included for those pupils that require ideas or support. ([Download](#))



Activity Two

Individual/Pairs or A Small Group
(40 - 60mins)

Using the Blueprint Design Sheet ([Download](#)), design an aircraft. Pupils to label what materials are required and what parts are going to move.

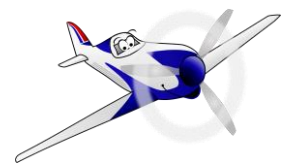
The adult should to guide pupils towards safe handling of tools as well as appropriate choices of joining techniques and materials.

The aircraft should have at least one moving part; for example, a moving propeller and/or landing gear (wheels.) Split pins are good for a moving propeller. Some pupils may like to combine both movements; so, as the wheel axel moves, the propeller turns too. Worm, screw or bevel gears will be required for this type of design.

To attach the landing gear to the aircraft please see below for a few suggestions.



PIONEERS OF POWER



Once the model is near completion, pupils should review each part to see if their design requires improvements; for example, making parts stiffer or joints stronger.

Where possible these aircrafts could be displayed by hanging from the ceiling, or suspended against a 'sky' backed display board.

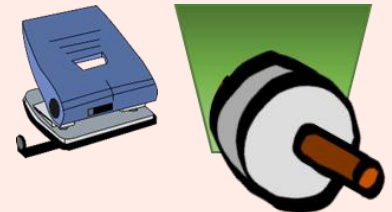
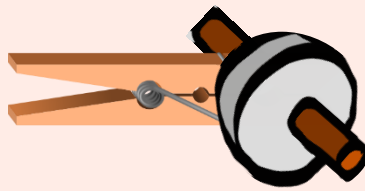
*Links with Science Activity Three

Making Tips

Make a 'u' shape within a strip of stiff card, secure each side with sticky tape. Make two in total and secure them where the axle is required. Pass the dowel or drinking straw, through the 'U' shape and attach the wheels each end.

Attach two clothing pegs to where the axle is required. Pinch open the pegs and place dowel or drinking straw between the largest hole. Let go of the pegs and the axle will be secured in place.

Cut out two 'tabs' from a stiff piece of card. Use a hole punch to punch a hole in both pieces of card. Stick these 'tabs' securely where the axle is required. Pass the dowel or drinking straw, through the punch holes and attach wheels.



Bevel Gear

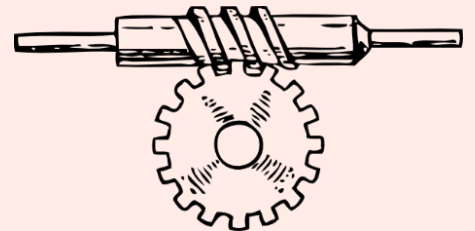
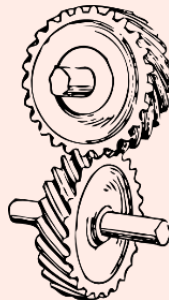
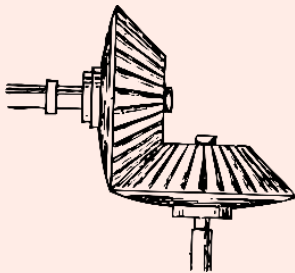
Bevel gears have a cone shaped appearance and are used to transmit force between two shafts which intersect at one point

Screw Gear

Screw gears are a pair of same hand helical gears with the twist angle of 45° on non-parallel, non-intersecting shafts

Worm Gear

A worm gear is a device consisting of a threaded shaft that connects with a gearwheel so that rotary motion can be transferred between two shafts at right angles to each other



PIONEERS OF POWER

